

**Bank of England PRA**

# Industry Roundtable IRB Wholesale

**15 July 2024**



# Opening

## Scope

- IRB models used to calculate capital requirements.

## Background

- PRA review of IRB models for retail and wholesale exposures highlighted cross-firm modelling issues.
- Industry participants have requested further clarification on specific topics to support their remediation efforts.
- To facilitate this, roundtables are proposed and organised into specific portfolios / themes to facilitate a focussed discussion.

## Purpose

- Increase dialogue between PRA and firms on practical challenges in developing compliant IRB models.
- PRA to provide further clarifications on specific topics as requested by the industry and highlight any additional cross-firm modelling issues.

## Terms of Engagement

- This presentation does not set new PRA expectations.
- This presentation is not a detailed list of all modelling issues. Clarifications provided are specific to the issues noted and merely following those does not guarantee approval as the review also takes into consideration appropriateness of the model overall and decisions are taken based on an assessment of compliance with the applicable requirements.
- Examples are stylised and aim to illustrate modelling issues and facilitate discussion. They are not step by step instructions.

# Agenda

Topic	Industry question	PRA observation	Time (approximate)
<b>Opening:</b> <i>Background, purpose and terms of engagement</i>			10m
<b>Session 1: Wholesale PD – Risk differentiation</b> <i>PRA to provide clarifications to industry questions and highlight common modelling issues, in the following areas:</i> <ul style="list-style-type: none"> <li>○ <i>Model redevelopment regulatory considerations</i></li> <li>○ <i>Data coverage for historical stress period</i></li> <li>○ <i>Choice of target variable</i></li> <li>○ <i>Model performance assessment</i></li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> <li>✓</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> </ul>	30m
<b>Session 2: Wholesale PD – Calibration</b> <i>PRA to provide clarifications to industry questions and highlight common modelling issues, in the following areas:</i> <ul style="list-style-type: none"> <li>○ <i>Low Default Portfolio (LDP) calibration</i></li> <li>○ <i>Cycle length and long run average default rate (LRA DR)</i></li> <li>○ <i>Master rating scale for wholesale portfolios</i></li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> </ul>	<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> </ul>	30m
Comfort break			10m
<b>Session 3: Wholesale IRB - Other</b> <i>PRA to highlight most common issues in the following areas:</i> <ul style="list-style-type: none"> <li>○ <i>Model complexity and margins of conservatism</i></li> <li>○ <i>Model scope / segmentation for corporate exposures</i></li> </ul>		<ul style="list-style-type: none"> <li>✓</li> <li>✓</li> </ul>	20m
<b>Future engagement and next steps</b>			10m
Close			10m



# Wholesale PD – Risk differentiation

- Model redevelopment regulatory considerations
- Data coverage for historical stress period
- Choice of target variable
- Model performance assessment

# Wholesale PD – Risk differentiation

## Model redevelopment regulatory considerations

*Industry question: Given there is little 'IRB repair' regulation (i.e. the IRB Roadmap) related to risk rank models, do risk ranking element of IRB models need to be redeveloped if the incumbent (previously PRA approved) risk ranking model is performing appropriately and was developed using data covering historical period of stress such as global financial crisis (GFC)?*

- No. The PRA does not expect firms to redevelop ranking models where incumbent models are compliant with all relevant regulation and performing appropriately.
- Based on the IRB Roadmap wholesale PD model submissions, we observe that some of the model changes have been well underway before the IRB Roadmap and in many cases a detailed re-assessment triggered by the regulation led to firms identifying areas to improve their ranking models. The primary reasons cited by firms for redevelopment of ranking models are:
  - a) Remediation of long-standing regulatory non-compliance / reduce reliance on external models.
  - b) Models landscape simplification / change in business model.
  - c) Address existing model weaknesses / reduce the model override rate.
  - d) Improve model performance using more representative and richer data available (in particular, for models built pre-GFC).
  - e) Model change triggered due to feedback from home / host regulator other than the PRA.

# Wholesale PD – Risk differentiation

## Data coverage for historical stress period

*Industry question: For risk rank development, does the model development (driver selection) need to cover a historical period of stress (GFC), or is it sufficient to develop on a recent period and only validate the ranking model on a historical period of stress?*

- Firms do not necessarily need to use data from an economic downturn to develop the rank-ordering part of their model. When determining the development sample period for risk ranking models, it is important to strike a balance in terms of representativeness of the development data to the range of application of the model, sufficiency of defaults and variability of the key risk drivers under different economic conditions.
- Firms do however need to assess the performance of their model during a downturn period to determine whether the model results in a meaningful differentiation of risk.
- This assessment should be driven by data where it is available; however, it may be appropriate to supplement quantitative analysis with expert judgment where data is more limited (e.g. to assess the performance of qualitative factors, or where firms have more limited data histories due to not having used the IRB approach during previous economic downturns).

# Wholesale PD – Risk differentiation

## Choice of target variable

*Industry question: What are the expectations in terms of target variable for wholesale (wave 1<sup>a</sup>) portfolios: are internal default, external default, agency rating and expert rank all permissible / preferred?*

- In principle, any of these approaches could be acceptable; however, firms need to take all relevant information into account in assigning obligors to rating grades.
- In practice, this means that firms should usually adopt the following approaches:
  - Default predictor models for default-rich portfolios.
  - Shadow rating models targeting external rating rank for default-scarce portfolios with sufficient external agency rating coverage.
  - Shadow rating models targeting expert rating rank for default-scarce portfolios without sufficient external agency rating coverage.
- The choice of the target variable should also guide additional tests required to evidence compliance, e.g. a shadow rating model developed with external agency ranking should be thoroughly tested for acceptable performance on externally unrated obligors if these are part of the range of application of the model.

<sup>a</sup> Wave 1 refers to wholesale exposures covering small, mid, large corporates and financial institutions.

# Wholesale PD – Risk differentiation

## Model performance assessment

*PRA observation: Model discriminatory power not tested or inadequate for material segments of the application portfolio is resulting in firms struggling to meet CRR 144(1)(a) requirement.*

- In accordance with Article 144(1)(a) of the CRR, firms’ rating systems must provide for a meaningful differentiation of risk. To comply with this requirement, we expect that PD models should perform adequately on material segments in the range of application of the model.
- Below is a non-exhaustive list of segments typically observed in SME, Mid / Large Corporates and Banks portfolios. Depending on firm’s portfolio, an assessment of model performance should be undertaken for the segments that are material.

<b>SME</b>	<b>Mid and Large Corporates</b>	<b>Banks</b>
- Size	- Size	- Size
- Industry	- Industry	- Country / Region
- Past delinquency	- Country <sup>b</sup> / Region	- Externally Rated / Unrated
	- Externally Rated / Unrated	

<sup>b</sup> For mid corporate PD models, firms should assess against PRA SS11/13 12.28-12.31 expectations.





# Wholesale PD – Calibration

- Low Default Portfolio (LDP) calibration
- Cycle length and long run average default rate (LRA DR)
- Master rating scale for wholesale portfolios

# Wholesale PD – Calibration

## Low Default Portfolio (LDP) calibration

*Industry question: Is the PRA open to use of alternative LDP approaches, other than Pluto Tasche and under what circumstances they would consider them acceptable?*

- Firms may use alternative LDP approaches other than Pluto Tasche, however where relevant we may benchmark the estimates against those derived using Pluto Tasche approach.

*Industry question: Could the PRA provide further clarification on the relationship between the SS11/13 12.34 requirement for conservative PD estimates for low default portfolios and the margin of conservatism for general estimation error would be helpful. There seems to be an overlap in these requirements and the simultaneous application of both requirements would overstate the uncertainty for general estimation error.*

- To the extent that estimates of PD determined under SS11/13 12.34<sup>c</sup> encompass the general estimation error (MoC C) there is no need to apply an additional MoC C to PD estimates.
- As a general approach, any biases in PD quantification stemming from data and methodological deficiencies should be corrected at source / input level to the extent possible with appropriate adjustments. Margin of Conservatism (MoC) should be added to reflect the uncertainty associated with these adjustments.

<sup>c</sup> PRA SS11/13 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 (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.”

# Wholesale PD – Calibration

## Low Default Portfolio (LDP) calibration

*PRA observation: Use of non-prudent modelling assumptions / calibration approaches is resulting in firms struggling to meet SS11/13 12.34 expectations.*

We observe that firms often struggle to meet the SS11/13 12.34 requirement because of the following reasons:

- Relying on non-representative external data to derive PD estimates instead of using an approach that meets SS11/13 12.34 expectations.
- Inappropriate choice of input parameters when applying Pluto Tasche approach which inadvertently result in non-conservative PD estimates, e.g. assuming intertemporal independence of the default events; use of all available years / extended observation period (instead of a complete cycle), using the sum of all obligors across the LRA DR time window.
- Lack of appropriate adjustments / conservatism to mitigate methodological limitations when applying Pluto Tasche approach e.g. for portfolios with significantly large number of obligors use of Pluto Tasche inadvertently results in non-conservative PD estimates.
- Use of a non-representative calibration sample when deriving grade level PDs which in effect results in average portfolio PD drift downwards over time and mis-alignment with the LRA DR.

# Wholesale PD – Calibration

## Low Default Portfolio (LDP) calibration

*PRA observation: Use of non-prudent modelling assumptions / calibration approaches is resulting in firms struggling to meet SS11/13 12.34 expectations.*

We have observed firms successfully meeting SS11/13 12.34 expectations by:

- a) Ensuring clear definition and rationale for the choice of input parameters, such as the interdependence between default events for individual obligors, the interdependence between default rates for different years and confidence level.
- b) Selecting a measure of number of obligor-years of the portfolio, which reflects the size of the portfolio and justifying the choice of the number of years from which the sample is drawn.
- c) Undertaking a sensitivity analysis of the resultant estimates to the choice of input parameters of the proposed statistical technique.
- d) Ensuring that the calibration sample used to estimate the grade level PDs is representative of the range of application of the model.
- e) Ensuring that the resultant PD is compliant with CRR 179(1)(f)<sup>d</sup> requirements.

<sup>d</sup> CRR 179(1)(f): “an institution shall add to its estimates a margin of conservatism that is related to the expected range of estimation errors. Where methods and data are considered to be less satisfactory, the expected range of errors is larger, the margin of conservatism shall be larger.”

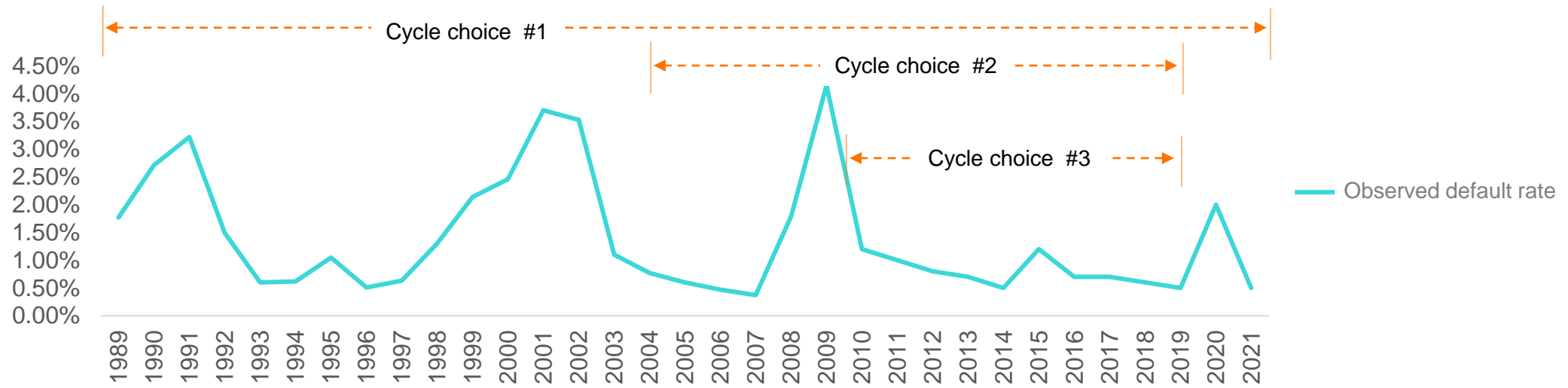
# Wholesale PD – Calibration

## Cycle length and long run average default rate (LRA DR)

*PRA observation: The long-run period (“cycle length”) used to determine the LRA DR should be representative of the likely range of variability of one-year default rates and in particular, the period should contain an appropriate mix of good and bad years. Firms differ significantly in their interpretation of this requirement leading to model mis-calibration.*

Examples of inappropriate modelling choices when defining the long run period using a stylised illustration:

- Cycle choice #1: Cycle length equals all years for which data is available without consideration to appropriate mix of good years and bad years.
- Cycle choice #2: Cycle length is overly representative of benign years.
- Cycle choice #3: Cycle length covers partial cycles such as only the tail of GFC stress event.



# Wholesale PD – Calibration

## Cycle length and long run average default rate (LRA DR)

*PRA observation: The long-run period (“cycle length”) used to determine the LRA DR should be representative of the likely range of variability of one-year default rates and in particular, the period should contain an appropriate mix of good and bad years. Firms differ significantly in their interpretation of this requirement leading to model mis-calibration.*

Firms should make the following considerations when determining cycle length for LRA DR:

- a) Choice of the long run period should be informed by the internal default experience with consideration to macro-economic factors.
- b) The chosen long run period for wholesale portfolios should typically represent one or more complete cycles covering an appropriate mix of good years and bad years (typically supported through peak-to-peak or trough-to-trough assessment).
- c) In terms of “appropriate mix”, firms should ensure that the period does not have an overrepresentation of stress (overly conservative) or benign years (under calibrated).
- d) Ensure that long run period is not automatically updated to incorporate the experience of additional years, as these may lead to an overrepresentation of stress or benign years.
- e) Ensure the chosen long run period is relevant for the overall calibration segment / portfolio and not biased by isolated stress periods observed in bespoke sub-portfolios.
- f) Ensure sufficient analysis / reasoning to justify the differences between the ‘stress periods’ and ‘benign periods’ in the cycle vs. the internal data experience.
- g) Ensure sensitivity analysis is performed to measure the impact of incremental changes to the start and end dates of the chosen long run period.

# Wholesale PD – Calibration

## Master rating scale for wholesale portfolios

*Industry question: Is the use of Master Rating Scales still appropriate for Wholesale portfolios or does PRA expect bespoke grading scales per portfolio?*

- Use of master rating scales can still be appropriate. One advantage of using master rating scales for wholesale portfolios is that they create a common language of risk, the meaning of the individual rating grades is thus identical across portfolios and the processes in the firm can be set up consistently.

*Industry question: Does the PRA have any appetite to change rating master scales to introduce further granularity/ensure appropriate risk differentiation/avoid undue concentrations?*

- Firms should use an appropriate number of grades in their master rating scale, taking into account factors such as concentrations within grades, model performance and model use considerations.
- While increasing the number of grades can potentially result in more accurate RWAs, the PRA considers that this is only justified where the extra grades result in a genuine increase in risk capture.



## Wholesale IRB – Other

- Model complexity and margins of conservatism
- Model scope / segmentation for corporate exposures



# Wholesale IRB – Other

## Model complexity and margins of conservatism

### PRA observation:

- *The firms' use of margins of conservatism (MoC) to mitigate fundamental data and methodological deficiencies is not in line with the intended use of MoCs.*
- *PRA has also observed a high degree of complexity in firms' estimation of MoC. Whilst we understand the need for complexity in certain cases, we often observe lack of detail explaining the methodology, assumptions and limitations and a lack of evidence that modelled outputs remain appropriate and prudent as a result.*

### Examples of non-prudent modelling practices:

- MoC used as a mitigation for breakdown in model discriminatory power after a material change in model scope or change in definition of default, instead of remediating the root cause e.g. missing risk drivers or model mis-specification.
- MoC applied using a dynamic re-estimation approach and coupled with use of manual optimization processes, which in effect may lead to volatile PD estimates and introduce implementation and operational complexity.
- MoC estimated using novel approaches, such as grade compression by artificially adjusting model accuracy ratio which uplift the portfolio PD but in effect result in counterintuitive grade migration, i.e. high risk obligors migrating to better grades and low risk obligors penalised.

- To the extent possible, firms should address data and methodology limitations at source and supplement with MoCs (where applicable) to reflect uncertainty in those adjustments as opposed to relying solely on use of MoCs.
- Where human judgment is used to a greater extent because of the low number of relevant available observations, firms should apply a higher MoC to their estimates to account for additional uncertainty.
- Review and re-assessment of MoCs should be supported by sufficient analysis and reviewed through appropriate governance as opposed to automated dynamic re-estimation.

# Wholesale IRB – Other

## Model scope / segmentation for corporate exposures

*PRA observation: Firms' choice of the model scope for corporate exposures in certain areas is resulting in increased challenges to meet the regulatory requirements.*

PRA has observed that some of the model issues on corporate IRB models are driven by the firms' choice of model scope / segmentation:

- Models with expansive scope – Where the model aims to cover a wide range of corporate exposures, firms should undertake a thorough assessment of the appropriateness of the model for material segments. In particular, we have observed firms struggling to satisfy regulatory requirements when exposures to the following obligor segments are combined into a single ranking model:
  - Externally rated and unrated corporates e.g. a model developed solely using externally rated entities (typically large size corporates) without sufficient consideration to unrated entities (relatively smaller size corporates) and how the range and relevance of risk drivers differ between the two segments.
  - Mid and large size corporates e.g. a single ranking model covering obligors with turnover in the £50m-£500b range.
  - Mid-size corporates spanning multiple developed and developing regions and countries.
- Models with overly granular / niche scope – When deciding to develop standalone ranking models for sub-portfolios, firms should ensure that sufficient data is available not just to develop the initial model but also to facilitate robust analysis to evidence compliance with regulatory requirements.
- Models with overlapping scope – Firms should ensure that there are no overlaps in the range of application of different PD models and that each obligor to which the IRB approach should be applied can be clearly assigned to one particular PD model.



# Future engagement and next steps

