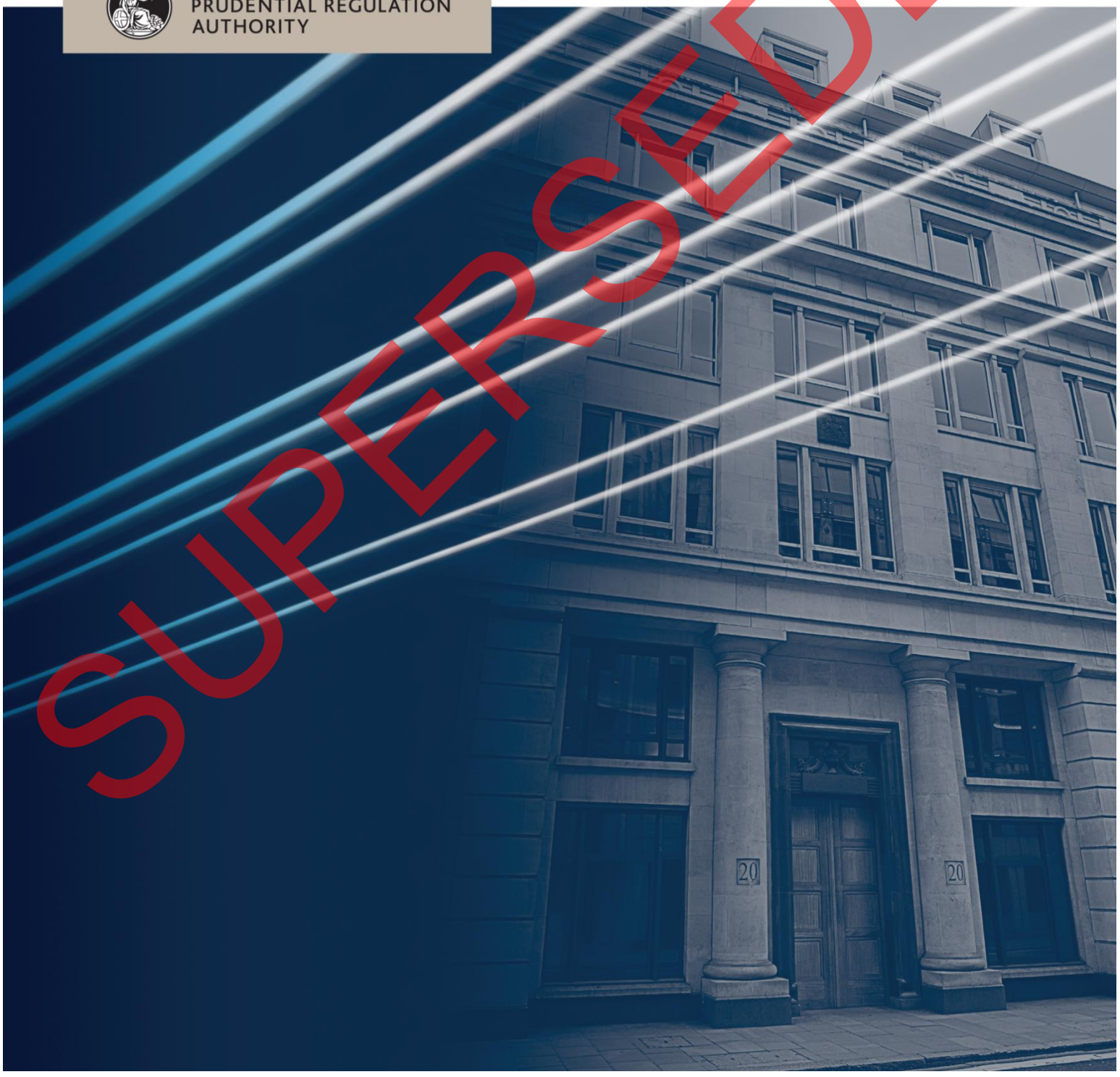
Supervisory Statement | SS11/13

Internal Ratings Based (IRB) approaches

March 2019

(Updating October 2017)

BANK OF ENGLAND
PRUDENTIAL REGULATION AUTHORITY



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Prudential Regulation Authority | 20 Moorgate | London EC2R 6DA

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1 Introduction

1.1 This supervisory statement (SS) is aimed at firms to which CRD IV[1] applies.

1.2 Article 143(1) of the CRR requires the Prudential Regulation Authority (PRA) to grant permission to use the Internal Ratings Based (IRB) approach where it is satisfied that the requirements of Title II Chapter 3 of the CRR are met. The purpose of this supervisory statement is to provide explanation, where appropriate, of the PRA's expectations when assessing whether firms meet those requirements, including in respect of the conservatism applied.

1.3 Responsibility for ensuring that internal models are appropriately conservative and are CRR compliant rests with firms themselves. The PRA stated in *The PRA's approach to banking supervision* that 'if a firm is to use an internal model in calculating its regulatory capital requirements, the PRA will expect the model to be appropriately conservative'.

1.4 Firms should be aware that where approval to use the IRB approach is subject to a joint decision under CRR Article 20, the expectations set out in this supervisory statement will be subject to discussion between the PRA and other EEA regulators regarding the joint decision.

1.5 On 19 June 2017 the PRA amended its expectations regarding residential mortgage rating systems. Specifically, this involved adding new paragraphs 10.14-10.19, 10.21, 12.4-12.7, 12.10, 16.2 and 17.4-17.5, as well as amending paragraphs 12.3 and 13.8 within SS11/13. Paragraphs 12.14-12.27 have also been amended and where appropriate deleted to reflect the revised expectations. The PRA expects that all rating systems should be amended in line with these new expectations by the end of 2020.

1.6 Some parts of this supervisory statement will require revision in due course as a result of the development by the EBA of binding technical standards required by the CRR. The PRA expects to amend or delete these parts of this supervisory statement when those technical standards enter into force.

1.7 The PRA expects that this document will be revised on a periodic basis.

2 Application of requirements to EEA groups applying the IRB approach on a unified basis

2.1 The CRR provides that where the IRB approach is used on a unified basis by an EEA group, the PRA is required to permit certain IRB requirements to be met on a collective basis by members of that group. The PRA considers that where a firm is reliant upon a rating system or data provided by another member of its group it will not meet the condition that it is using the IRB approach on a unified basis unless:

(a) the firm only does so to the extent that it is appropriate, given the nature and scale of the firm's business and portfolios and the firm's position within the group;

(b) the integrity of the firm's systems and controls is not adversely affected;

(c) the outsourcing of these functions meets the requirements of SYSC;[2] and

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

(d) the abilities of the PRA and the lead regulator of the group to carry out their responsibilities under the CRR are not adversely affected.

(CRR Article 20(6))

2.2 Prior to reliance being placed by a firm on a rating system, or data provided by another member of the group, the PRA expects the proposed arrangements to have been explicitly considered, and found to be appropriate, by the governing body of the firm.

2.3 If a firm uses a rating system or data provided by another group member, the PRA expects the firm's governing body to delegate those functions formally to the persons or bodies that are to carry them out.

(CRR Article 20(6))

3 Third country equivalence – DELETED November 2015

4 Materiality of non-compliance

4.1 Where a firm seeks to demonstrate to the PRA that the effect of its non-compliance with the requirements of CRR Title II Chapter 3 is immaterial under CRR Article 146(b), the PRA expects it to have taken into account all instances of non-compliance with the requirements of the IRB approach and to have demonstrated that the overall effect of non-compliance is immaterial.

(CRR Article 146(b))

5 Corporate governance

5.1 Where a firm's rating systems are used on a unified basis pursuant to CRR Article 20(6), the PRA considers that the governance requirements in CRR Article 189 can be met only if the subsidiary undertakings have delegated to the governing body or designated committee of the EEA parent institution, EEA parent financial holding company or EEA parent mixed financial holding company responsibility for approval of all material aspects of rating and estimation processes.

5.2 The PRA expects an appropriate individual in a Significant Influence Function (SIF) role to provide to the PRA on an annual basis written attestation that:

(i) the firm's internal approaches for which it has received a permission comply with the CRR requirements and any applicable PRA IRB supervisory statements; and

(ii) where a model rating system has been found not to be compliant, a credible plan for a return to compliance is in place and being completed.

5.3 Firms should agree with the PRA the appropriate SIF for providing this attestation. The PRA would not expect to agree more than two SIFs to cover all the firm's IRB models. In agreeing which SIF (or SIFs) may provide the annual attestation, the PRA will consider the firm's arrangements for approving rating and estimation processes under CRR Article 189.

2 Senior Management Arrangements, Systems and Controls, as contained in the PRA Rulebook.

(CRR Article 189, 20(6) and CRD Article 3(1)(7))

6 Permanent partial use

Policy for identifying exposures

6.1 The PRA expects a firm that is seeking to apply the Standardised Approach on a permanent basis to certain exposures to have a well-documented policy, explaining the basis on which exposures would be selected for permanent exemption from the IRB approach. This policy should be provided to the PRA when the firm applies for permission to use the IRB approach and maintained thereafter. Where a firm also wishes to undertake sequential implementation, the PRA expects the firm's roll-out plan to provide for the continuing application of that policy on a consistent basis over time.

(CRR Article 143(1), 148(1) and CRR Article 150(1))

Exposures to sovereigns and institutions

6.2 The PRA may permit the exemption of exposures to sovereigns and institutions under CRR Articles 150(1)(a) and 150(1)(b) respectively, only if the number of material counterparties is limited and it would be unduly burdensome to implement a rating system for such counterparties.

6.3 The PRA considers that the 'limited number of material counterparties' test is unlikely to be met if for the UK group total exposures to 'higher-risk' sovereigns and institutions exceed either £1 billion or 5% of total assets (other than in the case of temporary fluctuations above these levels). For these purposes, 'higher-risk' sovereigns and institutions are considered to be those that are unrated or carry ratings of BBB+ (or equivalent) or lower. In determining whether to grant this exemption, the PRA will also consider whether a firm incurs exposures to 'higher-risk' counterparties which are below the levels set out below, but are outside the scope of its core activities.

6.4 In respect of the 'unduly burdensome' condition, the PRA considers that an adequate, but not perfect, proxy for the likely level of expertise available to a firm is whether its group has a trading book. Accordingly, if a firm's group does not have a trading book, the PRA is likely to accept the argument that it would be unduly burdensome to implement a rating system.

(CRR Article 150(1)(a) and 150(1)(b))

Non-significant business units and immaterial exposure classes and types

6.5 Where a firm wishes permanently to apply the standardised approach to certain business units on the grounds that they are non-significant, and/or certain exposure classes or types of exposures on the grounds that they are immaterial in terms of size and perceived risk profile, the PRA expects to permit this exemption only to the extent that the relevant risk-weighted exposure amounts calculated under paragraphs (a) and (f) of CRR Article 92(3) that are based on the standardised approach (insofar as they are attributable to the exposures to which the standardised approach is permanently applied) — would be no more than 15% of the risk-weighted exposure amounts calculated under paragraphs (a) and (f) of CRR Article 92, based on whichever of the standardised approach and the IRB approach would apply to the exposures at the time the calculation was made.

6.6 The following points set out the level at which the PRA would expect the 15% test to be applied for firms that are members of a group:

(a) if a firm were part of a group subject to consolidated supervision in the EEA and for which the PRA was the lead regulator, the calculations in part (a) would be carried out with respect to the wider group;

(b) if a firm were part of a group subject to consolidated supervision in the EEA and for which the PRA was not the lead regulator the calculation set out in part (a) would not apply but the requirements of the lead regulator related to materiality would need to be met in respect of the wider group;

(c) if the firm were part of a subgroup subject to consolidated supervision in the EEA, and part of a wider third-country group subject to equivalent supervision by a regulatory authority outside of the EEA, the calculation set out in part (a) would not apply but the requirements of the lead regulator related to materiality would need to be met in respect of both the subgroup and the wider group; and

(d) if the firm is part of a subgroup subject to consolidated supervision in the EEA, and is part of a wider third-country group that is not subject to equivalent supervision by a regulatory authority outside of the EEA, then the calculation in part (a) would apply in respect of the wider group if supervision by analogy (as referred to in CRR) is applied and in respect of the subgroup if other alternative supervisory techniques are applied.

6.7 Whether a third-country group is subject to equivalent supervision, whether it is subject to supervision by analogy, as referred to in the CRR, or whether other alternative supervisory techniques apply, is decided in accordance with CRD Article 126.

(CRR Article 150(1)(c) and CRD Article 126)

Identification of connected counterparties

6.8 Where a firm wished permanently to apply the standardised approach to exposures to connected counterparties in accordance with CRR Article 150(1)(e), the PRA will normally grant permission to do so only if the firm has a policy that identifies connected counterparty exposures that would be permanently exempted from the IRB approach and also identifies connected counterparty exposures (if any) that would not be permanently exempted. The PRA expects a firm to use the IRB approach either for all of its intra-group exposures or for none of them.

(CRR Article 150(1)(e))

7 Sequential implementation following significant acquisition

7.1 In the event that a firm with IRB permission acquires a significant new business, it should discuss with the PRA whether sequential roll-out of the firm's IRB approach to these exposures would be appropriate. In addition, the PRA would expect to review any existing time period and conditions for sequential roll-out and determine whether these remain appropriate.

(CRR Article 148)

8 Classification of retail exposures

8.1 CRR Article 154(4)(d) specifies that for an exposure to be treated as a Qualified Revolving Retail Exposure (QRRE), it needs to exhibit relatively low volatility of loss rates. The PRA expects firms to assess the volatility of loss rates for the qualifying revolving retail exposure

portfolio relative to the volatilities of loss rates of other relevant types of retail exposures for these purposes. Low volatility should be demonstrated by reference to data on the mean and standard deviation of loss rates over a time period that can be regarded as representative of the long-run performance of the portfolios concerned.

8.2 CRR Article 154(4)(e) specifies that for an exposure to be treated as a QRRE this treatment should be consistent with the underlying risk characteristics of the subportfolio. The PRA considers that a subportfolio consisting of credit card or overdraft obligations will usually meet this condition and that it is unlikely that any other type of retail exposure would do so. If a firm wishes to apply the treatment in CRR Article 154(4) to product types other than credit card or overdraft obligations the PRA expects it to discuss this with the PRA before doing so.

(CRR Article 154(4))

9 Documentation

9.1 The PRA expects a firm to ensure that all documentation relating to its rating systems (including any documentation referenced in this supervisory statement or required by the CRR requirements that relate to the IRB approach) is stored, arranged and indexed in such a way that it could make them all, or any subset thereof, available to the PRA immediately on demand or within a short time thereafter.

10 Overall requirements for estimation

High-level expectations for estimation

10.1 In order to be able to determine that the requirements in CRR Article 144(1) have been met, the PRA would typically have the high level expectations set out in this subsection.

10.2 The PRA expects the information that a firm produces or uses for the purpose of the IRB approach to be reliable and take proper account of the different users of the information produced (customers, shareholders, regulators and other market participants).

10.3 The PRA expects firms to establish quantified and documented targets and standards, against which it should test the accuracy of data used in its rating systems. Such tests should cover:

(a) a report and accounts reconciliation, including whether every exposure has a Probability of Default (PD), Loss Given Default (LGD) and, if applicable, conversion factor (CF) for reporting purposes;

(b) whether the firm's risk control environment has key risk indicators for the purpose of monitoring and ensuring data accuracy;

(c) whether the firm has an adequate business and information technology infrastructure with fully documented processes;

(d) whether the firm has clear and documented standards on ownership of data (including inputs and manipulation) and timeliness of current data (daily, monthly, real time); and

(e) whether the firm has a comprehensive quantitative audit programme.

10.4 The PRA expects that in respect of data inputs, the testing for accuracy of data, including the reconciliation referred to above, should be sufficiently detailed so that, together with other available evidence, it provides reasonable assurance that data input into the rating system is accurate, complete and appropriate. The PRA considers that input data would not meet the required standard if it gave rise to a serious risk of material misstatement in the capital requirement, either immediately or subsequently.

10.5 In respect of data outputs, as part of the reconciliation referred to above, the PRA expects a firm to be able to identify and explain material differences between the outputs produced under accounting standards and those produced under the requirements of the IRB approach, including in relation to areas that address similar concepts in different ways (for example expected loss (EL) and accounting provisions).

10.6 The PRA expects a firm to have clear and documented standards and policies about the use of data in practice (including information technology standards) which should in particular cover the firm's approach to the following:

(a) data access and security;

(b) data integrity, including the accuracy, completeness, appropriateness and testing of data; and

(c) data availability.

(CRR Article 144(1)(a))

Prior experience of using IRB approaches

10.6A In order to be satisfied that the requirements in CRR Article 145 are met, the PRA expects firms to be able to evidence that:

a) its complete IRB governance framework has been through at least one annual cycle since internal approval;

b) it has used its internal rating systems in credit decisions, lending policies, risk appetite polices and credit risk monitoring for at least three years; and

c) there has been at least three years of monitoring, validation and audit of the IRB framework, recognising that the IRB framework is likely to be subject to development and refinement during this period.

10.6B The three years of evidence of using internal rating systems set out in 10.6A(b) need not necessarily relate to the use of the final, fully CRR compliant framework for all of that period. It could, for example, initially involve the use of internal credit risk models which are broadly in line with CRR requirements rather than the final, fully compliant, IRB rating systems. At approval however, applicants would be expected to have undertaken at least one annual review cycle of the completed framework.

10.6C The depth and detail of the monitoring, audit and annual reviews set out in 10.6A(c) may be proportionately lower at the start of the three year period, provided that firms provide a sufficiently accurate analysis of progress, and fully meet the required standard by the end of

the three year period. The monitoring of rating systems may include the use of provisioning models, scorecards, and rating assignment processes.

10.6D The PRA will not accept evidence of a third-party exercising governance of models (eg bureau scores monitored by the bureau) as evidence of a firm's ability to monitor the models itself.

(CRR Article 145)

Ratings systems: policies

10.7 In order for the PRA to be satisfied that a firm documents its ratings systems appropriately in accordance with CRR Article 144(1)(e) the PRA expects a firm to be able to demonstrate that it has an appropriate policy in respect of its ratings systems in relation to:

(a) any deficiencies caused by its not being sensitive to movements in fundamental risk drivers or for any other reason;

(b) the periodic review and action in the light of such review;

(c) providing appropriate internal guidance to staff to ensure consistency in the use of the rating system, including the assignment of exposures or facilities to pools or grades;

(d) dealing with potential weaknesses of the rating system;

(e) identifying appropriate and inappropriate uses of the rating system and acting on that identification;

(f) novel or narrow rating approaches; and

(g) ensuring the appropriate level of stability over time of the rating system.

(CRR Article 144(1)(a) and 144(1)(e))

Collection of data

10.8 In order to be satisfied that the requirements in CRR Article 179(1) are met, the PRA expects a firm to collect data on what it considers to be the main drivers of the risk parameters of PD, LGD, CF and EL, for each group of obligors or facilities, to document the identification of the main drivers of risk parameters, and to be able to demonstrate that the process of identification is reasonable and appropriate.

10.9 In its processes for identifying the main drivers of risk parameters, the PRA expects that a firm should set out its reasons for concluding that the data sources chosen provide in themselves sufficient discriminative power and accuracy, and why additional potential data sources do not provide relevant and reliable information that would be expected materially to improve the discriminative power and accuracy of its estimates of the risk parameter in question. The PRA would not expect this process necessarily to require an intensive analysis of all factors.

(CRR Article 179(1)(a), 179(1)(d) and CRR Article 179(1)(e))

Data quality

10.10 In order to demonstrate that rating systems provide for meaningful assessment, the PRA expects that a firm's documentation relating to data include clear identification of responsibility for data quality. The PRA expects a firm to set standards for data quality, aim to improve them over time and measure its performance against those standards. Furthermore, the PRA expects a firm to ensure that its data are of sufficiently high quality to support the firm's risk management processes and the calculation of its capital requirements.

(CRR Article 144(1)(a))

Use of models and mechanical methods to produce estimates of parameters

10.11 Further detail of standards that the PRA would expect firms to meet when it assesses compliance with CRR Article 174 are set out in the sections on PD, LGD and Exposure at Default (EAD).

10.12 In assessing whether the external data used by a firm to build models are representative of its actual obligors or exposures, the PRA expects a firm to consider whether the data are appropriate to its own experience and whether adjustments are necessary.

(CRR Article 174 and 174(c))

Calculation of long-run averages of PD, LGD and EAD

10.13 In order to estimate PDs that are long-run averages of one year default rates for obligor grades or pools, the PRA expects firms to estimate expected default rates for the grade/pool over a representative mix of good and bad economic periods, rather than simply taking the historic average of default rates actually incurred by the firm over a period of years. The PRA expects that a long-run estimate would be changed when there is reason to believe that the existing long-run estimate is no longer accurate, but that it would not be automatically updated to incorporate the experience of additional years, as these may not be representative of the long-run average.

10.14 In order to calibrate a long-run average PD for UK residential mortgages, the PRA expects that in defining a representative mix of good and bad economic periods (as referred to in paragraph 10.13 above) firms would need to incorporate economic conditions equivalent to those observed in the United Kingdom during the early 1990s. The PRA is setting this expectation in light of recent economic experience and may revise it in the future as appropriate.

10.15 CRR Article 180(1)(a) requires firms to estimate PDs by obligor grade from long-run averages of one-year default rates. However, for some types of residential mortgages ('low historical data') such as buy-to-let, self-certification and sub-prime, there may be an absence of or insufficient relevant internal or external data over a representative economic cycle. For such exposures, the PRA expects firms to model how book-level default rates in a given low historical data portfolio would have performed under the economic conditions that would be experienced in an economic cycle containing a representative mix of good and bad periods. The outputs of this model should then be used in order to calibrate long-run average PDs for each rating grade.

10.16 The PRA expects rating systems referred to in paragraph 10.15 above to result in long-run average PDs that include an appropriate margin of conservatism. For each low historical data mortgage portfolio, the PRA will undertake an assessment of whether the resultant

degree of uplift in PDs relative to comparable mortgages in a firm's prime portfolio is sufficient.

10.17 The PRA recognises that the amount of available data for non-UK mortgages varies by jurisdiction. Where a firm has insufficient internal or external data to calibrate long-run average PDs for these portfolios, it should apply the approach set out in paragraph 10.15. For each portfolio of non-prime non-UK mortgages, where the approach in paragraph 10.15 has been applied, the PRA will assess whether the degree of uplift in PDs relative to comparable mortgages in a firm's prime portfolio for the jurisdiction in question is sufficient.

10.18 The PRA would not normally expect low historical data and prime portfolios to be combined within the same rating system as it is challenging for firms to demonstrate a meaningful differentiation of risk and accurate and consistent quantitative estimates of risk in such cases. In the event that a firm is able to demonstrate to the PRA that such an approach is appropriate, the PRA expects the low historical data sub-set of the rating system to meet the expectations contained within paragraphs 10.15-10.17.

10.19 The PRA expects that PDs for portfolios in run-off are calibrated to reflect how a firm's existing portfolio would perform in an economic cycle containing a representative mix of good and bad periods. Where a firm has insufficient internal or external data to calibrate PDs the techniques outlined in paragraph 10.1 should be applied.

(CRR Article 180)

10.20 In order to be able to demonstrate compliance with CRR Article 144(1), the PRA expects a firm to take into account the following factors in understanding differences between their historic default rates and their PD estimates, and in adjusting the calibration of their estimates as appropriate:

(a) the rating philosophy of the system and the economic conditions in the period over which the defaults have been observed;

(b) the number of defaults, as a low number is less likely to be representative of a long-run average. Moreover, where the number of internal defaults is low, there is likely to be a greater need to base PDs on external default data as opposed to purely internal data;

(c) the potential for under-recording of actual defaults; and

(d) the level of conservatism applied.

10.21 The PRA expects recalibrations of rating systems applying the cyclicality assumptions set out in paragraph 12.4 to be rare and to be symptomatic of failures of the rating system's assumptions rather than part of rating system design. For these purposes any calculation mechanism embedded in a rating system that changes the PD applied to exposures with a given set of characteristics should be treated as a recalibration. The PRA expects that any recalibration of such a rating system would include:

(a) a robust assessment of the cyclicality of the rating system;

(b) a robust assessment and explanation of the cause of the need to recalibrate, including whether it is due to changes in default risk that are not purely related to changes in the cycle. This should include an assessment of the firm's own lending profile, its historical

performance, wider industry performance against historical levels and changes in economic factors; and

(c) a review of the appropriateness of undertaking a recalibration by an independent validation function.

(CRR Article 144(1))

10.22 The PRA expects that a firm that is not able to produce a long-run estimate, as described above, to consider what action it would be appropriate for it to take to comply with CRR Article 180(1)(a). In some circumstances, it may be appropriate for firms to amend their rating system so that the PD used as an input into the IRB capital requirement is an appropriately conservative estimate of the actual default rate expected over the next year. However, such an approach is not likely to be appropriate where default rates are dependent on the performance of volatile collateral.

(CRR Article 179(1)(f) and 180(1)(a))

10.23 In accordance with CRR Article 181(1)(b) and CRR Article 182(1)(b), where the estimates appropriate for an economic downturn are more conservative than the long-run average, we would expect the estimate for each of these parameters to represent the LGD or CF expected, weighted by the number of defaults, over the downturn period. Where this was not the case we would expect the estimate to be used to be the expected LGD or CF, weighted by the number of defaults, over a representative mix of good and bad economic periods.

(CRR Article 179, 181 and 182)

Assignment to grades or pools

10.24 In order to demonstrate that a rating system provided for a meaningful differentiation of risk and accurate and consistent quantitative estimates of risk the PRA expects that a firm would have regard to the sensitivity of the rating to movements in fundamental risk drivers, in assigning exposures to grades or pools within a rating system.

(CRR Article 171)

11 Definition of default

11.A1 When applying the definition of default in CRR Article 178, the PRA expects firms to comply with the EBA's Guidelines on the application of the definition of default (EBA/GL/2016/07).

Identification of obligors

11.1 The PRA expects that if a firm ordinarily assigns exposures in the corporate, institution or central government and central bank exposure classes to a member of a group substantially on the basis of membership of that group and a common group rating, and the firm does so in the case of a particular obligor group, the firm should consider whether members of that group should be treated as a single obligor for the purpose of the definition of default set out in CRR Article 178(1).

11.2 The PRA would not expect a firm to treat an obligor as part of a single obligor under the preceding paragraph if the firm rated its exposures on a standalone basis or if its rating

was notched. (For these purposes a rating is notched if it takes into account individual risk factors, or otherwise reflects risk factors that are not applied on a common group basis.) Accordingly, if a group has two members which are separately rated, the PRA would not expect that the default of one would necessarily imply the default of the other.

Days past due

11.3 Under CRR Article 178(2)(d) the PRA is empowered to replace 90 days with 180 days in the days past due component of the definition of default for exposures secured by residential or SME commercial real estate in the retail exposure class, as well as exposures to public sector entities (PSEs).

11.4 The PRA does not expect to replace 90 days with 180 days in the days past due component of the definition of default for any exposure class.

Unlikeliness to pay: use of materiality thresholds

11.4A The PRA expects firms to use a lower materiality threshold than that set by the PRA[3] as an indicator of unlikeliness to pay for non-retail exposure classes, if the lower threshold is a more relevant indication of default. When using a lower materiality threshold, firms should ensure compliance with paragraph 34 of the EBA's Guidelines on the application of the definition of default (EBA/GL/2016/07).

Unlikeliness to pay: distressed restructuring

11.5 Firms should comply with paragraphs 49 to 55, 72, 73 and 107 of the EBA Guidelines on the application of the definition of default (EBA/GL/2016/07), which cover the treatment of distressed restructuring as an unlikeliness to pay criterion.

(CRR Article 178(3)(d))

Return to performing status

11.6 In order to be satisfied that a firm complies with the documentation requirements set out in CRR Article 175(3) the PRA expects that a firm should have a clear and documented policy for determining whether an exposure that has been in default should subsequently be returned to performing status. Firms should also comply with Chapter 7 of the EBA Guidelines on the application of the definition of default (EBA/GL/2016/07), which covers the return to non-defaulted status.

(CRR Article 175(3))

Application of materiality thresholds to banking groups with cross-border entities

11.6A Rule 6.1 of the Credit Risk Part of the PRA Rulebook requires a firm to apply the PRA's materiality thresholds to all of its exposures on a UK individual solo level and, if applicable, UK consolidation group level. When applying materiality thresholds at a solo level, overseas subsidiaries of UK firms are expected to apply the relevant local thresholds. However, the PRA expects firms to apply for a rule modification[4] to modify rule 6.1 in order to also apply local thresholds for these overseas subsidiaries at the UK consolidation group level where, taking into account the local market characteristics, economic conditions, and financial risk, it would

3 Rule 6.1 of the Credit Risk Part of the PRA Rulebook.
4 Under section 138A of the Financial Services and Markets Act 2000.

be more appropriate to apply the local thresholds than the PRA's thresholds.[5] In respect of certain jurisdictions, the PRA may make available a 'modification by consent' and, if so, would provide details of the modification on the PRA's website. The PRA expects that firms apply for the modification for all jurisdictions in which the local thresholds are more appropriate, and not only those jurisdictions for which they expect the use of local thresholds to reduce capital requirements. Firms should provide supporting information about the appropriateness of local thresholds for all waiver applications.

12 Probability of default in IRB approaches

Rating philosophy

12.1 'Rating philosophy' describes the point at which a rating system sits on the spectrum between the stylised extremes of a point in time (PiT) rating system and a through the cycle (TTC) rating system. Points (a) and (b) explain these concepts further:

(a) PiT: firms seek explicitly to estimate default risk over a fixed period, typically one year. Under such an approach the increase in default risk in a downturn results in a general tendency for migration to lower grades. When combined with the fixed estimate of the long-run default rate for the grade, the result is a higher capital requirement. Where data are sufficient, grade level default rates tend to be stable and relatively close to the PD estimates; and

(b) TTC: firms seek to remove cyclical volatility from the estimation of default risk, by assessing borrowers' performance across the economic cycle. TTC ratings do not react to changes in the cycle, so there is no consequent volatility in capital requirements. Actual default rates in each grade diverge from the PD estimate for the grade, with actual default rates relatively higher at weak points in the cycle and relatively lower at strong points.

12.2 Most rating systems sit between these two extremes. Rating philosophy is determined by the cyclicality of the drivers/criteria used in the rating assessment, and should not be confused with the requirement for grade level PDs to be 'long run'. The calibration of even the most PiT rating system needs to be targeted at the long-run default rates for its grades; the use of long-run default rates does not convert such a system into one producing TTC ratings or PDs.

12.3 The cyclicality of the rating system is a measure of its degree of responsiveness to economic changes. At one extreme a fully cyclical rating system or 'point-in-time' (PiT) would see an economic downturn picked up through migration of exposures to lower rating grades and therefore no increase in default rate within a grade. At the other extreme a non-cyclical or 'through-the-cycle' (TtC) rating system does not respond to an economic downturn with grade migration, but the default rate within a grade increases instead. The PRA expects firms to be aware of the cyclicality of their rating systems to enable them to calibrate, monitor and stress test their systems. The PRA would define cyclicality for a rating system as follows:

$$\text{cyclicality}\% = \left(\frac{\text{PD}_t - \text{PD}_{t-1}}{\text{DR}_t - \text{DR}_{t-1}}\right) * 100$$

Where:

- PD_t means the long-run average PD at time t

5 This also applies to a scenario where UK firms passport into other jurisdictions, such that it is a UK firm with an exposures in a different jurisdiction.

- DR_t means the observed default rate at time t

12.4 In the PRA's experience, firms often have difficulty in practice in understanding the cyclicality of their residential mortgage rating systems. To mitigate the risk of under-calibration of these rating systems due to inaccurate estimation of their cyclicality, the PRA expects that when firms calibrate their residential mortgage rating systems by uplifting internal observed default rates to a long-run average, they should do so on the assumption that the cyclicality of each rating system is no more than 30% in those years where grade level internal observed default rates are not available. This cyclicality cap is the PRA's expectation of what firms should assume is the maximum level of cyclicality when imputing missing historical default rates. If 30% of the change in portfolio default rates comes from grade migration the remaining 70% would come from change in default rates within grades. Therefore when calibrating the long-run average default rates to assign to each rating grade the PRA expects firms to assume that at least 70% of the portfolio change in default rate reflects grade level changes in default rate. This level reflects the PRA's current view of an appropriately conservative assumption for rating system cyclicality in light of recent experience. This expectation may be adjusted by the PRA if it judges that there has been a change in the risk of under-calibration.

12.5 When a firm is calibrating or recalibrating a residential mortgage rating system using internal observed default rates taken predominantly from a downturn period (ie the firm is reducing the internal observed default rates to a long-run average) the PRA's expectation of a 30% cap on cyclicality will not apply. Instead, firms should determine an appropriately conservative adjustment to allow for uncertainty in their estimates of cyclicality in such circumstances.

12.6 As an alternative to the expectations on risk mitigation methodology in paragraph 12.4, the PRA may be satisfied that a firm has taken steps to mitigate these risks if the residential mortgage PD rating system meets the following standards:-

(a) the firm is able to convincingly articulate how the risk drivers in a rating system will generate the migration into other grades, scores or ratings assumed in its estimates of cyclicality;

(b) the firm is able to demonstrate that the assumed changes have occurred in practice across an economic cycle; and

(c) the above analysis is able to isolate the impact on the existing exposures covered by the rating system from changes in composition of the portfolio over the period being analysed.

12.7 Highly cyclical PiT models do not always adequately capture risks over the long-run and this is particularly an issue for residential mortgage portfolios where default rates are highly cyclical. The PRA therefore expects firms not to use an artificial highly cyclical PiT approach achieved through dynamic recalibration of the score to PD relationship in their application and behavioural scorecards for residential mortgage models.

Variable scalar approaches

Use of variable scalar approaches

12.8 We use the term 'variable scalar' to describe approaches in which the outputs of an underlying, relatively PiT, rating system are transformed to produce final PD estimates used for regulatory capital requirements that are relatively non-cyclical. Typically this involves basing the resulting requirement on the long-run default rate of the portfolio or segments thereof.

12.9 CRR Article 169(3) allows the use of direct estimates of PDs, though such a measure could be assessed over a variety of different time horizons which CRR does not specify. Accordingly, the PRA considers it acceptable in principle to use methodologies of this type in lieu of estimation of long-run averages for the grade/pool/score of the underlying rating system where conditions set out below are met. Meeting these conditions would require firms using the variable scalar approach to have a deep understanding of how and why their default rates varied over time.

(a) firms meet the following four principles which address the considerable conceptual and technical challenges to be overcome in order to carry out variable scalar adjustments in an appropriate way:

Principle 1: both the initial calculations of and subsequent changes to the scalar should be able to take account of changes in default risk that are not purely related to the changes in the cycle;

Principle 2: a firm should be able accurately to measure the long-run default risk of its portfolio; this must include an assumption that there are no changes in the business written;

Principle 3: a firm should use a data series of appropriate length in order to provide a reasonable estimate of the long-run default rate referred to in paragraph 10.13; and

Principle 4: a firm should be able to demonstrate the appropriateness of the scaling factor being used across a portfolio.

(b) stress testing includes a stress test covering the downturn scenarios outlined by the PRA, based on the PDs of the underlying PiT rating system, in addition to the stress test based on the parameters used in the Pillar 1 capital calculation (ie the portfolio level average long-run default rates); and

(c) firms are able to understand and articulate upfront how the scaling factor would vary over time in order to achieve the intended effect.

12.10 The PRA has found in its experience that for residential mortgage portfolios, firms are unable to distinguish sufficiently between movements in default rates that result from cyclical factors and those that result from non-cyclical reasons, and this results in risks not being sufficiently captured. The PRA therefore expects that firms should not use variable scalar approaches for residential mortgage portfolios.

12.11 The PRA will not permit firms using a variable scalar approach to revert to using a PiT approach during more benign economic conditions.

12.12 Principle 1 is the most important and challenging to achieve as it requires an ability to be able to distinguish movements not related to the economic cycle, from changes purely related to the economic cycle, and not to average these away. This is because a variable scalar approach removes the ability of a rating system to take account automatically of changes in risk through migration between its grades.

12.13 Accordingly, the PRA expects firms using a variable scalar approach to adopt a PD that is the long-run default rate expected over a representative mix of good and bad economic periods, assuming that the current lending conditions including borrower mix and attitudes

and the firm's lending policies remain unchanged. If the relevant lending conditions or policies change, then we would expect the long-run default rate to change.

(CRR Article 180(1)(a), 180(1)(b) and 180(2)(a))

Variable scalar considerations for retail portfolios

12.14 The PRA considers that until more promising account level arrears data are collected, enabling firms to better explain the movement in their arrears rate over time, the likelihood of firms being able to develop a compliant variable scalar approach for non-mortgage retail portfolios is low. This is because of the difficulty that firms have in distinguishing between movements in default rates that result from cyclical factors and those that result from non-cyclical reasons for these portfolios.

12.15 For the purposes of this subsection 'non-mortgage retail portfolios' refers to non-mortgage lending to individuals (eg credit cards, unsecured personal loans, auto-finance) but does not include portfolios of exposures to small and medium-sized entities (SMEs in the retail exposure class).

12.16 The PRA considers that one variable scalar approach, potentially compliant with the four principles set out above, could involve:

(a) segmenting a portfolio by its underlying drivers of default risk; and

(b) estimating separate long-run default rates for each of these segmented pools.

Segmentation

12.17 A firm that applied a segmentation approach properly could satisfy both Principle 1 and Principle 4. The choice of the basis of segmentation and the calibration of the estimated long-run default rate for the segments would both be of critical importance.

12.18 The PRA expects segmentation to be done on the basis of the main drivers of both willingness and ability to pay. The PRA expects firms to:

(a) incorporate an appropriate number of drivers of risk within the segmentation to maximise the accuracy of the system;

(b) provide detailed explanations supporting their choices of drivers, including an explanation of the drivers they have considered but chosen not to use; and

(c) ensure that the drivers reflect their risk processes and lending policy, and are not chosen using only statistical criteria (ie a judgemental assessment of the drivers chosen is applied).

(CRR Article 179(1)(d))

12.19 To the extent that the basis of segmentation is not sufficient completely to explain movements in non-cyclical default risk, the long-run default rate for that segment will not be stable (eg a change in the mix of the portfolio within the segment could change the long-run default rate). In such cases, we expect firms to make a conservative compensating adjustment to the calibration of the long-run average PD for the affected segments and to be able to demonstrate that the amount of judgement required to make such adjustments is not excessive. Where judgement is used, considerable conservatism may be required. The PRA expects conservatism applied for this reason not to be removed as the cycle changes.

Long-run default rate

12.20 The PRA expects firms to review and amend as necessary the long-run default rate to be applied to each segment on a regular (at least an annual) basis. When reviewing the long-run default rate to be applied to each segment, the PRA expects firms to consider the extent to which:

(a) realised default rates are changing due to cyclical factors and the scaling factors need to be changed;

(b) new information suggests that both the PiT PDs and the long-run PDs should be changed; and

(c) new information suggests that the basis of segmentation should be amended.

12.21 The PRA expects that over time the actual default rates incurred in each segment would form the basis of PD estimates for the segments. However at the outset the key calibration issue is likely to be the setting of the initial long-run default rate for each segment, as this will underpin the PD of the entire portfolio for some years to come. The PRA expects firms to apply conservatism in this area and this is something on which the PRA is likely to focus on in particular in PRA model reviews.

Governance

12.22 The PRA expects firms to put in place a governance process to provide a judgemental overlay to assess their choices of segments, PD estimates and scalars, both initially and on a continuing basis. Moreover, where the basis of their estimation is a formulaic approach, we would consider that the act of either accepting or adjusting the estimate suggested by the formula would represent the exercise of judgement.

12.23 The PRA expects firms to consider what use they can make of industry information. However, we would expect firms to seek to measure the absolute level of and changes to their own default risk, rather than changes in default risk relative to the industry. Given the potential for conditions to change across the market as a whole, the PRA expects a firm should not draw undue comfort from the observation that its default risk is changing in the same way as the industry as a whole. Doing so would not allow them to meet Principle 1.

12.24 The PRA expects firms to be able to demonstrate that they have adequate information and processes in order to underpin the decisions outlined above on choice of segmentation, source of data, and adequacy of conservatism in the calibration, and that this information is reflected in the reports and information being used to support the variable scalar governance process. Given that, for retail business, these decisions would be likely to affect only the regulatory capital requirements of the firm and not the day-to-day running of its business, we will be looking for a high level of reassurance and commitment from firms' senior management to maintain an adequate governance process.

Retail exposures: obligor level definition of default

12.25 Where a firm has not chosen to apply the definition of default at the level of an individual credit facility in accordance with CRR Article 178(1), the PRA expects it to ensure that the PD associated with unsecured exposures is not understated as a result of the presence of any collateralised exposures.

12.26 The PRA expects the PD of a residential mortgage would typically be lower than the PD of an unsecured loan to the same borrower.

(CRR Article 178(1))

Retail exposures: facility level definition of default

12.27 Where a firm chooses to apply the definition of default at the level of an individual credit facility in accordance with CRR Article 178(1) and a customer has defaulted on a facility, then default on that facility is likely to influence the PD assigned to that customer on other facilities. The PRA expects firms to take this into account in its estimates of PD.

(CRR Article 178(1))

Multi-country mid-market corporate PD models

12.28 In order to ensure that a rating system provides a meaningful differentiation of risk and accurate and consistent quantitative estimates of risk, the PRA would expect firms to develop country-specific mid-market PD models. Where firms develop multi-country mid-market PD models, we would expect firms to be able to demonstrate that the model rank orders risk and predicts default rates for each country where it is to be used for regulatory capital calculation.

12.29 The PRA expects firms to have challenging standards in place to meaningfully assess whether a model rank orders risk and accurately predict default rates. These standards should specify the number of defaults that are needed for a meaningful assessment to be done.

12.30 We would expect firms to assess the model's ability to predict default rates using a time series of data (ie not only based on one year of default data).

12.31 In our view a model is not likely to be compliant where the firm cannot demonstrate that it rank orders risk and predicts default rates for each country regardless of any apparent conservatism in the model.

Use of external ratings agency grades

12.32 We would expect firms using rating agency grades as the primary driver in their IRB models to be able to demonstrate (and document) compliance with the following criteria:

(a) the firm has its own internal rating scale;

(b) the firm has a system and processes in place that allow it continuously to collect and analyse all relevant information, and the 'other relevant information' considered by the firm in accordance with CRR Article 171(2) reflects the information collected and analysed by the firm when extending credit to new or existing obligors;

(c) the 'other relevant information' considered by the firm is included in an IRB model in a transparent and objective way and is subject to challenge. We would expect the firm to be able to demonstrate what information was used and why, and, how it was included; and if no additional information is included, to be able to document what information was discarded and why;

(d) the development of final grades includes the following steps:

    (i) the firm takes into account all available information (eg external agency grades and any 'other relevant information') prior to allocating obligors to internal grades. The firm does not automatically assign obligors to grades based on the rating agency grade;

(ii) any overrides are applied to these grades; and

(iii) the firm has a system and processes in place that allows it to continuously collect and analyse final rating overrides.

(e) the grades to which obligors are assigned is reassessed at least annually. The firm is able to demonstrate how the grades are reassessed on a more frequent than annual basis when new relevant information becomes available; and

(f) firms can demonstrate that a modelling approach is being applied, both in terms of the choice of the rating agency grade as the primary driver and, where information is found materially and consistently to add to the accuracy or predictive power of the internal rating grade, that they have incorporated this information as an additional driver. The PRA expects this work to be analytical (rather than entirely subjective) and could form part of the annual independent review of the model.

12.33 In the PRA's view, if a firm does not have any additional information to add to the external ratings for the significant part of its portfolio then the PRA expects it will not meet the requirements for using an IRB approach.

Low default portfolios

12.34 The PRA expects a firm to estimate PD for a rating system in accordance with this section where a firm's internal experience of defaults for that rating system was 20 or fewer, and reliable estimates of PD cannot be derived from external sources of default data including the use of market price related data. In PD estimation for all exposures covered by that rating system, the PRA expects firms to:

(a) use a statistical technique to derive the distribution of defaults implied by the firm's experience, estimating PDs (the 'statistical PD') from the upper bound of a confidence interval set by the firm in order to produce conservative estimates of PDs in accordance with CRR Article 179(f);

(b) use a statistical technique to derive the distribution of default which takes account, as a minimum, of the following modelling issues:

(i) the number of defaults and number of obligor years in the sample;

(ii) the number of years from which the sample was drawn;

(iii) the interdependence between default events for individual obligors;

(iv) the interdependence between default rates for different years; and

(v) the choice of the statistical estimators and the associated distributions and confidence intervals.

(c) further adjust the statistical PD to the extent necessary to take account of the following:

(i) any likely differences between the observed default rates over the period covered by the firm's default experience and the long-run PD for each grade required by CRR Articles 180(1)(a) and 180(2)(a); and

(ii) any other information that indicates (taking into account the robustness and cogency of that information) that the statistical PD is likely to be an inaccurate estimate of PD.

12.35 The PRA expects firms to take into account only defaults that occurred during periods that are relevant to the validation under the CRR of the model or other rating system in question when determining whether there are 20 defaults or fewer.

Supervisory slotting criteria for specialised lending

12.36 The PRA expects firms to assign exposures to the risk-weight category for specialised lending exposures based on the criteria set out in the tables in Appendix A. The planned EBA regulatory technical standards on supervisory slotting will further specify these assignments.

PD - use of external data for residential mortgages

12.37 The PRA expects that, for residential mortgages, where a firm's internal experience of defaults for a rating system is low, it may use external data to supplement internal data for rank-ordering different borrowers by credit quality and to help adjust for seasoning as credit quality changes with loan vintage. This is in addition to use of external data for calibration purposes. The PRA expects that firms attempting to evidence comparability with third-party data should include a comparison of default rates.

12.38 The PRA believes internal data may be considered to be the 'primary source' for residential mortgages where a firm assigns sufficient weight to internal data, including security (loan-to-value), loan (arrears history) and borrower (applicant information) factors, as inputs into their rank ordering but uses external data to achieve greater discrimination.

12.39 The PRA expects firms to apply appropriate margins of conservatism at every step to account for uncertainty in their estimates and to mitigate against incomplete data and where external data are not wholly representative.

12.40 Where firms lack sufficient internal defaults to evidence rank ordering or a reliable calibration, firms may use models that rank order on an early arrears definition (which tends to be correlated with default), provided they are calibrated with sufficient conservatism.

(CRR Articles 171, 179 and 180)

13 Loss Given Default in IRB approaches

Negative LGDs

13.1 The PRA expects firms to ensure that no LGD estimate is less than zero.

Low LGDs

13.2 The PRA does not expect firms to be using zero LGD estimates in cases other than where they had cash collateral supporting the exposures.

13.3 The PRA expects firms to justify any low LGD estimates using analysis on volatility of sources of recovery, notably on collateral, and cures (as outlined below). This includes:

(a) recognising that the impact of collateral volatility on low LGDs is asymmetric as surpluses over amounts owed need to be returned to borrowers and that this effect may be more pronounced when estimating downturn rather than normal period LGDs; and

(b) recognising the costs and discount rate associated with realisations and the requirements of CRR Article 181(1)(e).

13.4 In order to ensure that the impact of collateral volatility is taken into account, the PRA expects firms' LGD framework to include non-zero LGD floors which are not solely related to administration costs.

(CRR Article 179(1)(f))

Treatment of cures

13.5 Where firms wish to include cures in their LGD estimates, the PRA expects them to do so on a cautious basis with reference to both their current experience and how this is expected to change in downturn conditions. In particular, this involves being able to articulate clearly both the precise course of events that will allow such cures to take place and any consequences of such actions for other elements of their risk quantification. For example:

(a) where cures are driven by the firm's own policies, we would expect firms to consider whether this is likely to result in longer realisation periods and larger forced sale discounts for those exposures that do not cure, and higher default rates on the book as a whole, relative to those that might be expected to result from a less accommodating attitude. To the extent feasible, the PRA expects cure assumptions in a downturn to be supported by relevant historical data.

(b) the PRA expects firms to be aware of and properly account for the link between cures and subsequent defaults. In particular, an earlier cure definition is, other things being equal, likely to result in a higher level of subsequent defaults.

(CRR Article 5(2))

Incomplete workouts

13.6 In order to ensure that estimates of LGDs take into account the most up to date experience, we would expect firms to take account of data in respect of relevant incomplete workouts (ie defaulted exposures for which the recovery process is still in progress, with the result that the final realised losses in respect of those exposures are not yet certain).

(CRR Article 179(1)(c))

LGD – sovereign floor

13.7 To ensure that sovereign LGD models are sufficiently conservative in view of the estimation error that may arise from the lack of data on losses to sovereigns, the PRA expects firms to apply a 45% LGD floor to each unsecured exposure in the sovereign asset class.

(CRR Articles 144(1) and 179(1)(a))

LGD — UK retail mortgage property sales reference point

13.8 The PRA believes that an average reduction in property sales prices of 40% from their peak price, prior to the market downturn, forms an appropriate reference point when assessing downturn LGD for UK mortgage portfolios and expects a firm's rating systems to assume a reduction consistent with this. This reduction captures both a fall in the value of the property due to market value decline as well as a distressed forced sale discount. The PRA

expects the assumption for the fall in the value of the property due to house price deflation not to be lower than 25%.

13.9 Where firms adjust assumed house price values within their LGD models to take account of current market conditions (for example with reference to appropriate house price indices) we recognise that realised falls in market values may be captured automatically. Firms adopting such approaches may remove observed house price falls from their downturn house price adjustment so as not to double count. The PRA expects all firms wishing to apply such an approach to seek the consent of the PRA and to be able to demonstrate that the following criteria are met:

(a) the adjustment applied to the market value decline element of a firm's LGD model is explicitly derived from the decrease in indexed property prices (ie the process is formulaic, not judgemental);

(b) the output from the adjusted model has been assessed against the 40% peak-to-trough property sales prices decrease reference point (after inclusion of a forced sale discount);

(c) a minimum 5% market value decline applies at all times in the LGD model; and

(d) the firm has set a level for reassessment of the property market price decline from its peak. For example, if a firm had initially assumed a peak-to-trough market decline of 25%, then it will have set a level of market value decline where this assumption will be reassessed.

(CRR Article 181(1)(b))

Downturn LGDs

13.10 In order to ensure that their LGD estimates are oriented towards downturn conditions, the PRA expects firms to have a process through which they:

(a) identify appropriate downturn conditions for each IRB exposure class within each jurisdiction;

(b) identify adverse dependencies, if any, between default rates and recovery rates; and

(c) incorporate adverse dependencies, if identified, between default rates and recovery rates in the firm's estimates of LGD in a manner that meets the requirements relating to an economic downturn.

(CRR Article 181(1)(b))

Discounting cash flows

13.11 In order to ensure that their LGD estimates incorporate material discount effects, the PRA expects firms' methods for discounting cash flows to take account of the uncertainties associated with the receipt of recoveries with respect to a defaulted exposure, for example by adjusting cash flows to certainty equivalents or by using a discount rate that embodies an appropriate risk premium; or by a combination of the two.

13.12 If a firm intends to use a discount rate that does not take full account of the uncertainty in recoveries, we would expect it to be able to explain how it has otherwise taken into account that uncertainty for the purposes of calculating LGDs. This can be addressed by adjusting cash

flows to certainty equivalents or by using a discount rate that embodies an appropriate risk premium for defaulted assets; or by a combination of the two.

13.13 In addition to the above measures the PRA expects firms to ensure that no discount rate used to estimate LGD is less than 9%.

(CRR Article 5(2))

Wholesale LGD

13.14 The PRA expects firms using AIRB approaches to have done the following in respect of wholesale LGD estimates:

(a) applied LGD estimates at transaction level;

(b) ensured that all LGD estimates (both downturn and non-downturn) are cautious, conservative and justifiable, given the paucity of observations. In accordance with CRR Article 179(1)(a), estimates must be derived using both historical experience and empirical evidence, and not be based purely on judgemental consideration. We expect the justification as to why the firm thinks the estimates are conservative to be documented;

(c) identified and explained at a granular level how each estimate has been derived. This should include an explanation of how internal data, external data, expert judgement or a combination of these has been used to produce the estimate;

(d) clearly documented the process for determining and reviewing estimates, and the parties involved in the process in cases where expert judgement was used;

(e) demonstrated an understanding of the impact of the economic cycle on collateral values and be able to use that understanding in deriving their downturn LGD estimates;

(f) demonstrated sufficient understanding of any external benchmarks used and identified the extent of their relevance and suitability to the extent that the firm can satisfy itself that they are fit for purpose;

(g) evidenced that they are aware of any weaknesses in their estimation process and have set standards, for example related to accuracy, that their estimates are designed to meet;

(h) demonstrated that they have sought and utilised relevant and appropriate external data, including through identifying all relevant drivers of LGD and how these will be affected by a downturn;

(i) ensured, in most cases, estimates incorporate effective discrimination on the basis of at least security type and geography. In cases where these drivers are not incorporated into LGD estimates then we would expect the firm to be able to demonstrate why they are not relevant;

(j) have put in place an on-going data collection framework to collect all relevant internal loss and exposure data required for estimating LGD and a framework to start using these data as soon as any meaningful information becomes available; and

(k) ensured it can articulate the data the firm intends to use from any industry-wide data collection exercises in which it is participating, and how the data will be used.

(CRR Section 6)

LGD models for low default portfolios

13.15 We have developed a framework for assessing the conservatism of firms' wholesale LGD models for which there are a low number of defaults. The framework is set out in Appendix C and does not apply to sovereign LGD estimates which are floored at 45%. We are in the process of using this framework to assess the calibration of firms' material LGD models for low-default portfolios.

13.16 In the following cases, the PRA expects firms to determine the effect of applying the framework set out in Appendix C to models which include LGD values that are based on fewer than 20 'relevant' data points (as defined in Appendix C):

(a) the model is identified for review by the PRA; or

(b) the firm submits a request for approval for a material change to its LGD model.

13.17 In such cases firms should contact their supervisor to obtain the relevant data templates that should be populated and submitted to the PRA.

LGD - use of external data for residential mortgages

13.17A The PRA expects that, for residential mortgages, where a firm's internal experience of defaults for a rating system is low, the firm may use external data to supplement internal data when modelling LGD.

13.17B Where external data are used, the PRA expects firms to apply additional margins of conservatism in order to:

(a) recognise the difference between downturn recoveries from established firms with the experience and processes to realise high recoveries, and those from firms with more limited experience and less established processes;

(b) recognise any differences in portfolio comparability between the external data and the firm's lending; and

(c) address unobservable differences that relate to risk drivers or risk characteristics that cannot be derived from external data.

13.17C The PRA expects the level of added conservatism to be significant until sufficient internal data are available to support the firm's reduction.

13.17D Firms using external data in their LGD estimates should run a Forced Sale Discount (FSD) model and Probability of Possession Given Default (PPGD) model with appropriate governance and monitoring requirements. Firms with no internal repossession data for use in their FSD modelling could rely on external data, along with an internal expectation on costs and an additional margin of conservatism, as part of their FSD estimation.

13.17E The PRA considers that firms would be unlikely to be able to demonstrate that third-party recovery data from non-UK legal regimes are comparable to UK data. The PRA therefore expects only UK data to be used when estimating LGD for UK residential mortgage exposures. For non-UK mortgage exposures, the PRA expects firms to demonstrate that data are

representative for the local mortgage market in order to be used to supplement internal data where appropriate.

13.17F The PRA expects firms to incorporate internal data as it builds up.

(CRR Articles 171, 179 and 181)

Unexpected loss (UL) on defaulted assets[6]

13.18 The CRR is unclear in how UL should be calculated for defaulted assets. This was also the case for the BCD. The answer to transposition group question 655 on the calculation of UL for defaulted assets under the BCD referred to two approaches:

(a) the independent calculation approach; and

(b) subtraction of the best estimate of expected loss from post-default LGD.

13.19 The PRA considers that both of the approaches set out in the CRD transposition group answer are acceptable in principle.

13.20 Where an independent calculation approach is adopted for the calculation of unexpected loss on defaulted assets the PRA expects firms to ensure that estimates are at least equal, at a portfolio level, to a 100% risk-weight, ie 8% capital requirement on the amount outstanding net of provisions.[7]

(CRR Article 181(1)(h))

Unsecured LGDs where the borrowers' assets are substantially used as collateral

13.21 The extent to which a borrower's assets are already given as collateral will affect the recoveries available to unsecured creditors. If the degree to which assets are pledged is substantial this will be a material driver of LGDs on such exposures. Although potentially present in all transactions, the PRA expects firms to be particularly aware of this driver in situations in which borrowing on a secured basis is the normal form of financing, leaving relatively few assets available for the unsecured debt. Specialist lending (including property), hedge funds, some SME/mid-market lending are examples of such cases.

13.22 The PRA expects firms to take into account the effect of assets being substantially used as collateral for other obligations when estimating LGDs for borrowers for which this is the case. The PRA expects firms not to use unadjusted data sets that ignore this impact, and note that it is an estimate for downturn conditions that is normally required. In the absence of relevant data to estimate this effect, conservative LGDs — potentially of 100% — are expected to be used.

(CRR Articles 171(2), 179(1)(a))

6 https://ec.europa.eu/info/law/law-topic/eu-banking-and-financial-services-law_en.
7 Independent calculation approaches are an alternative to measuring the UL on defaulted assets as being the difference between downturn LGD and best estimate LGD. See link in previous footnote for further information.

Probability of Possession Given Default (PPGD) for residential mortgage exposures

13.23 For firms with low internal experience of possessions, the PRA expects firms to assess the appropriate margin of conservatism in the calculation of PPGD against PRA reference points.

13.24 The PRA believes the following reference points to be appropriate:

(a) PPGD reference point of 100% where there are very low default volumes, regardless of the length of observed outcomes; and

(b) PPGD reference point of 70% where firms are able to demonstrate they have greater, but still not considerable, volume and history of data to estimate future possession rates.

13.25 The PRA expects firms to assess whether, on a case-by-case basis, they can apply a PPGD level above or below the reference point relevant to their circumstances. Indicators supporting a PPGD level set higher than 70% include: high LTV lending; non-owner occupied lending (ie buy-to-let); and levels of default data towards the lower end of the mortgage lenders cohort. Indicators supporting a PPGD level set lower than 100% or 70% include: low LTV lending; owner-occupied lending; and more data than typical of the cohort. The PRA will consider a firm's proposal to use a lower level of PPGD than the relevant reference point on a case-by-case basis.

13.26 As required by the CRR, firms using the PRA reference points as a basis for calculating PPGD margins of conservatism will still need to run an LGD model subject to appropriate governance and monitoring requirements. As a firm gains additional data, and the modelled PPGD estimates rely upon internal data to a greater extent, the PRA expects the appropriate margin of conservatism to decline.

14 Own estimates of exposure at default (EAD) in IRB approaches

Estimation of EAD in place of conversion factors

14.1 The PRA considers that a firm may provide own estimates of EAD in place of the own estimates of CFs that it is permitted or required to provide under CRR Article 151.

14.2 In this supervisory statement references to EAD refer to both direct estimates of EAD and CFs unless specified otherwise.

(CRR Article 151)

General expectations for estimating EAD

14.3 The PRA expects that EAD estimates should not be less than current drawings (including interest accrued to date). Consequently, the PRA expects CF estimates not to be less than zero.

14.4 The EAD required for IRB purposes is the exposure(s) expected to be outstanding under a borrower's current facilities should it go into default in the next year, assuming that economic downturn conditions occur in the next year and a firm's policies and practices for controlling exposures remain unchanged other than changes that result from the economic downturn conditions.

14.5 In order to achieve sufficient coverage of the EAD, the PRA expects firms to take into account all facility types that may result in an exposure when an obligor defaults, including uncommitted facilities.

14.6 To the extent that a firm makes available multiple facilities, the PRA expects firms to be able to demonstrate:

(a) how they deal with the fact that exposures on one facility may become exposures under another on which the losses are ultimately incurred; and

(b) the impact of its approach on its capital requirements.

14.7 The PRA expects firms using own estimates of EAD to have done the following in respect of EAD estimates:

(a) applied EAD estimates at the level of the individual facility;

(b) where there is a paucity of observations, ensured that all EAD estimates are cautious, conservative and justifiable. In accordance with Article 179(1)(a), estimates must be derived using both historical experience and empirical evidence, and must not be based purely on judgemental consideration. The PRA would expect the justification as to why the firm thinks the estimates are conservative to be documented;

(c) identified and explained at a granular level how each estimate has been derived. This should include an explanation of how internal data, any external data, expert judgement or a combination of these has been used to produce the estimate;

(d) ensured that where expert judgement has been used there is clear documentation of the process for arriving at and reviewing the estimates, and identifying the parties involved;

(e) demonstrated an understanding of the impact of the economic cycle on exposure values and be able to use that understanding in deriving downturn EAD estimates;

(f) demonstrated sufficient understanding of any external benchmarks used and identified the extent of their relevance and suitability to the extent that the firm can satisfy itself that they are fit for purpose;

(g) evidenced that they are aware of any weaknesses in their estimation process and have set standards that their estimates are designed to meet (eg related to accuracy);

(h) ensured, in most cases, that estimates incorporate effective discrimination on the basis of at least product features and customer type. In cases where these drivers are not incorporated into EAD estimates then the PRA expects the firm to be able to demonstrate why they are not relevant;

(i) have an on-going data collection framework in place to collect all relevant internal exposure data required for estimating EAD and a framework to start using this data as soon as any meaningful information becomes available;

(j) made use of the data they are collecting to identify all relevant drivers of EAD and to understand how these drivers will be affected by a downturn; and

(k) identified dependencies between default rates and conversion factors for various products and markets when estimating downturn EADs. Firms are expected to consider how they expect their own policies regarding exposure management to evolve in a downturn.

14.8 The PRA has developed a framework for assessing the conservatism of firms' wholesale EAD models for which there are a low number of defaults. The PRA is in the process of using this framework to assess the calibration of firms' material EAD models for low-default portfolios.

14.9 In the following cases, the PRA expects firms to determine the effect of applying the framework set out in Appendix C to models which include EAD values that are based on fewer than 20 'relevant' data points (as defined in Appendix C):

(a) the model is identified for review by the PRA; or

(b) the firm submits a request for approval for a material change to its EAD model.

14.10 In such cases firms should contact their supervisor to obtain the relevant data templates that should be populated and submitted to the PRA.

(CRR Articles 4(56), 166, Section 6)

Time horizon

14.11 The PRA expects firms to use a time horizon of one year for EAD estimates, unless they can demonstrate that another period would be more conservative.

14.12 EAD estimates can be undertaken on the basis that default occurs at any time during the time horizon (the 'cohort approach'), or at the end of the time horizon (the 'fixed-horizon approach'). The PRA considers that either approach is acceptable in principle.

14.13 The PRA expects the time horizon for additional drawings to be the same as the time horizon for defaults. In effect this means that EAD estimation need cover only additional drawings that might take place in the next year, such that:

(a) no capital requirement need be held against facilities, or proportions of facilities that cannot be drawn down within the next year; and

(b) where facilities can be drawn down within the next year, firms may in principle reduce their estimates to the extent that they can demonstrate that they are able and willing, based on a combination of empirical evidence, current policies, and documentary protection to prevent further drawings.

(CRR Article 182)

Direct estimates of EAD

14.14 There are a range of approaches that focus on the total amount that will be drawn down at the time of default and directly estimate EAD. Typically, but not in all cases, these will estimate EAD as a percentage of Total Limit. These approaches can be described collectively as 'momentum' approaches.

14.15 A 'momentum' approach can be used either:

(a) by using the drawings/limit percentage to formulaically derive a conversion factor on the undrawn portion of the limit; or

(b) by using the higher of percentage of the limit and the current balance as the EAD.

14.16 The PRA considers that the use of momentum approaches in both of the ways outlined above is acceptable in principle as an alternative to direct estimation of conversion factors.

(CRR Article 4(56))

Distortions to conversion factor estimates caused by low undrawn limits

14.17 In cases where firms estimate CFs directly, using a reference data set that includes a significant number of high CFs as a result of very low undrawn limits at the observation date, the PRA expects firms to:

(a) investigate the distribution of realised CFs in the reference data set;

(b) base the estimated CF on an appropriate point along that distribution that results in the choice of a CF appropriate for the exposures to which it is being applied and consistent with the requirement in CRR Article 179 for estimates to include a margin of conservatism related to errors; and

(c) be cognisant that while the median of the distribution might be a starting point, they should not assume without analysis that the median represents a reasonable unbiased estimate. The PRA expects firms to consider whether the pattern of distribution in realised CFs means that some further segmentation is needed (eg treating facilities that are close to full utilisations differently).

(CRR Article 182(1)(a))

Identification of exposures for which an EAD must be estimated

14.18 The PRA expects firms to treat a facility as an exposure from the earliest date at which a customer is able to make drawings under it.

14.19 Where the facility is of the type that it is customary not to advise the borrower of its availability, the PRA expects an EAD/CF to be applied from the time that the existence of the facility is recorded on the firm's systems in a way that would allow the borrower to make a drawing.

14.20 If the availability of a facility is subject to a further credit assessment by the firm, an EAD/CF may not be required. However, the PRA expects this to be the case only if the subsequent credit assessment were of substantially equivalent rigour to that of the initial credit approval, and if this includes a re-rating or a confirmation of the rating of the borrower.

14.21 Firms are not expected to include in their EAD/CF estimates the probability of increases in limits between observation and default date. If the reference data set included the impact of such increases, the PRA expects firms to be able to adjust their estimates accordingly with the aim of assessing what the exposure would have been at default if the limit had not been increased.

14.22 The PRA expects firms to investigate the incidence of exposures existing at default that arise from products or relationships that are not intended to result in a credit exposure and,

consequently, have no credit limit established against them and are not reflected in their estimates of EAD. Unless such exposures are immaterial, the PRA expects firms to apply a Pillar 1 capital charge on a portfolio basis to such exposures.

14.23 The PRA expects firms to investigate how their EAD estimates are impacted by exposures that are in excess of limits at either the observation date (if in the reference data set) or at the current reporting date (for the existing book to which estimates need to be applied). Unless a momentum approach is being used exposures in excess of limit should be excluded from the reference data set (as the undrawn limit is negative and nonsensical answers would result from their inclusion). The PRA expects firms to ensure that their EAD estimation includes the risk of further drawings on accounts that are in excess of their limits.

(CRR Article 4(56))

Accrued interest

14.24 Exposures include not only principal amounts borrowed under facilities but also interest accrued which will fluctuate between payment dates. In order to ensure proper coverage of interest, the PRA expects firms to take the following approach:

(a) accrued interest to date should be included in current exposure for performing exposures;

(b) firms may choose whether estimated increases in accrued interest up to the time of default should be included in LGD or EAD;

(c) in the estimation of EAD increases in accrued interest may be offset against reductions in other outstandings;

(d) estimation of changes in accrued interest needs to take account of changes in the contractual interest rate over the time horizon up to default, and in a way consistent with the scenario envisaged in the calculation of the downturn/default weighted average;

(e) inclusion of estimates of future post-default interest is not necessary in either EAD or LGD; and

(f) firms' accounting policies will determine the extent to which interest accrued to date is reflected in current exposure as opposed to LGD for defaulted exposures.

(CRR Article 166(1))

Netting

14.25 The PRA considers that there is scope within the CRR for firms to recognise on-balance sheet netting (including in respect of cross-currency balances) through EAD as an alternative to LGD in those cases where the general conditions for on-balance sheet netting set out in CRR Article 205 are met.

14.26 As regards the CF on undrawn limits, this may be applied on the basis of the net limit provided the conditions in the CRR for the use of net limits are met. However, firms are reminded that the purpose of the measure is to estimate the amount that would be outstanding in the event of a default. This implies that their ability in practice to constrain the drawdown of credit balances will be particularly tested. Moreover the PRA expects the appropriate conversion factor to be higher as a percentage of a net limit than of a gross limit.

14.27 The lower the net limit as a percentage of gross limits or exposures, the greater will be the need on the part of the firm to ensure that it is restricting exposures below net limits in practice and that it will be able to continue to do so should borrowers encounter difficulties. The application of a zero net limit is acceptable in principle, but there is consequently a very high obligation on the firm to ensure that breaches of this are not tolerated.

(CRR Article 166(3))

Underwriting commitments

14.28 Estimation of CFs on underwritten facilities in the course of primary market syndication may take account of anticipated sell down to other parties.

14.29 Firms are reminded that since the basis of EAD estimation is that default by the borrower is expected to take place in a one-year time horizon, and quite possibly in downturn conditions, the PRA expects any reduction in their CF in anticipation of syndication to take account of this scenario.

(CRR Article 4(56))

15 Maturity for exposures to corporates, institutions or central governments and central banks

15.1 The PRA expects all firms that have not received permission to use own estimates of LGDs and conversion factors to use the maturity approach set out in CRR Article 162(2) to 162(3) for these exposures. This will be reflected in their permissions to use the IRB approach.

(CRR Article 166)

16 Stress tests used in assessment of capital adequacy

16.1 In order to be satisfied that the credit risk stress test undertaken by a firm pursuant to CRR Article 177(2) is meaningful and considers the effects of severe, but plausible, recession scenarios the PRA would expect that the stress test would be based on an economic cycle that is consistent with the supervisory statement on the Internal Capital Adequacy Assessment Process (ICAAP) and the Supervisory Review and Evaluation Process (SREP).

16.2 The level of cyclicality assumption used in calculating the long-run average PD for residential mortgages referred to in paragraph 12.4 above should not be relied on when undertaking the credit risk stress test required under CRR Article 177(2) and the PRA expects firms to consider the possibility that the model proves more cyclical than anticipated.

(CRR Article 177(2))

17 Validation

17.1 The PRA expects a firm to have a validation process that includes the following:

(a) standards of objectivity, accuracy, stability and conservatism that it designs its ratings systems to meet and processes that establish whether its rating systems meet those standards;

(b) standards of accuracy of calibration (ie whether outcomes are consistent with estimates) and discriminative power (ie the ability to rank-order risk) that it designs its rating systems to meet and processes that establish whether its rating systems meet those standards;

(c) policies and standards that specify the actions to be taken when a rating system fails to meet its specified standards of accuracy and discriminative power;

(d) a mix of developmental evidence, benchmarking and process verification and policies on how this mixture varies between different rating systems;

(e) use of both quantitative and qualitative techniques;

(f) policies on how validation procedures are expected to vary over time; and

(g) ensuring independent input into and review of its rating systems.

(CRR Article 185)

17.2 In the paragraph above:

(a) developmental evidence means evidence that substantiates whether the logic and quality of a rating system (including the quantification process) adequately discriminates between different levels of, and delivers accurate estimates of PD, EL, LGD and CFs (as applicable); and

(b) process verification means the process of establishing whether the methods used in a rating system to discriminate between different levels of risk and to quantify PD, EL, LGD and CFs are being used, monitored and updated in the way intended in the design of the rating system.

(CRR Article 185)

17.3 The PRA expects a firm to be able to explain the performance of its rating systems against its chosen measure (or measures) of discriminative power. In making this comparison a firm should rely primarily on actual historic default experience where this is available. In particular, the PRA expects a firm to be able to explain the extent of any potential inaccuracy in these measures, caused in particular by small sample size and the potential for divergence in the future, whether caused by changing economic conditions or other factors. Firms' assessment of discriminative power should include appropriate use of external benchmarks where available.

17.4 The PRA expects that a firm establishing compliance with CRR Article 185 for residential mortgage rating systems should be able to demonstrate that its monitoring includes at least the following:

(a) an assessment of whether each long-run average PD remains appropriate to the population it is applied to, including whether movements in default rate are due to external factors or changes in underlying credit quality. The PRA would expect to see consideration given to internal firm historical data, industry data and economic data in assessing this;

(b) an assessment of the rating system's cyclicality; and

(c) an assessment of the performance of any underlying rank-ordering or segmentation mechanism.

17.5 When applying for permission for either a new residential mortgage PD rating system or a material change to an existing rating system, the PRA expects firms to submit a completed monitoring management information pack in support of their application.

17.6 The PRA will take into consideration the sophistication of the measure of discrimination chosen when assessing the adequacy of a rating system's performance.

17.7 In the case of a portfolio for which there is insufficient default experience to provide any confidence in statistical measures of discriminative power, the PRA expects a firm to use other methods. For example, analysis of whether the firm's rating systems and an external measurement approach, eg external ratings, rank common obligors in broadly similar ways. Where such an approach is used we would expect a firm to ensure it does not systematically adjust its individual ratings with the objective of making them closer to the external ratings as this would be counter to the philosophy of an internal rating approach. The PRA expects a firm to be able to explain the methodology it uses and the rationale for its use.

18 Income-producing real estate portfolios

CRR compliance

18.1 The PRA considers income-producing real estate (IPRE) to be a particularly difficult asset class for which to build effective rating systems that are compliant with the CRR's requirements for the IRB approach.

18.2 As with all asset classes, firms should assess whether their IPRE model is CRR compliant and not whether it is the nearest they can get to compliance given the constraints imposed on their model development (eg lack of data or resource constraints).

18.3 Where material non-compliance is identified and cannot be remediated in a timely fashion, firms should adopt a compliant approach for calculating regulatory capital. In most cases this is likely to be the slotting approach.

(CRR Article 144(1))

Drivers of risk

18.4 The PRA expects firms to be able to demonstrate that the model drivers selected offer sufficient discriminatory power and to justify why other potential data sources are not expected to materially improve the discriminatory power and accuracy of estimates.

18.5 The PRA expects that an IPRE rating system will only be compliant if a firm is able to demonstrate the following in respect of its treatment of cash flows (except where the firm can demonstrate that this is not an appropriate risk driver):

(a) the difference in deal ratings when tenant ratings are altered is intuitive;

(b) the transformation of ratings into non-rent payment probability is intuitive;[8]

(c) selection of parameter values and/or distributions, and their impact on deal ratings, is well supported and intuitive;

(d) impact on the deal rating is intuitive for such features as: type of building, geographical location and building quality; and

(e) where data are missing or unavailable the treatment is conservative.

18.6 The PRA expects that an IPRE rating system will only be compliant if a firm is able to demonstrate the following in respect of its treatment of interest rate risk (IRR):

(a) IRR is included as a relevant risk driver (unless the portfolio is exclusively hedged);

(b) the way in which IRR is included in the deal rating is intuitive with respect to model philosophy;[9] and

(c) the model rates deals where IRR is hedged by the firm differently from deals where IRR is unhedged and the magnitude of the difference in these ratings is intuitive.

18.7 The PRA expects that an IPRE rating system will only be compliant if a firm is able to demonstrate the following in respect of its treatment of refinance risk:

(a) refinance risk is included as a relevant risk driver (unless the portfolio contains only amortising loans);

(b) the model rates interest only and amortising deals differently in the final year and that the magnitude of the difference in these ratings is intuitive;

(c) given the time horizon associated with IRB estimates (ie twelve months) the refinance risk could have a zero weight until the deal enters its final year for point in time models;[10] and

(d) the firm is able to report by borrowers that have previously had a distressed restructuring unlikeliness to pay indicator (even if they are now performing) by number, EAD and risk-weighted assets (RWA).

Calibration

18.8 The PRA expects that firms will not be compliant with the calibration requirements relating to use of a long-run default rate unless it can demonstrate that:

(a) the internal data series is the longest relevant and accurate data series, on a CRR compliant definition of default, that is available;

(b) the determination of long-run default rate includes reference to an appropriate source of downturn data;[11]

8 Even where tenants are rated by the firm the PD will not usually represent a direct read across to probability of non-payment due to, for example, model philosophy issues. Addressing this is likely to be a key area since many firms struggle with defining what divergence is expected between observed default rate and PD in different economic conditions in the mid-corporate space.

9 For example a 'point in time' rating should consider the current interest rate and likely change over a one-year time horizon, whereas a 'through the cycle' model needs to consider the interest rate risk averaged over an economic cycle.

10 In these cases the risk should be captured in stress testing and Pillar 2.

(c) the relevance of any external data used is analysed, and the relationship between internal default data and the external data used is considered over a multi-year period; and

(d) where uncertainty is introduced due to, for example, the quality of internal data or shortcomings in the relevance of external data a conservative adjustment to the estimates should be made.

18.9 The PRA expects that a firm will only be compliant with the calibration requirements relating to model philosophy if it can demonstrate that:

(a) model philosophy is clearly articulated and justified;[12] and

(b) in addition to encapsulating this information in a coherent way in the calibration, the impact of capturing risks such as IRR and refinance risk is clearly documented.

Low default portfolios

18.10 Where the rating system is classed as a low default portfolio in accordance with this supervisory statement firms should be able to demonstrate that the framework applied adequately considers:

(a) economic environment of data used;

(b) changes in portfolio composition over time;

(c) parameter choices; and

(d) model philosophy.

Constructed theoretically

18.11 Under CRR Article 144(1) all models, including those constructed from a theoretical basis without reference to any empirical default data (such as Monte Carlo cash flow simulation models) must meet the IRB requirements that are set out in CRR Title II Chapter 3.

18.12 The PRA considers that to meet these requirements it will be necessary for firms to demonstrate that a firm has a good understanding of PD models that are constructed theoretically and that the parameter estimates reflect a one-year PD. In addition, even if empirical data were not used to determine the PD estimate it should, where available, be used to back-test the estimates.

18.13 The PRA expects that, as most models of this type will be able to produce one-year estimates of PD that correspond closely to 'point in time' estimates, firms should conduct robust back-testing of such estimates by comparing them with realised default rates. Firms would need to demonstrate that the results of such back-testing meet pre-defined and stringent standards in order for the PRA to be satisfied that the IRB requirements are met.

18.14 Because assumptions in the model build process are likely materially to impact the resulting PDs, the PRA expects these choices to be clearly justified in the model documentation and to have been subject to independent review. In order to be satisfied that a firm is

11 This may require the use of external data.
12 Justification should include analysis of the performance of assets, and the corresponding ratings assigned, over a change in economic conditions (ie as long a period as possible).

complying with CRR Article 176(1)(d) the PRA expects a firm to support justification for all assumptions with analysis of the sensitivity of the model outputs to changes in the assumptions.

18.15 Where the firm has fewer than 20 defaults in its internal data set, the PRA expects it to be necessary for the firm to perform a statistical low default portfolio calibration, as set out in this Supervisory Statement.

Validation

18.16 The PRA expects that a firm will be compliant with the validation requirements only where it can demonstrate in respect of discriminatory power that:

(a) appropriate minimum standards that the rating system is expected to reach are defined together with reasoning behind the adoption of such standards and that the factors considered when determining the tests are clearly documented;

(b) an objective rank ordering metric, measured using an appropriate time horizon (eg using ratings one year prior to default) or cohort approach, such as Gini or Accuracy Ratio of 50% is achieved over time;

(c) where there are sufficient defaults from different time periods the discriminatory power is shown to have reached the appropriate minimum standard over an extended time period (ie longest period possible including most recent data); and

(d) any concentrations in ratings from the model are demonstrated to be appropriate.

18.17 The PRA expects that a firm will be compliant with the validation requirements only where it can demonstrate in respect of the calibration that:

(a) observed default rate versus PD is considered at grade level and across a range of economic environments (ie as long a period as possible);

(b) where the PD does not relate to a pure point in time estimate either the PD or the observed default rate is transformed such that comparison between the two is meaningful. This transformation should be consistent with the model philosophy and calibration technique applied; and

(c) pre-defined tolerances for the degree of divergence, and the associated actions for what should happen when they are not met, are set.

18.18 The PRA also expects that firms will be compliant with the validation requirements only where it can demonstrate that:

(a) appropriate stability metrics are considered across a range of economic environments (ie longest period possible including most recent data);

(b) the tolerances for the degree of divergence, and associated actions for what should happen when they are not met, is pre-defined; and

(c) subsections of portfolios by characteristics affecting risk profile, and therefore potentially model performance, are investigated. Such subsections could include:

(i) loan type (amortising/interest only);

(ii) degree of hedging;

(iii) building type; and

(iv) other factors such as non-special purpose vehicle (SPV) lending in a predominately SPV lending book or vice versa.

(CRR Article 185)

Other requirements

18.19 The PRA expects that a firm would only be able to comply with certain other CRR requirements where it can demonstrate that:

(a) in relation to CRR Article 144(1)(e), where more than one model was used, the rationale and the associated boundary issues were clearly articulated and justified. The PRA expects the criteria for assigning an asset to a rating model are objective and clear;

(b) in relation to CRR Article 173(1)(c), the firm has a process in place to ensure valuations of the property are appropriate and up to date;

(c) in relation to CRR Article 171(2), the firm makes reference to information available from the Investment Property Databank where relevant. Where this data is utilised at a broad level when more granular data is available this is fully justified with appropriate analysis;

(d) in relation to CRR Article 173(1)(b), the rating histories demonstrate that deals are re-rated every time material information becomes available;[13]

(e) in relation to CRR Article 189(3), management information covering all aspects required by the CRR is produced and reviewed regularly by senior management and the tolerances for the degree of divergence, and associated actions for what should happen when they are not met, are pre-defined; and

(f) in relation to CRR Article 177(2), the impact on PDs and RWAs in a firm's credit risk stress test is consistent with model philosophy (although ratings should be affected by events such as tenant defaults even if they are TTC) and impairment projections are justified with reference to past internal data.

19 Notification and approval of changes to approved models

Paragraphs 19.1 to 19.12 have been deleted.

Fees

19.13 There will be some circumstances where a fee may be applied, for example, where a firm is upgrading from FIRB to AIRB, or a special project fee in the case of a merger or acquisition.

13 For example where the deal enters its final year (and refinance risk becomes relevant) or a tenant defaults, is replaced or has their rating changed.

Paragraphs 19.14 and 19.15 have been deleted.

Temporary adjustments to approved models

19.16 Firms should address identified model issues in a timely fashion with suitable model changes, and ensure that such changes are implemented in accordance with the appropriate model changes process. The PRA recognises, however, that there are instances where it is prudent and correct for firms to adjust the capital requirements produced by their models on a temporary basis. The PRA does not expect any such adjustment to be in place for a period longer than six months and firms should take any action required to remove an adjustment (including notifying the PRA of a model change where appropriate) within that period.

19.17 Firms should meet the following criteria in respect of any temporary adjustments to approved models:

a) The framework must be applied at a portfolio level. For this a 'portfolio' is defined as the group of assets covered by the IRB model the adjustment is being made for. If adjustments are being made to more than one model (eg PD and LGD) which cover overlapping assets (eg a global LGD model and regional PD models), then a portfolio(s) must be defined as the subset of assets covered by the same models (eg in the example above the assets covered by the regional PD model would be classified as a single portfolio).

b) Irrespective of what model component the adjustment is for (eg PD, LGD or EAD) the RWA and EL adjustments are made as a portfolio level add-on to the requirements produced by the approved models (ie the underlying models must not be recalibrated or changed to give the desired capital outcome).

c) Firms' PD, LGD and EAD models remain in place until the correct level of approval has been obtained for any changes. These models continue to be monitored as required by the CRR.

d) Only adjustments that increase RWA and EL are made and there should be no netting of adjustments across portfolios (eg if there are two data issues, in separate portfolios, one which increases RWA by £200 million and one that decreased RWA by £100 million, only the adjustment increase of £200 million is applied). Where netting of impacts is proposed, this is applied in the relevant portfolio (ie where a model covers a number of portfolios, netting can only be done at a portfolio level).

e) A list of all model adjustments is included in the firm's model monitoring information presented to senior management, containing the following information as a minimum:

   (i) the portfolio and model component affected;

   (ii) a description of the issue and why it requires the adjustment;

   (iii) the date when the issue was first identified;

   (iv) what action is being taken to address the issue and the timeline for this action; and

   (v) the increase to RWA and EL as a result of the adjustment.

f) Firms may make adjustments across model components (eg PD, LGD and EAD), however if the PRA judges that a firm is not applying the netting across components appropriately, or

with the correct degree of conservatism, then it will require that netting is permitted only within a model component (eg if the adjustment to PD increases capital and to LGD decreases capital, the firm would only apply the increased capital that results from the PD adjustment).

19.18 Firms should include any EL and RWA adjustments in their regulatory returns. In respect of the FSA045 return the total RWA and EL figures for each of the PD grades should be increased proportionally.

Appendices

A	Slotting criteria
B	Model change pro-forma required when notifying changes to a ratings system
C	Wholesale LGD and EAD framework

Appendix A: Slotting criteria

Table 1 Supervisory rating grades for project finance exposures

	Strong	Good	Satisfactory	Weak
Financial strength				
Market conditions.	Few competing suppliers or substantial and durable advantage in location, cost, or technology. Demand is strong and growing.	Few competing suppliers or better than average location, cost, or technology but this situation may not last. Demand is strong and stable.	Project has no advantage in location, cost, or technology. Demand is adequate and stable.	Project has worse than average location, cost, or technology. Demand is weak and declining.
Financial ratios (eg debt service coverage ratio (DSCR), loan life coverage ratio (LLCR), project life coverage ratio PLCR), and debt-to-equity ratio).	Strong financial ratios considering the level of project risk; very robust economic assumptions.	Strong to acceptable financial ratios considering the level of project risk; robust project economic assumptions.	Standard financial ratios considering the level of project risk.	Aggressive financial ratios considering the level of project risk.
Stress analysis.	The project can meet its financial obligations under sustained, severely stressed economic or sectoral conditions.	The project can meet its financial obligations under normal stressed economic or sectoral conditions. The project is only likely to default under severe economic conditions.	The project is vulnerable to stresses that are not uncommon through an economic cycle, and may default in a normal downturn.	The project is likely to default unless conditions improve soon.
Financial structure				
Duration of the credit compared to the duration of the project.	Useful life of the project significantly exceeds tenor of the loan.	Useful life of the project exceeds tenor of the loan.	Useful life of the project exceeds tenor of the loan.	Useful life of the project may not exceed tenor of the loan.
Amortisation schedule.	Amortising debt.	Amortising debt.	Amortising debt repayments with limited bullet payment.	Bullet repayment or amortising debt repayments with high bullet repayment.
Political and legal environment				
Political risk, including transfer risk, considering project type and mitigants.	Very low exposure; strong mitigation instruments, if needed.	Low exposure; satisfactory mitigation instruments, if needed.	Moderate exposure; fair mitigation instruments.	High exposure; no or weak mitigation instruments.
Force majeure risk (war, civil unrest, etc).	Low exposure.	Acceptable exposure.	Standard protection.	Significant risks, not fully mitigated.
Government support and project's importance for the country over the long term.	Project of strategic importance for the country (preferably export-oriented). Strong support from Government.	Project considered important for the country. Good level of support from Government.	Project may not be strategic but brings unquestionable benefits for the country. Support from Government may not be explicit.	Project not key to the country. No or weak support from Government.
Stability of legal and regulatory environment (risk of change in law).	Favourable and stable regulatory environment over the long term.	Favourable and stable regulatory environment over the medium term.	Regulatory changes can be predicted with a fair level of certainty.	Current or future regulatory issues may affect the project.
Acquisition of all necessary supports and approvals for such relief from local content laws.	Strong.	Satisfactory.	Fair.	Weak.
Enforceability of contracts, collateral and security.	Contracts, collateral and security are enforceable.	Contracts, collateral and security are enforceable.	Contracts, collateral and security are considered enforceable even if certain non-key issues may exist.	There are unresolved key issues in respect of actual enforcement of contracts, collateral and security.
Transaction characteristics				
Design and technology risk.	Fully proven technology and design.	Fully proven technology and design.	Proven technology and design — start-up issues are mitigated by a strong completion package.	Unproven technology and design; technology issues exist and/or complex design.

	Strong	Good	Satisfactory	Weak
Construction risk				
Permitting and siting.	All permits have been obtained.	Some permits are still outstanding but their receipt is considered very likely.	Some permits are still outstanding but the permitting process is well defined and they are considered routine	Key permits still need to be obtained and are not considered routine. Significant conditions may be attached.
Type of construction contract.	Fixed-price date-certain turnkey construction EPC (engineering and procurement contract).	Fixed-price date-certain turnkey construction EPC.	Fixed-price date-certain turnkey construction contract with one or several contractors.	No or partial fixed-price turnkey contract and/or interfacing issues with multiple contractors.
Completion guarantees.	Substantial liquidated damages supported by financial substance and/or strong completion guarantee from sponsors with excellent financial standing.	Significant liquidated damages supported by financial substance and/or completion guarantee from sponsors with good financial standing.	Adequate liquidated damages supported by financial substance and/or completion guarantee from sponsors with good financial standing.	Inadequate liquidated damages or not supported by financial substance or weak completion guarantees.
Track record and financial strength of contractor in constructing similar projects.	Strong.	Good.	Satisfactory.	Weak.
Operating risk				
Scope and nature of operations and maintenance (O&M) contracts.	Strong long-term O&M contract, preferably with contractual performance incentives, and/or O&M reserve accounts.	Long-term O&M contract, and/or O&M reserve accounts.	Limited O&M contract or O&M reserve account.	No O&M contract: risk of high operational cost overruns beyond mitigants.
Operator's expertise, track record, and financial strength.	Very strong or committed technical assistance of the sponsors.	Strong.	Acceptable.	Limited/weak or local operator dependent on local authorities.
Off-take risk				
(a) If there is a take-or-pay or fixed-price off-take contract:	Excellent creditworthiness of off-taker; strong termination clauses; tenor of contract comfortably exceeds the maturity of the debt.	Good creditworthiness of off-taker; strong termination clauses; tenor of contract exceeds the maturity of the debt.	Acceptable financial standing of off-taker; normal termination clauses; tenor of contract generally matches the maturity of the debt.	Weak off-taker; weak termination clauses; tenor of contract does not exceed the maturity of the debt.
(b) If there is no take-or-pay or fixed-price off-take contract:	Project produces essential services or a commodity sold widely on a world market; output can readily be absorbed at projected prices even at lower than historic market growth rates.	Project produces essential services or a commodity sold widely on a regional market that will absorb it at projected prices at historical growth rates.	Commodity is sold on a limited market that may absorb it only at lower than projected prices.	Project output is demanded by only one or a few buyers or is not generally sold on an organised market.
Supply risk				
Price, volume and transportation risk of feed-stocks; supplier's track record and financial strength.	Long-term supply contract with supplier of excellent financial standing.	Long-term supply contract with supplier of good financial standing.	Long-term supply contract with supplier of good financial standing — a degree of price risk may remain.	Short-term supply contract or long-term supply contract with financially weak supplier — a degree of price risk definitely remains.
Reserve risks (eg natural resource development).	Independently audited, proven and developed reserves well in excess of requirements over lifetime of the project.	Independently audited, proven and developed reserves in excess of requirements over lifetime of the project.	Proven reserves can supply the project adequately through the maturity of the debt.	Project relies to some extent on potential and undeveloped reserves.

	Strong	Good	Satisfactory	Weak
Strength of sponsor				
Sponsor track record, financial strength, and country/sector experience.	Strong sponsor with excellent track record and high financial standing.	Good sponsor with satisfactory track record and good financial standing.	Adequate sponsor with adequate track record and good financial standing.	Weak sponsor with no or questionable track record and/or financial weaknesses.
Sponsor support, as evidenced by equity, ownership clause and incentive to inject additional cash if necessary.	Strong. Project is highly strategic for the sponsor (core business — long-term strategy).	Good. Project is strategic for the sponsor (core business — long-term strategy).	Acceptable. Project is considered important for the sponsor (core business).	Limited. Project is not key to sponsor's long-term strategy or core business.
Security package				
Assignment of contracts and accounts.	Fully comprehensive.	Comprehensive.	Acceptable.	Weak.
Pledge of assets, taking into account quality, value and liquidity of assets.	First perfected security interest in all project assets, contracts, permits and accounts necessary to run the project.	Perfected security interest in all project assets, contracts, permits and accounts necessary to run the project.	Acceptable security interest in all project assets, contracts, permits and accounts necessary to run the project.	Little security or collateral for lenders; weak negative pledge clause.
Lender's control over cash flow (eg cash sweeps, independent escrow accounts).	Strong.	Satisfactory.	Fair.	Weak.
Strength of the covenant package (mandatory prepayments, payment deferrals, payment cascade, dividend restrictions…).	Covenant package is strong for this type of project. Project may issue no additional debt.	Covenant package is satisfactory for this type of project. Project may issue extremely limited additional debt.	Covenant package is fair for this type of project. Project may issue limited additional debt.	Covenant package is Insufficient for this type of project. Project may issue unlimited additional debt.
Reserve funds (debt service, O&M, renewal and replacement, unforeseen events, etc).	Longer than average coverage period, all reserve funds fully funded in cash or letters of credit from highly rated bank.	Average coverage period, all reserve funds fully funded.	Average coverage period, all reserve funds fully funded.	Shorter than average coverage period, reserve funds funded from operating cash flows.

Table 2 Supervisory rating grades for income-producing real estate exposures

	Strong	Good	Satisfactory	Weak
Financial strength				
Market conditions.	The supply and demand for the project's type and location are currently in equilibrium. The number of competitive properties coming to market is equal or lower than forecasted demand.	The supply and demand for the project's type and location are currently in equilibrium. The number of competitive properties coming to market is roughly equal to forecasted demand.	Market conditions are roughly in equilibrium. Competitive properties are coming on the market and others are in the planning stages. The project's design and capabilities may not be state of the art compared to new projects.	Market conditions are weak. It is uncertain when conditions will improve and return to equilibrium. The project is losing tenants at lease expiration. New lease terms are less favourable compared to those expiring.
Financial ratios and advance rate.	The property's debt service coverage ratio (DSCR) is considered strong (DSCR is not relevant for the construction phase) and its loan to value ratio (LTV) is considered low given its property type. Where a secondary market exists, the transaction is underwritten to market standards.	The DSCR (not relevant for development real estate) and LTV are satisfactory. Where a secondary market exists, the transaction is underwritten to market standards.	The property's DSCR has deteriorated and its value has fallen, increasing its LTV.	The property's DSCR has deteriorated significantly and its LTV is well above underwriting standards for new loans.
Stress analysis.	The property's resources, contingencies and liability structure allow it to meet its financial obligations during a period of severe financial stress (eg interest rates, economic growth).	The property can meet its financial obligations under a sustained period of financial stress (eg interest rates, economic growth). The property is likely to default only under severe economic conditions.	During an economic downturn, the property would suffer a decline in revenue that would limit its ability to fund capital expenditures and significantly increase the risk of default.	The property's financial condition is strained and is likely to default unless conditions improve in the near term.
Cash-flow predictability				
(a) For complete and stabilised property.	The property's leases are long-term with creditworthy tenants and their maturity dates are scattered. The property has a track record of tenant retention upon lease expiration. Its vacancy rate is low. Expenses (maintenance, insurance, security, and property taxes) are predictable.	Most of the property's leases are long-term, with tenants that range in creditworthiness. The property experiences a normal level of tenant turnover upon lease expiration. Its vacancy rate is low. Expenses are predictable.	Most of the property's leases are medium rather than long-term with tenants that range in creditworthiness. The property experiences a moderate level of tenant turnover upon lease expiration. Its vacancy rate is moderate. Expenses are relatively predictable but vary in relation to revenue.	The property's leases are of various terms with tenants that range in creditworthiness. The property experiences a very high level of tenant turnover upon lease expiration. Its vacancy rate is high. Significant expenses are incurred preparing space for new tenants.
(b) For complete but not stabilised property.	Leasing activity meets or exceeds projections. The project should achieve stabilisation in the near future.	Leasing activity meets or exceeds projections. The project should achieve stabilisation in the near future.	Most leasing activity is within projections; however, stabilisation will not occur for some time.	Market rents do not meet expectations. Despite achieving target occupancy rate, cash flow coverage is tight due to disappointing revenue.
(c) For construction phase.	The property is entirely pre-leased through the tenor of the loan or pre-sold to an investment grade tenant or buyer, or the bank has a binding commitment for take-out financing from an investment-grade lender.	The property is entirely pre-leased or pre-sold to a creditworthy tenant or buyer, or the bank has a binding commitment for permanent financing from a creditworthy lender.	Leasing activity is within projections but the building may not be pre-leased and there may not exist a take-out financing. The bank may be the permanent lender.	The property is deteriorating due to cost overruns, market deterioration, tenant cancellations or other factors. There may be a dispute with the party providing the permanent financing.

	Strong	Good	Satisfactory	Weak
Asset characteristics				
Location.	Property is located in highly desirable location that is convenient to services that tenants desire.	Property is located in desirable location that is convenient to services that tenants desire.	The property location lacks a competitive advantage.	The property's location, configuration, design and maintenance have contributed to the property's difficulties.
Design and condition.	Property is favoured due to its design, configuration, and maintenance, and is highly competitive with new properties.	Property is appropriate in terms of its design, configuration and maintenance. The property's design and capabilities are competitive with new properties.	Property is adequate in terms of its configuration, design and maintenance.	Weaknesses exist in the property's configuration, design or maintenance.
Property is under construction.	Construction budget is conservative and technical hazards are limited. Contractors are highly qualified.	Construction budget is conservative and technical hazards are limited. Contractors are highly qualified.	Construction budget is adequate and contractors are ordinarily qualified.	Project is over budget or unrealistic given its technical hazards. Contractors may be under qualified.
Strength of sponsor/developer				
Financial capacity and willingness to support the property.	The sponsor/developer made a substantial cash contribution to the construction or purchase of the property. The sponsor/developer has substantial resources and limited direct and contingent liabilities. The sponsor/developer's properties are diversified geographically and by property type.	The sponsor/developer made a material cash contribution to the construction or purchase of the property. The sponsor/developer's financial condition allows it to support the property in the event of a cash flow shortfall. The sponsor/developer's properties are located in several geographic regions.	The sponsor/developer's contribution may be immaterial or non-cash. The sponsor/developer is average to below average in financial resources.	The sponsor/developer lacks capacity or willingness to support the property.
Reputation and track record with similar properties.	Experienced management and high sponsors' quality. Strong reputation and lengthy and successful record with similar properties.	Appropriate management and sponsors' quality. The sponsor or management has a successful record with similar properties.	Moderate management and sponsors' quality. Management or sponsor track record does not raise serious concerns.	Ineffective management and substandard sponsors' quality. Management and sponsor difficulties have contributed to difficulties in managing properties in the past.
Relationships with relevant real estate actors.	Strong relationships with leading actors such as leasing agents.	Proven relationships with leading actors such as leasing agents.	Adequate relationships with leasing agents and other parties providing important real estate services.	Poor relationships with leasing agents and/or other parties providing important real estate services.

	Strong	Good	Satisfactory	Weak
Security package				
Nature of lien.	Perfected first lien.(a)	Perfected first lien.(a)	Perfected first lien.(a)	Ability of lender to foreclose is constrained.
Assignment of rents (for projects leased to long-term tenants).	The lender has obtained an assignment. They maintain current tenant information that would facilitate providing notice to remit rents directly to the lender, such as a current rent roll and copies of the project's leases.	The lender has obtained an assignment. They maintain current tenant information that would facilitate providing notice to the tenants to remit rents directly to the lender, such as current rent roll and copies of the project's leases.	The lender has obtained an assignment. They maintain current tenant information that would facilitate providing notice to the tenants to remit rents directly to the lender, such as current rent roll and copies of the project's leases.	The lender has not obtained an assignment of the leases or has not maintained the information necessary to readily provide notice to the building's tenants.
Quality of the insurance coverage.	Appropriate.	Appropriate.	Appropriate.	Substandard.

(a) Lenders in some markets extensively use loan structures that include junior liens. Junior liens may be indicative of this level of risk if the total LTV inclusive of all senior positions does not exceed a typical first loan LTV.

Table 3 Supervisory rating grades for object finance exposures

	Strong	Good	Satisfactory	Weak
Financial strength				
Market conditions.	Demand is strong and growing, strong entry barriers, low sensitivity to changes in technology and economic outlook.	Demand is strong and stable. Some entry barriers, some sensitivity to changes in technology and economic outlook.	Demand is adequate and stable, limited entry barriers, significant sensitivity to changes in technology and economic outlook.	Demand is weak and declining, vulnerable to changes in technology and economic outlook, highly uncertain environment.
Financial ratios (debt service coverage ratio and loan to value ratio).	Strong financial ratios considering the type of asset. Very robust economic assumptions.	Strong/acceptable financial ratios considering the type of asset. Robust project economic assumptions.	Standard financial ratios for the asset type.	Aggressive financial ratios considering the type of asset.
Stress analysis.	Stable long-term revenues, capable of withstanding severely stressed conditions through an economic cycle.	Satisfactory short-term revenues. Loan can withstand some financial adversity. Default is only likely under severe economic conditions.	Uncertain short-term revenues. Cash flows are vulnerable to stresses that are not uncommon through an economic cycle. The loan may default in a normal downturn.	Revenues subject to strong uncertainties; even in normal economic conditions the asset may default, unless conditions improve.
Market liquidity.	Market is structured on a worldwide basis; assets are highly liquid.	Market is worldwide or regional; assets are relatively liquid.	Market is regional with limited prospects in the short term, implying lower liquidity.	Local market and/or poor visibility. Low or no liquidity, particularly on niche markets.
Political and legal environment				
Political risk, including transfer risk.	Very low; strong mitigation instruments, if needed.	Low; satisfactory mitigation instruments, if needed.	Moderate; fair mitigation instruments.	High; no or weak mitigation instruments.
Legal and regulatory risks.	Jurisdiction is favourable to repossession and enforcement of contracts.	Jurisdiction is favourable to repossession and enforcement of contracts.	Jurisdiction is generally favourable to repossession and enforcement of contracts, even if repossession might be long and/or difficult.	Poor or unstable legal and regulatory environment. Jurisdiction may make repossession and enforcement of contracts lengthy or impossible.
Transactions characteristics				
Financing term compared to the economic life of the asset.	Full payout profile/minimum balloon. No grace period.	Balloon more significant, but still at satisfactory levels.	Important balloon with potentially grace periods.	Repayment in fine or high balloon.
Operating risk				
Permits/licensing.	All permits have been obtained; asset meets current and foreseeable safety regulations.	All permits obtained or in the process of being obtained; asset meets current and foreseeable safety regulations.	Most permits obtained or in process of being obtained, outstanding ones considered routine, asset meets current safety regulations.	Problems in obtaining all required permits, part of the planned configuration and/or planned operations might need to be revised.
Scope and nature of O&M contracts.	Strong long-term O&M contract, preferably with contractual performance incentives, and/or O&M reserve accounts (if needed).	Long-term O&M contract, and/or O&M reserve accounts (if needed).	Limited O&M contract or O&M reserve account (if needed).	No O&M contract: risk of high operational cost overruns beyond mitigants.
Operator's financial strength, track record in managing the asset type and capability to remarket asset when it comes off-lease.	Excellent track record and strong remarketing capability.	Satisfactory track record and remarketing capability.	Weak or short track record and uncertain remarketing capability.	No or unknown track record and inability to remarket the asset.

	Strong	Good	Satisfactory	Weak
Asset characteristics				
Configuration, size, design and maintenance (ie age, size for a plane) compared to other assets on the same market.	Strong advantage in design and maintenance. Configuration is standard such that the object meets a liquid market.	Above average design and maintenance. Standard configuration, maybe with very limited exceptions — such that the object meets a liquid market.	Average design and maintenance. Configuration is somewhat specific, and thus might cause a narrower market for the object.	Below average design and maintenance. Asset is near the end of its economic life. Configuration is very specific; the market for the object is very narrow.
Resale value.	Current resale value is well above debt value.	Resale value is moderately above debt value.	Resale value is slightly above debt value.	Resale value is below debt value.
Sensitivity of the asset value and liquidity to economic cycles.	Asset value and liquidity are relatively insensitive to economic cycles.	Asset value and liquidity are sensitive to economic cycles.	Asset value and liquidity are quite sensitive to economic cycles.	Asset value and liquidity are highly sensitive to economic cycles.
Strength of sponsor				
Operator's financial strength, track record in managing the asset type and capability to remarket asset when it comes off-lease	Excellent track record and strong remarketing capability.	Satisfactory track record and remarketing capability.	Weak or short track record and uncertain remarketing capability.	No or unknown track record and inability to remarket the asset.
Sponsors' track record and financial strength.	Sponsors with excellent track record and high financial standing.	Sponsors with good track record and good financial standing.	Sponsors with adequate track record and good financial standing.	Sponsors with no or questionable track record and/or financial weaknesses.
Security package				
Asset control.	Legal documentation provides the lender effective control (eg a first perfected security interest, or a leasing structure including such security) on the asset, or on the company owning it.	Legal documentation provides the lender effective control (eg a perfected security interest, or a leasing structure including such security) on the asset, or on the company owning it.	Legal documentation provides the lender effective control (eg a perfected security interest, or a leasing structure including such security) on the asset, or on the company owning it.	The contract provides little security to the lender and leaves room to some risk of losing control on the asset.
Rights and means at the lender's disposal to monitor the location and condition of the asset.	The lender is able to monitor the location and condition of the asset, at any time and place (regular reports, possibility to lead inspections).	The lender is able to monitor the location and condition of the asset, almost at any time and place.	The lender is able to monitor the location and condition of the asset, almost at any time and place.	The lender's ability to monitor the location and condition of the asset is limited.
Insurance against damages.	Strong insurance coverage including collateral damages with top quality insurance companies.	Satisfactory insurance coverage (not including collateral damages) with good quality insurance companies.	Fair insurance coverage (not including collateral damages) with acceptable quality insurance companies.	Weak insurance coverage (not including collateral damages) or with weak quality insurance companies.

Table 4 Supervisory rating grades for commodities finance exposures

	Strong	Good	Satisfactory	Weak
Financial strength				
Degree of over-collateralisation of trade.	Strong.	Good.	Satisfactory.	Weak.
Political and legal environment				
Country risk.	No country risk.	Limited exposure to country risk (in particular, offshore location of reserves in an emerging country).	Exposure to country risk (in particular, offshore location of reserves in an emerging country).	Strong exposure to country risk (in particular, inland reserves in an emerging country).
Mitigation of country risks.	Very strong mitigation: Strong offshore mechanisms. Strategic commodity. 1st class buyer.	Strong mitigation: Offshore mechanisms. Strategic commodity. Strong buyer.	Acceptable mitigation: Offshore mechanisms. Less strategic commodity. Acceptable buyer.	Only partial mitigation: No offshore mechanisms. Non-strategic commodity. Weak buyer.
Asset characteristics				
Liquidity and susceptibility to damage.	Commodity is quoted and can be hedged through futures or OTC instruments. Commodity is not susceptible to damage.	Commodity is quoted and can be hedged through OTC instruments. Commodity is not susceptible to damage.	Commodity is not quoted but is liquid. There is uncertainty about the possibility of hedging. Commodity is not susceptible to damage.	Commodity is not quoted. Liquidity is limited given the size and depth of the market. No appropriate hedging instruments. Commodity is susceptible to damage.
Strength of sponsor				
Financial strength of trader.	Very strong, relative to trading philosophy and risks.	Strong.	Adequate.	Weak.
Track record, including ability to manage the logistic process.	Extensive experience with the type of transaction in question. Strong record of operating success and cost efficiency.	Sufficient experience with the type of transaction in question. Above average record of operating success and cost efficiency.	Limited experience with the type of transaction in question. Average record of operating success and cost efficiency.	Limited or uncertain track record in general. Volatile costs and profits.
Trading controls and hedging policies.	Strong standards for counterparty selection, hedging, and monitoring.	Adequate standards for counterparty selection, hedging, and monitoring.	Past deals have experienced no or minor problems.	Trader has experienced significant losses on past deals.
Quality of financial disclosure.	Excellent.	Good.	Satisfactory.	Financial disclosure contains some uncertainties or is insufficient.
Security package				
Asset control.	First perfected security interest provides the lender legal control of the assets at any time if needed.	First perfected security interest provides the lender legal control of the assets at any time if needed.	At some point in the process, there is a rupture in the control of the assets by the lender. The rupture is mitigated by knowledge of the trade process or a third party undertaking as the case may be.	Contract leaves room for some risk of losing control over the assets. Recovery could be jeopardised.
Insurance against damages.	Strong insurance coverage including collateral damages with top quality insurance companies.	Satisfactory insurance coverage (not including collateral damages) with good quality insurance companies.	Fair insurance coverage (not including collateral damages) with acceptable quality insurance companies.	Weak insurance coverage (not including collateral damages) or with weak quality insurance companies.

Appendix B: Model change pro-forma required when notifying changes to a ratings system

The pro-forma that should be used for notifying the PRA of model changes under Delegated Regulation (EU) No 529/2014 as amended by Delegated Regulation (EU) No 2015/942, and instructions on its completion, can be found at: https://www.bankofengland.co.uk/-/media/boe/files/prudential-regulation/authorisations/capital-requirements-regulation-permissions/pro-forma-for-notification-of-changes-to-irb-imm-ima-permissions-under-crr.pdf.

Appendix C: Wholesale LGD and EAD framework

19.19 The following framework should be used to assess wholesale LGD models in the circumstances set out in paragraph 13.15 of this supervisory statement:

a) For unsecured recoveries, if a firm has fewer than 20 relevant default observations of recoveries in a specific country for an individual type of exposure, then the maximum recovery a firm can assume must be equivalent to that which would give a 45% LGD for senior unsecured exposures, 75% for subordinated exposures and 11.25% for covered bonds.

b) If a firm is taking account of non-financial collateral which is not eligible under the foundation approach, where they do not have 20 or more relevant data points of recovery values for that type of collateral or do not have a reliable time series of market price data for the collateral in a specific country, then the LGD for the exposure to which the collateral is applied must be floored at 45%.

c) If a firm is taking account of non-financial collateral, which is eligible under the foundation approach, where they do not have 20 or more relevant data points of recovery values for that type of collateral or do not have a reliable time series of market price data for that collateral in a specific country, then the LGD for the exposure to which the collateral is applied must be floored at 35%.

19.20 Firms should note the following when applying the framework to LGD models:

a) The 20 or more relevant data points can include internal or external data, however the PRA expects firms to ensure that each data point is independent, representative and an accurate record of the recovery for that exposure or collateral type in that specific country.

b) We would anticipate firms being able to use market price data within the framework where they have fewer than 20 defaults only in exceptional circumstances. As a minimum, firms would need to demonstrate that the market price data being used is representative of their collateral and that it is over a long enough time period to ensure that an appropriate downturn and forced sale haircut can be estimated.

c) The framework does not affect the use of financial collateral.

d) The framework does not affect the use of unfunded credit protection.

e) Where a model takes account of multiple collateral types, if this only includes collateral that is eligible under the foundation approach then LGDs must be floored at 35%, and if any collateral type is not eligible under the foundation approach then LGDs must be floored at 45%.

f) The effect of this framework is to floor bank and non-bank financial institution (NBFI) exposures at foundation values unless sufficient country-specific recovery data is available. This floor should be applied where the exposures are to types of banks and NBFIs that are not sufficiently represented in the available historic data (eg if the historic recovery data only relates to small banks then the floor will affect large banks).

g) When applying the framework the PRA expects firms to assess whether the 11.25% LGD floor for covered bonds is sufficient given the quality of the underlying assets.

19.21 Firms should select the most appropriate of the following three options when using the framework to assess wholesale EAD models in the circumstances set out in paragraph 14.8 of this supervisory statement:

a) Rank-order the off balance sheet product types (separately for lending and trade finance) according to their drawdown risk. The EAD parameter for a product with 20 or more default observations can then be applied to low-default products with a lower drawdown risk; or

b) For product types where the firm has the defaults needed to estimate the EAD for committed credit lines (or an estimate derived from the option above) but fewer than 20 defaults for uncommitted credit lines, use 50% of the committed credit line conversion factor as an estimate of the uncommitted credit line conversion factor; or

c) Apply the foundation parameters.

19.22 Firms should note the following when applying the framework to EAD models:

a) Firms may select more than one option when applying the framework providing that they can demonstrate that their chosen combination is appropriate, reflecting their particular mix of products and risks, and is not selected in order to minimise their capital requirements.

b) As we believe that the EAD experienced by firms is dependent on their own credit management processes we would expect only internal data to be used to estimate EAD. However, where firms can convincingly demonstrate to the PRA's satisfaction that the credit processes are consistent across countries then we would accept that data sourced from these countries could be combined to estimate the EAD for each product (ie the 20 default data points do not have to be country specific for the purposes of estimating EAD).

c) Firms using the option in paragraph 22.3(a) above should be able to demonstrate that a sufficiently robust approach has been taken to rank-ordering their product types by drawdown risk. This approach must be fully documented and assessed by an independent reviewer.

Annex: Summary of updates to SS11/13

SS11/13 was first published in December 2013 following CP4/13 'Credit risk: internal ratings based approaches'[14] and SS1/13 'Credit risk: internal ratings based approaches'.[15] SS11/13 supersedes SS1/13.

This annex details changes made to this SS following its initial publication in December 2013.

2019

6 March 2019

Following PS7/19 'Credit risk: definition of default',[16] the PRA updated its expectations in Chapter 11 on the definition of default regarding:

(i) the removal of the PRA's exercise of the discretion to use 180 days instead of 90 days in the 'days past due component of the definition of default for exposures secured by residential, or small and medium sized enterprise (SME) commercial real estate in the retail exposure class and/or exposures to public sector entities (PSEs);

(ii) the expectation that firms comply with the EBA's Guidelines on the application of the definition of default;

(iii) the use of lower materiality thresholds as an indicator of unlikeliness to pay for non-retail exposure classes;

(iv) the return to performing status; and

(v) unlikeliness to pay: distressed restructuring.

The updates apply from Thursday 31 December 2020. This SS was also updated to simplify the formatting and aid readability, including sequential numbering of footnotes, the updating of hyperlinks to reflect the location of materials on the Bank of England's website, and to make hyperlinks more easily identifiable.

2017

3 October 2017

Following PS23/17 'Internal Rating Based (IRB) approach: clarifying PRA expectations',[17] the PRA updated its expectations for IRB model applicants regarding:

(i) prior experience of using the IRB approach (paragraphs 10.6A – 10.6D);

(ii) the use of external data in the estimation of Probability of Default (PD) (paragraphs 12.37 – 12.40);

14 March 2013: https://www.bankofengland.co.uk/prudential-regulation/publication/2013/credit-risk-internal-ratings-based-approaches.
15 August 2013: https://www.bankofengland.co.uk/prudential-regulation/publication/2013/credit-risk-internal-ratings-based-approaches-ss.
16 March 2019: https://www.bankofengland.co.uk/prudential-regulation/publication/2018/credit-risk-the-definition-of-default.
17 October 2017: https://www.bankofengland.co.uk/prudential-regulation/publication/2017/internal-ratings-based-approach-clarifying-pra-expectations.

(iii) the use of external data in the estimation of Loss Given Default (LGD) (paragraphs 13.17A – 13.17F); and

(iv) the use of two reference points for estimating Probability of Possession Given Default (PPGD) for residential mortgages for firms that lack significant possession data (paragraphs 13.23 – 13.26).

19 June 2017

Following PS13/17 'Residential mortgage risk weights'[18] the PRA amended its expectations regarding residential mortgage rating systems. This included an expectation that for the PD models firms would move away from the PiT and variable scalar approaches and instead adopt a calibration that assumes that model cyclicality does not exceed 30%. For the LGD models the expectation is that firms should apply an assumption for the fall in the value of a property due to house price deflation of at least 25%.

Specifically, these amendments have resulted in new paragraphs 10.14-10.19, 10.21, 12.4-12.7, 12.10, 16.2 and 17.4-17.5, as well as changes to paragraphs 12.3 and 13.8. Paragraphs 12.14-12.27 have also been amended and where appropriate deleted to reflect the revised expectations.

The statement was renumbered to accommodate the insertion of the above paragraphs.

2015

11 November 2015

The PRA updated this statement to remove expectations that had been superseded by decisions or technical standards adopted by the European Commission.

Specifically, those expectations relating to third country equivalence have been deleted and expectations for the notification of changes to IRB rating systems have been amended[19]. A reference to form FSA004 has been deleted. Paragraphs 3.1 and 3.2 have been deleted, as have paragraphs 19.1-19.12, 19.14 and 19.15. Paragraph 19.18 has been amended.

The model change notification pro-forma in Appendix B, which has also been updated to align with relevant regulation, has been removed from this statement and can now be accessed via the PRA's webpages using the link provided.

Finally, various typographical errors were corrected throughout this statement.

18 June 2017: https://www.bankofengland.co.uk/prudential-regulation/publication/2016/residential-mortgage-risk-weights.
19 See instead, Delegated Regulation (EU) No 529/2014 as amended by Delegated Regulation (EU) No 2015/942.