Consultation Paper

Supervisory handbook on the validation of rating systems under the Internal Ratings Based approach

Content

1. Responding to this consultation

The EBA invites comments on all proposals put forward in this paper and in particular on the specific questions summarised in 5.1.

Comments are most helpful if they:

- respond to the question stated;
- indicate the specific point to which a comment relates;
- contain a clear rationale;
- provide evidence to support the views expressed/ rationale proposed; and
- describe any alternative regulatory choices the EBA should consider.

Submission of responses

To submit your comments, click on the 'send your comments' button on the consultation page by 28 October 2022. Please note that comments submitted after this deadline, or submitted via other means may not be processed.

Publication of responses

Please clearly indicate in the consultation form if you wish your comments to be disclosed or to be treated as confidential. A confidential response may be requested from us in accordance with the EBA's rules on public access to documents. We may consult you if we receive such a request. Any decision we make not to disclose the response is reviewable by the EBA's Board of Appeal and the European Ombudsman.

Data protection

The protection of individuals with regard to the processing of personal data by the EBA is based on Regulation (EU) 1725/2018 of the European Parliament and of the Council of 23 October 2018. Further information on data protection can be found under the Legal notice section of the EBA website.

2. Executive summary

The task of the EBA to develop and maintain a supervisory handbook derives from Article 8(1)(aa) of the EBA Regulation[1] which stipulates that the 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 the context of the so-called '*Internal Ratings Based'* approach (IRB approach), the EBA has already clarified a number of requirements, aiming at reducing the risk-weighted exposure amounts (RWEA) unjustified variability stemming from different supervisory and bank-specific practices. In this context, this handbook complements the previous regulatory products published under the roadmap to repair IRB models as regards supervisory practices.[2]

In particular, the validation of the IRB rating systems is an essential step to ensure a robust measurement of credit risk within the IRB approach, such that it allows for the highest risk sensitivity, but also ensures comparability across institutions. It is foreseen as an activity to be performed by an independent function (the 'validation function'), which is expected to challenge the main methodological choices done by the credit risk control unit (CRCU) and assess regularly and empirically the performance of the rating system. As such, a general description of the activities and objective of the validation function is provided in Article 185 of the Regulation (EU) No 575/2013 (CRR), as well as in Chapter 3 of the Commission Delegated Regulation (CDR) (EU) 2022/439 on assessment methodology.

Nevertheless, the EBA has identified some heterogeneity in the expectations of competent authorities (CA) relative to the validation function. While the validation methods, procedures and concrete analyses are expected to be tailored to the specificities of the rating systems, the objective and the areas on which the validation function is expected to form an opinion on should be harmonised.

Consequently, the handbook provides additional clarity on the expectations relative to the validation function. It fully leverages on guidance from the IRB repair program. It clarifies the specificities of the validation in the context of the prudential framework, the general requirements applicable to the validation function and it provides a detailed description of the areas whereby the validation function is expected to form an opinion on.

Next steps

The draft supervisory handbook is published for a three months consultation period. The responses received during the consultation period will be taken into account when specifying the final handbook.

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[1] Regulation (EU) No 1093/2010 establishing a European Supervisory Authority (European Banking Authority)

[2] https://www.eba.europa.eu/eba-publishes-report-on-progress-made-on-its-roadmap-to-repair-irb-models

3. Background and rationale

1. **Mandate.** The task of the EBA to develop and maintain a supervisory handbook derives from Article 8(1)(aa) of the EBA Regulation[3] which stipulates that the 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), second subparagraph, of the EBA 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*.' As no 'comply or explain' mechanism is applicable to the handbook, any departure from it can be justified merely on the needs of judgment-led supervision. In terms of harmonisation effects, the handbook will predominantly be used as a benchmark of convergence during peer and other reviews.

2. **The IRB validation beyond a model validation.** The IRB validation is mostly described in Article 185 of the CRR, as well as in Chapter 3 of the CDR on assessment methodology[4] which clarifies the connection between the validation of IRB rating systems and the internal governance, as well as oversight in general. Based on these requirements, the validation of IRB rating systems goes beyond the pure concept of model validation. It is rather seen as an activity to be performed by an independent function (the 'validation function'), which is expected to challenge the main methodological choices made by the credit risk control unit (CRCU) and to assess regularly and empirically the performance of the rating system. As such, the validation function should communicate its opinion (i.e. findings and recommendations) to the CRCU, the senior management and the management body, as part of the corporate governance. On top of this performance assessment, the validation function is also expected to assess the part of the modelling environment (data quality and maintenance, as well as the IT implementation of the rating system) and assess the materiality of any model change or extension.

3. **Scope of the validation.** To satisfy the requirements of Part III, Title II of the CRR, the validation activities are expected to be performed at all relevant levels where an internal model is used. As such, the internal validation should be conducted at each level where a CA has granted an approval for a rating system (or is expected to do so in the context of an initial validation of a new model). As such, in the case where a rating system has received the approval on a

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[3] Regulation (EU) No 1093/2010 establishing a European Supervisory Authority (European Banking Authority)

[4] These requirements only apply indirectly to institutions as the CDR provides the scope of assessment criteria and the methods to be applied by CAs.

consolidated as well as sub-consolidated and/or individual basis, the internal validation is expected to be performed at all these levels.

4. **Validation policy.** The validation policy is expected to describe the validation framework, i.e. the roles, responsibilities, processes and content of the validation activities (i.e. tasks and quantitative tests) that need to be performed. In particular, the validation policy should include:

    a. A description of how the validation function should come up with an opinion on the accuracy and consistency of the rating system as a whole.

    b. A description of the data collection and selection process that is expected to result in the 'validation data set' (i.e. all the data sets used for the purpose of validation).

    c. The list of the analyses to be performed, along with a description of their purposes and possible limitations, their scope of application, their expected frequency.

    d. The conditions under which the validation function may leverage on the CRCU work.

    e. The main content, frequency and recipients of the validation reports.

5. **Validation report.** A key component of the communication of the validation opinion on the rating system is the validation report. Its structure is not expected to be harmonised between institutions (and is in particular not required to follow the structure of this validation handbook), nor necessarily between different rating systems for a given institution, but is left to the own judgment of the validation function in order to optimise the communication of its opinion. In practical terms, the validation report is expected to describe:

    a. A list of all the relevant tests performed to challenge the rating system, along with a description of the validation data preparation processes and the related data quality of validation samples used;

    b. The outcomes of the validation analyses, with a clear opinion on the performance of the rating system;

    c. As a good practice, the inclusion of a comparison between the latest results of the validation and the ones observed in the previous years as well as the highlighting of the previously identified deficiencies, along with their severity, and a description of how they have been addressed.

6. **Dimensions of the assessment of the core model performance.** One of the objectives of the validation function is to assess the core performance of the rating system, using the regulatory definitions of the realised default rate (DR), the economic loss and realised loss given default (LGD) as well as the realised conversion factor (CF). As such, this assessment can be broken down using the structure of the CRR, i.e. distinguishing between the performance in terms of risk differentiation and risk quantification:

a. **Risk differentiation**: The model should allow for a meaningful differentiation of risk to ensure the grouping of sufficiently homogenous exposures into the same grade or pool. To this end, the validation of a model is expected to include quantitative metrics to evaluate its discriminatory power, as well as the homogeneity within and heterogeneity across grades or pools.

b. **Risk quantification**: The estimates are expected to meet all regulatory requirements. To this end, the validation of the risk parameter estimates is expected to include a comparison of realised DR with estimated probabilities of default (PD) for each grade or pool, and analogous analysis for LGDs and CFs when allowed to use own estimates, taking into account the rating assignment dynamics ('rating philosophy'). For LGD and CF estimates, this should include an assessment of their appropriateness for an economic downturn where this is more conservative than the long-run average.

7. **Validation tasks**. In both cases, the validation function is expected to assess the input data used (in terms of data quality, data processing and representativeness), all the methodological choices of the CRCU and the performance of the final rating system based on empirical data, including via the use of 'challengers' (risk differentiation) or 'other quantitative tool' (risk quantification). In addition, for the risk differentiation, the validation function is expected to assess the consistency and comprehensiveness of the process setup for the rating assignments.

8. **Specific assessments.** The assessment of the performance of the rating systems is expected to be performed 'consistently and meaningfully', and as such the institution is expected to define and implement validation methods and procedures that are consistent across rating systems as well as through time. This does neither prevent institutions from developing a targeted validation framework for a specific type of portfolios or rating systems with specific challenges, nor from using data appropriate to the portfolio. In particular, the validation of the rating system applicable to the defaulted exposures, the use of credit risk mitigation and the slotting approach require some specific assessments. In addition, some situation may raise specific challenges. This is among others the case where the rating system is developed on a broader range of exposures than subsequently applied (i.e. via the use of external data), where the institution outsources some validation tasks or in the context of data scarcity. These challenges are expected to be accounted for in the validation policy and requires some additional validation tasks.

9. **Difference between initial and on-going validation.** The actual tasks may differ between the initial validation of a new model, the on-going validation of an unchanged model, as well as in the case of a model change. More specifically, the validation function is expected to assess a new rating system (in the context of the introduction of the IRB approach or according to its roll out plan) according to the requirement of the 'first validation' and an unchanged rating system according to the requirement of the 'subsequent validation'. In the case of a model change:

a. For those aspects that are directly or indirectly affected by the model change, the activities of the 'first validation' are expected be performed by the validation function;

b. For all other aspects, the validation activities may instead be performed by the validation function according to the 'subsequent validation';

c. In the case of a material change in the range of application of a model, the whole model is expected to be assessed by the validation function as a 'first validation';

10. **First validation.** One of the most important topics to be addressed in the first validation are the model design and risk quantification choices, as these are assessed by the validation function for the first time. As a consequence, with few exceptions, all the dimensions of the validation should be covered during the first validation in a comprehensive and independent manner. While the validation function should be informed about the analyses made and the conclusions reached by CRCU, the validation function should always analyse the results independently and come to its own independent conclusions. In contrast to the subsequent validation, where it can leverage to some extent on the analyses performed by the CRCU, in the case of the first validation the validation function is expected to challenge and complement the CRCU analyses.

11. **Subsequent validation**. The subsequent validation differs from the first validation as it benefits from additional data and observations and has at its disposal previous conclusions from the first validation. As a consequence, for some specific tasks, the validation function can base its assessment largely on its previous conclusions. In addition, for some other specific validation tasks, the validation function can review and challenge the analyses performed by the CRCU but, in contrast to the general expectations during the first validation, may decide not to perform additional tests if the CRCU tests are deemed adequate in terms of input data and specifications.

12. **Structure of the handbook**. The structure of the handbook is recalled in the figure below, and can be summarised as follow:

a. Section 1 recalls as an introduction the specificities of the validation in the context of the prudential framework, and in particular in terms of corporate governance and structural independence from the CRCU;

b. Section 2 deals with the general requirements applicable to the validation function (in terms of scope, validation policy and validation report, as well as in terms of validation tasks);

c. Section 3 provides a detailed description of the areas on which the validation function is expected to develop an opinion. It should be noted that the handbook does not prescribe any specific methodology to get this opinion, i.e. the validation tools should be tailor-made to best fit the rating system at stake. The section is divided between the tasks related to the pure model performance assessment (mirroring the CRR distinction between risk differentiation and risk quantification) and the ones dealing with on the modelling environment;

d. Sections 4 and 5 clarify the applicable requirements in the context of a first or subsequent validation, with a split between those aspects unaffected by any change since the last validation and those that need to be reviewed more thoroughly. Apart from general requirements specifying in particular the interaction with the CRCU, it follows the structure of section 3;

e. Section 6 deals with three specific aspects which may trigger specific validation challenges: the use of external data in the model development, the outsourcing of validation task and the validation in the context of data scarcity.

Consultation Box – General feedback

This validation handbook makes multiple references to the different regulatory products of the so called 'EBA repair program'. Institutions are welcomed to provide feedback on whether there are specific aspects or problems that have arisen in practice on any of the topics described in the handbook in connection with the EBA repair program.

When providing such feedback, respondents are invited to mention precisely which part of the handbook is deemed problematic in connection to the relevant regulatory requirements. The EBA also welcomes any comments on any elements which would be deemed specifically challenging to apply for small institutions, along with proposals to help mitigating those most material challenges.

In addition, some consultation boxes with dedicated questions have been added for more specific points.

On the way forward, based on the feedback received, EBA will finalise the handbook and make it accessible to supervisors and the general public. The handbook may be reviewed over time, based on supervisory experiences. Furthermore, as highlighted in the press release on principles of representativeness,[5] these principles are also expected to become part of the final version.

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[5]

https://www.eba.europa.eu/sites/default/documents/files/document_library/Publications/Other%20publications/2022/1035812/Principles%20on%20representativeness%20of%20COVID-19%20impacted%20IRB%20relevant%20data.pdf

4. Draft supervisory handbook on the validation of IRB rating systems

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Abbreviations

CA	Competent authority
CDR	Commission Delegated Regulation
CF	Credit conversion factor
CRCU	Credit risk control unit
CRD	Capital Requirements Directive (Directive 2013/36/EU)
CRM	Credit risk mitigation
CRR	Capital Requirements Regulation (Regulation (EU) 2013/575)
DR	Default rate
EBA	European Banking Authority
EL	Expected loss
EU	European Union
FCP	Funded credit protection
GL	Guidelines
GL on connected clients	Guidelines on connected clients (EBA/GL/2017/15)
GL on CRM	Guidelines on Credit Risk Mitigation for institutions applying the IRB approach with own estimates of LGDs (EBA/GL/2020/05)
GL on DoD	Guidelines on the application of the definition of default (EBA/GL/2016/07)
GL on downturn LGD estimation	Guidelines for the estimation of LGD appropriate for an economic downturn ('Downturn LGD estimation') (EBA/GL/2019/03)
GL on Internal governance	Guidelines on internal governance under Directive 2013/36/EU (EBA/GL/2017/11)
GL on outsourcing	Guidelines on outsourcing arrangements (EBA/GL/2019/02)
GL on PD and LGD estimation	Guidelines on PD estimation, LGD estimation and the treatment of defaulted exposures (EBA/GL/2017/16)
IRB	Internal ratings based
IA	Internal Audit
LGD	Loss given default
MoC	Margin of conservatism
OOS	Out-of-sample
OOT	Out-of-time
PD	Probability of default
RDS	Reference data set
RTS	Regulatory Technical Standards

CDR on assessment methodology	Commission Delegated Regulation (EU) 2022/439
CDR on materiality thresholds	Commission Delegated Regulation (EU) No 2018/171
CDR on model changes	Commission Delegated Regulation (EU) No 529/2014
CDR on economic downturn	Commission Delegated Regulation (EU) 2021/930
CDR on slotting approach	Commission Delegated Regulation (EU) 2021/598
RW	Risk weight
RWEA	Risk-weighted exposure amounts
Slotting approach	Supervisory Slotting Criteria Approach
UFCP	Unfunded credit protection

1. Introduction: overview of the validation framework

1.1 Validation as part of the internal governance framework

13. **General definitions.** The general definition of the term 'model validation' is known in various fields such as computer science, engineering and finance; as different as these disciplines are, model validation always refers to one of the key assessments undertaken to verify that a model is working as expected. In general, 'model risk' can be described as the potential for adverse consequences of decisions based on incorrect or misused model results and reports. Against this background, point 11 of Article 3(1) of the Capital Requirements Directive (Directive 2013/36/EU - CRD) defines this risk as the risk of a potential loss *'an institution may incur, as a consequence of decisions that could be principally based on the output of internal models, due to errors in the development, implementation or use of such models'*. Thus, the main task of the model validation process is to prevent models from producing inadequate results, by effectively challenging them and by assessing and identifying possible assumptions, limitations and shortcomings.

14. **Previous work on the validation in context of the internal ratings-based approach (IRB approach).** The scope and objectives of validation have already been described by various other initiatives. This handbook is bringing together the perspectives provided by these various initiatives and intends to add expectations in some specific areas, also leveraging on best practices observed by CA. Prior to this handbook, the 'CEBS Guidelines on the implementation, validation and assessment of Advanced Measurement and Internal Ratings Based Approaches'[6] (CEBS Guidelines 10) clarified the validation of IRB models in the European Union (EU). This guidance was based on the Newsletter 4 on validation[7] from the Basel Committee on Banking Supervision and listed six principles that validation of the IRB approach should follow.[8] In the United States of America, the Board of Governors of the Federal Reserve System issued an 'SR letter' dealing with the 'supervisory guidance on model risk management'.[9] This letter provides guidance on effective model risk management, where model validation plays a critical role. It builds on a previous bulletin issued by the Office of the Comptroller of the Currency in 2000, which outlines key model validation principles and expectations on sound model validation

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[6]   https://www.eba.europa.eu/sites/default/documents/files/documents/10180/16094/525151b9-ea22-42b2-bd28-00e35a0add7e/GL10.pdf?retry=1

[7] https://www.bis.org/publ/bcbs_nl4.pdf

[8] **Principle 1**: Validation is fundamentally about assessing the predictive ability of a bank's risk estimates and the use of ratings in credit processes; **Principle 2**: The bank has primary responsibility for validation; **Principle 3**: Validation is an iterative process; **Principle 4**: There is no single validation method; **Principle 5**: Validation should encompass both quantitative and qualitative elements; **Principle 6**: Validation processes and outcomes should be subject to independent review.

[9] https://www.federalreserve.gov/supervisionreg/srletters/sr1107a1.pdf

processes which was updated in 2011 and included in the 2011 Federal Reserve System newsletter.

15. **The IRB validation beyond a model validation.** In all these previous publications, there is a consensus that the validation of IRB rating systems goes beyond the pure concept of model validation. It includes the set of policies, processes and procedures put in place to assess the accuracy and performance of the rating systems[10] on the institution-specific portfolios and to verify that the models[11] used by the institutions work properly. In other words, the validation of IRB rating systems is not limited to the proper functioning of a model from a statistical perspective, but also includes the assessment of the data quality, the structure of the rating system and its correct application.

16. **The IRB validation in the EU framework.** This is reflected in the EU regulation,[12] and further elaborated in Chapter 3 of the CDR on assessment methodology[13] which clarifies the connection between the validation of IRB rating systems and the internal governance, as well as oversight in general. As such, the internal framework is not only limited to the tasks and organisation of the validation function: the regulation includes minimum requirements on the senior management and management body,[14] the internal reporting,[15] the interaction with CRCU[16] and the internal audit (IA).[17]

1.2 The validation function as a second layer of defence, between CRCU and Internal Audit

17. **The IRB validation through multiple layers of defence.** The extended scope of activities to be performed in the context of the validation of IRB rating systems has led to a specific set of governance and organisational requirements. In particular, the assessment of the model performance is performed by several functions, each of them with its own perspective. In this respect, the CRCU has an 'active participation in the design or selection, implementation and

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[10] A 'rating system' is defined in the Article 142(1)(1) of the Capital Requirements Regulation (Regulation (EU) 2013/575 -CRR) as *'the methods, processes, controls, data collection and IT systems that support the assessment of credit risk, the assignment of exposures to rating grades or pools, and the quantification of default and loss estimates that have been developed for a certain type of exposures'.*

[11] 'PD model' and 'LGD model' are defined in section 2.4 of the Guidelines on PD estimation, LGD estimation and the treatment of defaulted exposures (EBA/GL/2017/16 - Guidelines on PD and LGD estimation). While not provided in these guidelines, the definition of a CF model can be inferred using Article 4(1), point (56) of the CRR, as *'All data and methods used as part of a rating system within the meaning of Article 142(1), point (1) of the CRR, which relate to the differentiation and quantification of own estimates of CF which are used to assess the level of currently undrawn amount of a commitment that could be drawn and that would therefore be outstanding at default, to the currently undrawn amount of the commitment, for each facility covered by that model.'*

[12] Such as Articles 144(1)(f) and 185 of the CRR.

[13] These requirements only apply indirectly to institutions as the CDR on assessment methodology provides the scope of assessment criteria and the methods to be applied by CAs.

[14] Article 14 of the CDR on assessment methodology

[15] Article 15 of the CDR on assessment methodology

[16] Article 16 of the CDR on assessment methodology

[17] Article 17 of the CDR on assessment methodology

validation of models used in the rating process'[18] and as such is the first function to perform model validation activities. However, the EU regulation requires in addition institutions to set up a specific independent validation function with its own responsibilities. Following the background and rationale of the Final draft regulatory technical standard on assessment methodology for IRB ,[19] the validation function should be independent from the CRCU *'in order to allow for an objective assessment of the rating systems, a limited incentive to disguise the model deficiencies and weaknesses, as well as a fresh view on the rating systems by people not involved in the development process'.*

18. **Independence of the validation function vis-à-vis the CRCU**. Therefore, the validation function assesses the final model developed by the CRCU as a second layer of defence, i.e. it challenges in an independent manner the model design and methodological choices done by the CRCU during the model development. Thus, the independence of the validation function is crucial to prevent any conflict of interest, as well as ensure no subordination linked to the CRCU. This independence is ensured via two criteria:

   a. The structural independence ensured via the organisational setup (see Interaction box [1]). In this regard, it is expected that large and complex institutions apply the setup which provides the highest level of independence of the validation function (Point 1 of Interaction box [1]). However, as further described in paragraph [33.d], the validation function can leverage to some extent on the work performed by the CRCU.

   b. The sufficient resource allocation. In this regard, it is expected that the number, seniority and expertise of the validation staff is commensurate with the complexity and materiality of the rating systems under the scope of validation of the validation function.[20]

INTERACTION BOX 1: STRUCTURAL INDEPENDENCE OF THE VALIDATION FUNCTION VIS-A-VIS THE CRCU

Article 10 of the CDR on assessment methodology provides three different types of setups within the institution's organisational structure which can be allowed, depending on the nature, size and scale of the institution and the complexity of the risks inherent in its business model:

   1. *The validation function is in a unit separated from the CRCU and both units report to different members of the senior management;*

   2. *The validation function is in a unit separated from the CRCU, but both units report to the same member of the senior management;*

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[18] Article 190(2)(f) of the CRR

[19] EBA/RTS/2016/03

[20] Article 12(b) of the CDR on assessment methodology

> 3. *The validation function is not in a unit separated from the CRCU, i.e. no separated
> validation unit exists, but the staff performing the validation function is different from the
> staff responsible for the design and development of the rating system and from the staff
> responsible for the CRCU.*

19. **Communication of the findings and recommendations.** The management body has the
responsibility for all material aspects of the rating and estimation processes and senior
management shall have a good understanding of the rating system designs and operations and
shall ensure that rating systems are operating properly on an on-going basis.[21] In this context,
the outcome of the validation function's analyses is expected to allow senior management to
understand the identified model deficiencies and be in a position to decide on a remediation
action plan as well as to have a good understanding of how these deficiencies are addressed in
the risk estimates. Effectively, a key aspect of the outcome of the validation function is the
validation report, as further described in paragraph [34].[22] In addition, while the validation
function should only perform its assessments independently from the CRCU (i.e. independently
identify and report deficiencies and shortcomings) it is nonetheless expected to have a good
understanding on the issues detected and on the possibilities on how these might be
remediated (findings and recommendations).[23] However, in order to maintain its
independence, the validation function is expected not to advise CRCU on how to improve
certain aspects or to rectify deficiencies, and in any case should always remain critical on any
changes implemented on the rating system.

20. **The IA as a separate function.** When it comes to the IA function, in accordance with Article 191
of the CRR, the *'Internal audit or another comparable independent auditing unit shall review at
least annually the institution's rating systems and its operations'.*[24] This requirement is
complemented in the CDR on assessment methodology,[25] which *de facto* requires the
validation function to be set as an independent function within institution's governance
structure. Therefore, the validation and IA functions constitute different levels of defence and
should not be combined. The tasks and responsibilities of the IA and the validation function
should be clearly distinguished and cannot be transferred between each other. This requires
the existence of an effective separation between the staff of the IA and the validation function.

21. **The role of IA in the assessment of the validation function.** In addition, according to paragraph
139 of the Guidelines on internal governance[26] '*The risk management framework should be
subject to independent internal review, e.g. performed by the internal audit function'.* As the
validation function is part of an institution's risk management framework, the IA function

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[21] Article 189 of the CRR

[22] Article 13 of the CDR on assessment methodology

[23] For example, the validation could recommend redeveloping part of or in full the rating model, or recommend a
recalibration or the introduction of additional MoC.

[24] In the rest of the handbook, the IA refers to either the internal audit or another comparable independent auditing unit.

[25] Article 17(1)(a)(iv) of the CDR on assessment methodology

[26] EBA/GL/2017/11

should have an independent opinion on the institution's validation function, which encompasses:

a. The independence of the validation function, mentioned in paragraph [18]: the IA should form an independent opinion on its setup (e.g. whether it has a sufficient number of resources) and on its independence in relation to the CRCU as well as to the personnel and management function responsible for originating or renewing exposures;[27]

b. The institution's validation policy, mentioned in paragraph [33], i.e. the scope and suitability of the validation tasks in terms of assessment of the rating systems, including the documentation to be produced. This is particularly relevant in the context of a change in the validation methodology or processes, as this entails a categorisation of the model change as material,[28] and the assessment of the IA of such change is part of the application package sent to CAs.[29]

c. The adherence of the validation function to the validation policy during the performance of the validation tasks;

d. The comprehensiveness and clarity of its conclusion and the related documentation produced, including the validation report mentioned in paragraph [34], which should be understandable by a knowledgeable third party. This is particularly relevant in the context of a model change as the reports of the institutions' independent review or validation is part of the application package sent to CAs;[30]

e. The appropriateness and timeliness of the follow up of the validation function's findings mentioned in paragraph [19] by the institution[31] (and, where relevant, of the findings raised by the CA).

22. **Interaction between the IA and the validation function in the assessment of rating systems.** On top of the assessment of the validation function, the IA is responsible for assessing the regulatory compliance of the rating systems of the institutions. This requires the following:

a. A high-level perspective of the organisation's rating systems, which includes in particular an overview of the rating systems and related risks to ensure the adequacy of own funds requirements (this includes the assessment of the model risk as well as the corporate governance[32] and use test[33] fulfilment);

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[27] Article 10(1)(a) of the CDR on assessment methodology

[28] Annex I, Part II, section 1 point 4 of the CDR on model changes

[29] Article 8(1)(e) of the CDR on model changes (report of the institutions' independent review)

[30] Article 8(1)(e) of the CDR on model changes (report of the institutions' validation)

[31] Article 13(c) of the CDR on IRB assessment methodology

[32] Article 189 of the CRR, Chapter 3 - section 3 of the CDR on assessment methodology

[33] Articles 144(1)(b), 145, 171(1)(c), 172(1)(a), 172(1)(c), 172(2) and 175(3) of the CRR, Chapter 4 of the CDR on assessment methodology

b. An overview of all the operations related to rating systems, which includes in particular an annual review of the performance of each rating system. However, to avoid duplication of tasks between these two functions and ensure an appropriate challenge by the IA, the independent opinion that the IA should form on institution's rating systems can take into consideration the analyses performed by the validation function, where appropriate. In any case, all the necessary tasks to form an opinion on the institution's rating systems should be performed and the IA should be responsible of their completeness (i.e. absence of gaps due to the distribution of tasks between the IA and the validation function);

c. A detailed assessment of the elements not assessed by the validation function based on the allocation of tasks mentioned in the previous point. Some of these elements are further mentioned in 'interaction boxes' in the rest of the handbook. For example, the IA can be responsible for the review of the proper implementation of each rating system, which includes in particular the integrity of the rating system and rating grades assignment process, or the correct calculation of own funds requirements (e.g. allocation of each exposure to the proper exposure class, correct application of PD and LGD input floors, calculation of the maturity, IT implementation of the rating system).

1.3 Legal status and structure of the supervisory handbook

23. **Mandate.** The task of the EBA to develop and maintain a supervisory handbook derives from Article 8(1)(aa) of the EBA Regulation[34] which stipulates that the 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), second subparagraph, of the EBA 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.*' Therefore, the supervisory handbook should cover all matters which are within EBA's remit with the aim to set out best supervisory practices rather than provide further specifications for the application of the legislation.

24. **The supervisory handbook vis-à-vis EBA GL.** Both EBA GL and the supervisory handbook are of non-binding nature, of general application and acts of Union law whose validity can be determined only by the Union courts, in a preliminary ruling. However, unlike guidelines, the supervisory handbook is not addressed directly to financial institutions, but to CAs, and does not limit their judgment-led supervision. As no 'comply or explain' mechanism is applicable to the handbook, any departure from it can be justified merely on the needs of judgment-led

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[34] Regulation (EU) No 1093/2010 establishing a European Supervisory Authority (European Banking Authority)

supervision. In terms of harmonisation effects, the handbook will predominantly be used as a benchmark of convergence during peer and other reviews.

Figure 1: Structure of the validation handbook
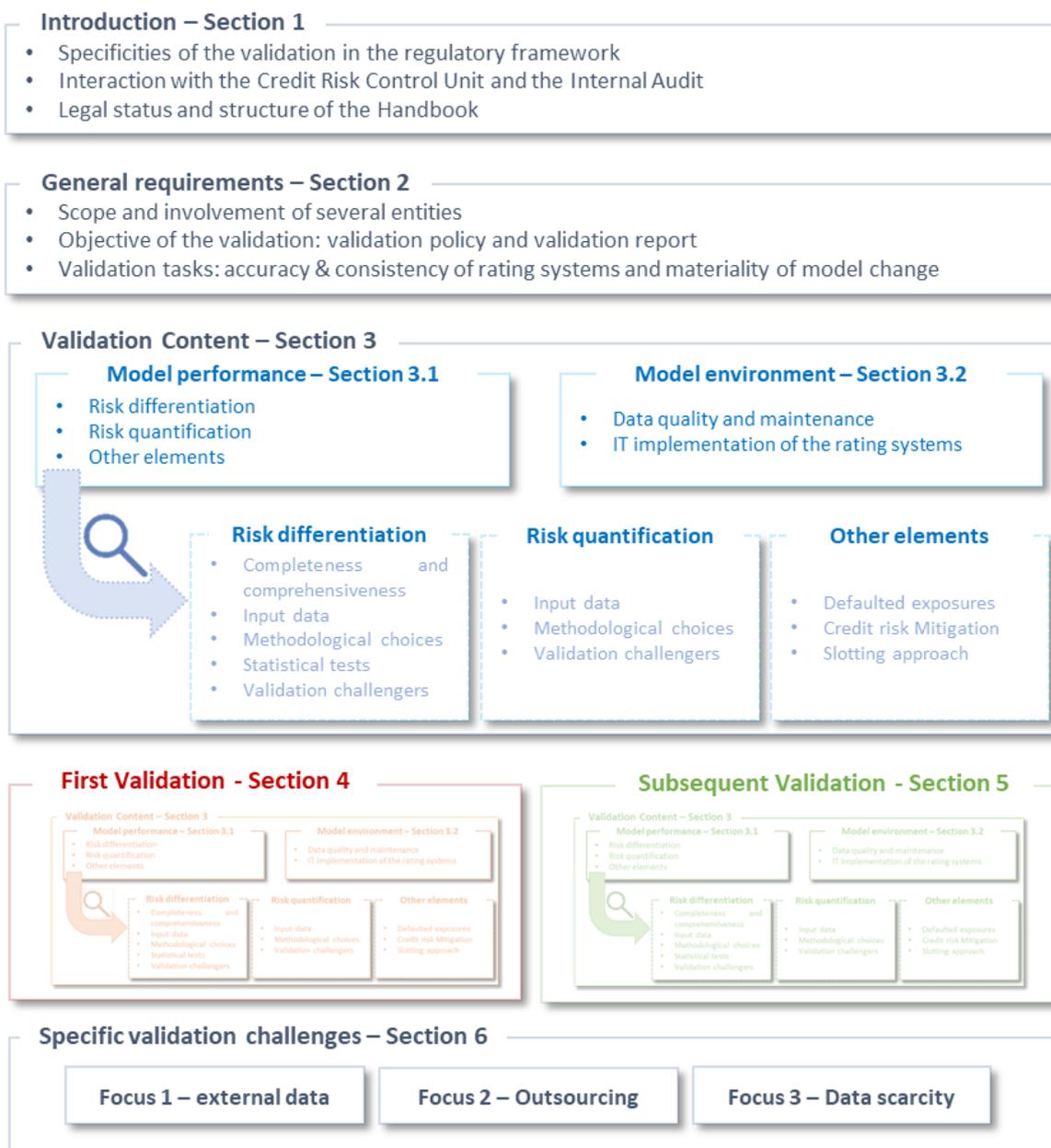
25. **Structure of the handbook (illustrated in Figure 1).** A general description of the requirements applicable to the validation function and on the tasks to be performed is given in the sections [2 General requirements] and [3 Validation content] respectively. In practice, the description of the validation tasks is organised in two sections. The tasks related to the pure model performance assessment are developed in section [3.1 Assessment of the core model performance] and the ones dealing with the modelling environment (i.e. the data quality and the IT implementation of the rating system) are further described in section [3.2 Assessment of

the modelling environment]. The presentation of the core performance assessment is split in three parts:

a. **Performance of the rating system - Risk differentiation:**

Consistency and comprehensiveness of the rating assignment	1. Documentation for consistency 2. Comprehensiveness and conservatism for non-standard ratings	
Accuracy of the rating assignment		**Discriminatory power**	**Homogeneity & Heterogeneity**
	Input data	1. Data quality 2. Completeness of the RDS 3. Data preparation *(including estimations)* 4. Representativeness	
	Methodological choices	1. Risk drivers 2. Functional forms and human judgment *3.* Definition of grades or pools	
	Statistical tests	1. Scope and level of application 2. Various economic conditions	
	Validation challengers	1. Impact of overrides 2. Number of overrides 3. Stability of the ratings 4. Monotonicity of the DR 5. External data sources 6. Concentration in rating grades	

b. **Performance of the rating system - Risk quantification**

Input data	1. Data quality 2. Completeness of the RDS 3. Data preparation (review of the exclusions and realised LGD floored at 0%) 4. Representativeness (challenge adjustments)			
	PD	**LGD**	**Conservatism**	**Downturn (DT)**
Methodological choices	1. General calibration methodology 2. Average DR *(Overlapping windows)* 3. LRA *(including for LGD treatment of Incomplete work-out)* 4. Calibration segment and type 5. Appropriate adjustments		1. In CRR 2. Quantification for each MoC category 3. Aggregation of MoC categories	1. Economic DT 2. LGD DT
Validation challengers	1. Compare DR with PD and similar analysis for LGD and CF – 185(b) CRR 2. Other quantitative validation tools (best estimates) – 185(c) CRR 3. External data sources			

c. **Performance of the rating system - Other specific points**

Defaulted exposures	1. RDS: reference dates, realised LGDs and data requirements 2. ELBE: MoC, economic conditions and SCRA 3. LGD in default: relation with LGD non defaulted and ELBE	
CRM	1. RDS: source and allocation of cash flows, recoveries from collateral 2. Level of validation 3. Meaningful recognition (no double counting)	
	FCP	**UFCP**
	1. On-balance sheet netting and master netting agreement 2. Adverse dependency	1. Choice of the approach 2. Recognition of multiple CRM
	Use of multiple CRM	
Slotting approach	1. Assessment of the assignment process 2. Assessment of the input data 3. Assessment of the modelling choices 4. Quantitative and challenger analyses	

26. **Difference between the first and subsequent validation.** While the section [3 Validation content] describes the validation analysis in a general manner, the actual tasks to be performed may differ between the initial validation of a new model, the on-going validation of an unchanged model as well as in the case of a model change. This difference is expected to be reflected by the institutions in their validation policy, as further described in paragraph [33]. More specifically, the validation function is expected to assess a new rating system (in the context of the introduction of the IRB approach or according to its roll out plan) according to the section [4 First validation of newly developed rating systems or changed aspects of a rating system], and an unchanged rating system according to the section [5 Subsequent validation of unchanged aspects of a rating system]. In the case of a model change:

a. For those aspects that are directly or indirectly affected by the model change, the activities described in the section [4 First validation of newly developed rating systems or changed aspects of a rating system] are expected be performed by the validation function;

b. For all other aspects, the validation activities may instead be performed by the validation function according to the description provided in the section [5 Subsequent validation of unchanged aspects of a rating system];

c. In the case of a material change in the range of application of a model, the whole model is expected to be assessed by the validation function according to the requirements of the

section [4 First validation of newly developed rating systems or changed aspects of a rating system].[35,36]

Consultation Box

The handbook introduces expectations with respect to the split of the first and subsequent validation activities and institutions are specifically invited to provide feedback on these expectations.

Question 1:

1a) How is the split between the first and the subsequent validation implemented in your institution?

1b) Do you see any constraints in implementing the proposed expectations (i) as described in section 4 for the first validation for a) newly developed models; and b) model changes; and (ii) as described in section 5 for the subsequent validation of unchanged models?

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27. **Focus sections**. This handbook also covers some specific areas where the validation function may face specific challenges:

    a. Some models are developed on a broader scope than it is afterwards applied. The specificities of the validation of this type of models are further discussed in the section [6.1 Focus 1: validation in the context of use of external data]

    b. Some of the operational tasks of the validation function can be outsourced both internally or externally. However, the responsibility of these tasks remains within the validation function. This particular point is further described in the section [6.2 Focus 2: validation in the context of outsourcing of validation tasks];

    c. The validation of the so-called low-default portfolio, or more generally low-data portfolio, can result in challenges for the use of some validation tools which require a minimum

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[35] In the exceptional case of a non-material change in the range of application of a model, the validation activities may be performed according to the description provided in the [5 Subsequent validation of unchanged aspects of a rating system] (as per Annex 1, Part 1, section 2, paragraph 3 of the CDR on model changes). However, the assessment of the materiality of the change in the range of application of a model requires, in the case of additional exposures related to the lending decision of a third party to the group, an assessment of representativeness (as described in paragraph [44.d]) and comparability (as described in paragraph [49.d]) as per Annex 1, Part 1, section 1, paragraph 1(c) of the CDR on model changes, which are expected to be performed according to the requirements of the section [4 First validation of newly developed rating systems or changed aspects of a rating system].

[36] Therefore, this handbook uses the concepts of 'first validation' and 'subsequent validation' which are slightly different than the usually known 'initial validation' and 'on-going (also named regular) validation'. While an initial validation always triggers a first validation, during the on-going validation a first validation is also expected for the aspects that have been changed in the rating system. Hence, a subsequent validation is only performed during the on-going validation for the unchanged aspects of a rating system (or on the full rating system in case of no change).

number of observations to be conclusive. Further thoughts on the validation of these
models are given in the section [6.3 Focus 3: validation in the context of data scarcity].

28. **Validation of CF estimates.** This handbook contains less guidance on the validation of own
estimates of CF, given that these parameters were not explicitly part of the EBA IRB repair
program. However and as a general remark, it is considered best practice to have similar
validation techniques in place as for the LGD risk parameter, especially when it comes to the
validation of the downturn component (as mentioned in paragraph [53]) and the treatment of
extreme realised values (as mentioned in paragraph [45.a]).

2. General requirements

2.1 Scope of the validation

29. **Scope of the validation.** To satisfy the requirements of Part III, Title II of the CRR, the validation activities are expected to be performed at all relevant levels where an internal model is used to satisfy the requirements of the CRR. As such, the internal validation should be conducted at each level where a CA has granted an approval for a rating system (or is expected to do so in the context of an initial validation of a new model). Therefore, in the case where a rating system has received the approval on a consolidated as well as sub-consolidated and/or individual basis, the internal validation is expected to be performed at these levels. While more than one validation function may be involved in the validation of a rating system, in particular in the context of outsourcing and/or when a rating system is used by different legal entities, the responsibility of the validation tasks and the validation objectives mentioned in paragraph [2.2] are expected to be retained by the validation function of the entity at the level of which the rating system has been approved. As mentioned in paragraphs [18] and [35], the validation function's resources and framework are expected to be commensurate with the complexity and materiality of the rating system.

30. **Involvement of several entities in the validation through outsourcing.** The degree to which one validation function can leverage on the validation activities of another validation function is further described in section [6.2 Focus 2: validation in the context of outsourcing of validation tasks], and in particular in paragraph [150] in the case of another validation function within the group.

31. **Involvement of several entities in the validation through a common rating system**. In the case where a rating system is used at different levels of a group, the validation functions are expected to share their findings and a good practice is to come up with an opinion on a single shared set of possible recommendations on the corrective actions against any identified model deficiency or under-estimation of risk parameters. In particular, the validation functions should come up to an agreement on whether a deficiency identified at a certain level is an indication of a general deficiency of the rating system at group level, taking into account the assessment of paragraph [32.c], along with the possibilities on how these might be remediated as mentioned in paragraph [19]. In any case, institutions (e.g. IA) are required to ensure the sufficient capitalisation at all relevant levels (consolidated, sub-consolidated and/or individual basis), taking into account the assessment of the validation functions.

Consultation box

Question 2: For rating systems that are used and validated across different entities, do you have a particular process in place to share the findings of all relevant validation functions? Do

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you apply a singular set of remedial action across all the entities or are there cases where remedial actions are tailor-made to each level of application?

2.2 Validation policy and validation report

32. **Objective of the validation**.[37] The validation function should form an opinion on whether the final rating system developed (or reviewed in case of model change) by the CRCU meets the regulatory requirements. It should then communicate its opinion to the CRCU, the senior management and the management body, as part of the corporate governance as mentioned in paragraph [19].[38] As such, the validation function is expected to come up with:

   a. A list of all the deficiencies identified, along with an assessment of their materiality and severity (e.g. via quantitative impact), such that it can be used by the CRCU to come up with a prioritisation plan for their resolution;

   b. An assessment of the consequences of the combination of these deficiencies on the overall performance of the rating system, along with the consequence in terms of usability of the rating system for regulatory purposes;

   c. An assessment of the level of confidence in the results of its assessments, in particular when lack of data can be considered as an impediment to the robustness of the statistical tests.

33. **Validation policy.[39]** The validation policy is expected to describe the validation framework, i.e. the roles, responsibilities, processes and content of the validation activities (i.e. tasks and quantitative tests) that need to be performed. In particular, the validation policy should include:

   a. A description of how the validation function should come up with an opinion on the accuracy and consistency of the rating system as a whole.[40] This implies that the validation policy is expected to describe the aggregation methodology to be used across the different analyses, in particular where quantitative tests are performed as further described in paragraph [35.b];

   b. A description of the data collection and selection process that is expected to result in the 'validation data set' (i.e. all the data sets used for the purpose of validation). This validation data set is expected to contain the validation samples (See Focus Box [1]) used for performing the quantitative tests as further described in paragraph [35.b] in addition to the reference data set (RDS) used by the CRCU during the estimation of the risk parameters;

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[37] Article 185(a) of the CRR, Articles 11 of the CDR on assessment methodology

[38] Article 189 of the CRR. For the rest of this handbook, this identification and communication of the deficiencies will be referred to as 'form an opinion on'.

[39] Article 12 of the CDR on assessment methodology, section 4.2.2 of the GL on PD and LGD estimation

[40] Article 185(a) of the CRR

🔍 **FOCUS BOX 1:** VALIDATION SAMPLES AND VALIDATION DATA SET

The validation samples used for the performance assessment, i.e. for running the validation challengers, need to contain all information to allow for all relevant types of validation analyses. To this end, it is in particular expected that the validation sample contains observations covering a time period that is as long as possible. While the validation samples are generally expected to reflect the range of application for the rating system in question (see further details in Focus Box [7]), it should also allow for analyses at sub-consolidated and/or individual level, where relevant. All kinds of data preparation steps are expected to be well documented in the validation report, as mentioned in paragraph [34.a].

In addition, to the data related to the validation samples, other data is expected to be used by the validation function ('validation data set'). This includes in particular the development data or other data used by the CRCU, or data gathered from independent data sources (e.g. for benchmarking purposes). The validation function is expected to document the validation data set used.

    c. The list of the analyses to be performed (as further described in paragraph [35]), along with a description of their purposes and possible limitations (i.e. underlying assumptions and theory), their scope of application (i.e. data sets on which they are applied and compulsory or discretionary use), their expected frequency (including if relevant for first and/or subsequent validation, as mentioned in paragraph [26]). For the quantitative tests as further described in paragraph [35.b], the documentation is expected to include a high-level description of the expected data preparation process, the computations to be performed, the fixed targets and tolerances in the form of thresholds (see Focus Box [2]) and the associated findings and recommendations mentioned in paragraph [19] triggered when breached, as well as the potential qualitative analyses to be conducted to complement the assessment;

🔍 **FOCUS BOX 2:** QUANTITATIVE THRESHOLDS AND COMPARATIVE ANALYSES

In practical terms, while absolute thresholds can generally be considered as adequate backstops, it is usually helpful to complement them by an ad-hoc comparative analysis (such as with results of previous years as mentioned above).

For the first validation, two cases can arise:

    1. In the context of the validation of model changes, typically the model performance of the new model has improved compared to the current version. Hence, the results of the key performance metrics of the new model are expected to be better than the ones

performed using the current model in place. If the model performance of the new model has not improved compared to the current version the validation function is expected to conduct a more in-depth analysis to fully understand the reasons and to critically assess the adequacy of the new model.

2. *In the context of newly introduced models, a relative comparison may be harder to find. While absolute thresholds may be deemed sufficient, other alternatives are however possible. One possible way is to compare the results of key performance metrics with the ones calculated for other rating systems (e.g. other exposure classes), for instance in the context of a roll out. Another possibility is to use the differentiation provided by the Standardised approach (via the different allocation of exposures into different risk weight (RW) buckets), the loss given default (LGD) and conversion factor (CF) regulatory values in the case of the introduction of the use of own LGD or CF estimates for non-retail exposures or the supervisory slotting criteria approach (slotting approach) for the specialised lending exposures, and ensure that the risk differentiation provided by the IRB parameters leads to better results (this approach produces less relevant results for retail exposures).*

For the subsequent validations, the comparison between the latest results of the validation and the ones observed in the previous years (and in particular the ones observed during the first validation) can be used to detect a trend (i.e. deterioration) in the model performance.

d. The conditions under which the validation function may leverage on the work performed by the CRCU (e.g. by reviewing the work performed by CRCU instead of performing its own calculation). As further developed in the section [4 First validation of newly developed rating systems or changed aspects of a rating system] and section [5 Subsequent validation of unchanged aspects of a rating system], the degree of leverage on the work performed by the CRCU may be different depending on the position in the model life cycle;

e. The main content, frequency and recipients of the validation reports.

34. **Validation report.**[41] A key component of the communication of the validation opinion on the rating system is the validation report. Its structure is not expected to be harmonised between institutions (and is in particular not required to follow the structure of this validation handbook), nor necessarily between different rating systems for a given institution, but left to the own judgment of the validation function in order to optimise the communication of its opinion. In practical terms, the validation report is expected to describe:

a. All the relevant tests performed to challenge the rating system, along with a description of the validation data preparation processes and the related data quality of validation samples used mentioned in paragraph [33.b], including their sizes (e.g. in term of number of

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[41] Article 13 of the CDR on assessment methodology

exposures and number of years), and a comparison vis-a-vis the application portfolio and overlap with the RDS (e.g. development sample or calibration sample);

b. The outcomes of the validation analyses, which are expected to be verifiable by third-party experts (e.g. the CRCU, the IA or the CA). In this report, the validation function is supposed to come up with a clear opinion on the performance of the rating system as mentioned in paragraph [2.2];

c. As a good practice, the inclusion of a comparison between the latest results of the validation and the ones observed in the previous years (as a result of the analyses performed as per paragraph [35]), as well as the highlighting of the previously identified deficiencies, along with their severity, and a description of how they have been addressed.

2.3 Validation tasks

35. **Type of analyses to assess the accuracy and consistency of rating systems**. As a general stance, institutions shall have robust systems in place to validate the accuracy and consistency of rating systems, processes and the estimation of all relevant risk parameters.[42] All relevant validation techniques are expected to be used and are expected to include quantitative as well as qualitative methods that should be commensurate with the complexity and materiality of the rating system.[43] In particular, the areas described in section [3 Validation content] should be understood as minimum expectations and should not prevent institutions from developing additional tools and methods. In practice, the type of analyses performed by the validation function are mainly, on the one hand, an assessment of the work done by the CRCU, and in particular of the different (modelling) choices taken during the development of the rating system, and, on the other hand, the development of own empirical challengers, in particular using new set of data not used during the development of the rating system:

a. **Assessment of CRCU's work and related documentation.[44]** To the end of gaining a good understanding of the CRCU work, the validation function is expected to review the steps performed during model development and risk quantification or the review of estimates, respectively, as well as the decisions made during these processes. In this context, the validation function is expected to check if the documentation of the rating system methodologies related to the validation function's scope of assessment is usable and understandable by any third parties.[45] The usability should be understood as allowing a third party to replicate the estimation of risk parameters and arrive at the same results, such that the validation function can independently assess the rating system. As a matter of fact, in addition to being used by the CA for the authorisation of the rating system, the documentation is expected to be used by the validation function to challenge the model

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[42] Article 12(a) of the CDR on assessment methodology

[43] Article 12(b) of the CDR on assessment methodology

[44] Article 11(2)(a) of the CDR on assessment methodology

[45] Articles 144(1)(e), 171(1)(b), 175 of the CRR, Article 3(1)(d) of the CDR on assessment methodology

specifications and monitor their changes (see Interaction Box [2]), on the top of using metrics measuring the pure performance of the model.

> 🤝 **INTERACTION BOX 2:** ASSESSMENT OF THE MODEL DOCUMENTATION BETWEEN IA AND VALIDATION FUNCTION
>
> *While the validation function assesses the content of the documentation, in particular during its assessment of the rating system developed by the CRCU, it is not necessarily expected to perform a regulatory compliance check based on the documentation they receive. Instead, this assessment may be performed by the IA.[46] However, as further mentioned in paragraph [88], the validation function is expected to review the documentation submitted to CAs in the context of a material model change (i.e. the application package that documents the change of the model).[47]*

b. **Assessment via challengers**. As mentioned in paragraph [33.a], the validation function is expected to come up with an opinion on the accuracy and consistency of the rating system as a whole.[48] This implies that, in the case where statistical tests are performed at a more granular level (e.g. for specific years or specific grades or pools), or when multiple tests or metrics are calculated, the validation function is expected to develop an aggregation methodology to deliver an overall assessment of the performance of the rating system as a whole. During this aggregation, specific attention is expected to be retained on the results of the assessment where a high share of obligors and exposure values are observed (in the development and application portfolio).

36. **Consistency of the validation tasks in the performance assessment.** The assessment of the performance of the rating systems is expected to be performed 'consistently and meaningfully',[49] and as such the institution is expected to define and implement validation methods and procedures that are consistent across rating systems as well as through time.[50] A good practice is to ensure the changes in the validation policy are recorded and highlighted, both for the methods and the data used (data source and periods covered). Nevertheless, institutions are expected to seek for state-of-the art validation techniques as well as to develop a targeted validation framework (e.g. processes, tests or frequencies) for a specific type of portfolios or rating systems with specific challenges, including using data appropriate to the portfolio.[51] Particular validation challenges are further discussed in the section [6 Focus on specific validation challenges].

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[46] E.g. assessment of the completeness the documentation on the design and operation details of rating systems as per Article 31 of the CDR on assessment methodology

[47] Article 8 of the CDR on model changes

[48] Article 185(a) of the CRR

[49] Article 185(a) of the CRR

[50] Article 185(d) of the CRR, Article 12(d) of the CDR on assessment methodology

[51] Article 185(c) of the CRR

37. **Assessment of the materiality of a model change or extension.** In addition to the assessment of the model change in terms of performance improvement, the validation function is expected to assess the materiality of all model changes and extensions and their combined effects.[52] This includes a qualitative assessment, using the relevant annexes of the CDR on model changes, and the quantitative assessment, using the thresholds defined in Article 4(1)(c) of the CDR on model changes. It should be noted that this quantitative assessment requires the institution to be in a position to estimate the own funds requirements resulting from its updated risk parameter estimates, as well as to be in a position to estimate the own funds requirements resulting from the last version of the model before the implementation of the change.

CONTEXT BOX 1: ASSESSMENT OF THE PROCESS-RELATED ASPECTS OF MODEL CHANGES BY IA

The IA is expected to review the process-related aspects of material model changes as regard to the identification, notification and classification (i.e. change in the interpretation and implementation of the requirements from the CDR on model changes).

In particular, the IA is expected to ensure that one material extension or change is not split into several changes or extensions of lower materiality.[53] A good practice is to calculate (or estimate) the total impact of all changes resulting from the updated risk parameter estimates, i.e. to compare the own funds requirements resulting from the updated risk parameter estimates with the ones resulting from the last version of the model authorised by the CA (i.e. the version of the model without taking into account non-material model changes).

In any case, the register of rating systems should cover all changes and extensions, and include their impact as part of the description of the change category assigned in accordance with the CDR on model changes.[54]

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[52] Article 11(2)(d) of the CDR on assessment methodology

[53] Article 3(3) of the CDR on model changes

[54] Article 32(2)(c) and (d) of the CDR on assessment methodology

3. Validation content

3.1 Assessment of the core model performance

38. **Dimensions of the assessment of the core model performance.** One of the objectives of the validation function is to assess the core performance of the rating system.[55] As such, this assessment can be broken down using the structure of the CRR, i.e. distinguishing between the performance in terms of risk differentiation and risk quantification:[56]

   a. **Risk differentiation**: The model should allow for a meaningful differentiation of risk[57] to ensure grouping of sufficiently homogenous exposures into the same grade or pool. To this end, the validation of a model is expected to include quantitative metrics to evaluate its discriminatory power, as well as the homogeneity within and heterogeneity across grades or pools.[58]

   b. **Risk quantification**: The estimates are expected to meet all regulatory requirements.[59] To this end, the validation of the risk parameter estimates is expected to include a comparison of realised DR with estimated PDs for each grade or pool, and analogous analysis for LGDs and CFs when allowed to use own estimates,[60] taking into account the rating assignment dynamics ('rating philosophy').[61] For LGD and CF estimates, this should include an assessment of their appropriateness for an economic downturn where this is more conservative than the long-run average.[62]

39. **Calculation of IRB metrics**. The validation function is expected to assess the performance of the rating system using regulatory definitions. To this end, the IRB metrics used to assess the core model performance are expected to be calculated according to the regulatory requirements (and the related data requirements are fulfilled).[63] This includes the calculation

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[55] Article 11(2)(c) of the CDR on assessment methodology

[56] Articles 144(1)(a) and 185(a) of the CRR

[57] Article 170(1) and (3) of the CRR

[58] Articles 170(1)(a),(d) and 170(3)(c) of the CRR, Articles 36 of the CDR on assessment methodology and paragraphs 69 and 130 of the GL on PD and LGD estimation.

[59] Articles 178 to 184 of the CRR

[60] Article 185(b) of the CRR. For the rest of the handbook, unless specified otherwise, the requirements on the LGD and CF models apply only to institutions allowed to use own estimates.

[61] Article 12(f) of the CDR on assessment methodology, Paragraph 66(c) of the GL on PD and LGD estimation

[62] Articles 181(1)(b) and 182(1)(b) of the CRR, CDR on economic downturn, GL on downturn LGD estimation and GL on LGD estimation.

[63] Sections 5.3.1, 6.1.2 and 7.1.3 of the GL on PD and LGD estimation

of the realised DR,[64] the economic loss and realised LGD[65] as well as the realised CF,[66] while the definition of default may be treated separately (see Interaction Box [3]). In practice, the validation function is expected to come up with an opinion on the compliance of the IRB metrics used by CRCU as part of the model development, risk quantification and the review of estimates. When the validation function does calculate these IRB metrics by itself to run the statistical tests and validation challengers, it is expected to compare its own IRB metrics as well as the results of the analyses with those that are derived by the CRCU.

> **INTERACTION BOX 3: ASSESSMENT OF THE DEFINITION OF DEFAULT BETWEEN IA AND VALIDATION FUNCTION**
>
> *The assessment of the definition of default may involve multiple analyses, which are not necessarily conducted by the same function:*
>
> 1. *The compliance of the internal criteria used for the identification of defaulted exposures with the regulation [67] is not necessarily checked by the validation function, but is expected to be assessed by the IA function;*
>
> 2. *The correct implementation of the default definition, and in particular the documentation, the implementation in the IT systems[68] and the identification and monitoring of the technical past due situations,[69] is also not necessarily checked by the validation function, but is expected to be assessed by the IA function;*
>
> 3. *The definition of default may trigger some issues in the model development or risk quantification (e.g. representativeness), which are on the other side expected to be assessed by the validation function, including the related appropriate adjustments and margin of conservatism (MoC). As such, the validation function is expected to review the documentation related to the definition of the default in order to understand potential changes impacting the RDS, as well as in the context of a material model change as part of the review of the documentation submitted to the CA (see Interaction Box [2]).*

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[64] Article 4(1)(78) of the CRR, Article 46(1) of the CDR on assessment methodology, section 5.3.2 of the GL on PD and LGD estimation, Q&A 2019/4599

[65] Articles 5(2), 175(3), 181(1)(i), 182(1)(c) of the CRR, Article 48(h), 49 and 54(d) of the CDR on assessment methodology, Sections 6.3.1 and 7.3.1 of the GL on PD and LGD estimation

[66] Article 182(1)(c) of the CRR, Article 48(h) and 54(d) of the CDR on assessment methodology and section 6.3.1.2 of the GL on PD and LGD estimation

[67] Articles 175(3) and 178 of the CRR, CDR on materiality thresholds, Chapter 6 of the CDR on assessment methodology and the GL on the definition of default

[68] Chapter 10 of the GL on the definition of default

[69] Paragraphs 23 and 24 of the GL on the definition of default

Consultation box

The definition of default goes beyond the mere development of an IRB rating system: for example, it also applies to exposures risk weighted according to the Standardised approach, and has some wider implications in terms of the risk management and provisioning (e.g. link with Stage 3 exposures and provisioning under IFRS 9). Therefore, it appears reasonable to expect a function other than the validation function to review those non-modelling aspects related to the definition of default.

Question 3:

3a) Do you deem it preferential to split the review of the definition of default between IRB-related topics and other topics?

3b) If you do prefer a split in question 3a, which topics of the definition of default would you consider to be IRB-related, and hence should be covered by the internal validation function?

3.1.1 Risk differentiation

40. **Dimensions of the assessment of the risk differentiation.** The validation function is expected to come up with an opinion on two dimensions (see Context Box [2]) to assess the risk differentiation performance of a model:

    a. The **consistency and comprehensiveness** of the rating assignment process;

    b. The **accuracy** of the rating assignment in the model development.

> **CONTEXT BOX 2: ACCURACY IN THE DEVELOPMENT SAMPLE AND CONSERVATISM IN THE APPLICATION PORTFOLIO OF THE RATING ASSIGNMENT [Q&A 2021/5761, Q&A 2019/5029]**
>
> *To ensure that RWEA are calculated in a conservative way, IRB models generally need to be applied in a conservative manner, i.e. the rating assignment process itself is required to be conservative when relying on insufficient information.[70] This requirement is frequently implemented by e.g. using conservative assumption(s) in case of a lack of information or missing risk drivers.*
>
> *In contrast to that, when it comes to model development, it is important that the risk quantification is based on an accurate rating assignment.[71] As such, a conservative rating*

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[70] Article 171(2) of the CRR, Section 8.1 of the GL on PD and LGD estimation

[71] Article 171(2) of the CRR, paragraph 74 of the GL on PD and LGD estimation

*assignment[72] could lead to a biased default rate calculation and risk parameter estimation when
used subsequently for the calibration sample. This aspect is further developed in the Focus Boxes
[3] and [4].*

41. **Outcome of the assessment of the model**. In any case, the validation function should be
confident enough that all the deficiencies observed in the risk differentiation are sufficiently
limited according to its criteria defined in the validation policy (including the fixed targets and
tolerance thresholds mentioned in paragraph [33.c] and the Focus Box [2]).[73]

42. **Consistency and comprehensiveness of the rating assignment process.** In order to validate the
rating assignment process, the validation function is expected to review the framework used
for the assignment process, such that:

   a. The assignment process is adequately described so that the rating assignment can be
   performed in a consistent manner (See Interaction Box [4]). To this end, the validation
   function is expected to check that the assignment process is appropriately documented and
   understandable by a third party such that it can be replicated 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);[74]

   b. The assignment process is performed in a comprehensive manner.[75] In practice, 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 (non-rated exposures) or where the assignment could not be
   renewed in time (outdated ratings), and assess the materiality of these cases in the
   application portfolio (along with the resolution plan proposed by the CRCU).[76] A good
   practice is to make the assessment of materiality in terms of exposure value and RWEA, as
   well as in terms of number of obligors or facilities to monitor the magnitude of the
   deficiencies.

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[72] To note, this conservative rating assignment is different to the conservatism added to the estimates (the latter being
so called 'margin of conservatism').

[73] As explained in the Context Box [2], deficiencies or lack in performance in the risk differentiation can generally not be
covered directly by additional conservatism. It is nevertheless likely that a lack of homogeneity within grades or pools will
indirectly lead to a higher uncertainty at grades or pools level in the risk quantification process and will increase the MoC
added to the best estimates.

[74] Articles 142(1)(1) and (2) and 171(1)(b) of the CRR, Articles 24(1)(a), (c), (d), 31(2)(b), 32(2)(a) of the CDR on assessment
methodology, Section 4.1 of the GL on PD and LGD estimation.

[75] Article 24(1)(b) and 25(2) of the CDR on assessment methodology

[76] Article 171(2), 172(2) and 173(1) of the CRR, Article25(3) of the CDR on assessment methodology and Section 8.1 and
paragraph 75 of the GL on PD and LGD estimation. N.B.: these cases are not expected to be dealt with the standardised
approach, but instead rather through a conservative IRB treatment (i.e. via a downgrade of the exposure).

> **INTERACTION BOX 4:** ASSESSMENT OF THE HUMAN JUDGMENT IN THE ASSIGNMENT PROCESS BETWEEN **IA** AND VALIDATION FUNCTION
>
> *The validation function is expected to review the incorporation of subjective data in the model (i.e. the specification of the model) for the assignment of the exposures to grades or pools. This assessment is expected to be conducted along two dimensions:*
>
> 1. *The clarity of the definitions, processes and criteria defined by the CRCU to ensure the consistency of the rating assignment, as described in paragraph [42.a];*
>
> 2. *The integration of the human judgment in the overall rating assignment, as mentioned in paragraph [45.b].*
>
> *However, the evaluation of the actual implementation (e.g. integrity of the assignment process),[77] may be carried out by the IA. This includes:*
>
> 1. *Governance aspects, such as the assessment of the independence of staff and management responsible for the final approval of the assignment from the ones responsible for the origination or renewal of exposures;*
>
> 2. *Application aspects, such as the evaluation of the consistency between the framework and the actual implementation of the human judgment (i.e. the application of the model specifications).*
>
> *In addition, the IA may be responsible for assessing the rating assignment review and in particular for the frequency and adequacy of the assignment process (in order to ensure that all outdated ratings are properly identified as such).[78]*

43. **Dimensions of assessment of the accuracy of the rating assignment.** IRB models are in practice based on either statistical models or other mechanical methods, in order to assign exposures to obligors or facilities grades or pools. In this context, the validation function is expected to assess the input data, challenge all methodological choices used during the risk differentiation, and perform statistical tests on the model performance, in order to come up with an opinion on two dimensions of the accuracy of the rating assignment, namely:

    a. 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 default (for the PD), loss given default (for the LGD) and conversion (for the CF) risk;[79]

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[77] Article 173 of the CRR

[78] Articles 173(1)(b) and 173(2) of the CRR, Article 25(2) of the CDR on assessment methodology

[79] Article 170(1) and (3) of the CRR

b. 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.[80]

44. **Assessment of the input data.** The assessment of the input data is expected to include:

a. An opinion on the data quality of the full RDS, as part of the validation function activities described in [section 3.2.1];

b. A review of the completeness of the RDS,[81] in terms of scope (obligors, facilities and default identification) and information (values of the risk drivers at the relevant dates, data necessary for calculating realised DR, realised LGD and realised CF and any other relevant data used in the risk differentiation);[82]

c. A review of all the procedures applied to the data used for the development of the model, including data collection, data cleansing, data processing (e.g. normalisation, treatment of collinearity) and data estimation (e.g. cash flow projections used for specialised lending). A good practice is to complement the review of the framework used for these estimated input data with back-testing comparisons between these estimations (including the projections which go beyond the one-year time-horizon) and the subsequently realised values (out-of-time (OOT) validation tests);

d. The analysis of the representativeness of the development sample vis-à-vis the application portfolio.[83] The validation function is expected to include in its assessment the dimensions mentioned in the GL on PD and LGD estimation: the scope of application, the definition of default, the distribution of relevant risk characteristics as well as the lending standards and recovery policies.[84] This assessment should be done in accordance with the process and methods defined in the validation policy.[85] It is expected to subsequently evaluate the measures taken by the CRCU to deal with potential deficiencies in these areas.

45. **Assessment of the modelling choices and specifications.** The assessment of the modelling choices and specifications[86] 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.[87] As such, the validation function is expected to have a good understanding of the documentation and the features of the model, including its scope of application, limitations

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[80] Articles 170(1)(a), (d) and 170(3)(c) of the CRR, Articles 36 of the CDR on assessment methodology and paragraphs 69 and 130 of the GL on PD and LGD estimation

[81] Article 174(b) of the CRR

[82] Sections 5.2.1, 6.1.2 and 6.2.1 of the GL on PD and LGD estimation

[83] Article 174(c) of the CRR

[84] Article 37(2) of the CDR on assessment methodology and Section 4.2.3 of the GL on PD and LGD estimation

[85] Section 4.2.2 of the GL on PD and LGD estimation

[86] Article 174(d) of the CRR

[87] Article 174(a) of the CRR

and weaknesses, main and alternative assumptions or approaches to those finally chosen, in order to effectively challenge them.[88] In this context, the validation function is expected to assess:

a. The selection process and related outcomes of risk drivers and rating criteria in terms of predictive power, such that all relevant information is taken into account. [89] In practice, the choices should be consistent with the results of the statistical methods further described in paragraph [46][90] and with business expectations.[91] This analysis is expected to include a review of:

- The minimum list of potential risk drivers to be considered mentioned in the regulation;[92]

- Extremely high values of realised LGDs, as it could require the identification of specific risk drivers;[93]

- Where external ratings are used as primary risk driver, whether all relevant information has been considered;[94]

- The use of third-party ratings,[95] by challenging the appropriateness of the use of rating transfers, the related use of overrides (as further discussed below) or the related use of risk drivers;

- The framework for the treatment of connected clients, ensuring in addition that cases where the obligors are assigned to a better grade than their parent entities are intended to be exceptional and duly justified.[96]

b. Any functional form or 'hyperparameters'[97] used in the model development to aggregate all the risk drivers. This includes how the statistical model and human judgement (see Context Box [3]) are combined to derive the final assignment of exposures to grades or pools.[98] This assessment is expected to comprise an evaluation of the theoretical framework (such that only additional information not considered in the statistical model is incorporated via

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[88] Article 175(4)(a) of the CRR, Article 38 of the CDR on assessment methodology

[89] Article 171(2) of the CRR, Article 24(1)(e) and (f) of the CDR on assessment methodology

[90] Article 33(1)(c) of the CDR on assessment methodology

[91] Article 171(1)(c) of the CRR, Article 33(1)(b) of the CDR on assessment methodology

[92] Article 170(4) of the CRR, Article 33(2) of the CDR on assessment methodology, Sections 5.2.2 and 6.2.1 of the GL on PD and LGD estimation.

[93] Paragraph 162 of the GL on PD and LGD estimation

[94] Article 171(2) of the CRR

[95] Section 5.2.3 of the GL on PD and LGD estimation

[96] Article 172(1)(d) of the CRR and Article 24(3) of the CDR on assessment methodology

[97] See [Discussion Paper on Machine Learning] pages 16 and 17

[98] Article 174(e) and Article 31(5)(d) of the CDR on assessment methodology

human judgment in a consistent way – see Interaction Box [4])[99] and the comprehensiveness of its documentation.[100]

📖✏️ **CONTEXT BOX 3: THE DIFFERENT FORMS OF HUMAN JUDGMENT**

The human judgement refers to three particular notions:

1. *The human judgement applied in the development of the model used for assigning exposures to grades or pools.[101]*

2. *The human judgement applied in the process of assignment of exposures to grades or pools, in the form of subjective input data (such as qualitative variables based on an expert-based assessment).[102]*

3. *The human judgement in the form of overrides, either of input or outputs, of the assignment process.[103]*

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c. How obligor and facility grades are defined, such that the methodology used to define grades or pools ensures the homogeneity of obligors and exposures assigned to the same grade or pool over time.[104] In particular, 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 to ensure that the assignment of a rating to obligors or facilities is done in a consistent manner to the same grade or pool;[105]

- The number of rating grades meets the regulatory requirements in terms of minimum number: the obligor rating scale for exposures to corporates, institutions and central governments and central banks shall have a minimum of seven grades for non-defaulted obligors and one for defaulted obligors and at least four grades for non-defaulted obligors and at least one grade for defaulted obligors for specialised lending exposures treated under the slotting approach;[106]

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[99] Article 39(b) and (d) of the CDR on assessment methodology

[100] Article 39(c)(i) and (d) of the CDR on assessment methodology

[101] Article 39(a) and (d) of the CDR on assessment methodology, paragraph 35(a) the GL on PD and LGD estimation

[102] Paragraph 201(a) the GL on PD and LGD estimation

[103] Article 24(2) and 39(b), (c) and (d) of the CDR on assessment methodology, Paragraph 201(a) and (b) of the GL on PD and LGD estimation

[104] Article 170(1) and (3)(c) of the CRR and Article 36 of the CDR on assessment methodology

[105] Article 171(1)(c) of the CRR

[106] Articles 170(1) and 170(2) of the CRR, Article 34(1)(a) of the CDR on assessment methodology

- The number of rating grades is not excessive: the number of exposures in a given grade or pool is sufficient to allow for meaningful quantification and validation of the default or loss characteristics at the grade or pool level;[107] as such, a high number of rating grades can be an indication of a lack of heterogeneity between grades or pools.

🔍 **FOCUS BOX 3: ACCURACY OF THE RATING ASSIGNMENT IN THE CONTEXT OF MODEL REDEVELOPMENT [Q&A 2021/5761 AND Q&A 2019/5029]**

In the context of a model development, the rating assignment of exposures in past years may involve some operational challenges, in particular when the model cannot retrospectively be run in a fully automated manner (e.g. use of human judgement in the form of qualitative variables or overrides).

In this context, the validation function is expected to assess the assumptions and limitations of the approach chosen by the CRCU to come up with the rating assignment of past exposures, and get an opinion of their impact on the risk quantification (in terms of bias or additional uncertainty). In practice, this may involve:

1. *If an institution chooses to build the risk quantification on retrospectively calculated ratings (based consistently on the model to be calibrated), the validation function is expected to assess if these retrospectively performed rating assignments were determined without incorporating potential conservative adjustments in the ratings. For example, overrides or other forms of human judgement may not be available and be derived via assumptions from the overrides performed as part of the old model [See Q&A 2019 5029].*

2. *If an institution chooses to base the risk quantification on historically performed ratings (even potentially stemming from different versions of a rating model), the validation function is expected to check if appropriate measures were taken in model development, or risk quantification respectively, to remove conservative assumptions from historical ratings.*

This analysis should then be considered for the assessment of the appropriateness of the MoC as further described in the Focus Box [4] in the section risk quantification.

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46. **Quantitative analyses**. The empirical assessment of the model performance is expected to be based on rigorous statistical tests (see Interaction Box [5]). These tests should be part of the validation policy, as mentioned in paragraph [33], and are expected to be sound and adequate

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[107] Article 170 of the CRR, Article 34(1)(c) and (d) of the CDR on assessment methodology

(including using IRB metrics as defined in the regulation as mentioned in paragraph [39]) and considering the all available data (See Focus Box [1]):

a. They should cover the dimensions mentioned in paragraph [43]. As such, they are expected to be conducted at all relevant levels. In this context, it is considered as best practice to complement the evaluation of the final rating by an analysis of the intermediate modelling steps (e.g. qualitative or quantitative sub modules, evaluation before and after overrides as mentioned in paragraph [8]). For the evaluation of the selection of risk drivers and final ranking, the evaluation is expected to be performed in particular at calibration segment level (when used). For the evaluation of the homogeneity and heterogeneity, the evaluation is expected to be performed within (homogeneity) and across (heterogeneity) grades;

b. They should allow for an evaluation of the performance of the model under various economic conditions.[108]

INTERACTION BOX 5: STATISTICAL ASSESSMENT OF THE MODEL BETWEEN CRCU AND VALIDATION FUNCTION

*Institutions shall establish a rigorous statistical process including **out-of-time (OOT)** and **out-of-sample (OOS)** performance tests for validating the model.[109] In particular, institutions need to develop robust models to allow for stable model use across time (and thus to a certain extent across potentially changing environment or even economic conditions). As such, these tests are based on two different samples, as illustrated in a schematic view in Figure 2.*

Figure 2 : Schematic view of the development sample versus Validation samples

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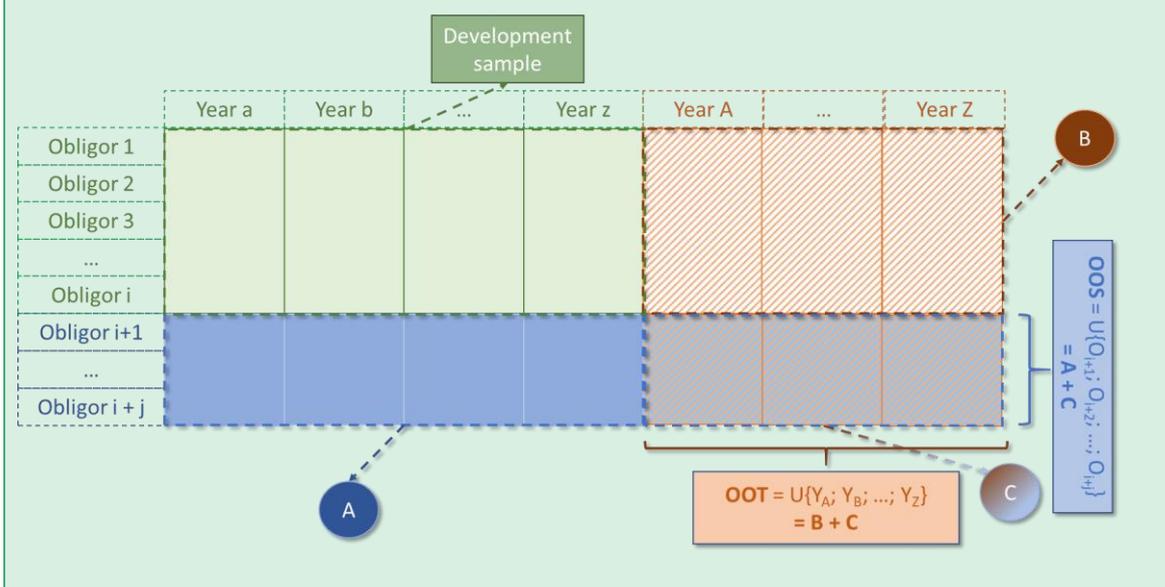
[108] Article 35 of the CDR on assessment methodology

[109] Article 175(4)(b) of the CRR

*These tests are expected to be used by the **CRCU** as part of the model development. However, as further developed in the Sections [4 First validation of newly developed rating systems or changed aspects of a rating system] and [5 Subsequent validation of unchanged aspects of a rating system], the validation function is expected to or may have to perform additional tests to form its opinion on the performance of the model.*

47. **Validation challengers**. In addition to these statistical tools, the validation function is expected to assess the following:

    a. The impact of overrides on the performance of the rating assignment process. To this end, the validation function is expected to assess the performance of the model before and after overrides. [110]

    b. The number of overrides applied on the model outcomes. This could indicate a weakness in the rating model in terms of effectiveness to consider all relevant information.[111] To this end, the validation function is expected to assess their materiality (in terms of number of obligors or facilities, their exposure value and their related RWEA) for the application portfolio, and review the threshold set as maximum acceptable rate of overrides for the model.[112]

    c. The stability of the ratings assigned to individual obligors or facilities (using for instance a migration matrix). This analysis is expected to be used to understand the core feature of the model with respect to the rating philosophy.[113] The outcome of this analysis is expected to be compared to the expected outcome due to the rating philosophy.[114] In case of material deviation, this could be an indication of a deficiency in the model, such as missing risk drivers or inadequate definition for grades or pools (i.e. lack of homogeneity or heterogeneity). 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, the risk quantification methodologies used[115] and their impact on the stability of risk parameters.[116] The result of this analysis is expected to be considered for back-testing purposes, as mentioned in paragraphs [55] and [56].

    d. The relationship between obligor grades in terms of the level of default risk.[117] In particular, this assessment can be done by analysing the monotonicity of the one-year DR or long-run

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[110] Article 172(3) of the CRR, Article 24(2)(d) of the CDR on assessment methodology, paragraphs 206 and 207 of the GL on PD and LGD estimation

[111] Articles 170(4) and 172(1) of the CRR, Article 24(2)(d) and (e) of the CDR on assessment methodology

[112] Paragraph 205 of the GL on PD and LGD estimation

[113] Article 12(f) of the CDR on assessment methodology, section 5.2.4 of the GL on PD and LGD estimation

[114] In case of the application of paragraph 90 of the GL on PD and LGD estimation, the calibration can have an impact on the rating assignment and should therefore be considered.

[115] Paragraph 66(c) of the GL on PD and LGD estimation

[116] Article 11(2)(c) of the CDR on assessment methodology

[117] Article 170(1)(c) of the CRR

average DR. The validation is expected to have a good understanding of the reasons for the non-monotonicity and is expected to take into account this analysis in particular when assessing the discriminatory power of the model. A similar analysis can be conducted for the realised LGD or realised CF in the case where rating grades are used.

e. Other relevant external data sources, where available.[118] For this purpose, where a sufficient number of external ratings is available, it is a best practice to use them as a challenger. As such, the comparison with external ratings should not be used as an objective benchmark to assess the performance of the internal model, but rather as a tool to search for potential weaknesses in terms of effectiveness to consider all relevant information.

f. The potential concentration in rating grades, which if unwarranted, could be an indication of a lack of homogeneity within grades or pools and therefore of missing risk drivers.[119] In addition, concentration in rating grades can give rise to data scarcity related issues, which are further discussed in section [6.3 Focus 3: validation in the context of data scarcity].

3.1.2 Risk quantification

48. **Dimensions of the assessment of the risk quantification.** The validation function is expected to assess the input data, challenge all methodological choices used during the risk quantification and perform statistical tests between estimates and observed data, in order to come up with an opinion on the 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, in relation with the observed realised DR,[120] LGD[121] and CF respectively;[122]

b. The conservatism of the risk estimates, taking into account in particular the quantification of the MoC;[123]

c. For the LGD and CF parameters, the appropriateness of the estimates for an economic downturn, if those are more conservative than the long-run average.[124]

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[118] Article 185(c) of the CRR

[119] Articles 170(1)(d), 170(1)(f) and 170(3)(b) of the CRR, Article 34(1)(b) of the CDR on assessment methodology, paragraph 87(c) of the GL on PD and LGD estimation

[120] Article 180(1)(a) and Article 180(2)(a) of the CRR

[121] Article 181(1)(a) of the CRR

[122] Article 182(1)(a) of the CRR

[123] Article 179(f) of the CRR, Section 4.4.3 of the GL on PD and LGD estimation

[124] Articles 181(1)(b) and 182(1)(b) of the CRR

49. **Assessment of the input data.** The input data used for the risk quantification is expected to be reviewed to ensure that any uncertainty related to a deficiency is sufficiently covered through a MoC.[125] It is expected to include:

   a. An opinion on the data quality of the full RDS, as part of the validation function activities described in [section 3.2.1];

   b. 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 (obligors, facilities and default identification) and information (values of the risk drivers at the relevant dates, data necessary for calculating the realised DR, realised LGD and realised CF and any other relevant data used in risk differentiation or risk quantification);[126]

   c. A review of all the 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.[127] For these years used for the risk quantification, the validation function is expected to check that all observations have been taken into account, with the exception of exclusions in the specific circumstances mentioned in the regulation (i.e. wrong rating model assignment or default identification),[128] and those exclusions and data cleansing are duly documented.[129] In particular, the treatment of the cases with non-standard or outdated ratings (as referred to in paragraph [42.b]) should be carefully reviewed, as further described in the Focus Box [4]. With respect to the LGD parameters, the realised LGDs of the cases with no loss or with a positive outcome should be floored at 0% for the purpose of the calculation of the observed average LGD and the estimation of the long-run average LGD.[130]

> 🔍 **FOCUS BOX 4: ACCURACY OF THE RATING ASSIGNMENT IN THE CONTEXT OF MODEL (RE-) DEVELOPMENT [Q&A 2021/5761 AND Q&A 2019/5029]**
>
> *A key input during the risk quantification is the rating assigned to each exposure based on the model developed during the risk differentiation. As mentioned in the previous section, the rating assignment used for the risk quantification should be as accurate as possible to ensure homogenous grades or pools. In particular, in the context of model development, the rating assignment of exposures of the past years should not include the additional conservatism added due to insufficient information (as per section 8.1 of the GL on PD and LGD estimation), and may*

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[125] Section 4.4, and in particular paragraph 37(a) of the GL on PD and LGD estimation

[126] Article 174(b) of the CRR, Article 42(1)(a) of the CDR on assessment methodology, Sections 5.3.1 and 6.1.2 of the GL on PD and LGD estimation

[127] Article 11(2)(a) of the CDR on assessment methodology

[128] Paragraph 71 of the GL on PD and LGD estimation

[129] Article 42(1)(e) of the CDR on assessment methodology, Sections 5.3.1, 6.3.2 and paragraph 163 of the GL on PD and LGD estimation

[130] Paragraph 160 of the GL on PD and LGD estimation

*also require some assumptions (with hence associated limitations) by the CRCU to come up with
the rating assignment of past exposures when human judgement was involved.*

*In this context, the validation function is expected to assess the materiality of the cases with non-
standard or outdated ratings, 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 any related uncertainty is sufficiently covered by a MoC.[131]*

d. A review of the representativeness[132] of the data used for the risk quantification. The
validation function is expected to develop statistical tests or metrics for this task,[133] and
check that any related uncertainty is sufficiently covered by a MoC.[134] As such, the validation
function is expected to have an opinion on the representativeness of the samples used for
risk quantification (i.e. samples used to calculate long-run-averages and calibration samples
– if different) vis-à-vis the application portfolio. 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.[135] This assessment is expected to be performed at the
calibration segment level; in the specific case of a risk quantification based on the long-run
average DR at the level of grade or pool,[136] the assessment of the representativeness is
expected to factor in the properties of the rating assignment.

50. **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:

a. The choice of the general calibration methodology,[137] based on the assessment mentioned
in paragraph [49] of input data for both internal data[138] and external data (as further
discussed in section [6.1 Focus 1: validation in the context of use of external data]). As such,
the validation function is expected to check that the use of a second-best approach, such as
a strong reliance on external data, or a retail calibration or a for purchased corporate
receivable based on an estimate of total losses, is justified by insufficient internal data. Last,

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[131] Article 46(6) and (7) of the CDR on assessment methodology, paragraphs 37(a) and 75 of the GL on PD and LGD
estimation

[132] NB: the representativeness in the context of the risk quantification is also referred to as 'comparability', for instance
in Annex 1, Part 1, Section 1, paragraph 1(c)(ii) of the CDR on model changes.

[133] Paragraph 17 of the GL on PD and LGD estimation

[134] Paragraph 37(a) of the GL on PD and LGD estimation

[135] Article 42(2) of the CDR on assessment methodology, section 4.2.4 of the GL on PD and LGD estimation

[136] Paragraph 92(a) of the GL on PD and LGD estimation

[137] Articles 160(2), 180(1)(a), (c), (d), (e), (f), (g), 180(2)(a), (b), (c), (d), paragraph 91 of the GL on PD and LGD estimation

[138] See in particular Paragraph 95 of the GL on PD and LGD estimation where institutions derive PD estimates from the
estimates of losses and LGDs in accordance with Articles 161(2) and 180(2)(b) of the CRR.

the validation function should check that the use of continuous PD estimates meets the
requirements set out in the regulation;[139]

b. The choice of the approach used to calculate the observed average one-year DR.[140] In
practice, this refers to the choice of overlapping versus non-overlapping one-year time
windows, which should be appropriately justified;[141]

c. The choices underlying the calculation of the long-run-average DR,[142] and in particular the
length of the historical period used;[143]

d. The choices underlying the calibration to the long-run average DR. This includes the choice
of calibration segments and calibration type,[144] the length of the calibration sample within
each calibration segment[145] and the associated hypothesis to arrive at the final estimates[146]
considering the rating philosophy (and as such the analysis performed under paragraph
[47.c]);[147]

e. The existence and accuracy of any appropriate adjustment, which should result in a better
estimate of the risk parameter;[148] in particular, the validation function is expected to review
the impact of any correction based on the input data mentioned in paragraph [49] as well
as the representativeness of the historical observation period[149] and the related impact of
any adjustments performed in case of non-representativeness of the likely range of
variability of DR used to derive PD estimates.[150]

51. **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 realised LGD per grades or pools, the validation function is expected to assess:

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[139] Paragraph 96 of the GL on PD and LGD estimation

[140] Section 5.3.3 of the GL on PD and LGD estimation

[141] Paragraph 80 of the EBA GL on PD and LGD estimation

[142] Section 5.3.4 of the GL on PD and LGD estimation

[143] Articles 180(1)(h) and 180(2)(e) of the CRR, Articles 42(1)(d) and 45 of the CDR on assessment methodology, section
5.3.4 of the GL on PD and LGD estimation. In addition, as per Article 180(2)(e) of the CRR and Article 45(c) of the CDR on
assessment methodology, the validation function is expected to review the choice of not giving equal importance to
historic data for retail exposures, which should be justified by better predictions of loss rates of the most recent years.
The better prediction is to be understood in terms of capturing changes in specific policy or business changes rather than
to capture change in macro-economic conditions.

[144] Paragraph 92 of the GL on PD and LGD estimation

[145] Paragraph 88 of the GL on Downturn LGD estimation

[146] Articles 46(4)(a), (b) and (c), 46(9) of the CDR on assessment methodology, Sections 5.3.5 and 6.3.3 of the GL on PD
and LGD estimation

[147] Paragraph 66 of the GL on PD and LGD estimation

[148] Section 4.4.2 of the GL on PD and LGD estimation

[149] Article 46(2) of the CDR on assessment methodology, paragraphs 83 and 94 of the GL on PD and LGD estimation

[150] Article 46(3) of the CDR on assessment methodology, paragraphs 84, 85 and 86 of the GL on PD and LGD estimation
and

a. The choice of the general calibration methodology[151] based on the assessment mentioned in paragraph [49] of input data for both internal data[152] and external data (as further discussed in section [6.1 Focus 1: validation in the context of use of external data]). As such, the validation function is expected to check that the use of a second-best approach, such as a strong reliance on external data, a retail calibration or a specific calibration for corporate purchased receivables based on an estimate of total losses,[153] is justified by insufficient internal data, and in any case the use of external data is only used to supplement internal experience.[154] In addition, the number of closed recovery processes should be sufficient to provide robust LGD estimates;[155]

b. The choices underlying the calculation of the long-run-average LGD. This includes the proper calculation of the arithmetic average,[156] and the choices made for the treatment of incomplete recovery process to calculate the observed average loss rate.[157] In particular, it is expected that the validation function evaluates the following:

- Choice of the length of the period for the maximum recovery process used to estimate future recoveries;[158]

- Choice of the method and data set used for the estimation of future costs and recoveries on these exposures, and the related MoC to ensure that the relevant information is taken into account in a conservative manner;[159]

- Impact of any potential adjustment for massive disposals,[160] in order to ensure that it does not result in any estimation bias on other exposures which would not be subject to such massive disposals.[161]

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[151] Articles 181(1) and 181(2) of the CRR, Article 48 of the CDR on assessment methodology

[152] See in particular Paragraph 95 of the GL on PD and LGD estimation where institutions derive PD estimates from the estimates of losses and LGDs in accordance with Articles 161(2) and 180(2)(b) of the CRR.

[153] Articles 161(2) and 181(2)(a) of the CRR, Paragraph 103 of the GL on PD and LGD estimation

[154] Paragraph 102 of the GL on PD and LGD estimation

[155] Paragraphs 147(b) and 148 of the GL on PD and LGD estimation

[156] Article 48(b) of the CDR on assessment methodology, Paragraph 150 of the GL on PD and LGD estimation. In addition, as per Articles 181(2) of the CRR and 47(c) of the CDR on assessment methodology and paragraphs 151 and 152 of the GL on PD and LGD estimation, the validation function is expected to review the choice of not giving equal importance to historic data for retail exposures, which should be justified by better predictions of loss rates of the most recent years.The better prediction is to be understood in terms of capturing changes in specific policy or business changes rather than to capture change in macro-economic conditions.

[157] Section 6.3.2.3 of the GL on PD and LGD estimation

[158] Paragraphs 155 and 156 of the GL on PD and LGD estimation

[159] Paragraphs 153 and 159 of the GL on PD and LGD estimation

[160] Article 500 of the CRR

[161] See in particular Q&A 2019_4819 and Q&A 2019_4824

c. The choices underlying the calibration to the long-run average LGD. This includes the length of the historical period used[162] and the choice of calibration segments (for the LGD estimates, this choice interacts with the quantification of downturn LGD[163] and should therefore be evaluated in this context, taking also into account the existence of potentially high values of realised LGDs[164]), and calibration type;[165]

d. The existence and accuracy of any appropriate adjustment, which should result in a better estimate of the risk parameter.[166] In particular, the validation function is expected to review the impact of any correction based on the input data mentioned in paragraph [49]. When assessing the representativeness of the historical observation period, the validation function is expected to check that adjustments made on the basis of the changes expected in the foreseeable future do not lead to a decrease in the estimates of LGD parameter.[167]

52. **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:

a. The two conservative requirements mentioned in the CRR (see Context Box [4]) are implemented in the risk estimates, either in the risk quantification or in the rating assignment process in the application of the model;

CONTEXT BOX 4: SPECIFIC CASES WITH CONSERVATIVE REQUIREMENTS IN THE CRR

The CRR explicitly mentions several areas in which institutions should ensure sufficient prudence (on the top of generic requirements on missing and outdated ratings and MoC):

1. *for exposures to corporates, institutions, central governments and central banks, where the obligors are highly leveraged or with predominantly traded assets, to ensure that the PDs reflect the performance of the underlying assets in the periods of stressed volatility;[168]*

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[162] Articles 181(1)(j) and 181(2) of the CRR, Articles 42(1)(d), and 47(a) and (b) of the CDR on assessment methodology, sections 6.3.2.1 of the GL on PD and LGD estimation

[163] Paragraph 14 of the GL on Downturn LGD estimation

[164] Paragraph 162 of the GL on PD and LGD estimation

[165] Paragraph 161 of the GL on PD and LGD estimation

[166] Section 4.4.2 of the GL on PD and LGD estimation

[167] Paragraph 164 of the GL on PD and LGD estimation

[168] Article 180(1)(a) of the CRR, Article 46(5) of the CDR on assessment methodology

> *2. in the case of LGD, where there is a significant degree of dependence between the risk of the obligor and that of the credit protection or provider of credit protection[169] as well as currency mismatches between the obligation and the credit protection.[170]*
>
> *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, it should check that the conservative requirements are implemented and it should 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 the IA.*

b. The quantification of Category A and Category B MoC[171] is meaningful to cover for the uncertainty related to all identified deficiencies related to the estimation of risk parameters[172] (and in particular related to the potential deficiencies identified on the input data in paragraph [49] and the adjustments mentioned in paragraphs [50.e] and [51.d]), and Category C MoC covers the general estimation error.[173] In addition, larger MoC should be incorporated in CF estimates where a stronger positive correlation can reasonably be expected between the default frequency and the magnitude of CF;[174]

c. The aggregation of MoC within each category is meaningful,[175] the aggregation between categories is additive,[176] the MoC is applied on the best estimate of the risk parameter,[177] regardless of how it is quantified and each category does not lead to a decrease of the risk parameter estimates.[178]

53. **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:

a. The methodology used to identify the nature of the economic downturn (in particular, the choice of economic factors),[179] its severity (in particular, the length of the historical period considered),[180] and its duration (in particular, that the downturn period spans a 12-month

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[169] Article 181(1)(c) of the CRR, Article 48(f) of the CDR on assessment methodology

[170] Article 181(1)(d) of the CRR

[171] The categories are defined in the section 4.4.1 of the GL on PD and LGD estimation.

[172] The estimation of risk parameters is defined in paragraph 8 of the GL on PD and LGD estimation.

[173] Article 44 of the CDR on assessment methodology and section 4.4 of the GL on PD and LGD estimation

[174] Article 182(1)(c) of the CRR

[175] Paragraph 43 and 44 of the GL on PD and LGD estimation

[176] Paragraph 45 of the GL on PD and LGD estimation

[177] Paragraph 46 of the GL on PD and LGD estimation, with the exception of the ELBE which should be void of any Margin of Conservatism according to paragraph 182 of the GL on PD and LGD estimation

[178] Paragraph 47 of the GL on PD and LGD estimation

[179] Article 2 if the CDR on downturn

[180] Article 3 if the CDR on downturn

period, or that any length of a downturn period exceeding 12 months is properly justified),[181] according to the CDR on downturn;

b. For the downturn LGD estimates,[182] the methodology chosen for the estimation,[183] the comparison with long-run averages,[184] the sensitivity of downturn LGD estimates to changes in economic cycles,[185] the aggregation of the impacts from intermediate parameters,[186] the calculation of the reference value[187] and the estimation process for defaulted exposures.[188] 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 GL on Downturn LGD estimation, its incorporation in the calibration of the downturn[189] and the MoC applied in case where no impact of a downturn period is observed on the institution's relevant loss data;[190]

- In the case the institution uses the downturn LGD estimation based on estimated impact,[191] the validation function is expected to challenge the choice of the methodology used by the institution (*'Haircut approach'* versus *'Extrapolation approach'*), the use of intermediate parameter in the calibration of the downturn[192] and the MoC applied in case of a lack of data.[193]

54. **Validation challengers**. The validation function is expected to develop and use various statistical tools, to ground its opinion on the performance of the rating system on empirical evidence, making particular use of the most recent validation sample (and more generally of any data available, see Focus Box [1] and section [6.3 Focus 3: validation in the context of data scarcity]) and using IRB metrics as defined in the regulation as mentioned in paragraph [39]. The analyses that are expected to be performed by the validation function include the back-

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[181] Article 4 if the CDR on downturn. To note, this duration is used for the purpose of identifying the downturn, while the duration used for the risk quantification is further assessed in paragraph [53.b].

[182] Article 50 of the CDR on assessment methodology

[183] Section 4.3 of the GL on Downturn LGD estimation

[184] Paragraph 16 of the GL on Downturn LGD estimation, the floor at the long run average is also applicable to the CF as per Article 182(1)(b) of the CRR

[185] Paragraph 17 of the GL on Downturn LGD estimation. More generally, the validation function is expected to assess whether the downturn estimates do not fluctuate with the economic cycle.

[186] Paragraph 26(a) of the GL on Downturn LGD estimation

[187] Paragraphs 18 and 19, Section 8 of the GL on Downturn LGD estimation

[188] Paragraph 21(b) and (c) of the GL on Downturn LGD estimation

[189] Paragraph 28 of the GL on Downturn LGD estimation

[190] Paragraph 29 of the GL on Downturn LGD estimation

[191] Section 6 of the GL on Downturn LGD estimation

[192] Paragraph 34 of the GL on Downturn LGD estimation

[193] Paragraph 35 of the GL on Downturn LGD estimation

testing of risk estimates, as further described in paragraph [55], the assessment of the accuracy of model prediction and best estimate calibration, as further described in paragraph [56] as well as the benchmarking analysis, as further described in paragraph [57].

55. **Back-testing of risk parameter estimates.** In order to come up with this opinion on the appropriateness of the risk parameter estimates, the validation function is expected to compare the realised DR with the estimated PD for each grade or pool and perform analogous analysis for LGD and CF estimates ('*back-testing*'),[194] considering the rating philosophy of the model as mentioned in paragraph [47.c].[195] This comparison is expected to be used to challenge the level of the final risk parameters used for the RWEA calculation (while the assessment of accuracy of the model is rather assessed in paragraph [56]), and as such the LGD and CF estimates used for this comparison should be the estimates used for the RWEA calculation, i.e. the ones appropriate for an economic downturn if more conservative than the long-run average.[196] In practice this means the following:

a. For this assessment, the validation function is expected to make use of historical data that cover a period as long as possible.[197] In this context, it is best practice to use not only the full historical data in one test, but also to consider multiple sub-periods separately for this purpose (e.g. for any single year - including the latest 12-months period, most recent three years, most recent five years, one economic cycle, etc.);

b. For the back-testing of PD estimates, where the realised one-year DR in a grade or pool falls outside the expected range for that grade or pool, the validation function is expected to analyse the deficiency in accordance with point [d]. In this context, it is best practice to consider the deviation in light of:

- Whether this deviation happened during an extreme year considering the business cycle (i.e. bad year in case of DR exceeding PD estimates and vis versa) as reflected by economic indicators that are relevant for the considered type of exposures;[198]

- The grade assignment dynamic (is the grade assignment less sensitive to economic conditions),[199] i.e. how the business cycle interacts with the related systematic variability in default experience;[200]

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[194] Article 185(b) of the CRR

[195] Article 12(f) of the CDR on Assessment methodology, Paragraph 66(c) of the GL on PD and LGD estimation

[196] Articles 181(1)(b) and 182(1)(b) of the CRR

[197] Article 185(b) of the CRR

[198] Paragraph 83(b) of the GL on PD and LGD estimation

[199] Where rating assignment process is highly sensitive to economic conditions, grade assignment will change significantly while default rates of each grade remain relative stable. Contrary when the assignment is less sensitive to economic conditions, the yearly default rates per grade will capture the cyclicality of the economic conditions.

[200] Article 12(f) of the CDR on Assessment methodology

- The results for other sub-periods as mentioned in point [a];

c. For the back-testing of LGD estimates, the validation is expected to perform three checks: (i) one comparing the LGD estimates with the realised LGDs using only closed cases (including cases for which the maximum period of the recovery process has been reached),[201] (ii) one using all cases (i.e., incorporating some estimations of future recoveries on incomplete cases), and (iii) a comparison of the estimation of future costs and recoveries on incomplete cases versus their realisation. In case where the realised LGD in a grade or pool falls outside the expected range for that grade or pool, the validation function is expected to analyse the deficiency in accordance with point [d];

d. Where the results of these analyses show an inappropriate level of the regulatory parameter in question, appropriate actions are expected in the context of the review of estimates, considering a high severity in terms of deficiency (i.e. in the short term).[202] The analyses are expected to take into account the confidence level of the back-testing results, as mentioned in paragraph [32.c].

56. **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 the rating philosophy of the model as mentioned in paragraph [47.c]:[203]

a. For this assessment, the validation function is expected to make use of historical data that cover a period as long as possible. [204] In this context, it is a best practice to use not only the full historical data in one test, but also multiple sub-periods (e.g. most recent year, most recent three years, most recent five years, one economic cycle) separately for this purpose.

b. These other quantitative tools are expected to include a back-testing of the PD best estimates (i.e. without any conservative adjustment) for each grade or pool, to assess the accuracy of the model predictions. In this context, it is a best practice to assess the distance between the observed DR and the PD best estimates in a similar way as for the assessment with the PD estimates described in paragraph [55.b];

c. These other quantitative tools are also expected to include a back-testing of the LGD and CF best estimates for each grade or pool, as well as of the final long-run average estimates when the back-testing of LGD and CF estimates was performed on the parameters appropriate for an economic downturn. For the LGD estimates, the validation function can perform as an additional check a comparison of the LGD estimates with the realised LGDs

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[201] Paragraph 156 of the GL on PD and LGD estimation

[202] Article 185(e) of the CRR, Chapter 9, and in particular paragraph 217(c), of the GL on PD and LGD estimation

[203] Article 185(c) of the CRR, Article 12(f) of the CDR on Assessment methodology, Paragraph 66(c) of the GL on PD and LGD estimation

[204] Article 185(c) of the CRR

using only closed cases and excluding cases for which the maximum period of the recovery
process has been reached;

d. For this assessment, a good practice for the validation function is to complement the tests
based on the final rating grades assignment used for the own funds calculation (see Context
Box [2], Focus Boxes [3] and [4]) by other tests based on rating grades without additional
conservatism (e.g. by excluding exposures with a 'non-standard' rating or assigning them to
rating grades without conservative assumption);

e. Where the results of these analyses show an inappropriate level of model predictions for
the parameter in question, appropriate actions are expected in the context of the review of
estimates framework. The analyses are expected to take into account the confidence level
of the back-testing results, as mentioned in paragraph [32.c].

Consultation box

The back-testing of PD is expected to take into account the rating philosophy, among other
things. However, the regulation is not specific on how such integration into the back-testing
analyses could be designed.

**Question 4: Which approach factoring in the rating philosophy of a model into the back-testing
analyses should be considered as best practices?**

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57. **External data sources.** Last, the validation function is expected to perform an analysis based
on relevant external data sources, where available.[205] For this purpose, the DR 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 (see Context Box [5]).

CONTEXT BOX 5: REGULATORY SUPERVISORY BENCHMARKING

*Since 2015, the EBA has been conducting an annual supervisory benchmarking exercise for credit
risk models. The underlying framework is mandated by Article 78 of the CRD, which requires CAs
to conduct an annual assessment of the quality of internal approaches used for the calculation of
own funds requirements. To assist CAs in this assessment, the EBA calculates and distributes
benchmark values against which individual institutions' risk parameters can be compared. These
benchmark values are based on data submitted by institutions as laid out in EU Regulation
2016/2070, which specifies the benchmarking portfolios (for all exposures, i.e. for both low-
default portfolios and high-default portfolios), templates and definitions to be used as part of the
annual supervisory benchmarking exercises. By nature, these benchmarks are not at the level of
grades or pools (which are institution-specific), but at the level of portfolios.*

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[205] Article 185(c) of the CRR

3.1.3 Other specific points

58. **Scope of the section.** This section describes the specificities of three aspects, which are complementing the expectations described in the general section. As such, the usual validation activities described in the previous section are expected to be performed. This section deals with the validation of rating systems in relation to:

    a. Defaulted exposures, i.e. the methodology used to derive LGD in-default and expected loss best estimates (ELBE) for defaulted exposures;

    b. Credit risk mitigation (CRM) techniques;

    c. Exposures risk weighted according to the slotting approach.

Specificities related to the validation of defaulted exposures' rating systems

59. **Applicability of all requirements to defaulted exposures.** The validation of the LGD rating system encompasses a specific review for defaulted exposures, i.e. validation of LGD in-default and ELBE.[206] As such, all the activities related to the LGD parameter mentioned previously on the risk differentiation and risk quantification are expected to be performed,[207] but using the reference dates instead of the dates of default (for instance for the back-testing). Therefore, these risk parameters bring some specific validation tasks, even though the RDS and the methods used should be generally consistent with the ones used for non-defaulted exposures.[208]

60. **Additional requirements on the RDS related to the estimation for defaulted exposures.** As opposed to the LGD estimation for non-defaulted exposures, additional relevant information from and after the default should be taken into account,[209] and therefore may entail a specific validation of both risk differentiation and risk quantification.[210] In particular, on top of assessing the RDS along with the general requirements for non-defaulted exposures, the validation function is expected to:

    a. Challenge the way reference dates have been defined (such that it is consistent with the recovery patterns observed);[211]

    b. Check that realised LGDs related to each of these reference dates have been appropriately calculated. In this context, compared to non-defaulted exposures, the realised LGDs of defaulted exposures requires some re-calculation to account for, in particular, the

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[206] Article 51 of the CDR on Assessment methodology, Chapter 7 of the GL on PD and LGD estimation

[207] Paragraph 167 of the GL on PD and LGD estimation

[208] Section 7.1.1 and paragraph 175 of the GL on PD and LGD estimation

[209] Article 171(2) of the CRR, Section 7.1.3 of the GL on PD and LGD estimation

[210] Sections 7.2 and 7.3 of the GL on PD and LGD estimation

[211] Section 7.1.2 of the GL on PD and LGD estimation

treatment of the capitalised fees and interests, the discounting of cash flows and drawings and the treatment of partial write-offs;[212]

c. Check that the related data requirements are fulfilled.[213]

61. **ELBE.** The validation function is expected to check that the ELBE parameters:

a. Are without any MoC,[214] nor any other adjustments for conservatism;

b. Are sufficiently reflective of the current economic circumstances.[215] In this context, the validation function is expected to check that the long-run average LGD is not unduly adjusted if one of the conditions of paragraph 184 of the GL on PD and GLD estimation is met and thereby current economic conditions are already reflected,[216] and challenge any adjustment related to economic conditions;[217]

c. Rely on specific credit risk adjustment models only if all the LGD estimation requirements are met (including the definition of the economic loss),[218] or rely on individually assessed specific credit risk adjustments via overrides if the accuracy of the ELBE is improved and reflective of the definition of the economic loss.[219] In general, any situations where the specific credit risk adjustments exceed the ELBE amounts are justified adequately.[220]

62. **LGD in-default.** The validation function is expected to check:

a. The consistency between defaulted and non-defaulted estimates, including aspects related to the downturn nature of the estimate.[221] In this context, the validation function is expected to identify and challenge any systematic deviations in the LGD estimates applied immediately before and after the default.[222] This assessment is expected to be performed on the basis of a comparison between the average LGD estimates immediately before and after default at a comparable granular level. This implies that, in the case where post-default information is factored in LGD in-default estimates, this comparison should be performed at an intermediate aggregated level;

b. The relation between the LGD in-default and the ELBE**.** As such, the LGD in-default should always be higher than the ELBE, in particular when the ELBE is derived via specific credit risk

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[212] Section 7.3.1 of the GL on PD and LGD estimation

[213] Section 7.1.3 of the GL on PD and LGD estimation

[214] Paragraph 182 the GL on PD and LGD estimation

[215] Article 181(1)(h) of the CRR, Section 7.3.2 of the GL on PD and LGD estimation

[216] Paragraph 184 the GL on PD and LGD estimation

[217] Paragraph 185 the GL on PD and LGD estimation

[218] Paragraph 186 the GL on PD and LGD estimation

[219] Paragraph 187 the GL on PD and LGD estimation

[220] Article 51(2)(f) of the CDR on assessment methodology, paragraph 188 the GL on PD and LGD estimation

[221] Section 4.2 of the GL on Downturn LGD estimation

[222] Paragraph 169 of the GL on PD and LGD estimation

adjustments[223] and/or via overrides[224] to ensure their consistent application. The validation function is expected to ensure that the difference between the LGD in-default and the ELBE covers for the effects of a downturn (and as such the validation function is expected to perform the checks described in paragraph [53]), MoC, and potential additional unexpected loss if relevant.[225]

Specificities related to the validation of credit risk mitigation

63. **General requirements on the appropriate recognition related to the CRM**. The validation function is expected to check that the LGD estimates reflect the collection and recovery policy.[226] Therefore, generally speaking, all general requirements apply to the exposures benefitting from a CRM. As such, the validation function is expected to check the recognition of CRM in own estimates, as part of the assessment of the model performance, and therefore perform the validation activities described previously in this section. However, these are complemented by additional specific requirements to ensure a prudent and consistent recognition of the CRM effects, some of them being performed in cooperation with IA (See Interaction Box [6]).

INTERACTION BOX 6: ASSESSMENT OF THE CRM BETWEEN IA AND VALIDATION FUNCTION

Cases where no estimates need to be assessed may be checked by another function (e.g. the IA). These relate in particular to the implementation of the model and calculation of own funds requirements, such as:

1. *The application of the regulatory requirements to derive own funds requirements if an institution has not received the permission of the CA to use own LGD estimates for exposures to corporates, institutions, central governments and central banks pursuant to Article 143. This includes cases where the recognition of the funded credit protection (FCP) or unfunded credit protection (UFCP) involves the use of regulatory parameters;*

2. *The pure calculation of the RW floor when a UFCP is used;[227]*

3. *The proper identification of the eligible CRM[228] (while the validation is expected to check the proper treatment of the CRM in the model development);*

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[223] Paragraph 191 of the GL on PD and LGD estimation

[224] Paragraph 192 of the GL on PD and LGD estimation

[225] Article 181(1)(h), Paragraph 193 of the GL on PD and LGD estimation

[226] Paragraph 105 of the GL on PD and LGD estimation

[227] Articles 161(3) and 164(2) of the CRR, paragraphs 42 to 47 of the GL on CRM

[228] Section 5 of the GL on CRM. It should be noted that this assessment is expected to be bi-directional, i.e. an eligible CRM should meet all the eligibility requirements, while a non-eligible CRM should not meet at least one eligibility requirement.

> 4. *The allocation of CRM related to multiple facilities across different (models or) regulatory approaches (i.e. between the use of own estimates or regulatory values);*
>
> 5. *The recognition of CRM in a consistent manner,[229] which implies a review of the actual implementation of the model, including the assessment of the integrity of the assignment process (See Interaction Box [4]).*

64. **Additional requirements on the validation of the RDS related to the CRM:** The use and recognition of CRM come along with specific requirements on the observations themselves. In particular, the validation function is expected to check that:

   a. The source of the recovery cash flows is properly identified. In the context of CRM, this requires a comprehensive identification of CRM, regardless of their eligibility.[230] The validation function is expected to ensure that the RDS as well as more recent data used by the validation function contains the information on the eligibility of the CRM for each exposure, as part of the assessment described in paragraphs [38] and [44.b]. As such, the RDS and the validation data should be sufficiently detailed to allow for a specific analysis on the use of CRM as potential risk drivers;[231]

   b. The allocation of recovery cash flows to specific facilities is consistent with the internal recovery and collection process of the institution.[232] This includes the allocation, sequence and recognition of FCP and UFCP, and more generally the overall traceability of the recoveries as described in paragraph [82];

   c. The recoveries from collateral and, in particular, the value of repossession which should adequately reflect the value of the repossessed collateral, is consistent with any established internal requirements for collateral management, legal certainty and risk management; in addition, it is expected to check the appropriateness of the estimation of the haircut applied to the repossession value, including its related MoC.[233]

65. **Validation level for the validation of estimates related to the CRM:** Any validation activities on exposures with CRM are expected to be performed at least at the same level (e.g. obligor or facility level) than validation activities on exposures without CRM. Nevertheless, this should not prevent the validation function to perform additional tests to challenge the modelling choices. For instance, additional statistical tests at the obligor level (or even several obligors, in the case of a specific CRM which benefits to several obligors such as in the case of a mortgage for a household) may be used to challenge the policy of allocation of costs and recovery cash flows

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[229] Paragraph 46(c) of the GL on CRM

[230] Paragraph 33 of the GL on CRM

[231] Paragraphs 105, 109(k) and 121(a) of the GL on PD and LGD estimation

[232] Paragraphs 37-38 and 46(a) of the GL on CRM

[233] Paragraph 117 of the GL on PD and LGD estimation

mentioned in paragraph [64.b],[234] which is especially relevant in the context of obligors with multiple facilities with different degrees of protection (and hence different levels of risk). The level of validation is expected to also be adjusted in the case of use of a substitution approach, where the guaranteed and non-guaranteed parts have to be validated separately.[235]

66. **General requirements on the appropriate recognition related to the CRM**: Last, the validation function is expected to check that there is no double counting in the recognition of any CRM in the estimates (i.e. that the effects of the same credit protection are not recognised more than once,[236] for instance both in the exposure value and risk estimates).[237]

67. **FCP – On-balance sheet netting and Master netting agreement**: The non-recognition of a CRM more than once should be carefully assessed in the case of master netting agreements or on-balance sheet netting. In this context, the validation function is expected to check that the realised LGD is calculated using the fully-adjusted exposure value as the outstanding amount and that no cash flows from netting should be included as recoveries after default in the economic loss.[238]

68. **FCP - Validation of recognition of collateral in estimates**: In the recognition of the effect of FCP, the validation function is expected to check that cases with adverse dependency between the risk of the obligor and that of the collateral or collateral provider are identified and dealt with an appropriate level of conservative as pointed out in the Context Box [2]. In addition, the validation function is expected to challenge the methodology used to estimate LGD in the cases where the collateral is a liability of the obligor, a subordinated position of the institution (in relation to the collateral) or is a movable collateral with different likely geographic locations.[239]

INTERACTION BOX 7: OTHER VALIDATION FUNCTION IN FCP

The recognition of FCP may involve specific estimation techniques, which, while not being necessarily purely related to the estimation of credit risk per se, is expected to nonetheless be validated by an independent function (i.e., not necessarily the credit risk validation function). This includes the estimation of volatility adjustments under the own estimates approach[240] as well as the use of internal models approach for the master netting agreements.[241]

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[234] Paragraph 112 of the GL on PD and LGD estimation

[235] Paragraphs 37 and 38 of the GL on CRM

[236] Paragraph 46(b) of the GL on CRM

[237] Article 181(1)(g) of the CRR

[238] Paragraph 29 of the GL on CRM

[239] Article 181(1)(e) of the CRR, paragraph 30 of the GL on CRM

[240] Article 225 of the CRR

[241] Article 221 of the CRR

69. **UFCP - Choice of the approach**: The recognition of the effect of UFCP can be performed according to different methods.[242] Generally speaking the methods used are expected to be consistent,[243] in particular in the case of multiple credit protection. In addition, the validation function is expected to check that the requirements for the use of a particular approach are met; this includes on the one hand the eligibility, cost and defaulted status criteria[244] and back-testing requirements on the expected loss (EL)[245] for the substitution of risk parameters approach (and the non-use of this approach under the slotting approach),[246] and on the other hand the 'fall-back approach' criterion for the override approach.

70. **Use of multiple CRM – risk parameters:** With respect to the validation of risk parameters, the use of multiple CRM can bring additional modelling challenges, which are expected to be checked by the validation function. This includes the estimation of the *LGD of a comparable direct exposure to each of the guarantors along with the effect of other existing unfunded credit protection* for the RW floor,[247] as well as the estimation the LGD *of a comparable direct exposure to the guarantor that includes the effect of additional unfunded or funded credit protection* in the context of both the RW floor and the substitution of risk parameter approach,[248] where the 'comparable exposure' is expected to be effectively challenged.

71. **Consistency of the metrics:** the validation function is expected to check the consistency between the back-testing metrics (e.g. realised loss rates), the model design, and the final risk parameters applied for the RWEA calculation, in terms of allocation of collateral to specific exposures.

Specificities related to the validation of the slotting approach

72. **Adaptation of the requirements for the slotting approach.** For specialised lending exposures where no partial use of the standardised approach is used and in respect of which an institution is not able to estimate PDs or the institutions' PD estimates do not meet the regulatory requirements, the regulation prescribes the use of the so-called 'slotting approach'.[249] As such, this approach does not rely on the usual risk parameters (i.e. PD and LGD) and is more prescriptive compared to the usual approaches (i.e. via the CDR on the slotting approach instead of the usual risk differentiation and via the prescribed RW and EL instead of the usual risk quantification). Therefore, these differences entail some adaptations of the validation tasks and related best practices, in particular when it comes to the performance assessment.

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[242] Paragraph 31 of the GL on CRM

[243] Paragraph 32 of the GL on CRM

[244] Paragraph 36 of the GL on CRM

[245] Paragraph 40 of the GL on CRM

[246] Q&A 3295

[247] Paragraphs 45(b) of the GL on CRM

[248] Paragraphs 47(b) of the GL on CRM

[249] Articles 153(5) and 158(6) of the CRR

73. **Assessment of the assignment process**. As part of the assessment of the rating assignment process described in paragraph [42], the validation function is expected to assess the assignment of corporate exposures to the sub-exposure class 'specialised lending exposures' (if not covered by IA, see paragraph [22.c]) and to a class of specialised lending exposures ('project finance', 'real estate', 'object financing', 'commodities financing).[250] Where the assignment to the specialised lending sub-exposure class is not reviewed by IA, the validation function is expected to ensure that only exposures assigned to corporates following the assigning sequence[251] are classified as specialised lending exposures, and that the process for identifying specialised lending exposures[252] allows for a consistent and replicable identification. In all cases, the validation function is expected to check that the assignment of exposures to a class of specialised lending exposures is also implemented in a consistent and replicable manner.

74. **Assessment of the input data**. As part of the assessment of the input data as described in paragraph [44], a good practice is to assess the representativeness separately between exposures with a maturity shorter than 2.5 years from those with a longer maturity. In addition, the validation function is expected to check the evolution of the distribution of the features (i.e. sub factors and sub-factor component) that receive a high or low weight in the aggregation methodology mentioned in paragraph [76].[253]

75. **Assessment of the modelling choices – selection of relevant information and rating criteria**. The validation function is expected to review the selection of relevant information and rating criteria as per paragraph [45.a], including:

   a. The scope of slotting approaches, such that all exposures covered by one approach have a credit risk assessment in a similar manner. A good practice is to challenge cases where the same rating assignment process is used across different classes of specialised lending exposures (for instance leveraging on the challenger analysis of overrides as mentioned in paragraph [47.b]) or when different rating assignment processes are used within the same class of exposure of specialised lending exposures;

   b. The relevant information and rating criteria considered are consistent with the factors, sub-factors and sub-factor components mentioned in the regulation.[254] In particular, the validation function is expected to challenge any deviation from the definition of the sub-factor components as defined in the CDR on slotting approach, the inclusion of additional

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[250] Article 1 of the CDR on slotting approach

[251] Article 61 CDR on assessment methodology

[252] Article 147(8) of the CRR

[253] For instance, the validation function may have to check the evolution of the proportion of balloon payments to assess whether the weight associated with the sub-factor component '*amortisation schedule*' is still appropriate.

[254] Article 153(5) of the CRR, annexes of the CDR on slotting approach

relevant information into a selected sub factor component[255] and the dismissal of any sub factors or sub-factor components for a type of specialised lending exposures.[256]

76. **Assessment of the modelling choices – aggregation of relevant information**. As part of the assessment of the aggregation methodology described in paragraph [45.b], the validation function is expected to review:

   a. The allocation of each sub-factor component into a category.[257] This includes an assessment of the cut-off values used when quantitative metrics (e.g. financial ratios) are used;

   b. The determination of the category for each sub-factor, in particular when based on the aggregation of the relevant sub-factor components' category;[258]

   c. The determination of the category for each factor, i.e. the aggregation methodology of the relevant sub-factors' category;[259]

   d. The determination of the final category for the exposure, i.e. the weights used to aggregate the relevant factors' category.[260]

77. **Assessment of the modelling choices – definition of obligor and facility grades.** As mentioned in paragraph [45.c], the minimum number of grades should match the number of categories prescribed in the CRR.[261]

78. **Quantitative analyses**. As for any other IRB model, the predictive power of the slotting approach is expected to be assessed by the validation function. However, the empirical assessment mentioned in paragraph [46] requires some adjustment, as the slotting approach does not require a rating assignment to have an obligor rating scale which reflects exclusively quantification of the risk of obligor default risk. Hence the dimensions mentioned in paragraph [43] may not be fully appropriate. Instead, these analyses may be conducted via specific challenger analyses (see Focus Box [5]).

79. **Validation challengers**. As part of the challenger analyses mentioned in paragraph [47], the validation function is expected to perform the following:

   a. Challenge the use of overrides different than 'input overrides', in order to assess whether it is not an indication of disregarding relevant information in the assessment of a sub-factor

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[255] Articles 3(3) and 6(1)(b) of the CDR on slotting approach

[256] Articles 3(4) and 6(1)(c) of the CDR on slotting approach

[257] Article 3(2)(a) of the CDR on slotting approach

[258] Articles 3(1), (2)b and 4 of the CDR on slotting approach

[259] Article 2(1) of the CDR on slotting approach

[260] Article 2(2), (3), (4) of the CDR on slotting approach

[261] Article 170(2) of the CRR

that should have been considered jointly with a sub-factor to which it most closely corresponds (via an 'input override');[262]

b. Use other external data sources, where available and analyse the potential concentration within a particular category, which if unwarranted could be an indication of missing risk drivers;

c. Assess the monotonicity of the observed loss rates per slotting category.

🔍 **FOCUS BOX 5: SPECIFIC CHALLENGER ANALYSES FOR THE MODELLING CHOICES UNDER THE SLOTTING APPROACH**

When assessing the aggregation methodology under the slotting approach, the following best practices have been observed:

1. *For the allocation of each sub-factor component into a category, the validation function can challenge the human judgment (see Interaction Box [4]) and estimation methodology used in the case where estimation projections are required (e.g. analysis of the cash flow projections). In particular, this can entail some back-testing analyses with longer time horizon than the usual one-year time horizon considered for other metrics, since the cash flow projections can be performed for the full lifetime of the exposure (e.g. back-testing of the estimated value of an aircraft's engine over n years);*

2. *For the aggregation of the sub-factor components' category and sub-factors' category, which is less prescriptive than the aggregation of the factors' category (weighted average), possible analyses include an assessment of:*

   a. *The sensitivity of the aggregation to the model components (e.g. weights if a linear aggregation is used), by looking at the magnitude of the migrations between the categories due to a small change in the model components used;*

   b. *Whether each sub-factor and sub-factor component has an influence in the aggregation.[263]*

3. *For the aggregation of the factor category, which is constrained by the CDR on slotting approach (weighted average), a possible analysis is to assess the sensitivity of the aggregation to weights used by looking at the magnitude of the migrations between the categories due to a small change in the weights used.*

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[262] Recital 8 and Article 3(3) of the CDR on slotting approach. 'Input overrides' are required to take into account each of any additional risk drivers and consider it jointly with the sub-factor of the specialised lending exposure framework which most closely corresponds to the risk driver.

[263] In other words, for any sub-factor and sub-factor component, there exists at least one particular configuration (a particular allocation of categories to other sub-factors or sub-factor components respectively) where two different categories for the sub-factor or sub-factor component considered lead to two different categories for the factor or sub-factor respectively.

When assessing the performance of the model in terms of final rating assignments, while no risk quantification is required under the slotting approach, as a best practice the validation function is expected to assess the general consistency between the (number of exposure-weighted) average losses observed on the exposures assigned to a particular category and the related regulatory parameters[264] as other quantitative validation tools.[265] Such analysis is expected to be generally consistent with the back-testing analysis performed for the LGD mentioned in paragraph [55.c], however taking into account also non-defaulted exposures using a 0% loss rate and with some different level of calculation.

Consultation Box

Question 5: What analyses do you consider to be best practice to empirically assess the modelling choices in paragraph [76] and, more generally, the performance of the slotting approach used (i.e. the discriminatory power and homogeneity)?

3.2 Assessment of the modelling environment

80. **Scope of this section.** As noted in the introduction, the validation function is not only responsible for analysing the model performance from a pure statistical perspective, but is expected to assess the development and production environment.[266] As such, the validation function is expected to be involved in the data quality assessment (before the core performance assessment) and check the proper IT implementation of the rating system (after the core performance assessment).

3.2.1 Data quality and maintenance

81. **The data quality framework.** To ensure a proper assessment of the data quality and maintenance,[267] the data quality framework (See Context box [6]) should clearly define policies, roles and responsibilities in data processing and data quality management.

> **CONTEXT BOX 6: THE DATA QUALITY FRAMEWORK AND ITS APPLICATION IN THE IRB FRAMEWORK**
>
> *Institutions should ensure that information technology and data governance are adequate to support the broad management of financial risks, including bank-wide data aggregation, consistent data quality, implementation and monitoring of the IRB models. This has been*

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[264] Article 158(6) of the CRR

[265] Article 185(c) of the CRR

[266] Article 11(2)(a) and (b) of the CDR on assessment methodology

[267] Chapter 12 of the CDR on assessment methodology

developed in the BCBS principles,[268] where it is specified that institutions should have in place a strong data governance framework based on sound IT infrastructure.

In particular, in relation to the governance, the Board and senior management should review and approve the group risk data aggregation and risk reporting framework and ensure that adequate resources are deployed. Senior management should be fully aware of and understand the limitations that prevent full risk data aggregation, in terms of coverage (e.g. risks not captured or subsidiaries not included), in technical terms (e.g. model performance indicators or degree of reliance on manual processes) or in legal terms (legal impediments to data sharing across jurisdictions).

The institution's data quality framework should cover all relevant data quality dimensions.[269] completeness, accuracy, consistency, timeliness, uniqueness, validity, and traceability and should cover the full data life cycle, from data entry to reporting, and encompass both historical data and current application databases.

Therefore, to ensure the quality of the data used for credit risk measurement and management processes, institutions should establish and implement an effective data quality management framework that is formalised in a set of policies and procedures.

When it comes to the application of this data quality framework in the modelling, each institution should have in place a process for vetting data inputs into a model, which includes an assessment of the accuracy, completeness and appropriateness of the data.[270] This framework should be applicable to all data used in IRB-related processes, i.e. internal data, external data and pooled data,[271] if any. It includes the assessment of the RDS regarding input data, in particular characteristics and risk drivers, but also the data for the application of the model as well as the output data like the risk parameter estimations and the RWs as discussed in the next section. Hereby not only particular elements are considered, but also their interactions such as the relationship or mapping used to produce IRB parameter estimates (e.g. consistency between PD and LGD in terms of default recording).

🤝 **INTERACTION BOX 8: ASSESSMENT OF THE DATA QUALITY BETWEEN THE DIFFERENT FUNCTIONS**

Although institution's IT functions are responsible for supporting the operation of the systems for data collection, processing, transformation and storage during the entire life of the data, the

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[268] BCBS 239: Principles for effective risk data aggregation and risk reporting (bis.org).

[269] Article 73 of the CDR on assessment methodology.

[270] Article 174(b) of the CRR. The appropriateness is however not a data quality dimension *per se* and is therefore rather checked as part of other assessments (e.g. assessment of the representativeness in paragraph [44.d]).

[271] Article 72(1)(a) of the CDR on assessment methodology.

validation function is expected to have sufficient knowledge of the IT infrastructure of the institution and of all data quality checks performed with respect to IRB models and their inputs, outputs and the calculation of the own funds requirements. In practice, it is important to make the distinction between the tasks that are expected to be performed by validation function and tasks by other relevant functions of the institution, such as the IA or the IT functions.

As such, the data quality in the IRB rating systems is usually assessed by different functions with a different perspective:

1. *The institution's independent dedicated data quality function, which is expected to be a second line of defence and to ensure the quality of the data itself that flows between the different systems and databases supporting the IRB modelling and application (including reporting), as defined in the data quality framework;*

2. *The CRCU, which is expected to assess the data quality of the (historical) data for the estimation of the risk parameters (and in particular for the quantification of any potential appropriate adjustment applied to the risk estimates and/or the MoC);*

3. *The validation function, which is expected to check the quality of two datasets:*

   a. *The data it uses for the validation activities, such that it can be used effectively to perform analyses on the rating system developed by the CRCU;*

   b. *The data used by the CRCU (and potentially manipulated) for the estimation of the risk parameters. This includes the data extracted by the CRCU from a database, where the validation function is expected to detect errors in the data, as this extraction is part of the full modelling process,[272] and hence typically not checked by the institution's data quality function.[273] In this context, the validation function is expected to compare the outcome of its data quality assessment with the one performed by the CRCU in point [2] as part of its challenge of the rating system developed by the CRCU (and in particular the quantification of any potential appropriate adjustment applied to the risk estimates and the MoC);*

4. *The IA, which is expected to be the third line of defence, particularly with regard to IT and data quality review.[274] In particular, the validation function is not necessarily expected to review the data quality for the application of the risk parameters, to the extent that this may be carried out by IA.*

82. **Dimensions assessed by the validation function for data quality.** The validation function is expected form an opinion on the data quality dimensions (*completeness, accuracy, consistency,*

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[272] Paragraph 8 of the GL on PD and LGD estimation

[273] However, in the case the institution's data quality function check this step, the validation function can leverage on the result of this assessment.

[274] See The internal audit function in banks (BCBS, June 2012).

timeliness, uniqueness, validity and traceability) and data quality processes relevant for the IRB modelling.[275] The outcome of this assessment is expected to be an opinion from the validation function on the data quality used for IRB modelling. In case the validation function detects any errors in this data, the identified deficiencies are expected to be reported and addressed in the validation report as mentioned in paragraph [34].[276] As mentioned in the Interaction Box [8], the validation function is expected check whether the identified data quality deficiencies impact the estimation of risk parameters and lead to a bias in the quantification of those parameters or to an increased uncertainty to be addressed by a MoC.

83. **Tools used to assess the data quality.** In order to form an opinion on the quality of data used by the rating system (e.g. the IRB relevant data do not have material quality errors), the validation function is expected to check that all the relevant IRB data (including internal, external or pooled data) used in model development and risk quantification, is encompassed by the institution's data quality framework. In order to perform this check, the validation function is expected to have access to the relevant data quality management reports submitted to institution's senior management.[277] In addition, the validation function is expected to also assess how frequently the conservatism referred to in chapter 8.1 of the GL on PD and LGD estimation is being used, as this might be an indication of data-quality-related issues.

84. **Accessibility of the data for the data maintenance.** The validation function is expected have an independent access of all the relevant IRB data and their respective databases, as well as sufficient data extraction and manipulation capabilities.[278] To this end, the IT infrastructure that supports the data used for IRB-modelling purposes and the relevant data sources and flows should be appropriately documented and understandable by a third party, to ensure that the validation function is in a position to propose an effective and independent challenge to model development and use. Therefore, the validation function is expected to assess:

   a. The completeness and readability of the global map of databases involved in the calculation systems used for the purposes of the IRB approach, of the documentation supporting the relevant processes for data extraction and transformation, and the specifications of the modelling databases;[279]

   b. The data flow diagram showing a map of the key applications, databases and IT components involved in the application of the IRB Approach and related to rating systems.[280]

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[275] Article 73 of the CDR on assessment methodology

[276] Article 189(2)2 of the CRR.

[277] As defined in Article 74(2) of the CDR on assessment methodology.

[278] To ensure that the validation function is in a position to propose an effective and independent challenge to model development and use. To this end, the data should be available, as referred to in Article 42(1)(b) of the CDR on assessment methodology.

[279] Article 74(1)(a) of the CDR on assessment methodology

[280] Article 75(1)(b) of the CDR on assessment methodology

3.2.2   IT implementation of the rating systems

85. **Adequacy of the implementation.** The validation function is expected to verify the adequacy of the implementation of internal ratings and risk parameters in IT systems.[281] To this end, the validation function is at least (See Interaction Box [9]) expected to:

   a. Check that the business/functional requirements defined for the systems supporting the IRB modelling and application are adequately translated into IT specifications. To this end, the validation function is expected to analyse the relevant functional documentation,[282] for example, by checking if the functional documentation of the IT systems (e.g. business specifications) supporting the model is consistent with the rating system documentation;

   b. Ensure that the implementation of the rating system in the relevant IT systems is compliant with and reproduces exactly the documented model under review.[283] To this end, the validation function is expected to check whether the necessary user acceptance tests (UATs) relating to the model have been performed and concluded with no material errors. For those tests, good practices are to set up *'walk-through'* sessions between the validation function and the IT department for a better understanding of the IT documentation related to the testing of the model implementation.

INTERACTION BOX 9: IA AND THE VALIDATION FUNCTION ON THE IT IMPLEMENTATION OF THE RATING SYSTEM

The validation function is not expected to assess the correct implementation of the model and calculation of own funds requirements beyond the elements mentioned above. Instead, this can be performed by the IA, which can leverage on the methods described in Article 67(4), 68 and 71 of the CDR on assessment methodology.

FOCUS BOX 6: IT IMPLEMENTATION AND ASSIGNMENT OF PARAMETER ESTIMATES

Different forms of IT implementation approaches have been observed, especially when it comes to the assignment of the parameter estimates. The two most prominent are:

   1. The model engine not only assigns exposures to grades or pools, but also assigns the parameter estimate. In other words, the IT system in which the rating assignment process has been implemented also adds the information about the parameter estimate (PD,

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[281] Article 11(2)(b) of the CDR on assessment methodology

[282] Article 67(4)(a) of the CDR on assessment methodology

[283] Article 31(8)(b) of the CDR on assessment methodology

LGD, CF, ELBE, RW, EL) to the respective obligor/facility/exposure. E.g. model engine output: "Obligor [XYZ]"; "Grade [ABC]"; "PD [NN]"

2. *The model engine assigns the exposures to grades or pools, and the parameter estimates are added at a later stage, often in the RWEA calculation engine, through a steering table.*
   E.g. model engine output: "Obligor [XYZ]"; "Rating System [UVW]"; "Grade [ABC]" => steering table: "Rating System [UVW]" + "Grade [ABC]" = "PD [NN]"

The first implementation approach has been observed stand-alone or as a sub-system of the RWEA calculation engine.

When validating the IT implementation, the validation function is expected to verify not only that the correct rating assignment process has been implemented, but also that the correct parameter estimates are assigned to each grade or pool. Therefore, under the second implementation mentioned, besides the model engine, also the mapping table assigning the parameter estimate should be reviewed.

4. First validation of newly developed rating systems or changed aspects of a rating system

4.1 General requirements

86. **Scope of application of this section.** As mentioned in paragraphs [26], this section deals with the validation of new models without any previous authorisation from CA pursuant to Article 143 ('*newly introduced models'*) as well as the validation of changes or extensions to previously approved rating systems ('*changed models'*). As such, it interacts with section [5 Subsequent validation of unchanged aspects of a rating system] in the case of changed models, as the validation function is expected to perform the activities described in this section at least for the aspects that have been directly or indirectly affected by the model change. In this handbook, 'first validation' refers to the validation of either a *newly introduced models* or the validation of changes or extensions to *changed models*.

🔍   **FOCUS BOX 7: SAMPLES USED DURING THE VALIDATION OF NEW OR CHANGED ASPECTS OF A RATING SYSTEM**

Two types of samples are relevant in the context of the validation:

1. *The 'performance metric samples', whereby the exposures are assigned to grades or pools and the empirical metrics (e.g. defaults) can be observed to assess the core model performance, to the extent possible (e.g. in sample). This can refer, for example, to the development sample(s) or the calibration sample(s) used by the CRCU;*

2. *The 'use test samples', whereby the exposures are assigned to grades or pools, but there has been not enough time to observe the empirical realisations to assess the model. This can refer for example to the application portfolio.*

The requirements to the first validation may differ due to different situations with respect to the application of the model. As a matter of fact, the scope of exposures available for the first validation with ratings assigned to grades or pools according to the full rating system under validation ('use test sample') is expected to be different:

1. *In the context of the very first validation of a new rating system, an institution shall have actually been using rating system which are broadly in line with the requirements of the IRB Approach for at least three years prior to its application to use the said IRB approach.*

> [284] *Therefore, it is expected that at the time of initial validation, the vast majority of exposures under the scope of the rating system has been assigned to grades or pools according to the 'full' rating process under application (i.e. including with the human judgement applied in the process of assignment of exposures to grades or pools, or in the form of overrides);*
>
> 2. *In the context of a first validation of model changes, it is expected that institution falls within one of the following two situations:*
>
>   a. *All the exposures of the relevant range of application are re-rated according to the new model. This is in particular expected if the rating is fully automatic, with no human judgement applied in the process of assignment of exposures to grades or pools, or in the form of overrides;*
>
>   b. *A representative sample of exposures[285] is re-rated according to the 'full' rating process (i.e. including with the human judgement applied in the process of assignment of exposures to grades or pools, or in the form of overrides).*

87. **Objective of the first validation**. One of the most important topics to be addressed in the first validation are the model design and risk quantification choices. This is because, firstly modelling and risk quantification decisions are assessed by the validation function for the first time, and secondly because only few new data will be available and thus standard statistical measures (e.g. for discriminatory power) will in most cases not provide much new information compared to what was performed by the CRCU. For these reasons, the validation function should focus during the first validations on the assessment and challenge of the modelling and calibration choices, including the modelling assumptions and model limitations. Unless specified otherwise, all the dimensions of the validation should be covered during the first validation in a comprehensive and independent manner (see Interaction Box [10]). The rest of this section further describes some specificities in this assessment related to the elements covered in section [3 Validation content]. In addition, in case of a model change, the validation function is expected to compare the performance of the new models with the previous ones in order to assess whether the changes have led to a documented improvement of the performance and consistent implementation. In particular, the validation function is expected to check whether previously estimated risk estimates are still appropriate in the case of a change in the risk differentiation.

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[284] Article 145 of the CRR, Article 22 of the CDR on assessment methodology

[285] Article 3(2)(b) of the CRD on model changes. The exact definition of this sample should be determined on a case-by-case basis, taking into account the degree of expert judgments involved in the rating and the minimum number of exposures necessary to have an opinion on the compliance with regulatory requirements.

> 🤝 **INTERACTION BOX 10: INTERACTION BETWEEN THE CRCU AND THE VALIDATION FUNCTION DURING THE FIRST VALIDATION**
>
> *While the validation function should be informed about the analyses made and conclusions reached by CRCU, the validation function should always analyse the results independently and come to its own independent conclusions. In contrast to subsequent validations, where it can leverage to some extent on the analyses performed by the CRCU, in the case of the first validation, the validation function is expected to challenge and complement the CRCU analyses. This entails performing own data extraction and analyses using as much as possible new data available since the model development and risk quantification, and challenge the data extractions performed by the CRCU. In any case, the validation function is expected to perform additional tests whenever it considers that the actions performed by the CRCU do not cover all angles of all the potential deficiencies.*

88. **The first validation in connection with CA's approval of a rating system.** Any rating systems submitted for an approval from the CA should have been properly validated.[286] In this context, it is expected that sufficient time has been dedicated for an evaluation of any potential deficiencies through the relevant requirements of this section (i.e. a 'first validation' is performed as part of the initial validation[287]), such that all necessary changes have been performed before the submission for an approval to CAs.[288] In practical terms, it is expected that a rating system submitted for an approval from CAs is not assessed by the validation function as materially incompliant with the regulation (i.e. no material deficiencies nor material number of non-material deficiencies are yet to have been rectified).[289] In addition, in the context of extensions and changes to the IRB approach classified as requiring CAs' approval or notification, it is expected that the validation function reviews the documentation that will be submitted to CAs.[290]

4.2 Specificities of the first validation regarding the core model performance

89. **First validation of the IRB metrics.** The validation function is expected to check the correct calculation of the IRB metrics according to the regulatory requirements as mentioned in paragraph [39] for both newly introduced models as well as model changes.

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[286] Article 11(4) of the CDR on assessment methodology

[287] Article 12(c) of the CDR on assessment methodology

[288] Article 144(1)(f) of the CRR

[289] A possibility to assess whether a deficiency (or a sum of deficiencies) is 'material' is to consider whether the correction of this deficiency or these deficiencies would be considered as a material model changes according to the RTS on model changes.

[290] Article 8 of the CDR on model changes

4.2.1 Risk differentiation

90. **First validation of the rating assignment process.** With respect to the evaluation of the rating assignment process, the validation function is expected to perform the analyses described in paragraph [42]:

    a. The evaluation of the documentation referred to in point [42.a] is expected to be focused on the assessment of whether the documentation allows for a consistent application of the human judgement in the rating assignment;

    b. The evaluation of the materiality referred to in point [42.b] is expected to be performed in the context of a model change on the 'use test sample', focusing on the cases where no rating could be assigned with the new model (while the analysis of outdated ratings could be left aside). 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.

91. **First validation of the input data.** With respect to the assessment of the input data, all the dimensions should be assessed. In particular, the analysis of the representativeness described in paragraph [44.d] is expected to be conducted between the development 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.

92. **First validation of the modelling choices.** With respect to the assessment of the modelling choices and specifications described in paragraph [45], which is of particular importance in the first validation, the validation function is expected to assess all the elements mentioned in that paragraph. In particular, for the elements mentioned in point a, the assessment of the use of third-party ratings and the cases of obligors' assignment to a better grade than their parent entities are expected to be assessed on the most recent application sample or, in the context of a model change, on the 'use test sample';

93. **Quantitative analyses in the first validation.** With respect to the empirical assessment of the model performance described in paragraph [46], the validation function is expected to pay particular attention to the robustness of the model. To this end, during the first validation, the validation function is expected to:

    a. Assess if due measures were taken in the model development to avoid overfitting and to ensure that the model is able to perform also under a changing economic environment. In particular, during the first validation, the validation function is expected to check that OOT and OOS-testing was performed as part of the model development;

    b. Perform additional tests to have an independent view on the performance of the model, as described in the Interaction Box [11]. In particular, where a sufficient amount of more recent data as in model development is available (in the case where a significant period of time occurred between the cut-off date used for model development and the validation date), the validation function is expected to perform at least an OOT-validation using that data.

INTERACTION BOX 11: STATISTICAL ASSESSMENT OF THE MODEL BETWEEN CRCU AND VALIDATION FUNCTION DURING THE FIRST VALIDATION

It is considered as a best practice to ensure a validation based on OOS and OOT samples which have not been used for the model development (i.e. for the model design, but the CRCU may have used the OOS and OOT samples itself for the validation of the final model developed) by the CRCU, to ensure a complete independence of the assessment of the model (see Figure 3). It is however not expected that the validation is restricted to these OOS and OOT samples, i.e. additional validation tests based on the full data set can complement the analysis. In any case, the validation function should have at its disposal the empirical assessment conducted by the CRCU of the performance of the model on OOT and OOS samples.

Figure 3: Schematic view of best practice of uses of validation samples between the CRCU and the validation function
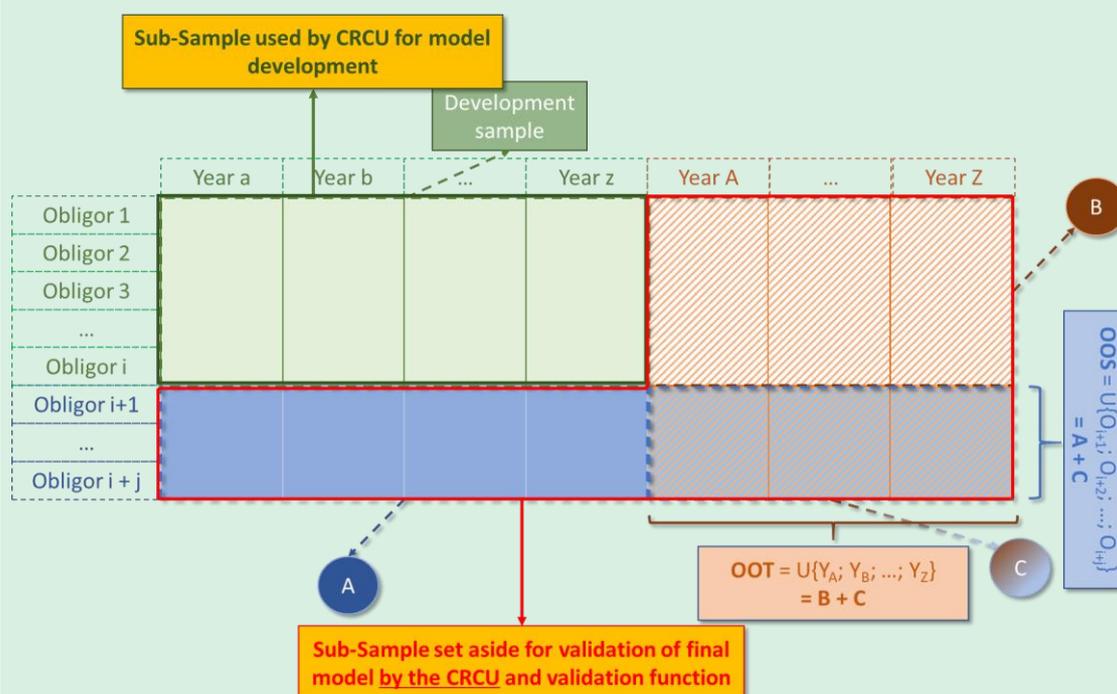
However, the model validation based on OOT and OOS samples may trigger specific challenges in the context of data scarcity, which are further discussed in section [6.3 Focus 3: validation in the context of data scarcity].

94. **Validation challengers in the first validation.** For the purpose of challenging the accuracy of the rating assignment, the validation function is generally expected to perform the analyses described in paragraph [47].

    a. The analyses mentioned in points a and b can be done on the most recent application sample or, in the context of a model change, on the 'use test sample';

b. The analysis mentioned in point c can be performed using the backward simulated ratings where possible in case of model changes;

c. The analysis mentioned in point d is expected to be performed on the calibration sample;

d. The analyses mentioned in point f are expected to be performed on the calibration sample and on the application portfolio;

4.2.2 Risk quantification

95. **First validation of the Risk quantification**. With respect to the assessment of the risk quantification, all the analyses described should be performed. To this end, during the first validation, the validation function is expected to:

a. Assess the input data as well as any methodology choices implemented by the CRCU, as mentioned in paragraphs [49], [50], [51], [52] and [53];

b. Perform additional tests to have an independent view on the risk quantification, as mentioned in paragraphs [55] and [56]. In particular, where a sufficient amount of more recent data as in model development is available (in the case where a significant period of time occurred between the cut-off date used for risk quantification and the validation date), the validation function is expected to perform the quantitative tests taking also into account that data.

4.2.3 Other specific points

96. **First validation of other specific points.** As mentioned in paragraph [58], this section describes the specificities of three aspects, which are complementing the expectations described in the general section. As such, the usual first validation activities described in the previous section are expected to be performed.

Specificities related to the validation of defaulted exposures' rating systems

97. **First validation of the defaulted exposures' rating systems.** With respect to the assessment of the risk parameters for defaulted exposures, all the analysis described are expected to be performed.

Specificities related to the validation of credit risk mitigation

98. **First validation of the CRM.** With respect to the assessment of the CRM, all the analyses described are expected to be performed.

Specificities related to the validation of the slotting approach

99. **First validation of the slotting approach.** With respect to the assessment of the slotting approach, all the analyses described are expected to be performed.

4.3 Specificities of the first validation regarding the modelling environment

4.3.1 Data quality and maintenance

100. **First validation of the data quality and maintenance.** With respect to the assessment of the quality of data, as mentioned in section [3.2.1 Data quality and maintenance], the validation function is expected to conduct its analysis along two dimensions:

   a. On the RDS for the modelling development, as mentioned in paragraphs [44.a] and [49.a];

   b. For the application of the model, in conjunction with the analyses described in section [4.3.2], however, taking into account that these processes might not be fully implemented in the production environment at the time of first validation to the extent they substitute currently implemented processes.

4.3.2 IT implementation of the rating systems

101. **First validation of the adequacy of the implementation.** For the purposes of first validation, points [85.a] and [85.b] are expected to be applied, to ensure that the model in production reproduces the business and functional requirements defined by the new or changed model. Point b. is expected be applied with regard to the development environment[291] of the new model. This assessment is expected to be performed on the basis of the specific test-related documentation, such as a general policy for IT implementation testing, individual user testing procedures, model change requests, list of detected anomalies and error logs.

102. **Documentation for the first validation of the IT implementation.** On this last aspect, when submitting a material model change, the model under validation is typically in a development environment and has not been set into a production environment. Nevertheless, the documentation package submitted to the validation function for the first validation is expected to include sufficient technical documentation, especially the IT functional documentation (e.g., business specifications), allowing the validation function to form an opinion on the integrity of the model implemented in the development environment and to be implemented in the production environment.

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[291] In some cases, this may include the test environment

5. Subsequent validation of unchanged aspects of a rating system

5.1 Scope of application

103.   **Scope of application of this section.** As described in paragraph [26], this section deals with the regular cycle of model validation for statistical models and other mechanical methods,[292] the regular back-testing analysis, including the annual update of the analysis and documentation[293] and more generally, the annual evaluation of the performance of the rating system, taking into account the risk differentiation, risk quantification and the stability of the internal ratings and risk parameters and the model specification.[294] As such, this assessment is closely related to the so-called 'review of estimate' (see Context Box [7]). This section describes the validation activities in the case of an unchanged rating system, as well as for the aspects that have not been directly or indirectly affected by the model change. In this later case, this section interacts with the section [4 First validation of newly developed rating systems or changed aspects of a rating system], which should be applied for the aspects that have been directly or indirectly affected by the model change. In this handbook, 'subsequent validation' refers to the validation of either an unchanged model or the validation of unchanged aspects of a *changed model.*

📖 **CONTEXT BOX 7: THE REVIEW OF ESTIMATES**

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*As part of the on-going model use, institutions are required to perform on a regular basis a **review of their estimates.**[295] The Chapter 9 of the GL on PD and LGD estimation has further clarified the two types of review that are supposed to be performed:*

1. *A 'regular' review of estimates, which should be conducted at least on a yearly basis, which is linked to the requirements in Article 179(1)(c) and are further clarified in Article 43 of the CDR on assessment methodology and paragraphs 217 and 218 of the GL on PD and LGD estimation.*

2. *A 'full' review of estimates, with a frequency that should be adjusted depending on the materiality of the model, and which is linked to the requirements in Article 190(2) and are further clarified in paragraphs 219 and 220 of the GL on PD and LGD estimation. A good*

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[292] Article 174(d) of the CRR

[293] Article 185(b) of the CRR and Article 11(2) and (3)(a) of the CDR on assessment methodology

[294] Article 11(2) and (3) of the CDR on assessment methodology

[295] Articles 179(1)(c) and 190(2) of the CRR

> *practice is to conduct this full review of estimate not less than every three years for*
> *material models, such that this assessment can be used by CAs while performing their*
> *regular review to assess whether the rating system is based on well-developed and up-*
> *to-date techniques practices.[296]*
>
> *The interaction between the CRCU and the validation function on the review of the estimates is*
> *further discussed in the Interaction Box [12].*

104.   **Specificities of the subsequent validation.** As such, the subsequent validation differs from the first validation in two ways:

   a. It benefits from additional data and observations, which can be used to further challenge the model, in a similar fashion to what is performed by the CRCU during the review of estimates;

   b. It has at its disposal previous conclusions from the first validation. More generally, during the subsequent validation, the validation function is expected to be aware of any deficiencies identified by other function, such as the IA (or perform the assessment itself during the subsequent validation if the validation function is in charge of it).

105.   **Objectives of the subsequent validation.** Therefore, the objectives of the subsequent validation are threefold:

   a. In case of a model change, as mentioned in paragraphs [26], [37], [86] and [103], check the materiality of model changes that occurred since its last review, and perform the activities described in the section [4 First validation of newly developed rating systems or changed aspects of a rating system] at least for the aspects that have been directly or indirectly affected by the model change;

   b. Form an opinion on the continuous performance of the model. For this assessment, the validation function is expected to use in particular the new data available along with its previous assessments and conclusions, and may rely in some circumstances on the CRCU analyses (See Interaction Box [12]). As mentioned in the Focus Box [2], the validation is expected to compare the results using the latest data available, with the ones observed in the previous years. In particular, the reference dates used for the tests are expected to be consistent from one year to another to ensure a robust comparison of the results over the years. In case where the validation is performed at a different period of time, such that the new data available do not cover a full year (i.e. the validation is performed more frequently than on a yearly basis), a good practice is to compare the validation results with the outcome of the analysis performed on previous year with a consistent reference date;

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[296] Articles 101(1) and (2) of the CRD

c. Assess the evolution of previously identified (non-material) deficiencies, such that all planned changes have been implemented,[297] and ensure that any negative evolution of the deficiencies does not lead to a rating system being materially incompliant with the regulation.

INTERACTION BOX 12: INTERACTION BETWEEN THE CRCU AND THE VALIDATION FUNCTION DURING THE SUBSEQUENT VALIDATION

As introduced in Context Box [6], some of the tasks performed by the CRCU and the validation function are typically very similar and some analyses might even be identical to validation. As a matter of fact, in their regular reviews of estimates, the institution's CRCU may take into account the analyses of the independent validation function where such results are up to date.[298] As such, the validation function may therefore rely to some extent on the analysis performed by the CRCU.

When it comes to the validation activities and their interaction with the analyses performed in a recent regular review of estimate (i.e. the review conducted on a yearly basis by the CRCU), the validation may rely to some extent on the analysis performed by the CRCU (if the regular review is performed by CRCU at the first place), depending on the materiality of the rating system and the validation activities. As such, two degrees of leverage are possible:

1. *[**Type 1 interaction: Leverage on CRCU analyses with independent conclusions**]. In these specific cases, the validation function can review and challenge the analyses performed by the CRCU but, in contrast to the general expectations during the first validation, may decide not to perform additional tests if the CRCU tests are deemed adequate in terms of input data, specifications and implementation (i.e. void of operational error). However, as for the first validation, the validation function is expected to analyse the results independently, come to its own independent conclusions and perform additional tests whenever it considers that the actions performed by the CRCU do not cover all angles of all the potential deficiencies;*

2. *[**Type 2 interaction: CRCU analyses complemented by own analyses**]. In the other cases, the interaction between the CRCU and the validation function is expected to be similar to the one described in the first validation, whereby the validation function is expected to complement the analyses performed by the CRCU with its own additional analysis.*

As such, the validation function can leverage on the CRCU activities along the following lines:

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[297] Articles 23(2)(f), 30(2)(f), 41(2)(f), 67(3)(g), 72(2)(f), 74(2)(a) and 75(4)(a) of the CDR on assessment methodology

[298] NB: on the contrary, the CRCU is expected to perform the full review of estimate independently from the validation function

1. *For the assessment of the data quality, a Type 2 interaction is expected (i.e. the validation function is expected to assess the data quality management reports submitted to institution's senior management directly);*

2. *For the assessment of the representativeness for both the risk differentiation and risk quantification, a Type 1 interaction is possible;*

3. *For the assessment of the appropriateness of the risk quantification s (i.e. back-testing analyses), a Type 2 interaction is expected. For other analyses relying on empirical data (i.e. performance assessment of the risk differentiation power of the model, including overrides, concentration and stability analyses), a distinction can be made between material rating systems and non-material rating systems. For non-material rating systems, a Type 1 interaction is possible, while for material rating systems a Type 2 interaction is generally expected.*

In the particular case where the validation tools are maintained by the validation function, the analysis can be considered as being derived from the validation.

When it comes to the validation activities and their interaction with the analyses performed in a recent full review of estimates conducted by the CRCU, the validation function is expected to perform two activities:

1. *Review the analysis conducted by the CRCU in the context of Article 190(2) of the CRR. This includes an assessment of the quality of the alternative modelling possibilities (i.e. the choices mentioned in paragraphs [45], [50], [51], [52] and [53]) attempted by the CRCU, which are expected to be sufficiently broad such that a realistic but ambitious number of alternatives have been investigated.*

2. *Perform an assessment of the performance of the rating system solely based on a Type 2 interaction for all the analysis as described in section [4 First validation of newly developed rating systems or changed aspects of a rating system].*

In this context, a good practice is to conduct independent challenging analysis via 'challenger models', an assessment of the new available data and market 'best practices' and /or a review of the latest challenger analysis results as mentioned in paragraph [47];

5.2 Specificities of the subsequent validation regarding the core model performance

106. **Subsequent validation of the IRB metrics.** For the assessment of the calculation of the metrics mentioned in paragraph [39], the validation function can use its previous assessment of their implementation.

5.2.1 Risk differentiation

107. **Subsequent validation of the rating assignment process.** With respect to the assessment of the rating assignment process described in paragraph [42] the validation function can use its previous assessment of the documentation of the assignment process (point a) and of the policy for the treatment of non-standard rating (point b). However, the validation function is expected to be aware of potential deficiencies detected in the actual implementation of the model (e.g. it is expected to know the conclusions of IA in the case where IA performs this assessment), and is expected to perform the materiality assessment of non-standard ratings on the latest years available.

108. **Subsequent validation of the input data.** With respect to the analysis of input data described in paragraph [44]:

    a. For the assessment of the data quality described in point [44.a], the validation function can use its previous assessments. As mentioned in the Interaction Box [12], the validation function is expected to assess the data quality management reports submitted to institution's senior management directly;

    b. For the assessment of the completeness of the RDS described in point [44.b], the validation function can use its previous assessment;

    c. For the procedures applied to the data used for the development of the model described in point [44.c], the validation function can use its previous assessment. However, a good practice is to perform the back-testing comparisons of the data estimation using the new data available;

    d. For the analysis of the representativeness of the data used for the model development described in point [44.d], the validation function is expected to perform this assessment with respect to the application portfolio. For this analysis, the validation function can take into account the analyses performed by the CRCU in the context of paragraph 218 (a) of the GL on PD and LGD estimation as further described in the Interaction Box [12].

109. **Subsequent validation of the modelling choices.** With respect to the assessment of the modelling choices and specifications described in paragraph [45], the validation function can use its previous assessments.

110. **Statistical tests in the subsequent validation.** With respect to the statistical tests mentioned in paragraph [46], the validation function is expected to form an opinion on the performance of the model on two samples, in order to compare the performance across time[299] (for instance by performing tests separately for each year of observation) and in particular with the performance reached in the model development:

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[299] Paragraph 218(b) of the GL on PD and LGD estimation

a. The sample composed of only the new data available since the last validation (as part of OOT tests);

b. The sample composed of all the data available since the last model approval (as part of OOT tests);

111. **Validation challengers in the subsequent validation.** For the purpose of challenging the accuracy of the rating assignment, all the analyses described in paragraph [47], are expected to be conducted during the subsequent validations. The validation function can take into account the analyses performed by the CRCU in the context of paragraph 205 of the GL on PD and LGD estimation (point [47.b]) and paragraphs 206 and 207 (point [47.a]), as further described in the Interaction Box [12].

5.2.2   Risk quantification

112. **Subsequent validation of the input data.** With respect to the assessment of the input data used for the risk quantification, the validation function is expected to review the elements described in paragraph [49]:

a. For the analysis of the data quality described in point [49.a], the validation function can use its previous assessments. As mentioned in the Interaction Box [12], the validation function is expected to assess the data quality management reports submitted to institution's senior management directly;

b. For the assessment of the completeness of the RDS described in point [49.b], the validation function can use its previous assessments;

c. For the assessment of the procedures for data collection and data cleansing described in point [49.c], the validation function can use its previous assessments;

d. For the analysis of the representativeness of the data used for the risk quantification described in point [49.d], the validation function is expected to perform this assessment with respect to the application portfolio. For this analysis the validation function can take into account the analyses performed by the CRCU in the context of Article 218 (a) of the GL on PD and LGD estimation as further described in the Interaction Box [12]. With this assessment the validation function is expected to challenge the continuous appropriateness of all appropriate adjustments applied on the risk estimates due to a lack of representativeness (mentioned in paragraphs [50.e] and [51.d]), in light of the new data available.

113. **Subsequent validation of the methodological choices – best estimates.** With respect to the assessment of the methodological choices for PD best estimates described in paragraph [50] and for LGD best estimates described in paragraph [51], the validation is expected to check that:

a. The conditions for the chosen general calibration methodology (points [50.a] and [51.a], in particular when a particular approach is justified by insufficient internal data) are still applicable;

b. The conditions for the chosen calculation of the observed default rates (point [50.b]) are still applicable, for which the validation function may rely fully on its previous assessments.

c. The conditions for the chosen calculation of the long-run-average (points [50.c] and [51.b]), in particular when a non-equal importance to historic data has been chosen) are still applicable. For the LGD, the validation function is expected to assess whether the inclusion of newly closed recovery processes leads to a significant change in the estimation related to the non-closed recovery cases;

d. The conditions for the chosen methodology of calibration to the long-run-average (points [50.d] and [51.c]) are still applicable. In the case where, during previous validation, the minimum years were not reached (i.e. the transitional period envisaged in the CRR was used). In this case, the validation function is expected to check that there has been a recalibration of the model and as a consequence, the core model performance regarding the risk quantification is expected to be assessed according to the section [4 First validation of newly developed rating systems or changed aspects of a rating system];

e. The potential deficiencies related to any appropriate adjustments (points [50.e] and [51.d]) are, to the extent possible, in a state of actively being resolved.[300]

114. **Subsequent validation of the methodological choices – MoC.** With respect to the assessment of the MoC incorporated in the risk estimates as referred to in paragraph [52], the validation function may rely fully on its previous assessments. A good practice is to assess the evolution of the different MoC in relation to the evolution of the corresponding uncertainties.

115. **Subsequent validation of the methodological choices – downturn.** With respect to the assessment of the inclusion of an economic downturn in LGD and CF estimates described in paragraph [53], the validation function is expected to consider the effects of recent changes in the economic conditions on the current portfolio and review:

a. The adequacy of the downturn period used for the estimation, i.e. whether any new observations would qualify as a downturn period or whether a change in the application portfolio would justify a change selection of the downturn period.

b. The adequacy of the method chosen for the estimation. In particular, the validation function should check that any new data cannot be used to change the selected methodology of estimation or enhance the adequacy of its outcomes.

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[300] Paragraph 40 of the EBA GLs on PD and LGD estimation.

116. **Validation challengers in the subsequent validation.** With respect to the statistical tests used to challenge the risk quantification of the model, all the analysis in paragraph [54] should be performed, in particular using also the new available data. In particular, the validation function is expected to assess whether the use of the most recent data in the risk quantification would lead to materially different risk estimates (long-run-average and downturn estimates). For the PD estimates, this includes a potential redefinition of the period of likely range of variability of defaults rates and mix of good and bad years. For this evaluation, the validation function can leverage on the analysis from the CRCU as further described in the Interaction Box [12].

5.2.3 Other specific points

117. **Subsequent validation of other specific points.** As mentioned in paragraph [58], this section describes the specificities of three aspects, which are complementing the expectations described in the general section. As such, the usual activities performed during the subsequent validations and described in the previous section are expected to be performed.

Specificities related to the validation of defaulted exposures' rating systems

118. **Subsequent validation of the defaulted exposures' rating systems.** With respect to the general assessment of the risk parameters for defaulted exposures, the validation function is expected to assess whether new systematic deviations of LGD estimates were observed on the most recent data, and check that the way reference dates are defined is not impacted by potential changes in the recovery policy (for instance if reference dates are defined as fixed dates and recovery practices change). For the other elements described in paragraphs [59] and [60], the validation function can rely on its previous assessment.

119. **Subsequent validation of the ELBE.** With respect to the ELBE assessment mentioned in paragraph [61], the validation function is expected to focus on the appropriateness of the adjustment related to the economic conditions (if applied) and the comparison with specific credit risks adjustments on the last year observations.

120. **Subsequent validation of the LGD in default.** With respect to the LGD in-default assessment mentioned in paragraph [62], the validation function is expected to perform all the checks related to the MoC and downturn assessment described in paragraph [52] and [53] (i.e. the LGD in default continues to be appropriate for an economic downturn and incorporate appropriate MoC), and check that the LGD in default is always higher than the ELBE on the last year observations.

Specificities related to the validation of credit risk mitigation

121. **Subsequent validation of the CRM.** More generally, as mentioned in paragraph [63], the validation function is expected to perform the regular validation activities as described in this section. Nevertheless, when using its previous assessments, the validation function is expected to check that the recovery policy was not changed.

122.   **Subsequent validation of RDS.** With respect to the assessment of the RDS described in paragraph [64], the validation function can rely on its previous assessments as well as from the conclusions drawn by the IA for the analyses mentioned in points [64.a] and [64.b]. For the analysis of the estimated recoveries from collateral mentioned in point [64.c], the validation function is expected to assess whether the use of the most recent data would lead to materially different recovery estimates.

123.   **Subsequent validation of the level of validation.** With respect to the additional requirements described in paragraph [65], the validation function is expected to perform the additional tests with the most recent data it deemed relevant during the first validation to check that the modelling choices and hypothesis are still relevant (e.g. these tests could check empirically that collateral agreements have not changed over time).

124.   **Subsequent validation of the general requirements for the recognition of CRM.** With respect to the general requirements on the appropriate recognition of CRM described in paragraph [66], the validation function can rely on its previous assessments.

125.   **Subsequent validation of the on-balance sheet netting and master netting agreement.** With respect to the specific assessment related to on-balance sheet netting and master netting agreement described in paragraph [67], the validation function can rely on its assessments.

126.   **Subsequent validation of the collateral recognition.** With respect to the assessment related to the recognition of collateral in estimates described in paragraph [68], the validation function can rely on its previous assessment.

127.   **Subsequent validation of the UFCP recognition.** With respect to the assessment related to the approach chosen to recognise UFCP described in paragraph [69], the validation function is expected to re-assess whether the most recent data show a material breach in the conditions for the use of a particular approach (e.g. increase in the costs or changes in the back-testing results of the EL).The validation function is expected to be aware of any possible misalignments between the policy and its implementation relative to the use of overrides (e.g. by leveraging on the assessment of the IA).

128.   **Subsequent validation of multiple CRM.** With respect to the assessment related to the recognition of multiple CRM described in paragraph [70], the validation function can rely on its previous assessment.

129.   **Subsequent validation of the consistent recognition of CRM.** With respect to the assessment of the consistency of the metrics described in paragraph [71], the validation function can rely on its previous assessment.

Specificities related to the validation of the slotting approach

130.   **Subsequent validation of the slotting approach.** The specificities of the subsequent validation of the slotting approach are similar to the ones of other rating systems described in

Section [5.2.1]. In particular, using the most recent data available, the validation function is expected to focus on:

a. The assessment of representativeness of exposures (in particular, if there is a change in the granting or renewal of loans when it comes to maturity and bullet payments);

b. The specific challenger analyses as described in the Focus Box [5];

c. The general challenger analyses mentioned in paragraph [47].

5.3 Specificities of the subsequent validation regarding the modelling environment

5.3.1 Data quality and maintenance

131. **Subsequent validation of the data quality and maintenance.** As mentioned in the Interaction Box [12], for the assessment of the data quality, the validation function is expected to assess the data quality management reports submitted to institution's senior management directly such that it is aware of any potential new deficiency. In addition, the validation function is expected to check how the previously identified deficiencies have been treated and addressed by the CRCU, in particular, if there was an appropriate adjustment applied to the risk estimates and if these have been appropriately addressed by a MoC.[301]

132. **Monitoring of the assignment process in the subsequent validation.** In addition, the validation function is expected to monitor the comprehensiveness of the assignment process, as developed in paragraph [42.b], as a downward trend could be an indication of new data quality issues.

5.3.2 IT implementation of the rating systems

133. **Subsequent validation of the implementation.** For the purposes of subsequent validation, only point [85.b] is expected to be applied, with regard to the production environment where the model in use is implemented, to the extent that the definitions of business/functional requirements (point a) for the systems supporting the IRB modelling and application are unchanged. However, the validation function is expected to check that any (non-material) model change has been properly reflected in the business/functional requirements.

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[301] Paragraph 37 of the EBA GLs on PD and LGD estimation.

6. Focus on specific validation challenges

6.1 Focus 1: validation in the context of use of external data

134. **Scope of this section**. This section is dedicated to the specific situation where a rating system is developed on a broader range of exposures than it is afterwards applied (i.e. with additional obligor or facilities added to the RDS vis-à-vis the application and historical portfolios). To note, the use of external data to supplement the development and/or application of the model without adding obligors or facilities (e.g. via the supply of data used as risk drivers) is not covered in this section. This is typically the case if:

a. **Case 1**: The development of the rating system is based on both internal and purchased external data stored in the internal systems, i.e. to which the institution has access to;

b. **Case 2**: The development of the rating system is based on internal data, as well as on external data to which the institution does not have access to. In practice, this can be the case when the rating system is developed:

- **Case 2a**: at group level while used at stand-alone level of multiple subsidiaries (i.e. this can be seen as a pool model from the perspective of each individual subsidiary) or

- **Case 2b**: externally based on pooled data of several institutions not belonging to the same group (in which case the participating institutions will share data and use a rating model with common features).

135. **General requirements on the validation when using external data**. In all these cases, the validation of the rating system is not expected to materially differ from the validation of other rating systems. But entails some specificities. As such, the validation of a rating system which is built on external data is expected to follow the following five principles.

136. **Principle 1 – appropriateness of the use of external data (representativeness)**: the use of external data entails some specific risks, and is not always appropriate. In particular, the representativeness for risk differentiation (as mentioned in paragraph [44.d]) and risk quantification (as mentioned in paragraph [49.d]) is expected to be carefully assessed *vis-a-vis* the individual entity's application portfolio. In particular, the CRR provides further requirements when a mapping to the rating grades of an external credit assessment institution or a similar organisation[302] or when pooled data is used.[303] Based on this opinion, the validation

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[302] Article 180(1)(f) of the CRR

[303] Article 179(2) of the CRR

function is expected to challenge the appropriateness of the external data used, and carefully review the quantification of the (Category A) MoC.[304]

137.   **Principle 2 – access to data**: The validation function keeps the responsibility of the objectives described in paragraph [2.2], and is expected to be in a position to challenge methodological choices related to the development of the rating system and perform additional quantitative analyses. In the cases 2a and 2b, this implies that the validation function has the possibility to request any further analyses from the data provider (the third party managing the data pool may *assist the institution in its validation activities by performing those tasks of validation which require access to the pooled data[305]* - this can be viewed as an outsourcing of operational tasks as further described in section [6.2 Focus 2: validation in the context of outsourcing of validation tasks]).

138.   **Principle 3 – methodological choices' assessment**: When assessing the methodological choices mentioned in paragraphs [45], [50], [51], [52] and [53], the validation function is expected to assess whether any bias has been introduced due to the duplication of observations on the same obligors or facilities used in the risk quantification.

139.   **Principle 4 – performance assessment**: Even if the rating system has been developed using external data,[306] the quantitative evaluation of its performance (i.e. tests mentioned in paragraphs [46],[307] [47] and [54], [55] and [56]) is expected to be performed first on the internal data. In addition, in the case where external data is used to circumvent data scarcity issues, the performance assessment of the rating system based on internal data can be complemented by an assessment of the performance using all data available. Challenges associated with the scarcity of data are further described in section [6.3 Focus 3: validation in the context of data scarcity].

140.   **Principle 5 – data quality**: The external data is not expected to be treated differently than internal data in terms of data quality assessment from the moment where it is stored in the internal system of the institution. As such, all the expectations mentioned in section [3.2.1 Data quality and maintenance] and more generally in paragraphs [44] and [49] apply. In addition, the validation function is expected to form an opinion on the data quality framework of the data provider.

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[304] Paragraph 37(a)(viii) of the GL on PD and LGD estimation

[305] Article 4(3) of the CDR on assessment methodology

[306] To note, in risk quantification the use of internal data is mandatory.

[307] In particular, OOT and OOS requirements are also expected to be respected when using external data.

6.2   Focus 2: validation in the context of outsourcing of validation tasks

141.   **Scope and relevant regulatory requirements.** Where an institution takes the decision to start the process of outsourcing certain operational tasks of the validation function, it is expected to perform a comprehensive analysis of its compliance with all the regulatory requirements on outsourcing. In particular, some requirements arise through the GL on Outsourcing, including the setting up of an outsourcing policy in which the outsourcing arrangements are carefully planned.[308] This plan is expected to account for the fact that, according to the CDR on Model Changes, any changes to the validation methodology and/or validation processes of existing IRB models have to be assessed and subsequently notified to the CA. In addition, the GL on Outsourcing define critical or important functions.[309] While the validation function is not separately mentioned, it should be viewed as an internal control function given the tasks it performs, and hence be subject to the requirements applicable to the critical or important functions introduced in the GL on Outsourcing.

142.   **Non-transferability of the responsibility**. The independence of all validation activities, regardless of them being outsourced or not, needs to be ensured by the institution (including in the case of intragroup outsourcing). In this context, only 'operational tasks of internal control functions' can be outsourced to anyone outside of the validation function, as also prescribed in the GL on Internal Governance[310] (see paragraph [150] for more details on inter-bank specifics). More specifically, in the context of the validation of IRB rating systems, the operational tasks are limited to tasks which are sufficiently specified by the validation function such that their outcomes are not dependent of the party performing them. Hence, the validation function of the respective institution will always retain responsibility for the opinion it should get on the rating system (and the related components of this opinion mentioned in paragraph [2.2]). As such, the validation function remains responsible of its validation policy (in particular its soundness), of the correct implementation of the validation methodology and of the final assessment on the rating system (including the follow-up of the validation function's findings by the institution and, where relevant, of the findings raised by the CA as mentioned in paragraph [105.c]). This should be evaluated by IA along the usual dimensions mentioned in paragraph [21].

143.   **Involvement of the senior management and management body.[311]** As a result, the management of the validation function will remain responsible for all validation activities. Therefore, all changes to validation methodologies and/or validation processes and validation reports should be understood and approved by the senior management and the members of the management body (or the designated committee thereof).

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[308] Paragraph 42(c) of the GL on Outsourcing

[309] Paragraph 29 of the GL on Outsourcing

[310] Paragraph 154 of the GL on Internal Governance

[311] Paragraph 36 of the GL on Outsourcing

144.   **Assessment of the outsourcing providers**. In addition to the regulatory requirements, the outsourcing policy of the institution plays an important role in order to ensure a sufficient degree of knowledge and resources of the validation function such that it can perform all the validation activities (as mentioned in paragraph [18]) in an independent manner with the help of the outsourcing provider. The outsourcing policy should take into account the nature of the outsourcing providers,[312] including:

a.   Whether they are authorised by a CA;

b.   Whether they are within the same group (intragroup outsourcing arrangements), outside of the group but from an entity being part of the same institutional protection scheme or completely unrelated;

c.   Whether they are located within a Member State or a third country;

d.   Whether the service provider performs some sub-outsourcing;[313]

e.   Whether they are currently performing model development or CRCU tasks. A good practice is, when the service provider to which operational validation tasks have been outsourced also performs CRCU activities, to have these tasks and activities are performed by independent units.

145.   **Communication with CA.** While all planned outsourcing of operational tasks of the validation function has to be communicated to the CA in a timely manner,[314] it is advised that the discussion process between the institution and the CA starts as early as possible, if possible as part of the pre-outsourcing analysis,[315] especially in cases where there are plans to outsource operational tasks of the validation to service provider that is:

a.   Not authorised by a CA of a member state;

b.   Outside the group or

c.   Located in third countries.

This is very much interlinked with the institution's ability to oversee the service provider and to manage the risks and the pertaining business continuity measures.[316]

146.   **Transparency of outsourcing.** Outsourcing requires to retain a clear and transparent organisational framework and structure.[317] To that end, any outsourcing of operational tasks of

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[312] Paragraph 43 of the GL on Outsourcing

[313] Section 13.1 of the GL on Outsourcing

[314] Paragraph 58 of the GL on Outsourcing

[315] Section 12 of the GL on Outsourcing

[316] Paragraph 44 of the GL on Outsourcing

[317] Paragraph 39(b) of the GL on Outsourcing

the validation function should be properly documented. Where operational tasks of the validation were outsourced, the respective validation reports should carry the logo and name of the institution and of the third party performing the outsourced tasks. Additionally, it should be clearly identifiable, which operational tasks had been performed by the service provider, for example via service level agreements.

147. **Access and inspection in the context of outsourcing.** As already established at the beginning of the chapter, the validation function falls into the category *'critical or important function'*.[318] It is therefore necessary that the institution as well as the CA (including resolution authorities, and any other person appointed by them or the CAs) have full access to the service provider and unrestricted rights of inspection and auditing related to the outsourced operational tasks.[319]

148. **Quality of outsourced operational tasks.** Institutions should monitor the performance of the service providers on an ongoing basis whenever it comes to the outsourcing arrangements regarding the operational tasks of the validation function.[320] To that end, it is also necessary to ensure that the service providers all meet appropriate performance and quality standards.[321]

149. **Business continuity in the context of outsourcing.** When outsourcing operational tasks of the validation function, the existence of a business continuity plan is required.[322] Therefore, the institution must be able to either transfer the function to alternative service providers or reintegrate the function within an appropriate time frame, including the operational tasks related to the validation for which this transfer or re-integration should be possible at the latest by the next validation of the affected rating system(s).[323] This should be part of the exit plan and strategy.[324]

150. **Intragroup outsourcing.** When it comes to outsourcing within a banking group (e.g. as in the case mentioned in paragraph [30]) it is also not possible to outsource any part of the validation function with the exception of operational tasks. Hence, while it is possible to perform certain operational tasks centralised through the use of service level agreements or other contractual arrangements, the responsibilities mentioned in paragraph [142] are still retained by each individual validation function**.** However, where a validation function outsources operational tasks to a validation function of a consolidating entity to which the CRR requirements apply, the following requirements should apply simultaneously:

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[318] Paragraph 29(b) of the GL on Outsourcing

[319] Paragraph 87 of the GL on Outsourcing

[320] Section 14 of the GL on Outsourcing

[321] Paragraph 104 of the GL on Outsourcing

[322] Section 9 of the GL on Outsourcing

[323] Paragraph 40(f) of the GL on Outsourcing

[324] Section 15 of the GL on Outsourcing

a. The independence of the validation function (paragraph [144]) of the consolidating entity can be verified most efficiently via the reports from IA of the consolidating entity as well as pertaining reports by the CA to which the outsourcing entity should have full access to.[325]

b. The transparency of the outsourcing (paragraph [146]) needs to be fully adhered to.

c. The unrestricted rights of inspection and audit (paragraph [147]) could be ensured by the contractually ensured possibility of the outsourcing entity to trigger an investigation by the IA of the consolidating entity in a timely manner.

d. The quality of the outsourced tasks (paragraph [148]) can be verified by the validation function of the outsourcing entity through an assessment of the reports from the IA of the consolidating entity as well as relevant CA reports. Additionally, the validation function should report deficiencies identified in relation to the outsourced operational tasks to the internal function responsible for the monitoring of the outsourcing.[326]

e. Business continuity (paragraph [149]) can be ensured via the business continuity plan of the consolidating entity. In addition, in the case of continuous quality or timeliness issues with regard to the outsourced tasks (e.g. issues with one of the previous points described in this paragraph), the outsourcing entity should be able to transfer the function to alternative service providers or reintegrate the function within an appropriately short time frame.

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[325] Paragraph 22(b) of the GL on Outsourcing

[326] Paragraph 104 of the GL on Outsourcing

6.3 Focus 3: validation in the context of data scarcity

151.   **Scope.** In the context of this section, data scarcity refers to the lack of observation on the empirical realisation of 'risk metrics', i.e. defaults, realised LGDs and realised CFs.

152.   **Adaptation of the validation policy in the context of data scarcity.** The validation of ratings systems in a context of data scarcity brings some additional challenges when it comes to the statistical tests mentioned in paragraph [35.b]. As such, the validation policy is expected to be adapted, and in particular provides:

   a. Specific metrics or tolerances defined.[327] In this context, the validation function is expected to pay special attention to the interpretation of the results obtained for the application of statistical challengers or tools. This includes the different assumptions underlying the application of the challengers, in particular the constraints of some statistical tests. In general, the use of broad confidence intervals is not considered best practice in the context of data scarcity: instead, a more logical or judgmental interpretation of the results may be warranted;

   b. Examples of complementary analyses to supplement quantitative measures, such as descriptive statistics or visual analyses (e.g. based on graphical analyses, such as boxplots or histograms).

153.   **Specific assessment of the risk differentiation in the context of data scarcity.** The validation function is expected to verify:

   a. Whether the main risk drivers of the observed defaults and losses are appropriately reflected in the model, as part of the analysis mentioned in paragraph [45.a], by analysing observed individual defaults (or at least a sample of them where the number of defaults makes a comprehensive analysis unduly burdensome). However, the model is not expected to be fully adjusted to fit a small number of observations (i.e. avoid overfitting);

   b. The adequacy of the number of rating grades and pools in relation to the available data to allow fora quantification and validation of the default and loss characteristics at grade or pool level, as mentioned in paragraph [45.c]. In this context, an excessive granularity may indicate a potential lack of heterogeneity between grades or pools.

154.   **Examples of alternative validation approaches in the context of data scarcity.** Where it is not feasible to apply certain statistical tests, examples of good practices to complement validation analyses or approaches are:

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[327] Article 12(c) of the CDR on assessment methodology

a. **Risk differentiation:** comparison with internal credit expert ranking (e.g. blind rank ordering tests, whereby the ranking produced by the model is assessed against the ranking produced by credit experts);[328]

b. **Risk differentiation:** OOT and OSS validation samples – see consultation box

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Consultation box

When it comes to the assessment on OOT and OOS samples, in the context of data scarcity, it may become more challenging to dismiss some data for the model development (to leave it for the validation). Nevertheless, the validation function is expected to conduct sufficient analyses in order to have sufficient confidence that the developed model does not suffer from overfitting and that its performance is preserved over different economic conditions. Several second-best approaches may be used:

1. Conduct the validation solely based on either OOT or an OOS sample, using data not used at all by the CRCU for the model development;

2. Leverage on the analyses performed by the CRCU, where the CRCU has assessed the performance of the model via OOT and OOS samples only during intermediate steps, but has used the whole sample to train the final model.

3. Complement the tests performed by the CRCU with in sample tests and qualitative analysis (such as with the one mentioned above);

Question 6:

5a) Which of the above mentioned approaches do you consider as best practices to assess the performance of the model in the context of data scarcity?

5b): More in general, which validation approaches do you consider as best practices to assess the performance of the model in the context of data scarcity?

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c. **Risk differentiation and risk quantification:** aggregation of data from different observation periods or consideration of analyses based on multi-year periods;

d. **Risk differentiation and risk quantification:** data enhancements (e.g. early arrears definition of default or an extension of the default horizon);

e. **Risk differentiation and risk quantification:** testing with external benchmarks (e.g. external ratings or market driven metrics such as bond spreads);

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[328] In case the validation relies on such approach, it should ensure the independence of the expert assessments from the rating assignment process.

5. Accompanying documents

5.1 Overview of questions for consultation

General feedback:

This validation handbook makes multiple references to the different regulatory products of the so called 'EBA repair program'. Institutions are welcomed to provide feedback on whether there are specific aspects or problems that have arisen in practice on any of the topics described in the handbook in connection with the EBA repair program.

Question 1:
1a) How is the split between the first and the subsequent validation implemented in your institution?
1b) Do you see any constraints in implementing the proposed expectations (i) as described in section 4 for the first validation for a) newly developed models; and b) model changes; and (ii) as described in section 5 for the subsequent validation of unchanged models?

Question 2: For rating systems that are used and validated across different entities, do you have a particular process in place to share the findings of all relevant validation functions? Do you apply a singular set of remedial action across all the entities or are there cases where remedial actions are tailor-made to each level of application?

Question 3:
3a) Do you deem it preferential to split the review of the definition of default between IRB-related topics and other topics?
3b) If you do prefer a split in question 3a, which topics of the definition of default would you consider to be IRB-related, and hence should be covered by the internal validation function?

Question 4: Which approach factoring in the rating philosophy of a model into the back-testing analyses should be considered as best practices?

Question 5: What analyses do you consider to be best practice to empirically assess the modelling choices in paragraph [76] and, more generally, the performance of the slotting approach used (i.e. the discriminatory power and homogeneity)?

Question 6:
6a) Which of the above mentioned approaches do you consider as best practices to assess the performance of the model in the context of data scarcity?
6b): More in general, which validation approaches do you consider as best practices to assess the performance of the model in the context of data scarcity?