Just in Time

EBA Supervisory Handbook on the Validation of Rating Systems Under the Internal Ratings-Based Approach

Part 1 - Focus on Risk Differentiation and Risk Quantification

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At a Glance

Keywords: EBA, Credit Risk, IRB Models, Model Validation

Executive Summary

- In August 2023, the **European Banking Authority (EBA)** published its ***Supervisory handbook on the validation of rating systems under the Internal-Ratings Based approach*** (EBA/REP/2023/29).
- The handbook provides an **overview of the validation framework** and describes the **elements where the Validation function is expected to form an opinion**. It covers both the tasks related to the **model performance assessment** as well those dealing with the **modelling environment**, such as data quality and model implementation assessment.
- With the publication of the handbook, the EBA aims to achieve **harmonised supervisory understanding and supervisory practices** and to **promote convergence on Competent Authorities (CA) approaches** by providing **good and best practices** for a sound IRB validation.
- The present publication is organized in **two parts**. The first one, presented in this document, provides an **overview of the background and objectives** of the EBA supervisory handbook, and describes the main elements on which the Validation function is expected to form an opinion when performing its **validation tasks on IRB models**, focusing on the assessment of the **risk differentiation** and **risk quantification** phase. A second document will follow in the upcoming weeks, with a focus on the assessments the Validation function should perform on **other specific points** and on the **modelling environment**, as well as on **specific challenges** for the Validation when dealing with external data, outsourcing and data scarcity.

01

Introduction

Background and Objectives of the EBA Supervisory Handbook

Specificities of the Validation in the Regulatory Framework

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Background and Objectives of the EBA Supervisory Handbook

In August 2023, the **European Banking Authority (EBA)** published *its* ***Supervisory handbook on the validation of rating systems under the Internal-Ratings Based approach***, through which the EBA aims to achieve **harmonised supervisory understanding and supervisory practices** and to promote convergence on Competent Authorities (CA) approaches by providing **good and best practices for a sound IRB validation**.

Background and Legal Status

EBA is mandated to develop a supervisory handbook by **Article 8(1) of EBA Regulation**[1], which states that EBA shall "***develop and maintain an up-to-date Union supervisory handbook on the supervision of financial institutions*** *in the Union which is to set out* ***supervisory best practices and high-quality methodologies and processes*** *and takes into account, inter alia, changing* ***business practices and business models*** *and the* ***size of financial institutions and of markets***". In addition, **Article 29(2)**, of the same Regulation specifies that "*For the purpose of* ***establishing a common supervisory culture****, the Authority shall* ***develop and maintain an up-to-date Union supervisory handbook on the supervision of financial institutions*** *in the Union, which duly* ***takes into account the nature, scale and complexity of risks, business practices, business models*** *and* ***the size of financial institutions and of markets***."

Objectives of the Handbook

The **objective of the EBA supervisory handbook** is to ensure a **robust measurement of credit risk** within the IRB approach and, ultimately, to contribute to **reducing the unjustified variability of *Risk-Weighted Exposure Amount* (*RWEA* or *RWA*)** stemming from different supervisory and bank-specific practices. At the same time, the handbook aims to achieve a **harmonized supervisory understanding** by providing an outline of **best practices**, promoting **convergence of approaches used by Competent Authorities (CAs)**, within both institutions (in terms of **validation frameworks**) and supervisors (in terms of **supervisory practices and expectations**).

1 *Regulation (EU) No 1093/2010 establishing a European Supervisory Authority (European Banking Authority).*

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Specificities of the Validation in the Regulatory Framework

EBA generally defines the **model validation activity** as a **process whose aim is to prevent models from producing inadequate results** by **effectively challenging** them and by **assessing and identifying possible assumptions, limitations and shortcomings**.
However, in the context of **IRB rating systems** and for the purpose of the supervisory handbook, EBA outlines that the definition of model validation entails a **broader set of activities and controls**, whose responsibility falls on **several functions**, each of them with its own perspective.

The IRB validation beyond a model validation

The IRB validation through multiple layers of defence

According to EBA, **the validation of IRB rating systems goes beyond the pure concept of model validation** and shall **not be limited to the proper functioning** of the model from a **statistical perspective**.
As a matter of fact, it also includes the **assessment of data quality**, the **structure of the rating system** and its **correct application** as well as the set of **policies**, **processes** and **procedures** put in place to assess the **accuracy and performance of the rating systems** on the institution-specific portfolios and to verify that the **models used by the institutions work properly**.

The activities related to IRB models' validation are **not exclusively attributable to the Internal Validation function** but follow specific organizational requirements. In particular, the assessment of the model performance is conducted by several functions, each of them with its own perspective. While the **Credit Risk Control Unit (CRCU) is the first function to analyse and validate the model**, a specific **independent Validation function with its own responsibilities is required and essential** to allow for an **objective assessment of the rating systems** by people not involved in the development process. Other activities can fall under the **responsibility of other organizational units**, such as the **Data Quality unit** and **Internal Audit function**, which are however not in scope of the present document.

Focus of the presentation is on the tasks of the Validation function

02

General Principles for the Validation Framework

Scope, Objectives and Tasks of the Validation

Validation Policy and Validation Report

General Principles for the Validation Framework 1/2

Scope, Objectives and Tasks of the Validation

1 Scope and Objectives of the Validation

The internal validation activities should be performed at **each level where a CA has granted approval** for a rating system.
In the case where a rating system is used at **different levels of a group**, the **Validation functions of the involved entities are expected to share their findings**.
The Validation function is expected to **form an opinion** on whether the final rating system meets the regulatory requirements, and to this aim, it is **expected to provide a list of all the deficiencies identified** along with an **assessment of their materiality and severity**, an **assessment of the consequences** of these deficiencies on the performance of the rating system, and an evaluation on the level of confidence in the results of its assessments.
Outcomes of the validation analyses shall be communicated to the senior management and the management body, who are expected to understand the model deficiencies and be able to decide on a remediation action plan.

2 Independence of the Validation Function

As a second layer of defence, the Validation function **should challenge in an independent manner** the choices made by the CRCU during the model development. Independence of the Validation function is crucial to **prevent any conflict of interest** and to **ensure no subordination** in relation to the CRCU, and is guaranteed by **two means**:

- **structural independence**, ensured via an adequate organizational setup;
- **sufficient resource allocation**, i.e., the number, seniority and expertise of the validation staff should be **commensurate with the complexity and materiality** of the rating systems to be validated.

3 Validation Tasks

Institutions shall have **robust systems** in place to **validate the accuracy and consistency of rating systems**, **processes** and the **estimation of relevant risk parameters**, with validation methods **appropriate to the nature**, **complexity** and **range of application** of rating systems and to the **data availability**. This should be done by the Validation function by:

- **Assessing the CRCU's work and related documentation**, reviewing and challenging the steps performed and the decisions made;
- Forming an **opinion on the accuracy and consistency of the rating system** as a whole, also via statistical tests;
- **Reviewing the materiality of all rating systems changes and extensions** and their overall effects;
- **Developing and implementing validation methods and procedures** which should be **consistent** and **meaningful** across rating systems as well as over time.

General Principles for the Validation Framework 2/2

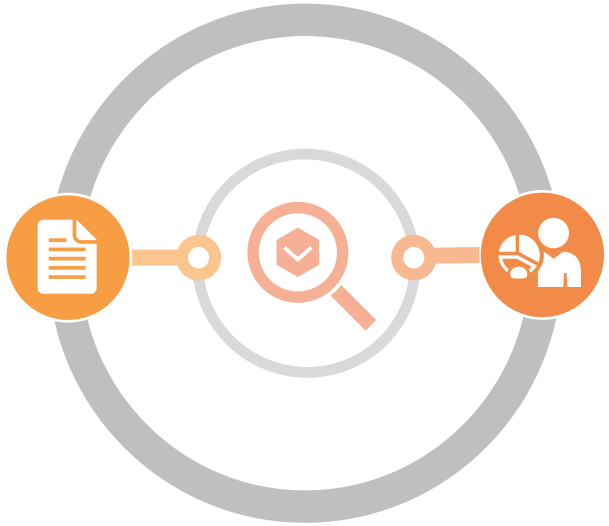
Validation Policy and Validation Report

Two fundamental elements of a sound and robust validation framework are the **validation policy** and the **validation report**. The former documents the **validation framework, roles, responsibilities, processes and content of the validation activities**, while the latter has the goal to **communicate**, in a clear and comprehensive manner, **how the validation policy has been applied to a particular rating system** and the **results of the validation activity**.

Validation Policy

The **validation policy** documents the validation framework, i.e., it defines the **roles, responsibilities, processes and content of the validation activities** that are expected to be performed in a sufficiently precise manner such that a third party can gain a good understanding of the tasks the Validation function will perform. It is expected to include:

- A **description of how the validation forms its opinion on the rating system** and the **aggregation methodologies used across different analyses**;
- A **description of the data collection** and **selection process** underlying the **construction of the validation datasets**;
- The **list of analyses to be performed** and a description of their **purposes**, **limitations**, **scope**, **frequency** and **methodology**, including details on **data preparation, computation, targets and tolerance thresholds** for quantitative analyses;
- The **conditions** under which the **Validation function may leverage on the work performed by the CRCU**;
- The main **content**, **frequency** and **recipients** of the **validation reports**.



Validation Report

The **validation report** structure is left to the Validation function's judgement, so as to **optimise the communication of its opinion**, and is not expected to be harmonized across institutions, nor across different rating systems within the same institution. Nevertheless, it shall at least detail:

- The **rating system version subject to validation**, and a description of the on-going model development activities, as well as an **opinion of the Validation function on the rating system changes**, including their materiality assessment;
- The **relevant tests performed to challenge the rating system** along with a **description of the data preparation steps** and the related **data quality of the validation samples**;
- The **outcomes of the validation analyses** and **clear opinions on the performance of the rating system**, with findings categorized in accordance with their materiality (e.g., **traffic light approach**);
- A **comparison between the latest results of the validation** and **the ones observed in the previous years**.

03

Validation Content

The Validation Cycle: First Validation and On-Going Validation

Assessment of the Core Model Performance

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The Validation Cycle: First Validation and On-Going Validation

Regarding the validation content, the actual tasks to be performed by the Validation function may differ depending on the position in the **validation cycle**, which leads to the distinction between **first validation**, which is the assessment conducted on the rating system **before submitting the application to the Competent Authority (CA)**, and **on-going validation**, which includes the activities to be conducted **after the rating system has been approved by the CA**.

First Validation

The **first validation activities** take place during or subsequently to the model development, to assess the **regulatory compliance** and **performance of the rating system**, in view of receiving approval from the CA. The first validation aims at ensuring:

- the **appropriateness of the rating system** once being used for own funds requirements and internal risk management;
- that the newly developed rating system is **ready for a supervisory assessment**.

An important focus point is then on the **methodological choices** of the CRCU regarding the **model design** and the **risk quantification**, since they are assessed by the Validation function for the first time.

The Validation function is then expected to **assess and challenge the modelling and calibration choices** in a comprehensive and independent manner.

The first validation of the rating system can be used as a **starting point for the on-going validation** and the related validation activities that are required to be conducted after the granting of regulatory approval.

On-going Validation

On-going validation aims at ensuring an **effective challenge** for the **adequate model performance** and **appropriateness of the rating system on an on-going basis**. In this regard, the outcome of the on-going validation will typically be taken into account in the on-going supervisory assessment performed by the CA.

The on-going validation differs from the first validation as it benefits from **additional data** and from **previous conclusions** from the first validation, on which the assessment of the Validation function can be based for some specific tasks. During on-going validation:

- on the empirical side, the Validation function should form an opinion on the **performance of the model over time**, comparing results obtained using latest available data with those observed in the previous periods;
- on the methodological side, the Validation function is expected to **assess the identified deficiencies over time**, i.e., to verify that all planned changes have been implemented;
- in case of a rating system change, the Validation function should **check the materiality of rating system changes** that occurred since its last review.

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Assessment of the Core Model Performance: Overview

The activities the Validation function is expected to perform focus on two main areas: the **assessment of the core performance** of the rating system and the **assessment of modelling environment**. The remainder of the present document focuses on the **risk differentiation** and **risk quantification** aspects of the core model performance assessment, while the assessment of the other specific points and of the modelling environment will be treated in the subsequent publication.

Following the structure defined by **Reg. EU 575/2013 (CRR)**, the **assessment of the core model performance** follows the distinction between **risk differentiation** and **risk quantification**. In addition, **other specific points** must be assessed by the Validation function in terms of performance of the rating system.

RISK DIFFERENTIATION

See slides 13-18

IRB models should allow for a **meaningful differentiation of risk** to ensure grouping of sufficiently homogenous exposures into the same grade or pool. To this end, the Validation function is expected to evaluate the **model's discriminatory power**, as well as the **homogeneity** within and **heterogeneity** across grades or pools.

RISK QUANTIFICATION

See slides 19-26

The Validation function should assess the **compliance of risk estimates with all regulatory requirements**, including a **comparison of realised default rates with estimated PDs** for each grade or pool, and analogous analyses for **LGDs and CFs** (in case of advanced IRB approach). For LGD and CF estimates, this should include an assessment of their **appropriateness for an economic downturn**.

In the context of the assessment of the core model performance, the Validation function is also expected to form an opinion on the **compliance with regulatory requirements of IRB metrics used by the CRCU**. In addition, regarding the **correct implementation of the definition of default (DoD)**, the Validation function is expected to **review the documentation related to the definition of the default** and **related impacts on the RDS**, as it might determine some issues in the model development or risk quantification.

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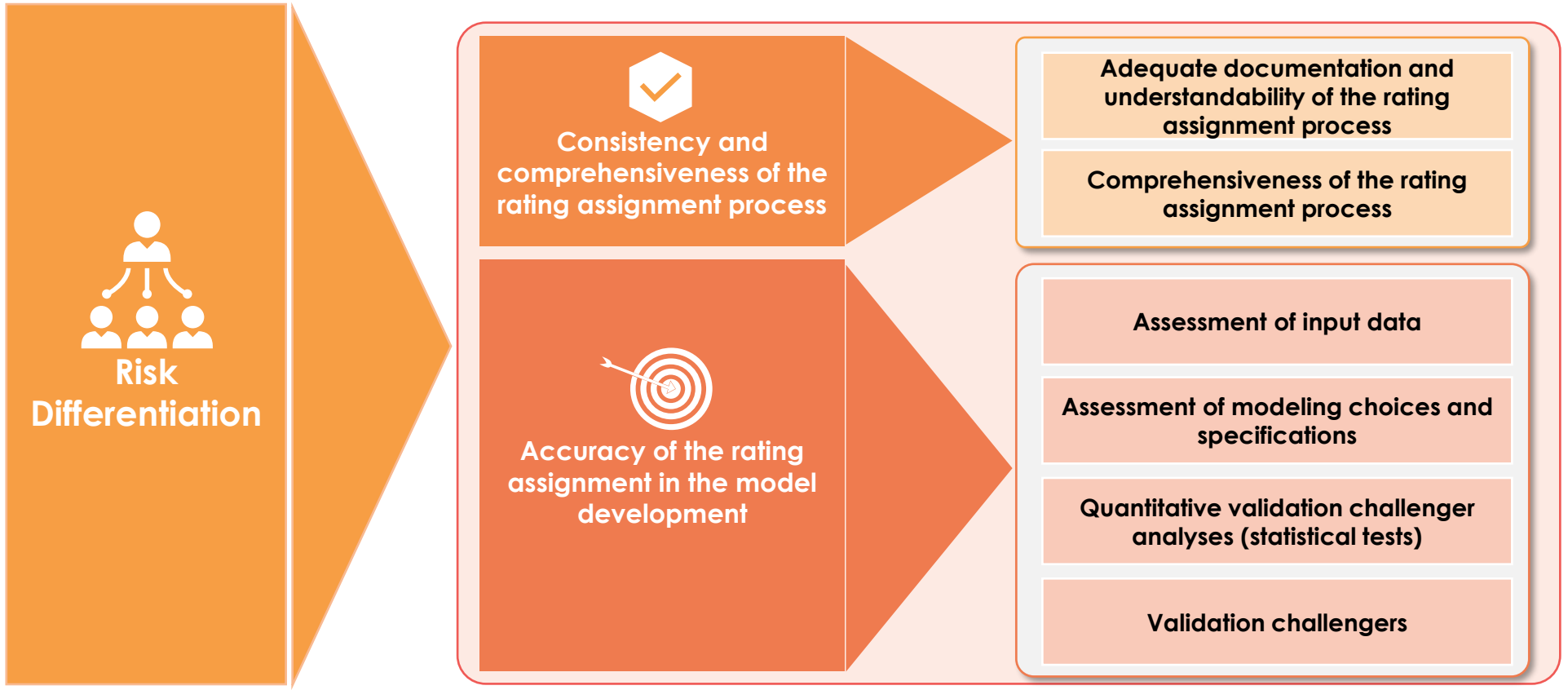
Assessment of the Core Model Performance: Risk Differentiation 1/6

As introduced in the previous slide, the Validation function is expected to evaluate the **risk differentiation** of IRB models, focusing on **two main dimensions**: the **consistency and comprehensiveness of the rating assignment process** and the **accuracy of the rating assignment in the model development**. Each of the two dimensions should be assessed on specific aspects, as illustrated below:



Each of the assessments on the left is presented in more detail in the following slides

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Assessment of the Core Model Performance: Risk Differentiation 2/6

Consistency and comprehensiveness of the rating assignment process

In order to validate the on-going rating assignment process, the Validation function is expected to **review the framework used for the rating assignment process**, such that:

1. The **rating assignment process is adequately documented and understandable** by a third party, such that it can be performed in a **consistent manner**, both in terms of **definition of the scope of application of the rating system** as well as in terms of **definition of rating criteria** (including the assignment to a ranking method and to a calibration segment);
2. The **rating assignment process is performed in a comprehensive manner**. In this regard, the Validation function is expected to **analyse the policy** for the treatment of those **cases where the obligor or facility could not be assigned to an obligor grade or pool based on the 'standard' rating assignment** and **assess the materiality of these cases in the application portfolio**. Such circumstances include **missing ratings** and cases where the assignment was **based on outdated or missing data**, or where the assignment could not be renewed in time (**outdated ratings**).
   A good practice observed in institutions is to make the **assessment of materiality** in terms of **exposure value** and **Risk Weighted Exposure Amount (RWEA)**, as well as in terms of **number of obligors or facilities** to monitor the magnitude of the deficiencies.

The Validation function is expected to review the **incorporation of subjective data in the model for the assignment of the exposures to grades or pools**, focusing on the **clarity of the definitions**, **processes and criteria** defined by the CRCU to **ensure the consistency of the rating assignment**, and on the **integration of the human judgment in the overall rating assignment**.

Validation Cycle Specificities

First validation

Regarding the **evaluation of the rating assignment process during first validation**:

- The **evaluation of documentation** (point 1.) should focus on whether **the documentation allows for a consistent application of the human judgment** in the rating assignment;
- The **evaluation of materiality** (point 2.) should be performed in the context of a **model change** on the **'application test sample'**[1], leaving aside the analysis of outdated ratings. In the context of the first validation of a **new rating system**, the evaluation is expected on all dimensions and using the **most recent application portfolio.**

On-going validation

Regarding the **evaluation of the rating assignment process in the on-going validation**, the Validation function can use its **previous assessment of the documentation** (point 1.) of the assignment process and of the **policy for the treatment of non-standard rating** (point 2.). However, it is expected to **assess the potential occurrence of deficiencies** detected in the actual implementation of the model, and to **perform the materiality assessment of non-standard ratings on the latest years available**.

1 The EBA supervisory handbook defines the 'application test sample' as a sample whereby the obligors or facilities are assigned to grades or pools, but there has not been enough time to observe the empirical realisations to assess the model.

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Assessment of the Core Model Performance: Risk Differentiation 3/6

Accuracy of the rating assignment

The Validation function should form an opinion on **two dimensions of the accuracy** of the rating assignment:

1. The **discriminatory power of the model**, i.e., its capacity to efficiently **discriminate riskier obligors or facilities from less risky ones**, based on the difference in the level of default (for the PD), loss given default (for the LGD) and conversion (for the CF) risk;
2. The **homogeneity within each grade or pool**, in terms of default, loss given default and conversion risk, and the **heterogeneity between grades or pools**, in terms of distributions' overlaps of default, loss given default and conversion risk between all grades or pools.

To do so, the Validation function should **assess the input data**, **challenge the methodological choices** and **perform statistical tests on the model performance**.

1 - Assessment of the input data

Such assessment should include:

1.a. An **opinion on the data quality of the RDS**;

1.b. A **review of the completeness of the RDS**;

1.c. A **review of all the procedures applied to the data** used for the model development, including **data collection**, **data cleansing**, **data processing** and **data estimation**. For the latter, a good practice includes the comparison of the estimations with the subsequently realised values;

1.d. The **analysis of representativeness** of the **development sample vis-à-vis the application sample**, considering: the **scope of application**, the **definition of default**, the **distribution of relevant risk characteristics** as well as the **lending standards and recovery policies.**

Validation Cycle Specificities

First validation

With respect to the **assessment of the input data during the first validation**, **all the dimensions** listed on the left are expected to be assessed. In particular, the **analysis of the representativeness** should be conducted **between the development sample and the current application portfolio at the time of the first validation** and assessing also the activities performed by the CRCU as part of the model (re)development.

On-going validation

With respect to the **assessment of the input data during the on-going validation:**

- For the **analysis of data quality** (point 1.a.) and for the **assessment of completeness of the RDS** (point 1.b.) the Validation function **can use its previous assessments**;
- For the **procedures applied to the data** (point 1.c.), the Validation function **can use its previous assessment**. However, a good practice is to **perform the back-testing of the data estimation using the new data available**;
- For the **analysis of the representativeness** (point 1.d.) the Validation function is **expected to perform the assessment with respect to the application portfolio**. For this analysis, it can take into account the analyses performed by the CRCU but with its **own independent conclusions**.

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Assessment of the Core Model Performance: Risk Differentiation 4/6

Accuracy of the rating assignment

2 - Assessment of the modelling choices and specifications

Such assessment should **ensure that the chosen input variables form a reasonable and effective basis** for the resulting predictions and that **the model does not have any material bias**. In this context, the Validation function is expected to assess:

2.a. The **selection process** (including the minimum list of risk drivers considered) **and related outcomes of risk drivers**, whose results are expected to be **consistent with the results of statistical tests** and **with business expectations**;

2.b. Any **functional form or hyperparameters** used in the model development, including how statistical results and human judgment are combined to derive the final assignment of exposures to grades or pools;

2.c. **How obligor and facility grades or pools are defined**, such that the methodology used ensures the **homogeneity of obligors and exposures assigned to the same grade or pool** over time. The Validation function is expected to assess whether:

- The **definition of grades or pools is sufficiently clear**, and **the rating scale is not too granular** so to allow for a consistent assignment of obligors or facilities posing similar risks to the same grade or pool;
- The **number of rating grades meets the regulatory requirements in terms of minimum number** (Art. 170 CRR);
- The **number of rating grades is not excessive**: the number of exposures in a given grade or pool should be sufficient to allow for **meaningful quantification and validation of the default or loss characteristics at the grade or pool level**; on the contrary, a high number of rating grades can be an indication of a lack of heterogeneity between grades or pools.

Validation Cycle Specificities

First validation

With respect to the **assessment of the modelling choices and specifications in the first validation**, the Validation function is expected to **assess all the elements** described on the left.

On-going validation

For the **assessment of the modelling choices and specifications in the on-going validation**, the Validation function **can use its previous assessments**.

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Assessment of the Core Model Performance: Risk Differentiation 5/6

Accuracy of the rating assignment

3 – Quantitative validation challenger analyses

The **empirical assessment of the model performance** is expected to be based on **rigorous statistical tests**, which should be **documented in the validation policy** (as described in slide 9), should be **sound and adequate** and should **consider all available data**. In particular, such tests are expected to:

3.a. Cover the **three dimensions** of 1) **discriminatory power**, 2) **homogeneity** and 3) **heterogeneity**. In this context, it is considered as best practice to complement the empirical assessment based on the final rating by a **deep dive analysis based on the intermediate steps of the model** for the analysis of discriminatory power. For the evaluation of the homogeneity and heterogeneity, the evaluation is expected to be performed **within (homogeneity) and across (heterogeneity) grades**;

3.b. Allow for an **evaluation of the performance of the model under various economic conditions**.

The quantitative validation challenger analyses described above are strictly interconnected with the assessment that institutions are expected to perform regarding the **stability of the model use and performance over time**. For this purpose, institutions shall establish a **rigorous statistical process** including ***out-of-time (OOT)*** and ***out-of-sample (OOS)*** performance tests for validating the model. These tests are expected to be used primarily by the CRCU in the model development phase, but the Validation function is **expected to perform additional tests** to form its own opinion on the performance of the model.

Validation Cycle Specificities

First validation

The Validation function should pay particular attention to the **robustness of the model**, and is expected to:

- **Assess if due measures were taken in the model development to avoid overfitting**, checking if OOT and OOS-testing was performed as part of the model development;
- **Perform additional tests** to have an independent view on the performance of the model. Where a sufficient amount of more recent data as in model development is available, the Validation function is **expected to perform at least an OOT-validation** using that data.

On-going validation

During the **on-going validation**, for the purpose of the quantitative analyses described on the left the Validation function **can take into account the analyses performed by the CRCU**, and is expected to **form an opinion on**:

- **The performance of the model on the sample composed of only the new data available since the last validation** (as part of OOT tests);
- **The evolution of the performance over time** (for instance by performing tests separately for each year of observation) and in comparison, with the performance reached in the model development.

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Assessment of the Core Model Performance: Risk Differentiation 6/6

Accuracy of the rating assignment

4 – Validation challengers

In addition to the statistical tests described in the previous slide, the Validation function is expected to assess also the **following aspects**:

4.a. The **impact of overrides on the performance of the rating assignment process**, evaluating the performance of the model before and after overrides;

4.b. The **number of overrides applied on the model outcomes**, assessing their **materiality** (in terms of number of obligors or facilities, exposure value and related RWEA) for the application portfolio, and reviewing the **threshold** set as maximum acceptable rate of overrides for the model;

4.c. The **stability of the ratings assigned to individual obligors or facilities** (e.g., using **migration matrices**) in relation to the economic cycle, in comparison to the outcome expected due to the **rating philosophy**. In addition, the Validation function is expected to be aware of the rating philosophy and **rating stability properties** of the model, and their **adequacy for the respective scope of application**, also considering the result of this analysis for back-testing purposes;

4.d. The **monotonicity of the one-year DR** or **long-run average DR** between obligor grades. The Validation should have a **good understanding of the reasons for the non-monotonicity**, and should conduct **similar analyses for the realised LGD or realised CF** in the case where rating grades are used;

4.e. **Other relevant external data sources**, where available (e.g., where sufficient **external ratings** are available, a best practice is to use them as a **challenger**);

4.f. The **potential concentration in rating grades**, which could be an indication of a **lack of homogeneity** within grades or pools and therefore of **missing risk drivers**.

Validation Cycle Specificities

First validation

In the **first validation**, the Validation function should perform **all the analyses** defined on the left, considering the following:

- The analysis mentioned in point 4.a. is not expected to be performed in case of a material change if **historical overrides are not meaningful for the new model**;
- The analysis mentioned in point 4.b. can be done on the **most recent application sample** or, in case of a model change, on the **'application test sample'**;
- The analysis mentioned in point 4.c. can be performed using the **backward simulated ratings** where possible in case of model changes;
- The analysis mentioned in point 4.d. is **expected to be performed on the RDS used for risk quantification**;
- The analyses mentioned in point 4.e. **should be performed**;
- The analyses mentioned in point 4.f. **are expected to be performed on the RDS used for risk quantification and on the application portfolio.**

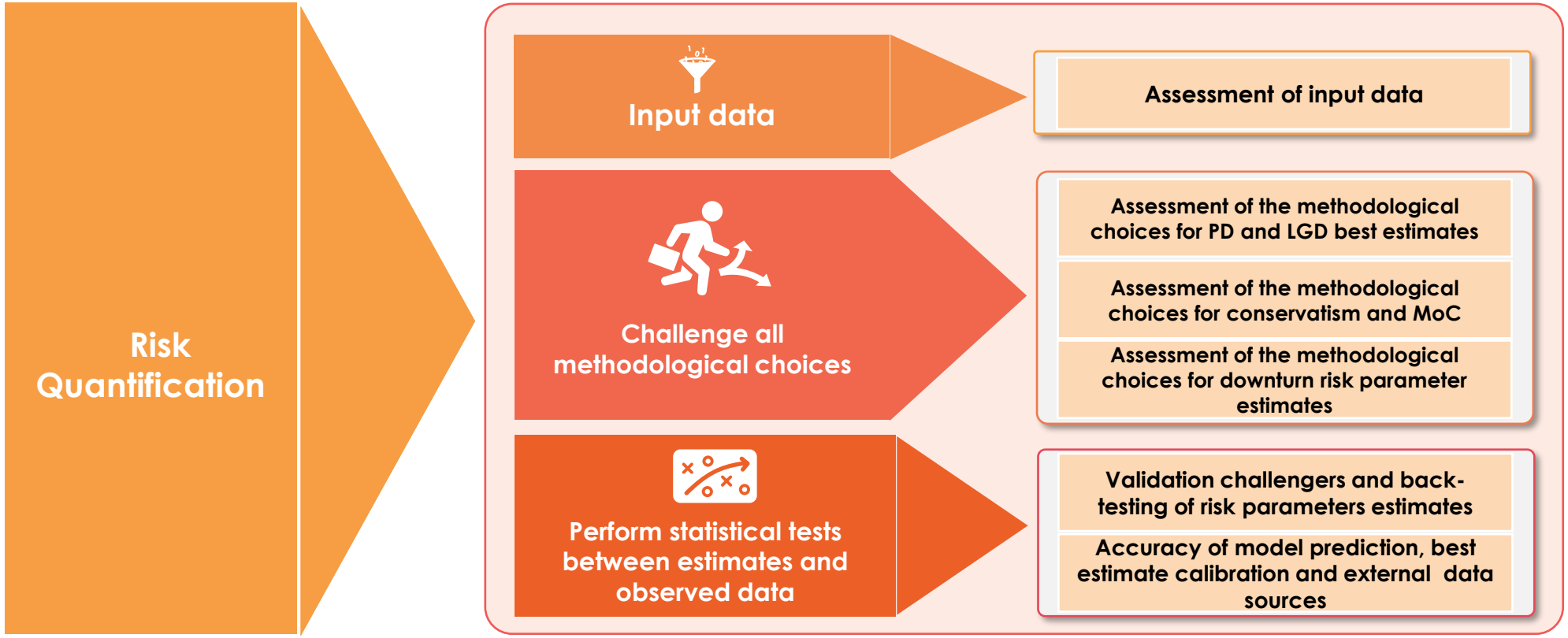
On-going validation

All the analyses described on the left **should be conducted during regular validations**. For the analyses of **overrides** (points 4.a. and 4.b.), the Validation function can take into account the **analyses performed by the CRCU** (described in par. 205, 206 and 207 of the EBA GL on PD and LGD Estimation).

Validation Content 9/16

Assessment of the Core Model Performance: Risk Quantification 1/8

The Validation function should assess (1) the **input data**, (2) **challenge all methodological choices** **used during the risk quantification** and (3) **perform statistical tests between estimates and observed data**, in order to form an opinion on three dimensions of the **risk quantification** performance of the model: a) the **accuracy of the best estimates** in terms of alignment with the **long-run averages** per grades or pools; b) the **conservatism of the risk estimates**; c) the **appropriateness of the estimates** for an **economic downturn** (for the LGD and CF parameters).



Each of the assessments on the left is presented in more detail in the following slides

Validation Content 10/16

Assessment of the Core Model Performance: Risk Quantification 2/8

Input data

The input data is expected to be reviewed to ensure that any uncertainty related to a **deficiency is sufficiently covered through a MoC**. It is expected to include:

1. An opinion on the **data quality of the full RDS**;
2. A review of the **completeness of the RDS**, in terms of **historical experience and empirical evidence** in order to check that all the available data was considered for the risk quantification, as well as in terms of **scope and information**.
3. A reviews of **all procedures for data collection and data cleansing** applied to the data used by the rating system and the compliance of the data preparation with the regulatory requirements. For the years used for the risk quantification, the Validation function is expected to check that **all observations have been taken into account** (the exclusions and data cleansing is expected to be **duly documented**). In particular, the treatment of the cases with **non-standard or outdated ratings** are expected to be carefully reviewed. In this context, the Validation function is expected to assess the **materiality of these cases**, as well as the **severity of the deficiency** (in terms of magnitude of the uncertainty on the real rating of the obligor or facility) in the calibration segment, and check that related uncertainty is sufficiently covered by a MoC.
4. A review of **the representativeness of the data used for the risk quantification**. The Validation function is expected to **develop statistical tests or metrics for this task**, and check that any related uncertainty is sufficiently covered by a MoC. The representativeness should be assessed in terms of **scope of application, definition of default, distribution of relevant risk characteristics, the current and foreseeable economic or market conditions, lending standards and recovery policies**. This assessment is expected to be performed at the calibration segment level.

Validation Cycle Specificities

First validation

With respect to the **assessment of the input data in the first validation**, the Validation function is expected to **assess all the elements** described on the left.

On-going validation

With respect to the **assessment of the input data during the on-going validation:**

- For the analysis described in the first three points, **the Validation function can use its previous assessments**;
- For point 4., the Validation function is expected to perform this assessment **with respect to the application portfolio** and to challenge the **continuous appropriateness of all appropriate adjustments applied on the risk estimated due to a lack of representativeness**. For this analysis the Validation function **can take into account the analyses performed by the CRCU**.

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Assessment of the Core Model Performance: Risk Quantification 3/8

Challenge all methodological choices

1 – Assessment of the methodological choices for PD best estimates

In order to challenge the **methodological choices used to derive the PD best estimates in relation to the long-run average DR per grades or pools**, the Validation function is expected to assess:

1.a. The **choice of the general calibration methodology**. As such, the Validation function is expected to check that the **approached used are appropriate for the portfolio and the available data**, such as a strong reliance on external data is justified by insufficient internal data;

1.b. The **choice of the approach used to calculate the observed average one-year DRs**. In practice, this refers to the **choice of overlapping vs non-overlapping one-year time windows**, which should be appropriately justified;

1.c. The **choices underlying the calculation of the long-run average DR**, in particular the length of the historical period used;

1.d. The **choices underlying the calibration to the long-run average DR** (the choice of **calibration segments and type**, the choice of the **calibration sample within each calibration segment** and the **associated hypothesis to arrive at the final estimates** considering the rating philosophy);

1.e. The **existence and accuracy of any appropriate adjustment**, which should result in a **better estimate of the risk parameters**. In particular, the Validation function is expected to review **the impact of any correction** based on the input data as well as the **representativeness of the historical observation period** and the related impact of any adjustments performed in case of non representativeness of the likely range of variability of DRs used to derive PD estimates.

Validation Cycle Specificities

First validation

With respect to the **methodological choices for PD best estimates in the first validation**, the Validation function is expected to **assess all the elements** described on the left.

On-going validation

With respect to the **assessment of the methodological choices for PD best estimates in the on-going validation**, the Validation function **can use its previous assessments**.

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Challenge all methodological choices

2 – Assessment of the methodological choices for LGD best estimates

In order to challenge the **methodological choices used to derive the LGD best estimates in relation to the long-run average realized LGD per grades or pools**, the Validation function is expected to assess:

2.a. The **choice of the general calibration methodology**. As such, the Validation function is expected to check that the **approaches used are appropriate for the portfolio and the available data**, such as a strong reliance on external data;

2.b. The **choices underlying the calculation of the long-run average LGD**. This includes the proper **calculation of the arithmetic average**, and **the choices made for the treatment of incomplete recovery processes** to calculate the observed average loss rate. In detail, the Validation function should evaluate (a) the **choice of the length of the period for the maximum recovery process** used to estimate future recoveries; (b) the **choice of the method and data set used for the estimation of future costs and recoveries on these exposures** (and the related MoC); (c) the **impact of any adjustment for massive disposals;**

2.c. The **choices underlying the calibration to the long-run average LGD**. This includes the **length of the historical period used** and the **choice of calibration segments and calibration type;**

2.d. The **existence and accuracy of any appropriate adjustment**, which should result in a **better estimate of the risk parameter**. In particular, the Validation function is expected to review the **impact of any correction** based on the input data as well as the **representativeness of the historical observation period**, to check that adjustments made based on the changes expected in the foreseeable future do not lead to a decrease in the estimates of LGD parameter.

Validation Cycle Specificities

First validation

With respect to the **methodological choices for LGD best estimates in the first validation**, the Validation function is expected to **assess all the elements** described on the left.

On-going validation

With respect to the **assessment of the methodological choices for LGD best estimates in the on-going validation**, the Validation function **can use its previous assessments**.

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Challenge all methodological choices

3 – Assessment of the methodological choices for conservatism and MoC

In order to challenge the **methodological choices used to derive conservative estimates and quantify and aggregate the MoC**, the Validation function is expected to assess whether:

3.a. The **two conservative requirements mentioned in the CRR[1] are implemented in the risk estimates**. For these two cases, the regulation does not require an explicit methodology of implementation. Therefore, the **exact role of the Validation function may differ depending on the approach chosen by the CRCU**. In any case, the Validation function is expected to check that the **conservative requirements are implemented and assess its theoretical implementation**. However, if the conservatism is implemented directly in the application of the model, the **correct final implementation can be assessed by other internal control functions;**

3.b. The **quantification of Category A and Category B MoC is meaningful to cover for the uncertainty related to all identified deficiencies** related to the estimation of risk parameters and **Category C MoC covers the general estimation error**. In addition, for CF estimates, larger MoC should be incorporated where a stronger positive correlation can reasonably be expected between the default frequency and the magnitude of CF;

3.c. The **aggregation of MoC within each category is meaningful, the aggregation between categories is additive, the MoC is applied on the best estimate of the risk parameter**, and each category does not lead to a decrease of the risk parameter estimates.

Validation Cycle Specificities

First validation

With respect to the **methodological choices for conservatism and MoC in the first validation**, the Validation function is expected to **assess all the elements** described on the left.

On-going validation

With respect to the **assessment of the methodological choices for conservatism and MoC in the on-going validation**, the Validation function **can use its previous assessments**.

1 *Article 180(1)(a) (obligors highly leveraged or whose assets are predominantly traded assets), Article 181(1)(c) (significant degree of dependence between the risk of the obligor and that of the credit protection or its provider) and Article 181(1)(d) of the CRR (currency mismatches between the obligation and the credit protection).*

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Assessment of the Core Model Performance: Risk Quantification 6/8

Challenge all methodological choices

4 – Assessment of the methodological choices for downturn risk parameter estimates

In order to challenge the **methodological choices used to derive LGD and CF estimates appropriate to an economic downturn**, the Validation function is expected to assess:

4.a. The **methodology used to identify the nature of the economic downturn, its severity and its duration**, according to the CDR on downturn[1];

4.b. For the downturn LGD estimates, the **methodology chosen for the estimation, the comparison with long-run averages, the sensitivity of downturn LGD estimates to changes in economic cycles, the aggregation of the impacts from intermediate parameters, the calculation of the reference value and the estimation process for defaulted exposures**. In addition:

- In the case the institution uses the downturn LGD estimation based on **observed impact**, the Validation function is expected to **challenge the analysis requested by paragraph 27 of the *Guidelines for the estimation of LGD appropriate for an economic downturn***[2], its incorporation in the calibration of the downturn and the MoC applied in case where no impact of a downturn period is observed in the institution's relevant loss data;
- In the case the institution uses the downturn LGD estimation based on **estimated impact**, the Validation function is expected **to challenge the choice of the methodology used by the institution, the use of intermediate parameter in the calibration of the downturn and the MoC applied in case of a lack of data.**

Validation Cycle Specificities

First validation

With respect to the **methodological choices for downturn risk parameter estimates in the first validation**, the Validation function is expected to **assess all the elements** described on the left.

On-going validation

With respect to the **assessment of the methodological choices for downturn risk parameter estimates in the on-going validation**, the Validation function **can use its previous assessments**.

1 *Commission Delegated Regulation (EU) 2021/930 [...] specifying the nature, severity and duration of an economic downturn* (available here).
2 *Guidelines for the estimation of LGD appropriate for an economic downturn ('Downturn LGD estimation', EBA/GL/2019/03)* (available here).

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Assessment of the Core Model Performance: Risk Quantification 7/8

Perform statistical tests between estimates and observed data

1 – Validation challengers

The Validation function is expected to **develop and use various statistical tools, to ground its opinion on the model performance on empirical evidence**. The analyses that are expected to be performed include the **back-testing of risk estimates**, the **assessment of the accuracy of model prediction** and **best estimate calibration**, as well as the **benchmarking analysis**. In this context, it is considered as best practice to complement the empirical assessment by a **deep dive analysis**.

2 – Back-testing of risk parameter estimates

In order to form this opinion on the appropriateness of the risk parameter estimates, the Validation function should **compare the realised DR with the estimated PD for each grade or pool and perform analogous analysis for LGD and CF estimates**. In practice, this means that the Validation function should:

2.a. **Make use of historical data that cover a period as long as possible**, to use not only the full historical data in one test, but also to consider multiple sub-periods separately for this purpose;

2.b. **Analyse the deficiency for the back-testing of PD estimates**, where the realized one-year DR in a grade pool falls outside the expected range for that grade or pool (considering the deviation in light of (a) whether it **happened during an extreme year**, (b) **the rating philosophy**, (c) the **results for other sub-periods**);

2.c. For the back-testing of LGD estimates, (a) **compare the LGD estimates with the realized LGDs using only closed cases**, (b) **using all cases**, (c) **compare the estimation of future costs and recoveries on incomplete cases;**

2.d. **Conduct actions**, considering a high severity in terms of deficiency, if the results of the analyses show an **inappropriate level of the regulatory parameter**.

Validation Cycle Specificities

First validation

With respect to the **validation challengers and the back-testing of risk parameter estimates in the first validation**, the Validation function is expected to **assess all the elements** described on the left. In particular, where a **sufficient amount of more recent data as used in the model development is available** the Validation function is expected to **perform the quantitative tests taking also into account that data**.

On-going validation

With respect to the **validation challengers and the back-testing of risk parameter estimates in the on-going validation**, the Validation function is expected to **assess all the elements** described on the left, in particular using also the **new available data**. The validation function is expected to assess the **evolution of the different adjustments and MoCs** in relation to the evolution of the corresponding deficiencies and uncertainties. For the PD estimates, this includes an **assessment of the period of the likely range of variability of defaults rates and the mix of good and bad years**. For this evaluation, the Validation function **can leverage on the analysis from the CRCU**. In particular, the Validation function is expected to **review the CRCU assessment of whether the use of the most recent data in the risk quantification would lead to materially different risk estimates**.

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Assessment of the Core Model Performance: Risk Quantification 8/8

Performing statistical tests between estimates and observed data

3 – Accuracy of model prediction and best estimate calibration

In addition, the Validation function is expected to **assess the accuracy of the model prediction using other quantitative tools**, considering in particular the rating philosophy of the model:

3.a. The Validation function is expected to **make use of historical data that cover a period as long as possible**, to use not only the full historical data in one test but also multiple sub-periods separately for this purpose;

3.b. These other quantitative tools are expected to **include a back-testing of the PD best estimates**, to assess the accuracy of the model predictions, and **of the LGD and CF best estimates for each grade or pool**, as well as of the **final long-run average estimates** when back-testing of LGD and CF estimates was performed on the parameters appropriate for an economic downturn;

3.c. For this assessment, a good practice is to **complement the tests based on the final rating grades assignment used for the own funds calculation by other tests based on rating grades without additional conservatism;**

3.d. Where the results of these analyses show an inappropriate level of model predictions for the parameter in question, **appropriate actions are expected, that take into account the confidence level of the back-testing results**.

4 – External data sources

The Validation function should **perform an analysis based on relevant external data sources, where available**. For this purpose, the default rate associated to external rating grades may be used as challenger for low default portfolios, as well as **benchmarks provided by the EBA on the EBA benchmarking portfolios**.

Validation Cycle Specificities

First validation

With respect to the **accuracy of model prediction and best estimate calibration and external data sources in the first validation and**, the Validation function is expected to **assess all the elements** described on the left. In particular, where a **sufficient amount of more recent data as used in the model development is available** it is expected to **perform the quantitative tests taking also into account that data**.

On-going validation

With respect to the **accuracy of model prediction and best estimate calibration and external data sources in the on-going validation,** the Validation function is expected to **assess all the elements** described on the left, in particular using also the **new available data**. The Validation function is expected to assess the **evolution of the different adjustments and MoCs** in relation to the evolution of the corresponding deficiencies and uncertainties. For the PD estimates, this includes an **assessment of the period of the likely range of variability of defaults rates and the mix of good and bad years**. For this evaluation, the Validation function **can leverage on the analysis from the CRCU**. In particular, the Validation function is expected to **review the CRCU assessment of whether the use of the most recent data in the risk quantification would lead to materially different risk estimates**.

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Michele Ferrandino

This document was prepared in collaboration with Vincenzo Frasca, Nicolas Nedertoft Melis and Leonardo Bandini who at the time were working for Iason Consulting.

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