



EUROPEAN CENTRAL BANK
BANKING SUPERVISION

ECB guide to internal models

General topics chapter

BANKENTOEZICHT

November 2018

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1 Introduction

1. Articles 143, 283 and 363 of Regulation (EU) No 575/2013 (CRR)¹ require the European Central Bank (ECB) to grant permission to use internal models for credit risk, counterparty credit risk (CCR) and market risk where the requirements set out in the corresponding chapters of the CRR are met by the institutions concerned. Based on the current applicable European Union (EU) and national law, the ECB guide to internal models (hereinafter the “guide”) provides transparency on how the ECB aims to apply the relevant rules consistently when assessing whether institutions meet those requirements.
2. This guide should not be construed as going beyond the current existing applicable EU and national law and therefore is not intended to replace, overrule or affect applicable EU and national law.
3. In accordance with the requirements set out in the CRR, the European Banking Authority (EBA) has drafted regulatory technical standards (RTS), namely the Final Draft RTS on assessment methodology for Internal Ratings-based (IRB) Approach², that specify how competent authorities should assess compliance with the IRB framework. The Final Draft RTS have not yet been adopted by the European Commission, but their provisions are referred to in this guide as good practices for interpretative purposes. Some parts of the guide may require revision once the European Commission has adopted the RTS by means of a Delegated Regulation. The ECB will amend or delete those parts of the guide when the RTS enter into force.
4. Within this guide, the chapter on general topics provides transparency on how the ECB understands the general (i.e. non-model-specific) topics for internal models, in particular for the IRB approach.

While section 2 (overarching principles for internal models) covers all Pillar 1 internal models for credit, market and counterparty credit risk (unless stated otherwise), all subsequent sections (implementation of the IRB approach, internal governance, internal validation, internal audit, model use, model

¹ Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012 (OJ L 176, 27.6.2013, p. 1), referred to in this guide as “CRR”. For the purposes of this document the reader’s attention is also drawn to the corrigendum published on 30 November 2013 (OJ L 321, 30.11.2013, p. 6).

² Final Draft Regulatory Technical Standards on the specification of the assessment methodology for competent authorities regarding compliance of an institution with the requirements to use the IRB Approach in accordance with Articles 144(2), 173(3) and 180(3)(b) of Regulation (EU) No 575/2013 (EBA/RTS/2016/03), referred to in this guide as “Final Draft RTS on assessment methodology for IRB”. See also: Final Draft Regulatory Technical Standards on the specification of the assessment methodology for competent authorities regarding compliance of an institution with the requirements to use internal models for market risk and assessment of significant share under points (b) and (c) of Article 363(4) of Regulation (EU) No 575/2013 (EBA/RTS/2016/07), referred to in this guide as the “Final Draft RTS on assessment methodology for IMA and significant share”. Note that there are no RTS on assessment methodology mandated for the assessment of the Internal Model Method (IMM) for calculating counterparty credit risk (CCR) exposures.

change management and third-party involvement) only cover credit risk Pillar 1 models (IRB approach). All other models, including operational risk models, Pillar 2 and managerial models are not included in the scope of the guide, unless otherwise mentioned.

The guide is also intended as a document for the internal use of the different supervisory teams, with the aim of ensuring a common and consistent approach to matters related to internal models. When applying the relevant regulatory framework in specific cases, the ECB will take into due consideration the particular circumstances of the institution concerned.

5. The first version of the guide was made available on 28 February 2017 and the general topics chapter was published for public consultation on 28 March 2018. It has been refined on the basis of the feedback received from the industry, also taking into account the outcomes of the reviews (questionnaires and on-site supervisory visits) and horizontal analyses performed as part of the targeted review of internal models (TRIM) project.

2 Overarching principles for internal models

Relevant regulatory references

	Date of issue	Article	Paragraph/Point
Legal background			
CRD IV, ³ as implemented in the relevant national law	26/06/2013	3, 76, 85	Paragraph 1, subparagraphs 7, 9 and 11
CRR	26/06/2013	175, 179, 185, 189, 190, 191, 287, 288, 292, 293, 368	
Other references			
Final Draft RTS on assessment methodology for IRB	21/07/2016	3, 9, 10, 12, 13, 14, 16, 17, 30, 32, 33	
Final Draft RTS on assessment methodology for IMA and significant share	22/11/2016	7-34	
SREP Guidelines ⁴	19/12/2014		235
EBA Guidelines on internal governance ⁵	21/03/2018		Section 22

Once adopted by the European Commission, the Final Draft RTS on assessment methodology for IRB and the Final Draft RTS on assessment methodology for IMA and significant share will become additional relevant legal references. Currently these RTSs only exist in a final draft version.

6. The principles listed in this section relate to internal models that are subject to supervisory approval for the calculation of own funds requirements for credit, market and counterparty credit risk (Pillar 1 models), unless stated otherwise.

2.1 Guidelines at consolidated and subsidiary levels

7. An inconsistent implementation of internal model-related tasks within a banking group bears the risk of an inappropriate coverage of the risks measured by internal models at group level. Therefore, institutions should either develop binding group-wide (i.e. consolidated) principles and guidelines relating to the

³ Directive 2013/36/EU of the European Parliament and the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC (OJ L 176, 27.6.2013, p. 338), referred to in this guide as "CRD IV".

⁴ Guidelines on common procedures and methodologies for the supervisory review and evaluation process (SREP) (EBA/GL/2014/13), referred to in this guide as "SREP Guidelines".

⁵ Guidelines on internal governance (EBA/GL/2017/11), referred to in this guide as "EBA Guidelines on internal governance".

life cycle⁶ of internal models⁷, or ensure that each relevant entity has appropriate and independently audited principles and guidelines in place with a high degree of consistency between one another.

8. A consistent and integrated level of application of the group principles and guidelines in the relevant entities is expected. This could be ensured by applying controls that verify that these principles are implemented correctly in all relevant entities. Examples of such controls include periodic monitoring procedures by the parent entity on implementation at local level or a gap analysis between group-wide principles and local application, including local guidelines. These controls can be used to identify those gaps and to mitigate any associated risk. The group-level policies should clearly define under which circumstances deviations from the group-wide principles would be accepted. The parent entity should be informed about such deviations. The effective implementation of the policies should be periodically monitored and assessed.

2.2 Documentation of internal models

9. All internal models should be documented to allow a qualified third party to independently understand the methodology, assumptions, limitations and use of the model and to replicate its development and implementation.
10. The institution should therefore define principles and guidelines for model documentation. These should encompass guidance for the governance of the model documentation itself. The scope of the model documentation should be defined by type of model. In-scope areas should include at least the technical aspects of the model (methodology and assumptions), data (processes), instructions for model users and performance/validation (including the results of implementation testing).
11. The institution should be able to demonstrate how its documentation and the register of its internal models facilitate the internal and external understanding of the models. The institution can choose to have one or more registers for models in use, according to the different risk types (credit, market or counterparty credit risk). The register(s) should contain at least the following information for each model:⁸ the model owner(s), range of application, materiality, approval date, potential restrictions on the model's use (e.g. conditions), as well as the key model weaknesses and change versioning. The register should also include models purchased from third-party vendors.

⁶ The model life cycle generally includes the following steps: development (including data preparation), calibration (including data preparation), validation, supervisory approval (if necessary), implementation in internal processes, application and review of estimates.

⁷ In the case of credit risk, "internal models" should be read hereinafter as "IRB rating systems".

⁸ Regarding credit risk, Article 33 of the Final Draft RTS on assessment methodology for IRB specifies the contents of a register of rating systems.

12. Adequate controls of the register of the institution's internal models, together with an inventory of the documentation, including an annual review, should be in place. This includes a policy for document management that clearly states the roles and responsibilities involved in approving documents, as well as how changes in documentation are applied and communicated internally. In addition, the institution should have a policy regarding the adequate archiving and maintenance of information, access permissions and the assessment of the completeness and consistency of the information held.
13. Documentation should be kept up to date and the institution should keep documents for an appropriate period of time, taking into account legal or regulatory retention periods.

2.3 Implementation of a model risk management framework

14. Effective model risk management allows institutions to reduce the risk of potential losses and underestimation of own funds requirements as a result of flaws in the development, implementation or use of the models. To mitigate these risks, institutions should have a model risk management framework⁹ in place that allows them to identify, understand and manage their model risk for internal models across the group. This framework should comprise, at least, the following.
 - (a) A written model risk management policy. This policy should, as a minimum, include a concept or a definition of what constitutes a model, provide the institution's interpretation of model risk¹⁰ and describe the model risk framework with reference to its different components (e.g. model governance, risk control function, validation function, internal audit) and their related documented policies.
 - (b) A register of the institution's internal models, as described in paragraph 11. This register should facilitate a holistic understanding of the application and use of the models and provide the institution's management body and senior management with a comprehensive overview of the models in place.
 - (c) Guidelines on identifying and mitigating any areas where measurement uncertainty and model deficiencies are known to exist, according to their materiality. In particular, those elements that relate to qualitative aspects of model risk (such as data deficiencies, model misuse or implementation errors) should be considered. This methodology should be applied consistently across the group (e.g. in subsidiaries or regions).

⁹ Institutions are expected to implement an effective model risk management framework for all models in use. However, section 2 focuses only on internal models approved for use for the calculation of own funds requirements for credit, market and counterparty credit risk and the respective requirements for a model risk management framework for these models.

¹⁰ "Model Risk" as defined in Article 3(1) sub-paragraph (11) of CRD IV.

- (d) Guidelines and methodologies for the qualitative and/or quantitative assessment and measurement¹¹ of the institution's model risk.
- (e) Guidelines with respect to the model life cycle as set out in paragraph 7.
- (f) Procedures for model risk communication and reporting (internal and external).
- (g) Definition of roles and responsibilities within the model risk management framework (e.g. define which unit(s) is/are in charge of or involved in independent reviews of risk estimates).

2.4 Identification of management body and senior management

15. Institutions should clearly define the roles and responsibilities of their management body and senior management as defined in Article 3(1) subparagraphs (7) and (9) of CRD IV, as implemented in the relevant national law with regard to internal models and in relation to each risk type. The institution's internal documentation should also clearly describe the composition of the management body and the senior management.
16. The term "management body" could refer to the single board, in a one-tier system, or to the function of the management and supervisory boards in a two-tier corporate governance system. The institution should document the roles and responsibilities of each individual in the management body. For the purposes of this guide, the management body refers to the members of the management body in its management function (executive members).
17. The institution should assess the appropriateness of designated committees of the management body (if applicable) in order to ensure that they provide an adequate support function for effective decision-making procedures. This holds, in particular, for decisions concerning material aspects of the institution's internal models. The institution should clearly document the composition, mandate and reporting lines of committees responsible for internal model governance and oversight, as well as the decisions taken. These committees should be given a mandate by the management body; the mandate should clearly define their tasks and authority. In order for the designated committee to be set at an appropriate level, it should be chaired by a member of the management body.

¹¹ Article 85(1) of CRD IV refers to model risk in operational risk. However, and specifically with regard to Pillar 1 models, the SREP Guidelines (paragraph 235) state that competent authorities should consider model risk as part of the assessment of specific risks to capital (e.g. IRB model deficiency is considered as part of the credit risk assessment) and for the capital adequacy assessment. In particular for IRB models, the expected range of estimation errors should be reflected in the margin of conservatism of the model, in accordance with article 179(1)(f) of the CRR. The guidance for the calculation of the margin of conservatism for IRB models is defined in the credit risk chapter of the ECB guide to internal models.

18. The institution should also be able to identify which individuals constitute its senior management with respect to the credit, market and counterparty credit risk Pillar I model frameworks. In addition to the specifications of Article 3(1) subparagraphs (7) and (9) of CRD IV, senior management can be deemed to constitute the highest hierarchical level(s) below the management body with a clearly defined responsibility for internal models.¹² The senior management should either report directly to the management body or be responsible for providing it with the necessary information to carry out its duties, especially with regard to its oversight role. The senior management's decision-making procedures relating to all aspects of internal models should be clearly documented.

2.5 General principles for internal validation

19. All internal models and internal estimates should be subject to an initial, and subsequently to an annual, internal validation. For the avoidance of doubt, the term "initial validation" in the guide refers to the validation of new models as well as the validation of material changes and extensions to approved models.
20. To ensure the effective independence of the internal validation function from the model development process (i.e. model design, development, implementation and monitoring), institutions should have appropriate organisational arrangements in place. The ECB understands that the possible organisational arrangements are as follows:¹³
- (a) separation into two different units reporting to different members of the senior management;
 - (b) separation into two different units reporting to the same member of the senior management;
 - (c) separate staff within the same unit.

The decision on which organisational arrangement to adopt should take into account the nature, size and scale of the institution and the complexity of the risks inherent in its business model.

21. Consequently, the ECB understands that large and complex institutions should implement the most robust independence option.

¹² This includes clarity on the role, authority and responsibilities of the various positions within senior management.

¹³ The principles set out in paragraphs 20-23 do not apply to the organisational structures for the management of counterparty credit risk (CCR) due to the specific requirements of Article 287(1) and (2) and Article 293(1)(c) of the CRR. Further guidance is given in the ECB guide to internal models, CCR chapter, section 9.

22. With option (b) of paragraph 20, two different units report directly¹⁴ to the same member of senior management, but act separately at any level below that. When using this second option, the ECB considers that it is good practice if the institution fulfils the additional requirements specified in Article 10(3) of the Final Draft RTS on assessment methodology for IRB and Article 22(1)(e) of the Final Draft RTS on assessment methodology for IMA and significant share. The internal audit should regularly assess whether these additional requirements are being met.
23. The ECB considers that option (c) of paragraph 20 could be suitable for small legal entities which are not classified as global systemically important institutions (G-SIIs) or other systemically important institutions (O-SIIs).¹⁵ When using this option, the ECB considers that it is good practice if the institution fulfils the additional requirements specified in Article 10(4) of the Final Draft RTS on assessment methodology for IRB and Article 22(2) of the Final Draft RTS on assessment methodology for IMA and significant share, and in particular that the internal audit regularly assesses that these additional requirements are met.
24. A proper separation of the staff of the development function from the staff of the validation function enables institutions to limit the risk of conflicts of interest resulting in an ineffective challenge from the validation. To mitigate this risk, the institution should ensure that the staff of the validation function is separate from the staff involved in the model development process.¹⁶
25. The validation function¹⁷ should be adequately staffed following the proportionality principle. It should have suitable resources and experienced,¹⁸ qualified personnel (who have appropriate quantitative and qualitative knowledge) to enable it to conduct an effective independent challenge of the internal models and internal estimates and their performance.

2.6 General principles for internal audit

26. The CRR requires internal models to be subject to regular review by the internal audit or another comparable independent auditing unit (hereinafter internal audit).¹⁹ In the understanding of the ECB, also taking into account the EBA Guidelines on internal governance²⁰, this regular review needs to be efficient and effective to meet that objective.

¹⁴ Crossing the units' reporting lines on a lower level would impede fulfilling the requirement.

¹⁵ SIs not considered as O-SIIs are those not included in the list available on the EBA banking website.

¹⁶ In particular regarding option (c) of paragraph 20, this means different sub-teams with different tasks.

¹⁷ Regardless of whether the related validation tasks are allocated internally or delegated to a third party.

¹⁸ The use of external resources has to comply with the institution's internal validation guidelines. See also 9.2.1.

¹⁹ See also Articles 191, 288 and 368(h) of the CRR.

²⁰ See section 22 "Internal audit function" of EBA Guidelines on internal governance.

27. To enable an objective assessment, the internal audit should be granted an adequate level of independence from the processes and units reviewed to ensure that:
- (a) there is an effective separation of the internal audit from the staff involved in the operations of the internal models, e.g. the validation function, the risk control unit and all other relevant business areas;
 - (b) it reports directly to the management body²¹;
 - (c) no undue influence is exerted on the staff responsible for the audit conclusions.
28. To enable a sufficient number and adequate scope of internal model reviews the internal audit should:
- (a) have adequate resources²² and experienced, qualified personnel (with the appropriate quantitative and qualitative knowledge) to undertake all relevant activities;
 - (b) be adequately equipped and managed in proportion to the nature, size and degree of complexity of the institution's business and organisational structure.
29. In the follow-up process to the internal audit conclusions and findings and to ensure that the internal audit reviews have a timely and effective impact, the following are considered to be good practice.
- (a) Conclusions, findings and recommendations should be reported to the audit committee²³ and/or the appropriate²⁴ management level of the audited areas.
 - (b) Where weaknesses are identified, action plans and related measures should be approved by the audit committee and/or the appropriate²⁴ management level of the audited areas. The internal audit function should monitor whether the audited areas implement the corrective measures in a timely manner. The institution should use appropriate IT tools in order to ensure the effectiveness of the monitoring procedures.
 - (c) Regular (at least annual) status reports should be prepared and the results discussed in the appropriate committees to ensure the timely and proper implementation of follow-up actions. Institutions should submit a summary

²¹ Definition provided in paragraph 16.

²² The use of external resources should comply with the institution's internal audit guidelines. See also section 9.2.1.

²³ As defined in Article 76(3), subparagraph 4, of CRD IV.

²⁴ The appropriate level of management (the management body or senior management) depends on the corporate governance model and the severity of the results.

of the outcomes of the relevant audit reports, action plans and the status of findings to the competent authority.

3 Roll-out and permanent partial use

Relevant regulatory references

	Date of issue	Article	Paragraph/Point
Legal background			
CRR	26/06/2013	148, 149, 150, 189	
Commission Delegated Regulation (EU) No 529/2014 ²⁵	12/03/2014		
SSM Regulation ²⁶	15/10/2013	10	
Other references			
Final Draft RTS on assessment methodology for IRB	21/07/2016	1, 6, 7, 8	
EBA Consultation Paper 2014/10 ²⁷	26/06/2014	Entire paper and responses received and published were considered	

Once adopted by the European Commission, the Final Draft RTS on assessment methodology for IRB will become additional relevant legal reference. Currently the RTS only exists in a final draft version.

3.1 Application of the IRB approach

30. In accordance with Article 148 of the CRR, institutions must implement the IRB approach for all exposures, unless they have received the permission of the competent authority to permanently use the standardised approach on some exposure classes or some types of exposures.
31. The criteria used to define the scope of application and sequential implementation of the IRB approach should be clearly documented and agreed with the competent authority. The ECB understands that these criteria include the following.
 - (a) Quantitative aspects: as a minimum, the materiality and risk profile of the exposures and internal thresholds/ratios (for both exposure at default

²⁵ Commission Delegated Regulation (EU) No 529/2014 of 12 March 2014 supplementing Regulation (EU) No 575/2013 of the European Parliament and of the Council with regard to regulatory technical standards for assessing the materiality of extensions and changes of the Internal Ratings Based Approach and the Advanced Measurement Approach (OJ L 148, 20.5.2014, p.36), referred to in the guide as "Commission Delegated Regulation (EU) No 529/2014".

²⁶ Council Regulation (EU) No 1024/2013 of 15 October 2013 conferring specific tasks on the European Central Bank concerning policies relating to the prudential supervision of credit institutions (OJ L 287, 29.10.2013, p. 63), referred to in this guide as "the SSM Regulation".

²⁷ Consultation Paper "Draft regulatory technical standards on the sequential implementation of the IRB Approach and permanent partial use under the Standardised Approach under Articles 148(6), 150(3) and 152(5) of Regulation (EU) No 575/2013 (CRR)" (EBA/CP/2014/10), referred to in the guide as "EBA Consultation paper 2014/10".

(EAD) value and risk-weighted (RW) exposure amounts) for the initial and targeted IRB coverage. For institutions for which the ECB is the competent authority of the consolidated entity, the initial IRB coverage ratio (rating systems included in the initial IRB application) is expected to be above 50% (in terms of both EAD and RW exposure amounts²⁸) at consolidated level. This takes into account that institutions must implement the IRB approach for all exposures included in the roll-out plan in a reasonable time period.²⁹

(b) Qualitative aspects: importance of the exposure classes or types of exposures for the institution's business model, data availability, operational capacity, staffing, length of experience and homogeneity of treatment of similar exposures.

32. Institutions which have already received permission to use the IRB approach are also expected to reach a 50% minimum IRB coverage ratio (in terms of both EAD and RW exposure amounts) in the implementation of the approved roll-out plan.
33. The IRB approach can be implemented sequentially across the different exposure classes or types of exposures, across different business units or for the use of own estimates of losses given default (LGDs) and conversion factors (roll-out). The ECB considers that the time frame for the initially approved roll-out plan should generally not exceed five years.³⁰
34. In the light of the ECB's need to know the regulatory treatment of all exposures for its ongoing supervision, institutions are expected to provide the competent authority with full transparency and regular communications regarding this treatment.³¹ These communications should include information on all subsidiaries and all portfolios (together with clear exposure assignment criteria). Institutions should receive explicit permission from the competent authority to use the standardised approach for exposure classes or types of exposures that are not in the scope of the IRB approach, following the requirements established under Article 150 of the CRR.

²⁸ The EAD and RW exposure amounts should be calculated by the institution in accordance with the regulatory approach envisaged for the calculation of own funds requirements in the initial approval request.

²⁹ For the computation of the IRB ratio, institutions should exclude the following exposures:

- equity exposures as referred to in Articles 133(1) and 147(6) of the CRR;
- exposures covered under Article 150(1) paragraphs (d), (e), (f), (i) and (j) of the CRR;
- exposures classified as "other non-credit obligation assets" and "items representing securitisation positions" under Article 147(2) paragraphs (f) and (g) of the CRR;
- exposures classified as "other items" under Article 112(q) of the CRR.

The rationale for these exclusions is to limit the scope to exposures for which the CRR envisages the implementation of a rating system.

³⁰ See Article 148(2) of the CRR.

³¹ Under Article 10 of the SSM Regulation, the ECB can request all relevant information.

35. Decisions of the institutions on the application and sequential implementation of the IRB approach should be triggered by internal criteria (as defined in paragraph 31) with the main purpose of enhancing risk management and risk sensitivity. In particular, sequential implementation should not be selectively used for the purpose of achieving reduced own funds requirements.³²

3.2 Governance of the roll-out plan for the IRB approach

36. “All material aspects of the rating and estimation processes shall be approved by the institution’s management body or a designated committee thereof and senior management.”³³ As the roll-out plan determines the intended application of the IRB approach and its sequential implementation, it too should be approved by the institution’s senior management and management body (or a designated committee thereof).
37. As a corollary and in accordance with Article 189(2)(a) of the CRR, the ECB understands that the reporting by senior management on the status and progress of the sequential implementation of the IRB approach should be a regular agenda item for the management body or designated committee. The ECB would consider the following to be good practice: that the status of the roll-out plan is reported frequently (at least annually) and that such reports include the exact scope of application (exposure class), the planned dates of approval and/or use, and the “initial, current and planned”³⁴ exposure amounts and RW exposure amounts.
38. To ensure compliance with Article 189(1) of the CRR with respect to the roll-out plan, institutions should have a framework or policy for the governance of their roll-out plan that includes, as mentioned above, the following:
- (a) indication of which internal bodies, including the management body or other committees and persons, are responsible for approving the roll-out plan and any changes to it;
 - (b) the frequency of reporting on the implementation of the roll-out plan to the management body (or designated committee) and to the competent authority;
 - (c) the criteria used for introducing changes to the roll-out plan (see also section 3.3, below);
 - (d) controls to assess compliance with the roll-out plan, for example second line of defence attestation or internal audit review (see also paragraph 84).

³² See Article 148(3) of the CRR.

³³ See Article 189(1) of the CRR.

³⁴ Where “initial” refers to the initial application, “current” to the moment the roll-out plan is updated and “planned” to the target level.

3.3 Changes to the roll-out plan for the IRB approach

39. Under Article 148(2) of the CRR, institutions are required to follow the roll-out plan approved by the competent authorities. In the event that a change in the approved roll-out plan is necessary, this change needs to be subject to a supervisory decision.
40. Article 7(3) of the Final Draft RTS on assessment methodology for IRB³⁵ provides a good understanding of the conditions under which competent authorities may approve any changes to the sequence and time period of the plan. The ECB intends to assess any application for a change to a roll-out plan against these conditions, on the basis of the documentation provided by the institution regarding the rationale for the change, the materiality of the portfolios affected, and governance arrangements for the change (e.g. which body will approve it). In addition, when assessing an application for a change to the roll-out plan, the competent authority will determine, if necessary, whether the proposed amendment to the time frame for the implementation of the roll-out plan is acceptable. If institutions have already completed the implementation of their roll-out plan but would like to extend the use of the IRB approach (for instance following a merger or acquisition), they should also seek approval³⁶ from the competent authority.
41. Furthermore, institutions should pay attention to the following.
- (a) Resource constraints and re-prioritisation may affect their operational capability to develop and maintain rating systems. Institutions should seek to minimise disruptions to the implementation of the roll-out plan as a result of such factors, taking appropriate mitigation or contingency actions to demonstrate compliance with the CRR requirements.
 - (b) General uncertainty caused by potential changes to the IRB regulatory requirements should not be considered a valid reason for changing the roll-out plan (or for delaying its implementation). If such regulatory changes take place and become binding, the institution can then reflect the impact on its plan by submitting a revised roll-out plan for approval.

³⁵ "In the course of their regular assessment of the institution's compliance with the plan for sequential implementation of the IRB Approach, which has been subject to permission of the competent authorities in accordance with Article 148 of Regulation (EU) No 575/2013, competent authorities may approve any changes to the sequence and time period only where any of the following conditions is met:

- a) there are significant changes in the business environment and in particular changes in strategy, mergers and acquisitions;
- b) there are significant changes in the relevant regulatory requirements;
- c) material weaknesses in rating systems have been identified by the competent authority, internal audit or validation function;
- d) there are significant changes to the aspects referred to in paragraph 2, or any of the aspects referred to in paragraph 2 were not taken into account adequately in the plan for sequential implementation of the IRB Approach which was approved."

³⁶ In line with the requirements of Commission Delegated Regulation (EU) No 529/2014 for model changes and extensions in the scope of that regulation.

3.4 Monitoring of compliance with permanent partial use provisions

42. Since permanent partial use (PPU) requires compliance with certain conditions, institutions need to ensure on an ongoing basis that exposures under PPU fall within the categories listed in Article 150(1) of the CRR.³⁷ To avoid a risk of non-compliance with these requirements, the ECB is of the view that institutions should implement the following.
- (a) Measures and triggers for a re-assessment of the suitability for PPU of PPU-authorised exposure classes or types of exposures. Examples of measures that could be used include the number of obligors, exposure at default, proportion of group EAD, and average risk weight.
 - (b) A reporting process monitoring the materiality (in terms of both EAD and RW exposure amounts) of the exposure classes or types of exposures in PPU over time. The PPU reporting should identify any changes in PPU exposures and RW exposure amounts over time as well as the exposure classes or types of exposures that are at risk of no longer fulfilling the PPU conditions.
 - (c) Processes and guidelines to assess whether further exposure classes or types of exposure – currently treated under the IRB approach – may become eligible for PPU (e.g. business in run-off or planned to be discontinued, excessive maintenance costs induced by the regulatory requirements vis-à-vis number of obligors).

³⁷ See also Article 8(4) of the Final Draft RTS on assessment methodology for IRB.

4 Internal governance

Relevant regulatory references

	Date of issue	Article	Paragraph/Point
Legal background			
CRR	26/06/2013	175, 179, 187, 189, 190	
Other references			
Final Draft RTS on assessment methodology for IRB	21/07/2016	2, 14, 15, 16, 33	
Basel Committee on Banking Supervision (BCBS) 328³⁸	08/07/2015		Principles 1, 2, 3, 4, 5, 6

Once adopted by the European Commission, the Final Draft RTS on assessment methodology for IRB will become additional relevant legal reference. Currently the RTS only exists in a final draft version.

43. The principles on internal governance have been organised along the following lines:
- (a) the materiality of rating systems (section 4.1);
 - (b) the management body and senior management:
 - (i) decision-making responsibilities (section 4.2);
 - (ii) internal reporting (section 4.3);
 - (iii) understanding of the rating systems (section 4.4);
 - (c) responsibilities of the credit risk control unit (CRCU) (section 4.5).

4.1 Materiality of rating systems

44. Whether a rating system is material depends on quantitative criteria (such as the share of total EAD and RW exposure amount covered by the material rating systems) and qualitative criteria (such as the type, riskiness and strategic importance of the exposures, the complexity of the rating systems and risk parameters, and the model risk – in alignment with the model risk management framework). The more material a rating system is, the higher are the risks resulting from any potential shortcomings in it. Consequently, materiality should

³⁸ Basel Committee on Banking Supervision "Guidelines: Corporate governance principles for banks", referred to in this guide as "Basel Committee on Banking Supervision (BCBS) 328".

be an essential consideration in model risk management and the rating systems classified as material by the institution should be subject to particular scrutiny.

45. In line with the above, institutions should assess and determine the materiality of their rating systems and communicate it to the competent authority. Material rating systems should at least include the rating systems covering material types of exposure. As the classification of the rating systems according to their materiality may be subject to changes resulting from internal or external factors (e.g. changes in economic factors, changes in business strategy), institutions should review their classification on a regular basis.
46. Although the same requirements apply to all rating systems throughout the model life cycle, additional requirements may apply to material rating systems, in particular with regard to internal reporting (see section 4.3) and internal validation (see section 5.2). This concept, that additional requirements may apply for material rating systems, is supported by the higher potential risk resulting from material rating systems and by Article 189 of the CRR, which also embeds the concept of materiality.³⁹

4.2 Decision-making responsibilities

47. In accordance with Article 189(1) of the CRR, material aspects of all rating and estimation processes must be approved by the institution's management body or a committee designated by it, as well as by senior management.⁴⁰ The ECB considers that Article 14(b) of the Final Draft RTS on assessment methodology for IRB provides a good understanding of the aspects that should at least be considered as material, and should therefore be approved at both levels.
48. The ECB understands that the approval process envisaged by Article 189(1) of the CRR should include the documentation of the approvals, so that they can be made available for review at the request of the institution's internal audit or the competent authority.
49. The institution should define which policies should be approved at both levels (management body and senior management) and this should be clarified in their respective mandates. At a minimum, the following should be considered as requiring approval at both levels: (i) risk management policies that could have a material impact on the institution's rating systems and risk estimates, and (ii) policies covering the risk of a third-party provider for model-related tasks ceasing to operate (in relation to IT infrastructure and contingency planning).⁴¹

³⁹ See Article 189(1) and (3) of the CRR.

⁴⁰ If the decision-making process takes place in the same forum where management body and senior management members meet, institutions should ensure that the information is approved beforehand by senior management and that senior management is responsible for presenting it to the forum.

⁴¹ This view of the ECB coincides with Article 14(b) of the Final Draft RTS on assessment methodology for IRB.

50. Senior management must provide notice to the management body or a designated committee thereof of material changes or exceptions from established policies.⁴² Consequently, institutions should be able to demonstrate which material changes or exceptions from established policies are communicated to the management body or a committee designated by it, and how this is done. To ensure compliance with this provision each institution should, in the ECB's view, have a policy in place which defines material changes or exceptions. They may use quantitative and/or qualitative criteria to do so. The use of expert judgement within the classification process should be clearly explained and documented.

4.3 Internal reporting

51. To ensure consistent oversight of the functioning of the rating systems, the CRR requires internal reporting on their performance.⁴³
52. To comply with this reporting requirement, institutions should determine the level of detail of the information and data to be presented to senior management and the management body (or designated committee thereof), and the frequency of the reporting. In view of proportionality, the level of detail of the information and data and the frequency of reporting may differ depending on the recipient and the materiality of the rating systems concerned (see section 4.1 on the materiality of rating systems). Reports regarding non-material rating systems may be provided in a more aggregated form. The procedures encompassing reporting for non-material rating systems should be clearly defined in the institution's policies and differences with respect to the reporting of material rating systems should be clearly identified.
53. The ECB considers that Article 15 of the Final Draft RTS on assessment methodology for IRB provides a good understanding of the elements to be included as part of the institution's internal reporting.⁴⁴ In particular, these

⁴² See Article 189(2)(a) of the CRR.

⁴³ See Article 189(2), subparagraph 2, and Article 189(3) of the CRR.

⁴⁴ *"In assessing the adequacy of the internal reporting as referred to in Article 9(1)(b)(ii), competent authorities shall, in particular, verify that:*

(a) the internal reporting includes all of the following:

- (i) a risk profile of the obligors or exposures, by grade;*
- (ii) the migration across grades;*
- (iii) an estimation of the relevant parameters per grade;*
- (iv) a comparison of realised default rates, and, to the extent that own estimates are used, of realised LGDs and realised conversion factors against expectations;*
- (v) stress test assumptions and results;*
- (vi) information about the performance of the rating process, areas needing improvement and the status of efforts to improve previously identified deficiencies of the rating systems;*
- (vii) validation reports;*

(b) the form and the frequency of internal reporting correspond to the significance and type of the information and to the level of recipient, taking into account the institution's organizational structure;

reports should include information regarding the materiality of each rating system, its perceived strengths and limitations, and its current status in the light of validation and/or audit actions.

54. As regards the level of detail of content, reports to the management body are expected to be more concise than reports to senior management. They should, however, include the necessary information for sound and appropriate decision-making. As regards frequency, institutions should provide reports to senior management as often as, or more frequently than, to the management body (or designated committee). Risk profiles and the comparison of estimated probability of default (PD) with realised default rates should be reported to senior management more frequently than annually (at least for material rating systems – see also paragraph 46) to enable senior management to ensure, on an ongoing basis, that the rating systems are operating properly in accordance with Article 189(2)(c) of the CRR and to avoid risks that could justify supervisory measures.
55. At least annually, both senior management and the management body should receive an aggregated overview of the validation results for each rating system (see also paragraph 74).

4.4 Understanding of the rating systems

56. The management body must possess a general understanding of the rating systems and senior management must have a good understanding of the rating systems designs and operations.⁴⁵ Institutions should therefore be able to provide evidence of the processes they use to improve and maintain the management body and senior management's understanding of the rating systems, including those implemented after receiving permission to use the IRB approach.
57. The format and content of these processes (for example workshops, seminars or dedicated training on IRB models) should match the roles and responsibilities of the management body and senior management, in particular those related to the model approval process. Especially for the management body, an adequate balance between collective and individual knowledge should be ensured. In the case of third-party involvement (see section 9), the institution should maintain adequate internal knowledge of the outsourced tasks.
58. While reporting or monitoring can be considered as part of the management body and senior management's knowledge-building process, it is expected that

(c) the internal reporting facilitates the senior management's monitoring of the credit risk in the overall portfolio of exposures covered by the IRB Approach;

(d) the internal reporting is proportionate to the nature, size, and degree of complexity of the institution's business and organizational structure."

⁴⁵ See Article 189(1) and (2)(b) of the CRR.

these will not be the only means of ensuring that they have an adequate understanding of the rating systems.

59. One outcome of an effective internal understanding of the rating system is that the management body or the designated committee should be able to hold an objective debate on, and challenge, the rating systems. This applies in particular to the approval of material changes or the escalation process contemplated in paragraph 76. In the ECB's view, it is good practice if the evidence of such debates is visible in the minutes of management body or designated committee meetings in which such a challenge is raised, as the management body or the designated committee should be able to discuss the outcomes, use, strengths and limitations of the IRB models.

4.5 The Credit Risk Control Unit (CRCU)

60. To ensure that the CRCU is independent from the personnel and management functions responsible for originating and renewing exposures,⁴⁶ institutions should clearly determine which individuals and/or teams make up the credit risk control function and which personnel and/or units are responsible for originating and renewing exposures,⁴⁷ and why they are independent from one another. In addition, institutions need to ensure a direct line of reporting of the CRCU to senior management in accordance with Article 190(1) of the CRR.
61. Institutions should have a clear written mandate for their CRCU which clarifies its roles and responsibilities in order to ensure that they are aligned to the responsibilities mentioned in Article 190(2) of the CRR. Institutions should also determine which units are responsible for performing which subset of the tasks allocated to the CRCU(s),⁴⁸ especially those tasks related to model design and development and the ongoing monitoring of the rating systems.
62. The CRCU is responsible for ensuring the satisfactory performance of the rating systems and their ongoing maintenance. The CRCU may provide the validation function, when required and in line with paragraph 70, with the necessary input for the validation of internal estimates. In addition, the CRCU should address any deficiencies identified by the validation function and conduct the approved remediation activities as described in paragraph 75.

⁴⁶ See Article 190(1) of the CRR.

⁴⁷ This refers in particular to those persons with authority or direct responsibility for decisions to originate or renew facility or obligor-level credit lines (for example by underwriting).

⁴⁸ See Article 190(2) of the CRR.

4.6 Review of estimates

63. In accordance with Article 179(1)(c) of the CRR, risk estimates should be reviewed⁴⁹ when new information comes to light but at least on an annual basis. The ECB considers it good practice to do this on the basis of:
- a) the ongoing monitoring performed by the CRCU;
 - b) the annual validation of internal estimates performed by the validation function (as described in section 5 of this guide).

⁴⁹ See credit risk chapter of the ECB guide to internal models.

5 Internal validation

Relevant regulatory references

	Date of issue	Article	Paragraph/Point
Legal background			
CRR	26/06/2013	144	(1)(f)
		143, 170, 172, 174, 185, 189	
Commission Delegated Regulation (EU) No 529/2014		Annex 1 Part 2 Section 1 and 2	
Other references			
Final Draft RTS on assessment methodology for IRB	21/07/2016	10	(1)(a) and (b), (2)(a)
		11	(1)(b), (2)(c), (4)
		12	(a), (c), (d), (e)
		13	(b)
		14	(b), (d)
		15, 34, 38	
Basel Committee on Banking Supervision (BCBS) Newsletter No. 4 ⁵⁰	01/2005		
Basel Committee on Banking Supervision (BCBS) Regulatory Consistency Assessment Programme (RCAP) ⁵¹	04/2016		

Once adopted by the European Commission, the Final Draft RTS on assessment methodology for IRB will become additional relevant legal reference. Currently the RTS only exists in a final draft version.

64. In the context of rating systems, the term “validation” encompasses a range of processes and activities that contribute to an assessment of whether ratings adequately differentiate risk, and whether estimates of risk parameters (such as PD, LGD and conversion factor) appropriately characterise the relevant aspects of risk.
65. The main role of the validation function is to perform a consistent and meaningful assessment of the performance of internal rating and risk estimation systems. The term “validation function” encompasses the personnel responsible for performing the validation.

⁵⁰ Basel Committee Newsletter No. 4 (January 2005), “Update on work of the Accord Implementation Group related to validation under the Basel II Framework”, referred to in this guide as “Basel Committee on Banking Supervision (BCBS) - Newsletter No. 4”.

⁵¹ Basel Committee on Banking Supervision “Regulatory Consistency Assessment Programme (RCAP) – Analysis of risk-weighted assets for credit risk in the banking book”, referred to in this guide as “Basel Committee on Banking Supervision (BCBS) - Regulatory consistency assessment programme (RCAP)”.

5.1 Validation level and responsibilities

66. In general, internal validation should be performed at all relevant levels. In particular, institutions should pay attention to the following.
- (a) If the institution has approval for a rating system on a consolidated basis only, the validation of that rating system should be performed at least at consolidated level.
 - (b) If the institution has approval for a rating system on a consolidated basis as well as on a sub-consolidated and/or individual basis, the validation of that rating system should be performed at the consolidated as well as on the sub-consolidated and/or individual levels. The results of the validation at the sub-consolidated and/or individual levels should be taken into account for consistency reasons in the validation performed at consolidated level.
67. In order to ensure consistency in validation activities across the different levels, the group validation function can provide support to validation functions at lower levels (sub-consolidated and/or individual level). However, responsibility for the validation tasks should be retained at the level at which the rating system is approved (sub-consolidated and/or individual level). See also section 9.2.1 on internal and external outsourcing of internal validation and internal audit tasks and section 9.2.5 on in-house knowledge.

5.2 Content and frequency of tasks of the validation function

68. To meet the requirements of Article 185 of the CRR with regard to the assessment of the performance of the internal rating and risk estimates by the validation function, the ECB understands that institutions should implement the following.
69. Validation policy
- Institutions should have internal validation policies involving proven procedures and methods which adequately validate the accuracy, robustness and stability of their estimation of all relevant risk parameters.⁵² The procedures and methods stipulated in the validation policy should be in line with the institution's classification of material and non-material rating systems as defined in paragraphs 44 and 46. Institutions should follow their internal validation policy when carrying out validations.
70. Validation process and content:

⁵² Validation policies are assumed by Article 185(d) of the CRR, which stipulates that the methods and data used for quantitative validation must be documented and consistent through time.

- (a) The validation process should assess the performance of the rating systems by means of qualitative and quantitative methods, in particular with regard to the ranking of borrowers by creditworthiness (ranking power) and risk parameter estimation (calibration appropriateness).
- (b) To be able to meaningfully and consistently assess the performance of the rating systems, the content of the validation process should be consistent across rating systems and through time.⁵³ The analyses and tests described in this paragraph should be considered as the minimum activities required to ensure that the assessment is meaningful. However, the implementation of all of these analyses and tests does not necessarily mean that the validation requirements according to CRR have been fulfilled, nor should it prevent the institution from developing additional tests when deemed relevant.
- (c) The content of the validation process should include quantitative analyses, which in turn should include thresholds. If such thresholds are breached, further investigation should be initiated and, if necessary, adequate measures or actions should be triggered.
- (d) All analyses and tests should be performed in such a way that the validation function is in a position to propose an effective and independent challenge to model development and use. To that end, the institution should ensure that the validation function has its own access to the relevant databases.⁵⁴ The results of the validation analyses and tests should be documented (validation report) and verifiable by third-party experts (e.g. the internal audit and the competent authority). This also includes the preparation of the validation data.
- (e) It is not expected that institutions develop a uniform validation process, as the relevant tests and their frequency may differ from one rating system to another (e.g. corporate vs. retail rating systems or material vs. non-material rating systems).
- (f) To ensure that the systems in place to validate the accuracy and consistency of rating systems are sufficiently robust,⁵⁵ institutions should ensure that any statistical tests or confidence intervals that they use are appropriate from a methodological point of view and sufficiently conservative.
- (g) A meaningful validation of the rating systems requires (as also anticipated by Article 185(b) of the CRR with respect to certain elements) not only an

⁵³ See Article 185(a) of the CRR for “consistently and meaningfully” and Article 185(d) for “consistent through time”.

⁵⁴ When an institution is using rating systems developed from pooled data, the validation function should have access to all relevant internal data of that institution. In addition, any third party involved may assist the institution in its validation activities by performing those validation tasks which require access to pooled data (see also paragraphs 134 and 137(e)).

⁵⁵ See Article 185(a) of the CRR.

initial validation but also assessment on a regular basis. In line with Article 185(b) of the CRR, these assessments should be carried out annually.⁵⁶ Therefore, the validation analyses listed hereinafter should be carried out annually, unless otherwise advised below. As mentioned in paragraph 19 the term “initial validation” in the guide refers to the validation of new models as well as the validation of material changes and extensions to approved models. In the case of material changes and extensions the validation should be conducted on those aspects directly or indirectly affected by the change.⁵⁷

- (h) In addition, and to ensure a robust validation, the analyses should be performed by the validation function without considering input from the CRCU⁵⁸ unless otherwise specified below.

- (i) Back-testing⁵⁹

For the annual validation of non-material rating systems, the validation function can also take into account the back-testing analyses performed by the CRCU.

- (ii) Discriminatory power

- (ii.a) Analyses of discriminatory power for PD models should be designed to ensure that the ranking of obligors/facilities resulting from the rating methodology appropriately separates riskier and less risky obligors/facilities.⁶⁰ Similarly, analyses of discriminatory power for LGD (respective conversion factor) models should be designed to ensure that the LGD (respective conversion factor) model is able to discriminate between facilities with high values of LGD (respective conversion factor) and those with low values of LGD (respective conversion factor).

- (ii.b) These analyses should be performed at least at the level of the overall model and, when relevant, at the level of individual risk factors and other possible segments including, for example, scorecards and modules.

- (ii.c) For the annual validation of non-material rating systems, the validation function can also take into account the analyses of discriminatory power performed by the CRCU.

- (iii) Analyses of representativeness

⁵⁶ See Article 174(d) of the CRR.

⁵⁷ See also Article 11(4) of the Final Draft RTS on assessment methodology for IRB.

⁵⁸ Or credit risk control function for institutions using option (c) of paragraph 20.

⁵⁹ Comparison of risk estimates with realised default rates, in accordance with Article 185(b) of the CRR.

⁶⁰ Further elaborated in Article 170(1), subparagraphs (d), (e) and (f), and 170(3)(c) of the CRR.

- (iii.a) The data used to build the model must be representative of the actual obligors or exposures (Article 174(c) of the CRR). This should include the following checks.
- Ensuring that the range of application of the model is in line with the approved one, in accordance with Article 143(3) of the CRR. Obligor characteristics should be compared for PD models, and facility types and characteristics should be compared for LGD and conversion factor models.
 - Monitoring the modifications undertaken in the definition of default, with the aim of identifying any changes that would affect the representativeness of the dataset with respect to the obligors or facilities within the range of application of the model.
 - Analysing lending standards or work-out procedures, external market and economic conditions, and other relevant characteristics surrounding the model development process.
- (iii.b) Where an institution uses data that are pooled across institutions, the analyses should also cover the requirements of Article 179(2) paragraphs (a) and (b) of the CRR.
- (iii.c) For the annual validation of rating systems, the validation function can also take into account the analyses of representativeness performed by the CRCU.
- (iv) Analyses of overrides
- (iv.a) Overrides should not only be monitored but also assessed as part of the validation process (Article 172(3) of the CRR). See also section 7.4.2.
- (iv.b) Analyses of overrides should be conducted on an annual basis (and not at initial validation). The validation function can also take into account the analyses of overrides performed by the CRCU.
- (v) Stability analyses of the internal ratings and risk parameters over time⁶¹
- (v.a) Examples for analysing the stability of internal ratings and risk parameters over a specific observation period for PD estimates can be the following:

⁶¹ This is required by Article 174(d) of the CRR.

- obligor/facility migrations;
 - stability of the migration matrix;
 - concentration in rating grades.
- (v.b) Institutions should justify excessive or unexpected variability.
- (v.c) For the annual validation of non-material rating systems, the validation function can also take into account the stability analyses performed by the CRCU.
- (vi) Analyses of model design stability⁶²
- (vi.a) The institution should analyse:
- the differences between the original weights of the risk drivers (derived from the development sample) and the weights estimated from a different sample (longer or more recent historical sample);
 - the continued homogeneity⁶³ of rating grades or pools used as a basis for the estimation of risk parameters.
- (vi.b) Institutions should justify excessive or unexpected variability.
- (vi.c) These analyses should be performed at initial validation and at an adequate frequency thereafter, but at least every three years. The validation function can also take into account the analyses performed by the CRCU for non-material rating systems, except at initial validation.
- (vii) Evaluation of input data⁶⁴
- (vii.a) This should ensure all of the following:
- that the data treatment process is reliable and well-founded;
 - that the necessary information is available and up to date for the majority of the application portfolio's⁶⁵ obligors and facilities by tracking the age of model input data, especially in the case of financial statements;

⁶² This is required by Article 174(d) of the CRR on "monitoring of model performance and stability" and "review of model specifications".

⁶³ Homogeneity as defined in Article 38 of the Final Draft RTS on assessment methodology for IRB. This understanding is also supported by Article 34(d) of the Final Draft RTS on assessment methodology for IRB.

⁶⁴ See Article 174(b) of the CRR.

⁶⁵ "Application portfolio" means the actual portfolio of exposures within the range of application of the PD or LGD model at the time of estimation of a risk parameter.

- that all defaults that occurred in the institution within the scope of application of the model are correctly identified and fully documented and registered in the appropriate and intended IT systems;
- that the number and reasons for technical past-due situations are tracked.

(vii.b) For the annual validation of the rating systems, the validation function can also take into account the evaluation of the input data performed by the CRCU.

(viii) Benchmarking analyses

(viii.a) The institution should carry out comparisons with up-to-date data from representative and comparable external data sources, in particular with regard to low-default portfolios (Article 185(c) of the CRR). The institution should provide sufficient evidence in the event that no usable external data are available.

(viii.b) Benchmarking analyses should be performed at initial validation and at an adequate frequency thereafter, but at least every three years. For benchmarking analyses at initial validation the validation function can take into account the benchmarking analyses performed by the CRCU.

(ix) Data cleansing analyses⁶⁶

(ix.a) These analyses refer to the exclusion of observations (and the reasons behind this) from the risk database for the construction of the reference dataset for the modelling.

(ix.b) These analyses should be performed at least at initial validation.

(x) Review of the model specification

(x.a) This analysis should include challenging the model design, assumptions and methodology. A stepwise initial validation process involving interaction with the model development at each step of the development phase may not be sufficient to perform this challenge effectively. Regardless of the validation approach followed, the validation unit should provide an overall conclusion on the model to ensure that individual model strengths and weaknesses are evaluated on an overall basis.

⁶⁶ The rationale for these analyses is set out in Article 174(c) of the CRR.

- (x.b) This analysis should be performed at least at initial validation.
- (xi) Quality assurance of the computer codes used
 - (xi.a) This should include at least the following:
 - that the implementation of the rating system in the relevant IT system is compliant with and reproduces exactly the documented model under review;⁶⁷
 - that the description of the data sources, variables and risk drivers used for development purposes are properly documented.
 - (xi.b) These analyses should be performed at least at initial validation.
- (xii) Additional qualitative analyses⁶⁸

These analyses should include, among other things, the following:

- qualitative assessments of assumptions and expert-based estimates and of the integrity of the rating assignment process;
- assessment of the use of the models and their correct application in practice;
- assessment of legal or macroeconomic changes that may impact the risk parameters;
- assessment of downturn phases and the correct application of margins of conservatism.

Not all of the above-mentioned qualitative analyses need to be performed annually, but institutions should have a clear policy in place defining the appropriate frequency of each assessment.

71. The duration from the start (reference date of data) to the end (approval of the validation results) of the yearly validation should not be more than one year. Deviations from this requirement should be clearly justified and documented by the institution and also reported to senior management.
72. Quantitative thresholds (see paragraph 70(c)) should be set up for at least the following tests:

⁶⁷ See also Article 144(1) of the CRR, which requires that the institution's systems for the management and rating of credit risk exposures be sound and implemented with integrity.

⁶⁸ This is contemplated in Article 174(e) of the CRR.

- (a) back-testing;
- (b) discriminatory power;
- (c) analyses of overrides;
- (d) stability analyses of the internal ratings and risk parameters over time.

73. In particular for tests where no thresholds are applied, a consistent qualitative assessment of the results should be performed and documented. In the event of a negative qualitative assessment, adequate measures or actions should be triggered.

5.3 Reporting and follow-up

74. Institutions should ensure that senior management and the management body (or the committee designated by it) are informed about the conclusions and recommendations of the validation results as set out in the rating systems' validation reports, and in particular about any exceeded thresholds and deficiencies identified, as this is required by Article 189(2)2 of the CRR. Such information should be provided, where appropriate,⁶⁹ in a summary document (or documents) to ensure that a sufficient level of information is provided to senior management and to the management body and to enable them to assess the performance of the rating systems. This summary document (or documents) should present an aggregated view and comparison of the results for all the rating systems.
75. Institutions should be able to demonstrate that, on the basis of the validation results and recommendations, measures are initiated to remedy the identified deficiencies of the rating systems (e.g. model change, recalibration) as contemplated by Article 189(2), sub-paragraph 2, of the CRR.
76. Article 189(2)(c) of the CRR requires senior management to ensure, on an ongoing basis, that the rating systems are operating properly. Article 189(2)2 requires senior management to be informed of the status of the measures to remedy any previously identified deficiencies. From this, it can be inferred that institutions should have a process in place (e.g. through a committee or another comparable body) to decide on such measures, who will be responsible for them, and the timelines for their implementation, on the basis of the validation results and recommendations. To ensure sufficient senior management engagement as contemplated by Article 189(2) of the CRR, the ECB is of the view that at least for material rating systems the direct involvement of senior management should be envisaged (e.g. by senior management chairing the committee). The process should involve persons with the appropriate level of

⁶⁹ Such a summary document (or documents) is (are) expected to be appropriate, for example in the case of institutions with a significant number of rating systems.

seniority and responsibility from both the CRCU and the validation function. If affected, business units should also be involved. An escalation process up to management body level should be in place in the event of conflicts between the validation function, the CRCU and/or business units.

77. Institutions should have adequate processes in place for tracking the status of the measures adopted to remedy deficiencies.⁷⁰
78. Institutions should always apply to/notify the competent authority in the event of changes to their validation methodology and/or processes in accordance with Annex 1 Part 2 Section 1 (material model change) or Section 2 (ex ante notification) of Commission Delegated Regulation (EU) No 529/2014.

⁷⁰ See Article 189(2), subparagraph 2, of the CRR.

6 Internal audit

Relevant regulatory references

	Date of issue	Article	Paragraph/Point
Legal background			
CRR	26/06/2013	145, 175, 191	
Commission Delegated Regulation (EU) No 529/2014		8	
Other references			
Final Draft RTS on assessment methodology for IRB	21/07/2016	17	
Basel Committee on Banking Supervision (BCBS) 328	08/07/2015	43, 139, 140, 141, 142, 143	
EBA Guidelines on internal governance ⁷¹	26/09/2017	V. 22. 201, 202, 204, 205, 206, 207	

Once adopted by the European Commission, the Final Draft RTS on assessment methodology for IRB will become additional relevant legal reference. Currently the RTS only exists in a final draft version.

Scope and frequency of the review of the rating systems

79. In accordance with the existing regulatory requirements under Article 191 of the CRR, the internal audit or another comparable independent auditing unit (hereinafter internal audit) must review the institution's rating systems and its operations at least annually. The areas for review must include adherence to all applicable requirements.
80. The ECB considers that an institution fulfils the above-mentioned requirements of Article 191 of the CRR if the internal audit carries out, annually and on the basis of up-to-date information, a general risk assessment of all aspects of the rating systems for the purpose of drawing up the appropriate internal audit work plan, as elaborated in paragraphs 81 to 83, and executes this plan.
81. Depending on the outcome of the general risk assessment, the intensity and frequency of the audit assignments⁷² may differ between specific areas.
- (a) An area showing signs of increased/high risk in the general risk assessment is subject to a thorough audit assignment ("deep dive"). Reasons for the increased risk might include, but are not limited to, new processes, new regulatory requirements, new types of exposures in the

⁷¹ Guidelines on internal governance (EBA/GL/2017/11), referred to in this guide as "EBA Guidelines on internal governance".

⁷² An audit assignment can refer to a separate audit, a range of audits or themes of audits.

range of application of a rating system, material model changes, findings by the competent authority or by any other function, open issues and areas with high risk identified in previous risk assessments. The audit assignments should be included in the annual audit work plan established on the basis of the general risk assessment.

- (b) Areas not showing any sign of an increased/high risk are subject to a deep dive mission at least every three years in order to provide a thorough update of the internal audit opinion on them.⁷³

82. For the purpose of the general risk assessment, the internal audit should develop its own opinion on the areas of rating systems to be reviewed but can take into consideration the analysis performed by the internal validation function where appropriate. This general risk assessment should include at least the opinion of the internal audit unit on the following aspects.

- (a) The development⁷⁴ and performance⁷⁵ of the rating systems.
- (b) The use of the models. The assessment of model use shows that the rating systems play an essential role in the most significant areas of the institution's risk management, decision-making, credit approval, internal capital allocation and corporate governance functions.
- (c) The process for the materiality classification,⁷⁶ the impact assessment and the compliance with regulatory requirements of all changes to the rating systems as well as their consequent implementation. The internal audit is informed of all changes to the rating systems.
- (d) The quality of the data used for the quantification of risk parameters.
- (e) The integrity of the rating assignment process.
- (f) The validation function, in particular with regard to its independence from the CRCU as described in paragraphs 22 and 23 of this guide, as well as the scope and suitability of the tasks performed and outputs obtained.
- (g) The process for calculating own funds requirements.

83. The procedures and results of the general risk assessment and prioritisation, the annual work plan, the guidelines, and the subsequent production of the internal audit reports should be properly documented and approved by the

⁷³ These deep dives may be either thematic, covering one area for several rating systems (e.g. rating assignment process, data quality management, definition of default), or targeted on a specific rating system.

⁷⁴ The scope should include the initial validation tasks described in the internal validation principles.

⁷⁵ The scope should include the annual/regular basic tasks described in the internal validation principles.

⁷⁶ The internal audit function may be involved in the classification as an independent function confirming the assessment of materiality, as set out in section 8.3.

management body. The auditing techniques used and applied by the institution should be documented to ensure that assessments are consistent.⁷⁷

84. To avoid delays in the procedures related to an initial IRB application or an application to extend the IRB approach to an exposure class or a type of exposure that is currently treated using the standardised approach, it is beneficial if the internal audit provides the competent authority with an independent assessment of the compliance of the initial IRB application or extension package with all applicable requirements. This applies in particular to compliance with the experience test requirements of Article 145 of the CRR. The benefit of carrying out an internal review of this nature is that shortcomings can be addressed by the institution before submitting the application, and the completeness of the initial IRB application or extension package can be ensured.
85. For extensions and changes to the IRB approach,⁷⁸ institutions must submit, among other things, reports of their independent review or validation.⁷⁹ In the case of material changes in the validation methodology and/or validation processes or process-related aspects of material changes, including changes in the definition of default, the review of those aspects should be subject to an independent assessment by the internal audit function before they are submitted to the competent authority for approval.

⁷⁷ See Article 175(1) and (2) of the CRR.

⁷⁸ See section 8.2 "Notification" on suggested templates to be used.

⁷⁹ Article 8(1)(e) of Commission Delegated Regulation (EU) No 529/2014.

7 Model use

Relevant regulatory references

	Date of issue	Article	Paragraph/Point
Legal background			
CRR	26/06/2013	143	(3)
		144	(1)(b) and (h)
		145	
		148	(1)
		150	
		171	(2)
		172	(3)
		173	(1)(b), 2
		174	(e)
		179	(1)
		189	(3)
Other references			
Final Draft RTS on assessment methodology for IRB	21/07/2016	18, 19, 20, 21	
		22	(a) and (b)
		23	(1)(a)
		24	2(a), (b), (c), (d) and (e)
		25	2(a) and (b)
		39	(c)
		42	
Basel Committee on Banking Supervision (BCBS) - Newsletter No. 9 ⁸⁰	18/09/2006	Principles: 1, 2, 3, 4	

Once adopted by the European Commission, the Final Draft RTS on assessment methodology for IRB will become additional relevant legal reference. Currently the RTS only exists in a final draft version.

Use test requirement

86. The ECB acknowledges that the degree of use of internal ratings and default and loss estimates in the institution's risk management and decision-making process, and in its credit approval, internal capital allocation and corporate

⁸⁰ Basel Committee Newsletter No. 9 (September 2006), "The IRB Use Test: Background and Implementation", referred to in this guide as "Basel Committee on Banking Supervision (BCBS) - Newsletter No. 9".

governance functions, is more extensive for PD/internal ratings than for LGD/loss estimates and conversion factors.

87. Moreover, the IRB risk parameters can be used in an adjusted form or indirectly through relevant risk measures/indicators stemming from the rating systems, provided that differences from the regulatory parameters are fully justified and properly documented.⁸¹ For example, institutions may use adjusted or transformed IRB parameters by removing certain constraints (e.g. downturn effect, conservative add-on, floor) or adjusting the time horizon.
88. The use of IRB risk parameters and their inclusion in internal policies and procedures enables institutions to continuously improve their accuracy and reliability by receiving feedback from model users. The conditions for an effective and beneficial feedback loop include a good understanding of the model, its assumptions and constraints and an adequate level of interaction between users, the CRCU and the validation function.

7.1 Risk management, credit approval and decision-making process

89. As set out in Article 144(1)(b) of the CRR, internal ratings and default and loss estimates produced by the rating systems must play an essential role in the risk management and decision-making process and in credit approval. To ensure that they are able to play this essential role, institutions should use internal ratings and default and loss estimates in the approval, restructuring and renewal of credit facilities, and in lending policies and the monitoring process for obligors and exposures. This should be formally included in the institution's internal policies.

(a) Credit approval

The ECB considers that institutions comply with the requirement to use the internal ratings and default and loss estimates in the approval, restructuring and renewal of credit facilities if they establish the following.

- (i) Institutions incorporate the internal rating systems in the overall credit granting, restructuring and renewal process. Related policies are calibrated on the basis of rating classes or groups of rating classes or risk parameters.
- (ii) For the incorporation of internal rating systems to be beneficial, staff involved in the credit granting, restructuring and renewal process need to have sufficient knowledge of the rating systems, including their strengths and limitations. This encompasses the inclusion of rating system users' feedback in model development and

⁸¹ See Article 179(1), subparagraph 2, of the CRR.

maintenance as well as having appropriate training programmes in place.

- (iii) The assignment or updating of ratings is a prerequisite for the assessment underlying the granting and reviewing of credit lines.

The ECB considers that institutions comply with the requirement to use the internal ratings and default and loss estimates in their lending policies, including exposure limits and mitigation techniques, if those policies have the following features.

- (iv) Lending policies include specific references to the use of internal rating systems and related parameters (for instance, use of a grid of parameters in the decision-making process). These parameters serve as an indicator of riskiness (e.g. in terms of expected loss (EL)). They may be differentiated by institutions' portfolios (e.g. retail/non-retail) and by facility type.

- (b) Risk management – monitoring process for obligors and exposures

The ECB considers that institutions comply with the requirement to use their internal ratings and default and loss estimates in respect of the monitoring process for obligors and exposures if the following is established.

Individuals in charge of the monitoring process are promptly provided with adequate information on the development of counterparties' credit risk as expressed by ratings, so that the relevant information can be easily incorporated in the process and trigger appropriate actions.

- 90. In addition, institutions should consider taking into account the internal ratings and default and loss estimates produced by the rating systems in the five areas shown below. If an institution decides to take into account the internal ratings and default and loss estimates in any of these five areas, this should be formally included in its internal policies.⁸² If an institution is not using internal ratings or risk parameters in one or several of these areas, it should properly document and justify the rationale for that to ensure that discrepancies are explained in a sound and understandable manner.

- (a) Pricing of transactions

- (i) Internal ratings and risk estimates can be considered in the pricing of transactions, in particular for non-retail exposures.
- (ii) The methodology underlying pricing can be documented and the use of risk-adjusted performance indicators (e.g. return on risk-adjusted

⁸² See Article 19(2) of Final Draft RTS on assessment methodology for IRB.

capital – RORAC) or adjusted IRB parameters is considered as good practice for pricing estimation.

(b) Early warning systems

- (i) Early warning systems can be applied to all the institution's exposures and can be tailored to its specific sub-portfolios (with at least a distinction between retail and non-retail exposures).
- (ii) PD/ratings dynamics (i.e. downgrades) and other indicators linked to other risk measures (e.g. EL, loan-to-value, overdraft) can be taken into account in the institution's early warning system – at least for the most relevant portfolios. Whenever an anomaly is detected, appropriate risk management decisions can be triggered. This process can be adjusted depending on the persistency and intensity of the warning. It can also be designed according to other variables such as exposure size or facility type.

(c) Collection and recovery policies and processes

- (i) Regarding the collection process, institutions can have risk management procedures in place which are triggered in advance of the exposure's default (e.g. early collection calls) and are based – among other indicators – on their internal ratings or risk drivers.
- (ii) Regarding the recovery process, institutions can have in place rules, strategies or procedures that take into consideration, inter alia, their LGD/expected loss best estimate (ELBE) values, as well as their set-aside provisions.

(d) Credit risk adjustments

- (i) The credit risk adjustments methodology for both performing exposures and exposures in default (or share of exposures in default) can be aligned to the calculation of own funds requirements, although some adjustments might be needed to comply with accounting standards (for example, International Financial Reporting Standards 9 (IFRS 9)). The institution should justify and document any significant deviations to ensure that the rationale for discrepancies is sound and understandable.

(e) Allocation or delegation of competence for the approval process

- (i) Along with the materiality of credit lines, the delegation of competences for credit approval can take risk estimates into account through one or several IRB parameters or through EL (for example, an increase of some EL-driven measures above a pre-defined threshold should typically trigger an escalation process).
- (ii) The allocation and delegation process can include the criterion of proportionality, taking into account portfolio risk and facility types.

7.2 Internal capital assessment and allocation

91. Internal ratings and the default and loss estimates produced by the rating systems play an important role in the assessment, calculation and allocation of institutions' internal capital⁸³ under the framework of the internal capital adequacy assessment process (RW exposure amounts can also be used as an additional driver). This role should be reflected within the institutions' internal policies and procedures on internal capital assessment and allocation.

7.3 Corporate governance functions

92. Internal ratings and the default and loss estimates produced by the rating systems play an important role in the institution's corporate governance functions.⁸⁴ To ensure that they are able to play this essential role, institutions should use internal ratings and default and loss estimates, in particular in their internal reporting and portfolio credit risk monitoring procedures. This role should be reflected within the institutions' internal policies.
93. The ECB considers that institutions comply with the requirement to use the internal ratings and default and loss estimates in their corporate governance functions if they establish the following.
- (a) Institutions' internal reporting⁸⁵
 - (i) Institutions have a structured reporting system on risk measured by their IRB risk parameters. This reporting framework contains information about frequency, recipients and contents (if possible broken down by segment, portfolio and product).
 - (ii) The reports are accompanied by comments and explanations on the numbers provided as well as by qualitative assessments, to enable recipients to fully understand the potential underlying risks.
 - (b) Portfolio credit risk monitoring
 - (i) In its ongoing model monitoring function, the CRCU performs descriptive analyses of portfolio riskiness (distribution of exposures among rating classes, average risk estimates and their realisations,

⁸³ See Article 144(1)(b) of the CRR.

⁸⁴ See Article 144(1)(b) of the CRR.

⁸⁵ See also section 4.3 for further details.

ELs). These analyses are progressively refined to include the analytical insights derived from the information on ratings.⁸⁶

- (ii) Reporting to senior management provides a concise but complete overview of the relevant variables⁸⁷ so that the evolution of credit risk can be monitored at portfolio level.

7.4 Assignment of exposures to grades or pools

7.4.1 Non-rated exposures and outdated ratings

94. Article 144(1)(h) of the CRR requires institutions to assign and continue with assigning each exposure in the range of application of a rating system to a rating grade or pool of this rating system. Furthermore, and in accordance with Article 173(1)(b) of the CRR, institutions must review those assignments at least annually. Nevertheless, the ECB observes that institutions' portfolios occasionally show a certain proportion of non-rated exposures and/or outdated ratings. The ECB considers that this should be properly investigated, justified, documented and monitored.

(a) Root causes

- (i) Non-rated exposures are temporary exceptions to the "ordinary" rating assignment process and should therefore be investigated, documented and justified in detail.
- (ii) Outdated ratings include both ratings that have not been updated within the 12-month period following the last rating date⁸⁸ and ratings based on outdated information.⁸⁹

(b) Materiality

- (i) Non-rated exposures and outdated ratings present a risk for institutions of not being compliant with the CRR requirements related to rating systems. To mitigate that risk, institutions should implement specific policies and procedures to identify these non-rated exposures and outdated ratings and monitor their materiality (in terms of number, EAD and RW exposure amounts). A formal check should

⁸⁶ For example: highlighting, in aggregate terms, the volume of credits whose rating has worsened by more than one class ("double downgrade"); rating stability; the speed and frequency of rating modifications; the incidence of defaults; the relationship between "upgrade" and "downgrade" at portfolio level in a given period of time; and changes in rating by line of business, market segment or type of credit line.

⁸⁷ At least those defined in Article 189(3) of the CRR.

⁸⁸ See related requirements in Article 173(1)(b) and 173(2) of the CRR.

⁸⁹ For instance, when financial information is used in the rating assignment process, it should be taken from financial statements dating back no more than two years.

be carried out on these issues, at least annually, and reported to senior management. These items should also be reviewed periodically by the internal validation function.

95. With regard to ratings not updated within the 12-month period following the most recent rating date, a transition period during which the current rating is carried forward can be considered provided all the following conditions are met:
- (a) the transition period begins 12 months after the date the current rating was assigned or when new material information on the obligor or exposure became available (if earlier);
 - (b) the transition period does not exceed three months;
 - (c) the transition period applies:
 - (i) to wholesale exposures whose rating assignment relies on external information (e.g. financial statements), which may be available/published not exactly 12 months apart;
 - (ii) in the presence of exceptional internal impediments that affect the timely review of the rating assignment;
 - (d) adequate monitoring and reporting policies, together with escalation procedures, are implemented to ensure a rapid return to compliance; restrictions to credit granting or to delegation of powers for credit approval are also envisaged for those counterparties whose rating falls within the transition period;
 - (e) conservative treatments apply after three months, as detailed in paragraph 96.
96. All exposures within the range of application⁹⁰ of an IRB rating system must eventually be rated⁹¹ and are not expected to be treated under the standardised approach, unless they have received the permission of the competent authority to be permanently treated under that approach in accordance with Article 150 of the CRR.⁹² Non-rated exposures and outdated ratings present a risk of potential underestimation of own funds requirements. To mitigate that risk, institutions should adhere to the following guidance.
- (a) Institutions should have internal policies in place establishing a process to monitor and manage non-rated exposures and outdated ratings prudentially. In particular, they should be able to prove that their procedures allow for a conservative measure of risk, such as time-

⁹⁰ The range of application refers to Article 143(3) of the CRR and thus to all exposures of the relevant type of exposure for which that rating system has been developed and approved.

⁹¹ See Article 144(1)(h) of the CRR.

⁹² See Article 148(1) of the CRR.

dependent downgrading for outdated ratings and at least the application of the worst-performing rating grade for unrated exposures.⁹³

- (b) The calibration of the prudential treatment should be validated at least annually (evidence of conservativeness).

7.4.2 Analysis of overrides

- 97. For grade and pool assignments institutions must document the situations in which human judgement may override the inputs or outputs of the rating system and the personnel responsible for approving these overrides.
- 98. For the purposes of this subsection, instances of overruling of internal policies and/or procedures are not considered as overrides. If institutions overrule internal policies and/or procedures, they should, as in the case of overrides, document these instances and report them to the relevant functions (e.g. CRCU, internal validation function). The functions concerned should assess the performance of the exposures affected by the overruling and its potential impact on the rating systems.
- 99. As a general principle, the rating of retail exposures is less likely to be affected by an override process, given the high degree of standardisation of information processing – including in qualitative terms – and the small margins of discretion in the evaluation.
- 100. “For grade and pool assignments institutions shall document those situations in which human judgement may override the inputs or outputs of the assignment process.”⁹⁴ Accordingly, institutions should have documented policies that incorporate the following principles:
 - (a) the policies include clear and exhaustive justifications for triggering the override process on the basis of pertinent and significant information for an accurate assessment of the counterparty’s creditworthiness;
 - (b) the policies define the maximum extent of overrides (in terms of, for example, maximum number of notches up⁹⁵ and maximum share of overridden exposures), also considering model/portfolio specificities; institutions should aim to be more restrictive with positive overrides than with negative ones.
- 101. Institutions must document each override.⁹⁶ To this end, they should retain the quantitative and qualitative information concerning each phase of the rating

⁹³ To avoid any distortion of risk estimates, institutions should ensure that these ex-post conservative adjustments are not included in the calibration dataset.

⁹⁴ See Article 172(3) of the CRR.

⁹⁵ Where “up” refers to the direction of non-conservative overwrites.

⁹⁶ See Article 172(3) of the CRR.

process. In particular, all decisions taken throughout the process – including interim ratings – should be recorded, as should the reasons for any override. The information should be proportionate to the severity and extent of the override.

102. “Institutions shall analyse the performance of those exposures whose assignments have been overridden.”⁹⁷ To comply with this requirement, the institutions should carry out the following procedures.
- (a) Performance analysis of the rating systems, to assess whether the judgemental adjustments improve their discriminatory power. The analysis may be extended to all of the underlying components (modules) of the rating system. It is deemed particularly useful to measure the difference in terms of performance and impact of the “pre-override” and “post-override” stages.
 - (b) Other analyses, including the assessment of the distribution of overrides by override root cause, i.e. if there is a situation that systematically triggers an adjustment.
103. To mitigate the risks identified through the aforementioned analyses (paragraph 102), institutions should identify specific criteria for assessing whether or not the number of and justifications for overrides indicate significant weaknesses in the rating system and whether this is a reason to take ad hoc actions (e.g. a model change). In general, situations where there are too many overrides could be a strong indicator of weaknesses in the model (i.e. systematic and material adjustments can be the consequence of a misspecification of the model).

⁹⁷ See Article 172(3) of the CRR.

8 Management of changes to the IRB approach

Relevant regulatory references

	Date of issue	Article	Paragraph/Point
Legal background			
CRR	26/06/2013	143	(3) and (4)
Commission Delegated Regulation (EU) No 529/2014	12/03/2014	2, 3, 4, 5, 8, Annex 1	
Other references			
Final Draft RTS on assessment methodology for IRB	21/07/2016	86, 87	

Once adopted by the European Commission, the Final Draft RTS on assessment methodology for IRB will become additional relevant legal reference. Currently the RTS only exists in a final draft version.

104. Changes to a rating system's range of application or to a rating system itself are subject to approval by the competent authorities if assessed as material, or to ex ante or ex post notification if non-material.
105. Commission Delegated Regulation (EU) No 529/2014 requires institutions to assess and classify the materiality of changes to rating systems. To comply with these requirements in a comprehensive and consistent way, institutions should establish a policy related to changes to the IRB approach ("change policy"). In line with the above, this policy should include, in particular, detailed criteria to ensure that the classification of changes is consistent and that any arbitrage in that regard is avoided. Institutions are encouraged to share their policy with the competent authority and inform the latter about any implemented modifications to it, in order for both sides to have a common understanding of the classification process.

8.1 Content of the change policy

106. The change policy should include provisions relating to the operationalisation of the requirements of Commission Delegated Regulation (EU) No 529/2014 with respect to the materiality assessment, classification, impact assessment,

notification and documentation of changes and extensions.⁹⁸ To that end, it should include, in particular, the following.⁹⁹

- (a) Responsibilities, reporting lines and procedures for the internal approval of changes, taking into account the institution's organisational characteristics. This policy should define at least the unit(s) responsible for the assessment and classification of changes or extensions, as well as the function/committee responsible for confirming and countersigning the classification.
- (b) Definitions, methods and, where applicable, metrics and significance levels for the impact assessment, threshold calculation and classification of changes; in particular, the quantitative/qualitative criteria referred to in Commission Delegated Regulation (EU) No 529/2014. In addition, as required by Annex 1, Part 2, Section 1 of the Regulation and to ensure consistency, the following should be observed:
 - (i) the institution should specify metrics and significance levels that define the significance/materiality of changes in the distribution across rating grades produced by changes to the rating methodology (paragraph 2(d)(ii) of Annex 1, Part 2, Section 1); these metrics and significance levels should be complementary to those of Articles 4(2) and (3) and Article 5(2) of the same Regulation;
 - (ii) the institution should specify metrics and significance levels that define the significance/materiality of rating migrations produced by changes in the rating system's assumptions on the impact of economic conditions (paragraph 2(c));
 - (iii) the institution should specify metrics and significance levels that define the significance/materiality of changes in the rank ordering of clients/exposures (paragraph 2(d)(i));
 - (iv) in its change policy, the institution should define which changes constitute a change in the fundamental methodology for estimating PDs, LGDs (including best estimate of EL) and conversion factors and are considered as material in the sense of paragraph 2(f) (as opposed to the changes referred to in paragraph 2(h) of Annex 1, Part 2, Section 2);
 - (v) the institution's change policy should include a definition of changes in the validation methodology and/or validation processes which lead to changes in its judgement of the accuracy and consistency of the estimation of the relevant risk parameters, the rating processes or the performance of the rating systems (paragraph 4 of section 1).

⁹⁸ Articles 2, 3, 4, 5 and 8 of Commission Delegated Regulation (EU) No 529/2014.

⁹⁹ Article 87 of the Final Draft RTS on assessment methodology for IRB provides for a comparable set of policy elements.

- (c) Procedures to identify and monitor changes, and to notify and apply to the competent authorities for permission to make such changes. In particular, institutions should establish an end-to-end process from identification to notification/application and describe how they perform the activities at each step.
- (d) Procedures for the implementation of changes, including their documentation; in particular, the re-rating process should be defined (if no other document is already in place).

8.2 Notification

107. To facilitate the process for submitting the documentation package defined under Article 8 of Commission Delegated Regulation (EU) No 529/2014, on the banking supervision website the ECB has made available to institutions standardised templates for notifying ex ante and ex post non-material changes/extensions and for submitting applications for material model changes/extensions. Institutions are invited to use these templates to facilitate the process and to ensure consistency and completeness.¹⁰⁰

8.3 Classification

108. For the reasons mentioned in paragraph 105, institutions should have processes in place which specify, in detail, that the classification of a change/extension is adequate and consistent with the classification of other changes/extensions. The institution should ensure that the classification process is not subject to any arbitrage. In line with Article 3(3) of Commission Delegated Regulation (EU) No 529/2014, “One material extension or change shall not be split into several changes or extensions of lower materiality”. Similarly, an extension or change that requires notification before its implementation (ex ante) should not be split into several changes or extensions to produce one that is notified after implementation (ex post). Nor should several unrelated changes/extensions be combined to produce one change of lower materiality (e.g. two different model changes that affect RW exposure amounts in opposite ways).
109. In accordance with Article 3(4) of Commission Delegated Regulation (EU) No 529/2014, “in case of doubt institutions shall assign extensions and changes to the category of the highest potential materiality”.
110. To ensure the accuracy of the impact assessment and the correctness and consistency of the resulting classification, the institution should establish a four-

¹⁰⁰ In addition, further forms and guidelines have been made available on the SSM website to support institutions in the pre-application process.

eye principle. This means that the assessment and classification should be confirmed by a unit independent of the one responsible for the assessment and classification of the change/extension.

8.4 Impact assessment

111. The impact assessment process must fulfil the requirements of Commission Delegated Regulation (EU) No 529/2014. It should consist of a quantitative and a qualitative assessment.
112. The quantitative assessment focuses on the impact of the change or extension on RW exposure amounts. Before and after the change or extension the institution should calculate the difference in these amounts for credit and dilution risk associated with the range of application of the internal rating system.
113. This quantitative impact assessment is based on the specifications of Article 4(2) and (3) and Article 5(2) of Commission Delegated Regulation (EU) No 529/2014. The institution should use transparent definitions and internal procedures.
 - (a) The institution should document the relevant reference date on which the calculations are based. In accordance with Article 3(2)(a) of Commission Delegated Regulation (EU) No 529/2014, the institution should use the most recent data available. In the case of material change or ex ante notification the time between the reference date and the date of notification should not exceed nine months.¹⁰¹
 - (b) The institution should give a precise definition of the range of application of the rating system applied in the calculations as referred to in Article 4(1)(c) and Article 5(1)(a)(iii) of Commission Delegated Regulation (EU) No 529/2014. It should ensure that the change to the IRB approach is directly related to exposures within the range of application of the rating system.
 - (c) The institution should generally perform a precise impact assessment¹⁰² (all exposures of the relevant range of application) when the rating system is automatic and does not require any human judgement of the qualitative variables (e.g. behavioural scoring).
 - (d) If the institution applies Article 3(2)(b) of Commission Delegated Regulation (EU) No 529/2014 and performs an impact assessment based on the re-rating of a representative sample of the population (only possible for rating systems that require qualitative assessment to define the final rating/score), this sample and its relation to the population should be

¹⁰¹ For impact assessments provided during an on-site inspection, the most recent data should be used.

¹⁰² As derived from Article 3(2) of Commission Delegated Regulation (EU) No 529/2014.

described in detail (number of observations/exposures, minimum/maximum exposure amount, mean/median exposure amount, first/third quartile). The representativeness of the sample should be documented.

- (e) If the institution applies Article 3(2)(b) of Commission Delegated Regulation (EU) No 529/2014 and performs an impact assessment based on other reliable inference methodologies, these methods should be described in detail and their reliability corroborated by qualitative and quantitative means.

114. The qualitative assessment is based on the specifications of Article 4(1)(a) and (b) and Article 5(1)(a) points (i) and (ii) of Commission Delegated Regulation (EU) No 529/2014, which refer to the Annex I of that same Regulation. The institution should thoroughly examine each of these criteria. In addition, as reported in the change policy and to ensure consistency, institutions should examine the metrics and significance levels for the impact assessment and threshold calculation (see also section 8.1, content of the change policy).

115. If a criterion specified in Annex 1 of Commission Delegated Regulation (EU) No 529/2014 may be applicable a priori (and within reason) to a change or an extension and the institution's assessment concludes that this particular criterion is not fulfilled, the institution should document this conclusion in the notification.

8.4.1 User acceptance test

116. To avoid the risk of having unexpected consequences in the use of the changed rating system (e.g. altered role of the changed rating system in the risk management of credit exposures), institutions should assess and document the impact of a material change/extension on the use of the parameters and ensure that the related internal policies and procedures for the areas described in section 7.1 remain relevant.

117. In the context of rating systems which contain qualitative inputs and/or any expert judgement component, the exposures of the representative sample referred to in point (d) of paragraph 113 should be fully re-rated under the amended rating system (including the material change or extension); adherence to the entire rating assignment process should be ensured. The feedback received from users on the application of the amended rating system and on the rating results is expected to be analysed and documented.

118. Changes or extensions that are classified as non-material do not generally require the preparation of a use test sample, unless there is evidence of a potential impact on the use of the parameters.

8.5 Re-rating process

119. Where competent authorities have provided their permission in relation to a material extension or change, Article 3(5) of Commission Delegated Regulation (EU) No 529/2014 requires institutions to calculate their own funds requirements on the basis of this approved extension or change from the date specified in the new permission. The ECB understands that this process (i.e. the re-rating process) should be covered in the institution's change policy.
120. Re-rating refers to the computation of a rating using the changed or extended rating system and the assignment of this new rating to an obligor previously rated using the rating system as it was before the change or extension.
121. In the context of changes or extensions that are classified as material, the change policy should ensure that the re-rating process is immediate. All former ratings and estimates should therefore be replaced by ratings and estimates calculated using the changed or extended model from the date specified in the approval decision – if the conceptual design allows this. This applies, for example, to rating systems that are exclusively based on behavioural scoring or in the case of recalibration not affecting the rating process.
122. If an immediate re-rating is not possible (for example if the rating assignment requires new manual input and human judgement), and only for non-retail rating systems, the policy should ensure the following.
- (a) The obligors/exposures/facilities are rated using the amended rating system within the time frame of the yearly re-rating process, i.e. within a maximum of 12 months.
 - (b) To mitigate the risk of underestimation of own funds requirements, in the event that a material change would lead to a material increase in the RW exposure amount (i.e. more than 10% on the range of application of the rating system subject to change), the institution should apply the RW exposure amount impact, simulated on the basis of the representative sample. The impact thus produced is the positive difference between the simulated RW exposure amount after the material change and the RW exposure amount before the material change approved by the competent authority. This should be done at the first Common Reporting date after the date of implementation.

For the purpose of point (b) above, the ECB would consider the following approach as the most appropriate:

- apply the simulated RW exposure amount impact until all exposures within the range of application are rated using the changed model;
- remove the simulated RW exposure amount impact linearly, i.e. 25% every quarter.

123. The re-rating process for changes/extensions that are classified as non-material may take up to one year from the date of implementation.

9 Third-party involvement

Relevant regulatory references

	Date of issue	Article	Paragraph/Point
Legal background			
CRR	26/06/2013	144	(1)
		171	
		179	(2)
		190	(3) and (4)
Other references			
Final Draft RTS on assessment methodology for IRB	21/07/2016	4	(1) to (5)
CEBS Guidelines on Outsourcing ¹⁰³	14/12/2006		

Once adopted by the European Commission, the Final Draft RTS on assessment methodology for IRB will become additional relevant legal reference. Currently the RTS only exists in a final draft version.

9.1 Preliminary principles

124. Outsourcing, as defined in the Committee of European Banking Supervisors (CEBS) Guidelines on Outsourcing, refers to an authorised entity's use of a third party (the "service provider") to perform activities that would normally be undertaken by the authorised entity itself, now or in the future. For the purposes of this section, outsourcing in the context of IRB models refers to the involvement of third parties in any IRB-related tasks, including data provisioning and the use of external data (e.g. development data, calibration data, external ratings as input for internal models, pooled data). The specific case of delegation of IRB-related tasks to different legal entities within the same group (internal outsourcing) is also considered as outsourcing and hence is subject to the expectations set out below.¹⁰⁴

¹⁰³ Committee on European Banking Supervisors, "Guidelines on Outsourcing", referred to in this guide as "CEBS Guidelines on Outsourcing".

¹⁰⁴ For generic requirements on outsourcing, such as the existence of an outsourcing policy, contract requirements, monitoring of third-party performance and a contingency plan for interruption of service, institutions must take into consideration the generic guidelines set out in the CEBS Guidelines on Outsourcing, as well as the review of those guidelines by the EBA once published. The ECB's thematic review on outsourcing should also be considered once published.

9.1.1 Contract requirements

125. All outsourcing arrangements for IRB-related tasks should be subject to a formal and comprehensive contract or similar documented agreement in accordance with the proportionality principle (in the case of internal outsourcing between different entities within the same group, provisions such as service level agreements (SLAs) or other written agreements may be considered as sufficient, subject to the criticality or importance of the tasks outsourced). Outsourcing institutions should take into account the aspects set out in Guideline 8 of the CEBS Guidelines on Outsourcing when preparing written outsourcing contracts. To avoid operational risks which could hinder the performance and operations of the rating systems, outsourcing agreements should provide for the following.

- (a) The agreed terms do not impede the institution in performing its validation activities.
- (b) The agreed terms do not impede the necessary communication between the institution and the competent authorities in performing their supervisory duties. In this sense they should include:
 - (i) full and timely access for competent authorities to all information required (e.g. all of the models' development details, where an externally developed rating system is used);
 - (ii) a requirement for the third party to provide support to the institution in the event of a request for information by the competent authority.
- (c) The agreed terms should ensure that the provider gives the institution access to relevant information in order to maintain sufficient in-house knowledge. The delivery of training and workshops is considered good practice.

9.2 Third-party involvement in internal functions and tasks

9.2.1 Internal validation and internal audit tasks

126. Although institutions are allowed to delegate some of their tasks, activities and functions to a third party, this should be done in accordance with all existing legal requirements and after due consideration of this guide, in particular the principles relating to internal validation and the internal audit included in this general topics chapter. If an institution plans to delegate certain internal validation or internal audit tasks to a third party that would perform them outside the EU, it should discuss this plan with the competent authority in advance.

127. The ECB considers that responsibility for delegated tasks should be retained by the outsourcing institution.¹⁰⁵ This understanding is also expressed in Guideline 2 of the CEBS Guidelines on Outsourcing.

128. To ensure consistency in the content, quality and governance of the activities performed internally and externally, the ECB understands that the following practices in particular should be observed:

- (a) Reports should carry the logo and name of the institution and of the third party performing the tasks.
- (b) Reports should be approved by the senior management and the members of the management body (or the designated committee thereof) responsible for the function within the institution.
- (c) The institution should assess the quality/performance of the outsourced tasks.
- (d) The independence requirements set out in section 2.5 for internal validation and section 2.6 for internal audit also apply to external parties. Institutions must ensure that model reviews are independent and free from any undue influence, also when performed by third parties. In this respect institutions should establish independence guidelines/policies with regard to third parties and those participating in internal model tasks equivalent to the internal guidelines and rules set internally. In particular, third parties and individuals that have performed or are currently performing model development or CRCU tasks should not perform model validation tasks within the same institution until a prudent cool-off period has elapsed.^{106,107}

9.2.2 Use of external credit risk parameters/ratings

129. Although institutions are allowed to use external credit risk parameters as a component of their rating systems, the following practices should be observed:

- (a) Internal ratings and estimates methodology should also take internal information into account.¹⁰⁸ When institutions use external ratings or parameters, they should ensure that these are incorporated in their estimation process in an appropriate manner and adjusted in accordance with the specificities of the institution.¹⁰⁹

¹⁰⁵ This also applies in the case of internal outsourcing.

¹⁰⁶ In the case of internal outsourcing or delegation of tasks within different legal entities of the same group, "third party" refers to the unit/function that would perform the delegated tasks.

¹⁰⁷ In the light of Article 4(3) of Final Draft RTS on assessment methodology for IRB, the third party may provide the institution with the information necessary to conduct the validation activities.

¹⁰⁸ See Article 171(2) of the CRR.

¹⁰⁹ See also the credit risk chapter of the ECB guide to internal models on the use of external data.

- (b) Analogously to the requirements for data pooled across institutions,¹¹⁰ the institution should demonstrate good knowledge of the work performed by the third party in producing the estimates. In particular, the institution should demonstrate a good understanding of the data cleansing process, assumptions used, methodological choices and resulting limitations. The institution should also monitor the performance of the rating systems involved and be able to audit them, and have clear triggers for requesting a model review.

9.2.3 Model development and maintenance

- 130. When institutions delegate the development and/or maintenance of internal models, this should be done in accordance with all existing regulatory requirements and the institutions' internal guidelines and policies, also taking this guide into account. If an institution plans to delegate such tasks to a third party that would perform them outside the EU, it is encouraged to discuss this with the competent authority in advance.
- 131. As the ultimate model owners and users, institutions should do the following:
 - (a) maintain an appropriate level of in-house knowledge (see section 9.2.5);
 - (b) have a robust contingency plan in place to ensure that they are prepared for the risk that could derive from insufficient maintenance of the rating systems.

9.2.4 Use of pool models

- 132. In accordance with Article 179(2)(d) of the CRR, an institution using pool models must remain responsible for the integrity of its rating systems. In particular, the institution is ultimately responsible for the performance of the internal validation activities as elaborated in section 5 of this guide.
- 133. To comply with the requirement to ensure integrity of the rating system specified in Article 179(2)(d) of the CRR, if deficiencies are identified in the pooled rating system at institution level, the institution should be able to independently trigger a procedure designed to amend the system, if necessary, at individual or pool level. This applies regardless of the performance of the rating system at the pool level or at the level of the other participating institutions.
- 134. Where a third party is involved in the tasks of developing a rating system and risk estimation for an institution, the institution should verify that the validation activities with regard to those rating system and those risk estimates are not performed by that third party. Where, for the purpose of developing a rating

¹¹⁰ See Article 179(2) of the CRR and in particular subparagraph (e).

system and risk estimation, the institution uses data that is pooled across institutions and a third party is developing the rating system, the third party may assist the institution in its validation activities by performing those tasks of validation which require access to the pooled data.¹¹¹

9.2.5 In-house knowledge

135. To ensure that institutions are able to identify, manage and monitor the risks connected with internal models, they should maintain adequate in-house knowledge and core competence, as they are ultimately responsible for outsourced tasks and functions. Institutions should have access to all relevant information; this will enable them to take direct control of an outsourced activity in extremis. Best practice to ensure that this in-house knowledge is maintained includes ad hoc training at all levels (not only at management level) and proper oversight of the outsourced activities.
136. In the relationship with the third party, and for the purpose of maintaining appropriate in-house knowledge and responsibilities, the ECB would consider the following practices as being advisable in the event of third-party involvement in IRB-related tasks:
- (a) the terms of the contract include transparency requirements;
 - (b) the institution has full access to all relevant information regarding internal model-related topics;
 - (c) the institution receives regular reports;
 - (d) on request, the institution is provided with specific reports;
 - (e) on request, the third party provides support and attends interviews with the competent authorities.
137. In cases where third parties are involved in model (re-)development and/or parameter (re-)calibration, to ensure that the institution maintains sufficient in-house knowledge and an adequate understanding of the rating system or that part of the rating system obtained from the third party¹¹², the ECB would consider the following practices as being advisable with regard to both the methodology and the data used for (re-)development and (re-)calibration:
- (a) The institution has access to all relevant information that enables it to understand the main model assumptions and risk estimation processes.
 - (b) The institution has access to its own obligors' information.

¹¹¹ See Article 4(3) of the Final Draft RTS on assessment methodology for IRB.

¹¹² See Article 4(2)(b) of the Final Draft RTS on assessment methodology for IRB and paragraph 133 of this guide.

- (c) In cases where pooled or external data are used for model development or calibration, the institution is able to assess to what degree the portfolio on which the model is based/developed is representative of its own portfolio, for the purposes of risk differentiation and risk quantification.
- (d) The institution has sufficient knowledge of the definition of default applied for the purposes of risk differentiation and risk quantification.
- (e) The institution has access to all necessary information to enable it to perform independent validation, including the validation of the model assumptions and performance of its own portfolio.
- (f) The institution has a specific change policy in place for models developed by third parties.
- (g) The institution is able to assess the need for a model change. The criteria that trigger a model change should be reflected in both the institution's model change policy and the contract with the third party, to ensure that the institution is able to make or request changes to the models.

9.2.6 Independent monitoring of third-party performance

138. To ensure that it is able to identify and manage the risks connected with internal model-related outsourced tasks, the institution should also independently monitor the performance of third parties and have appropriate processes in place in this regard. This practice reinforces the fact that the institutions are the ultimate users of the rating systems and thus have the ultimate responsibility for their operations.
139. The following are considered by the ECB as good practices with regard to monitoring third-party provisioning of external data.
- (a) Similar data vetting should be performed as would be the case if the data or service were provided in-house. Data quality checks should be automated (IT/batch processes) when possible, and technical issues as well as reasonableness and consistency should be considered.
 - (b) Historical differences in the data provided should trigger inquiries if justified, or if there has been an error.
 - (c) Where external data are used, their representativeness, appropriateness and consistency with regard to the institution should be assessed.
 - (d) Cross-checks should be carried out between different databases (when available) or between different providers. This is a sign of consistency and robustness.
 - (e) SLAs/contract agreements should include the required specific key performance indicators (KPIs) and performance metrics.

- (f) It should be recognised that the data quality of the information provided cannot be determined by its predictive power or by the performance of the model itself.

140. The following are considered by the ECB as good practices with regard to monitoring third-party IRB-related tasks:

- (a) the same standards of monitoring and audit should be applied to external tasks as to those performed in-house;
- (b) SLAs/contract agreements should include the specific KPIs and performance metrics that the service should include;
- (c) specific bodies should be designated, with clear responsibilities regarding the monitoring of external IRB activities (such as a monitoring committee).

10 Glossary

Basel Committee on Banking Supervision (BCBS) 328

Basel Committee on Banking Supervision “Guidelines: Corporate governance principles for banks”

Basel Committee on Banking Supervision (BCBS) - Newsletter No. 4

Basel Committee Newsletter No. 4 (January 2005), “Update on work of the Accord Implementation Group related to validation under the Basel II Framework”

Basel Committee on Banking Supervision (BCBS) - Newsletter No. 9

Basel Committee Newsletter No. 9 (September 2006), “The IRB Use Test: Background and Implementation”

Basel Committee on Banking Supervision (BCBS) - Regulatory consistency assessment programme (RCAP)

Basel Committee on Banking Supervision “Regulatory Consistency Assessment Programme (RCAP) – Analysis of risk-weighted assets for credit risk in the banking book”

BCBS

Basel Committee on Banking Supervision

CCR

Counterparty credit risk

CEBS

Committee on European Banking Supervision

CEBS Guidelines on Outsourcing

Committee on European Banking Supervisors “Guidelines on Outsourcing”

Commission Delegated Regulation (EU) No 529/2014

Commission Delegated Regulation (EU) No 529/2014 of 12 March 2014 supplementing Regulation (EU) No 575/2013 of the European Parliament and of the Council with regard to regulatory technical standards for assessing the materiality of extensions and changes of the Internal Ratings Based Approach and the Advanced Measurement Approach (OJ L 148, 20.5.2014, p.36)

CRCU

Credit risk control unit

CRD IV

Directive 2013/36/EU of the European Parliament and the Council of 26 June 2013 on access to the activity of credit institutions and the prudential supervision of credit institutions and investment firms, amending Directive 2002/87/EC and repealing Directives 2006/48/EC and 2006/49/EC (OJ L 176, 27.6.2013, p. 338)

CRR

Regulation (EU) No 575/2013 of the European Parliament and of the Council of 26 June 2013 on prudential requirements for credit institutions and investment firms and amending Regulation (EU) No 648/2012 (OJ L 176, 27.6.2013, p. 1). For the purposes of this document the reader's attention is also drawn to the corrigendum published on 30 November 2013 (OJ L 321, 30.11.2013, p. 6)

EAD

Exposure at default

EBA

European Banking Authority

EBA Consultation paper 2014/10

Consultation Paper "Draft regulatory technical standards on the sequential implementation of the IRB Approach and permanent partial use under the Standardised Approach under Articles 148(6), 150(3) and 152(5) of Regulation (EU) No 575/2013 (CRR)" (EBA/CP/2014/10)

EBA Guidelines on internal governance

Guidelines on internal governance (EBA/GL/2017/11)

EL

Expected loss

ELBE

Expected loss best estimate

EU

European Union

Final Draft RTS on assessment methodology for IRB

Final Draft Regulatory Technical Standards on the specification of the assessment methodology for competent authorities regarding compliance of an institution with the requirements to use the IRB approach in accordance with Articles 144(2), 173(3) and 180(3)(b) of Regulation (EU) No 575/2013 (EBA/RTS/2016/03)

Final Draft RTS on assessment methodology for IMA and significant share

Final Draft Regulatory Technical Standards on the specification of the assessment methodology for competent authorities regarding compliance of an institution with the requirements to use internal models for market risk and assessment of significant share under points (b) and (c) of Article 363(4) of Regulation (EU) No 575/2013 (EBA/RTS/2016/07)

GL

Guidelines

G-SIIs

Globally significant institutions

IFRS

International Financial Reporting Standards

IRB

Internal ratings-based

KPIs

Key performance indicators

LGD

Loss given default

O-SIIs

Other systemically important institutions

PD

Probability of default

PPU

Permanent partial use

RORAC

Return on risk-adjusted capital

RTS

Regulatory Technical Standards

RW

Risk-weighted

SLAs

Service level agreements

SSM Regulation

Council Regulation (EU) No 1024/2013 of 15 October 2013 conferring specific tasks on the European Central Bank concerning policies relating to the prudential supervision of credit institutions (OJ L 287, 29.10.2013, p. 63)

SREP Guidelines

Guidelines on common procedures and methodologies for the supervisory review and evaluation process (SREP) (EBA/GL/2014/13)

TRIM

Targeted review of internal models