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Guidelines

on PD estimation, LGD estimation and the treatment of defaulted exposures

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1. Executive summary

The guidelines (GL) are one of the initiatives undertaken by the European Banking Authority (EBA) to reduce unjustified variability of risk parameters and own funds requirements and are part of a broader review of the Internal Ratings-Based (IRB) Approach that is carried out by the EBA in accordance with the plan outlined in the Report on the review of the IRB Approach published in February 2016¹. These GL are focused on the definitions and modelling techniques used in the estimation of risk parameters for both non-defaulted and defaulted exposures, whereas other regulatory products developed in the review process will clarify other aspects related to the application of the IRB Approach. The EBA considers these clarifications and harmonisation necessary to achieve comparability of risk parameters estimated on the basis of internal models, and to restore trust in these models by market participants while at the same time preserving risk sensitivity of capital requirements.

The EBA has in its previous work identified a clear need for these GL, including in five reports on the comparability and pro-cyclicality of capital requirements, developed in accordance with Article 502 of Regulation (EU) No 575/2013 and published by the EBA in December 2013², in addition to subsequent benchmarking reports. These reports confirmed significant discrepancies in risk parameters and own funds requirements across institutions and jurisdictions, which did not reflect differences in risk profiles but resulted from different underlying definitions and certain modelling choices. These discrepancies were in part a consequence of excessive flexibility incorporated in the IRB framework and are considered to be a main driver in the loss of trust of internal models by observers, investors and other market participants.

With regard to non-defaulted exposures the draft GL provide detailed clarifications on the estimation of probability of default (PD) and loss given default (LGD) parameters. In the case of defaulted exposures, institutions are required to estimate LGD (so called LGD in-default) and expected loss best estimate (EL_{BE}). As these parameters are in fact part of LGD models, the clarifications on the estimation provided in the GL are based largely on the requirements specified for the estimation of LGD for non-defaulted exposures. In addition, the GL specify aspects common to all risk parameters, such as the use of human judgement both in the development and in the application of the internal models, appropriate margin of conservatism (MoC) that should be incorporated in risk parameters, and regular reviews of the models to ensure timely implementation of necessary changes in case of deteriorated performance of the models. The aim of the GL is therefore to harmonise the concepts and methods used today.

The goal of the GL is ultimately to reduce the unwarranted variability in capital requirements stemming from differences in model practices. For this purpose, the GL differentiate between model development and model calibration, as it has been important for the EBA to allow flexibility in terms

¹ <https://www.eba.europa.eu/-/eba-sets-out-roadmap-for-the-implementation-of-the-regulatory-review-of-internal-models>

² <http://www.eba.europa.eu/-/eba-publishes-reports-on-comparability-of-risk-weighted-assets-rwas-and-pro-cyclicality>

of model development, such that risk-sensitive models continue to be allowed. However, the calibration and the determination of capital requirements have to be identified in an objective manner. Consequently, the GL have put the highest emphasis on the requirements for model calibration. For instance, whereas the model development may exclude observations during the building of the model to obtain an accurate model, all loss observations have to be used for the calibration of the actual capital requirements.

As it is expected that these GL may lead to material changes in numerous rating systems used currently by institutions, sufficient time has to be granted for their implementation, which also takes into account the time needed to seek supervisory approval for material model changes. The proposed deadline for implementation is the end of 2020, based on the Opinion on the implementation of the review of the IRB Approach published by the EBA in February 2016³. This Opinion describes the envisaged phasing-in approach and the specified deadline refers to implementation of all changes stemming from the regulatory review of the IRB Approach. It is expected, however, that institutions immediately initiate preparations to implement the GL.

³ <https://www.eba.europa.eu/-/eba-sets-out-roadmap-for-the-implementation-of-the-regulatory-review-of-internal-models>

2. Background and rationale

Introduction

The concept of the Internal Ratings Based (IRB) Approach for credit risk was first introduced by Directives 2006/48/EC and 2006/49/EC of 14 June 2006 (known as the Capital Requirements Directive), later replaced by Regulation (EU) No 575/2013 (Capital Requirements Regulation – CRR) and Directive 2013/36/EU of 26 June 2013 (Capital Requirements Directive – CRD). The CRR introduced a number of mandates for the European Banking Authority (EBA) to develop technical standards and guidelines to supplement the basic legislation in order to ensure more harmonised application of the IRB requirements.

In this regard and in accordance with Article 502 of the CRR, the EBA published in December 2013 a set of five reports on the comparability and pro-cyclicality of capital requirements, presenting the results of a study conducted by the EBA on the comparability of risk estimates and capital requirements, including analysis of the factors that contribute to discrepancies among institutions. Based on the results, the EBA concluded that further guidance was needed, as current practices differed significantly across countries and institutions. Consequently, the EBA initiated work to provide further regulatory guidance, and these Guidelines on PD estimation, LGD estimation and the treatment of defaulted exposures (GL) are one of the resulting initiatives, specifically targeting the significant discrepancies identified in the methodologies underlying risk estimates.

The sources of discrepancies identified in the area of modelling were related mostly to different definitions of the main concepts underlying the risk parameters, and different modelling choices made possible by the large degree of flexibility incorporated in the IRB framework. In addition, different understanding of regulatory requirements was also observed.

These GL are therefore focused on aligning terminology and definitions, in particular in relation to metrics such as default rate or realised LGD, which are the basis for estimation of risk parameters. Furthermore, the GL provide clarification on the application of certain regulatory requirements which, until now, have been interpreted in various ways, and specify principles for the estimation of risk parameters, including those applicable to defaulted exposures. Although the GL may limit certain modelling choices, they are focused on the elements that lead to non-risk-based variability and intend to preserve sufficient flexibility to ensure risk sensitivity of the models. Therefore, the GL do not prescribe any specific estimation methodology, recognising that different approaches may be appropriate for different portfolios to reflect different risk profiles.

The main objective of the GL is to provide the rules that will lead to increased comparability of the model outcomes. Differences in risk parameters between institutions should ideally reflect differences in the underlying risk rather than different modelling choices. In addition, clearer rules in that regard will limit the possibility for regulatory arbitrage. Other aspects of the models that are not explicitly prescribed in the GL, such as the choice of risk drivers and estimation methodology, will

have to be justified on the basis of the risk profile of the portfolio covered by the model as well as the credit and recovery policies and efficiency of these processes.

As the GL are part of a broader review of the IRB Approach carried out by the EBA they do not address all identified sources of risk-weighted asset (RWA) variability. The GL focus on aspects related to modelling of parameters such as PD, LGD, best estimate of expected loss (EL_{BE}) and LGD in-default, whereas other elements, including the definition of default on which these parameters should be based, rating processes, data quality processes and other aspects of the application of the IRB Approach, are addressed in other regulatory products. The regulatory products, developed as part of the regulatory review of the IRB Approach as outlined in the Report published in February 2016⁴, will affect nearly all aspects of the IRB Approach and, as a consequence, it is expected that they will be able to significantly reduce unjustified RWA variability, which is deemed to stem from the lack of sufficiently specified requirements with regard to certain aspects of the IRB Approach. These GL provide such specifications, where necessary, to achieve the objective of a Single Rulebook, as well as to regain public trust in the use of internal models.

It has to be stressed that these GL include numerous references to the EBA draft Regulatory Technical Standards (RTS) on IRB assessment methodology⁵, which set conditions for competent authorities to assess the rating systems of institutions. As the RTS contain rules for competent authorities on their assessment of the IRB methodologies, they also provides details to institutions about how competent authorities are expected to understand and apply aspects of the CRR in the course of their assessment. Therefore, these GL and the RTS mentioned above should be read together, as many aspects related to modelling have already been clarified in the RTS, and in these cases the provisions are not repeated in the GL. When implementing any changes in the rating systems stemming from the regulatory review of the IRB Approach, and also subsequently on a continuous basis, institutions should take into account not only these GL but also provisions included in other related regulatory products, in particular in the RTS on IRB assessment methodology, the RTS on materiality threshold for past due credit obligations, the GL on the application of the definition of default, and the RTS on the nature, severity and duration of economic downturn.

As the RTS on the nature, severity and duration of economic downturn are still under development the requirements regarding the estimation of downturn LGD have not been included in the GL at this stage. Once the RTS have specified the identification of the downturn period the GL will be updated by adding a section clarifying how the impact of economic downturn should be reflected in the LGD estimates. In order not to pre-empt any decisions that will be taken when specifying the final RTS, it is considered appropriate that the RTS on the nature, severity and duration of economic downturn and the relevant section of the GL should be published together.

Neither these GL nor any of the EBA's other regulatory products address the issue of the scope of application of the IRB Approach and modellability of low-default portfolios. These aspects are

⁴<https://www.eba.europa.eu/documents/10180/1360107/EBA+Report+on+the+regulatory+review+of+the+IRB+Approach.pdf>

⁵ <https://www.eba.europa.eu/regulation-and-policy/credit-risk/regulatory-technical-standards-on-assessment-methodology-for-irb-approach>. References to these RTS will be replaced with references to the Delegated Regulation that will adopt these technical standards, once it is published in the Official Journal of the EU.

currently under consideration at the international level by the Basel Committee on Banking Supervision (BCBS), and may subsequently be incorporated in the European legal framework via relevant changes to the CRR. Regardless of these potential developments, the provisions included in these GL and other related regulatory products will continue to apply to these models and portfolios, which will remain within the scope of the IRB Approach.

Overview of the scope of the guidelines

The GL are focused on two of three main risk parameters underlying the IRB Approach, namely PD and LGD; conversion factors are not within the scope of these GL. The estimation of risk parameters is understood in a broad sense, encompassing all data, methods and processes leading to the estimates, including preparation of the necessary datasets, model development for the purpose of risk differentiation, and calibration that aims to arriving at risk parameters reflecting the long-run averages and, in the case of LGD, additional calibration step to take into account downturn conditions. As an LGD model encompasses not only LGD parameters applicable to non-defaulted exposures but also parameters such as LGD in-default and EL_{BE} , all requirements for LGD are also applicable to LGD in-default and EL_{BE} , unless specified otherwise in Chapter 7 of the GL. LGD in-default and EL_{BE} are therefore defined through differences between them and the LGD for non-defaulted exposures. In addition to the requirements regarding the estimation of risk parameters, the GL address selected aspects of the application of risk parameters and the review of risk parameters.

Figure 1: Life cycle of the estimates of risk parameters

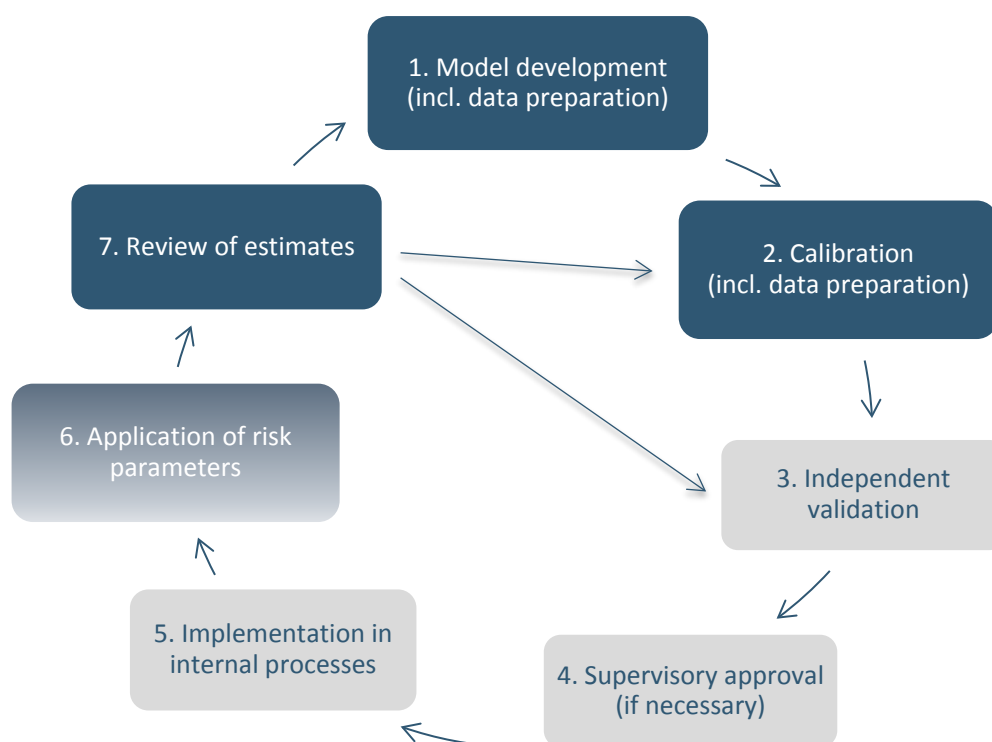


Figure 1 presents the scope of the GL in graphical format. The first two steps, i.e. model development and calibration, including preparation of data for each of these steps, form the full process of the estimation of a risk parameter. To capture specific aspects of the estimation of various risk parameters, the requirements in this regard have been specified in the GL separately for PD, LGD and parameters for defaulted exposures, i.e. EL_{BE} and LGD in-default.

Model development is understood in the GL as the part of the process of estimation of risk parameters that leads to appropriate risk differentiation, whereas calibration is the part of the estimation process that leads to appropriate risk quantification. These steps include preparation of various datasets for the purpose of model development and calibration. These datasets may be at least partly overlapping; however, it is not only the samples of data that may be different in each phase. The scope of necessary information, as well as requirements regarding data representativeness, are also different and hence will have to be assessed separately.

Of those two phases, the GL put more focus on calibration, leaving significantly greater flexibility for institutions in model development. This approach is related to the objective of the GL to contribute to increased comparability of the risk estimates and the resulting own funds requirements. For this purpose, the GL provide detailed definitions of the main concepts underlying risk quantification, such as default rate and long-run average default rate for PD and realised LGD and long-run average LGD for LGD quantification. At the same time, the GL intend to preserve the risk sensitivity of the IRB Approach, and hence more flexibility is given in the model development, with the intention that risk differentiation should be reflective of the institution's specific risk profile.

The three subsequent steps presented in the chart in grey, comprising internal independent validation, supervisory approval for the rating systems and their material changes, and implementation of the models in the IT systems and internal processes of the institution, are not within the scope of these GL. It is considered that sufficient clarifications in that regard have been provided in the RTS on IRB assessment methodology, and in Regulation (EU) No 529/2014 on the materiality of extensions and changes of the IRB Approach and the Advanced Measurement Approach.

Under step 6, the estimated risk parameter are applied by the institutions in the calculation of own funds requirements, as well as in internal risk management and decision making processes. The GL clarify only selected aspects of the application of the risk parameters, including additional conservatism in the application of risk parameters, the use of human judgement and overrides, and certain clarifications regarding the use of risk parameters. As the required areas of the use test have already been specified in the RTS on IRB assessment methodology, these GL only complement these requirements with the clarification on the possible deviations between the parameters used for the purpose of own funds requirements and those used in internal processes.

While the calculation of risk weights and risk-weighted exposure amounts based on risk parameters is not in the scope of the GL, additional clarification is provided on a specific regulatory area of use of the risk parameters, namely the calculation of IRB shortfall or excess based on the amount of expected loss, in accordance with Article 159 of the CRR. This section of the GL is also complementary to the requirements provided in the RTS on IRB assessment methodology.

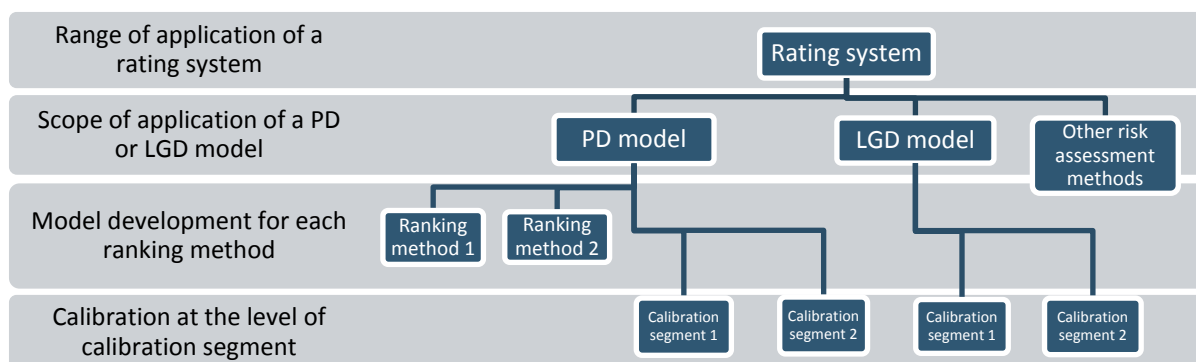
Finally, the GL provide clarifications on the regular reviews of risk parameters, which is presented as step 7 on the chart, including the required scope of annual reviews. The additional arrows within the circle present actions that may be taken as a result of a review. The GL leave flexibility in that regard, and specify that the actions should be appropriate to the character and severity of the identified deficiencies. The appropriate actions could therefore entail redevelopment of the model, recalibration of risk parameters or additional analysis to be performed, for instance as an ad hoc validation.

Structure of the rating systems

Rating systems should be developed for specific types of exposures, i.e. groups of exposures that are homogeneously managed in accordance with the definition included in Article 142(1) of the CRR. The type of exposures for which the rating system is developed form the range of application of a rating system. A rating system encompasses a PD model and an LGD model (or regulatory LGDs in case an institution does not use own estimates of LGD), and any other credit risk assessment methods, including in particular conversion factors. The scope of application of a PD or LGD model may be different from the range of application of a rating system, as long as exposures covered by the rating system are assigned to a common obligor and facility rating scales.

A PD model may entail various ranking methods. A common example of such a combination may be an application or customer scorecard and a behavioural scorecard for retail exposures, where the use of a given scorecard may depend on, among others, the availability of the necessary input data. Furthermore, the calibration of either PD or LGD may be performed separately for different calibration segments. This may be necessary where the scope of application of a PD or LGD model includes portfolios of exposures which carry significantly different level of risk, for instance because of different geographical locations. The scope of application of a given ranking method may not be aligned with the scope of application of a calibration segment. Where a calibration segment includes obligors or exposures that are subject to different ranking methods, the scores resulting from these methods should be normalised to perform a meaningful calibration. The relations between these different notions are presented in a schematic manner in Figure 2.

Figure 2: Possible structure of the rating system



Structure of the guidelines

Figure 3 presents the structure of the GL, in which the requirements related to the estimation of risk parameters are split into two highly interlinked main phases, as introduced above:

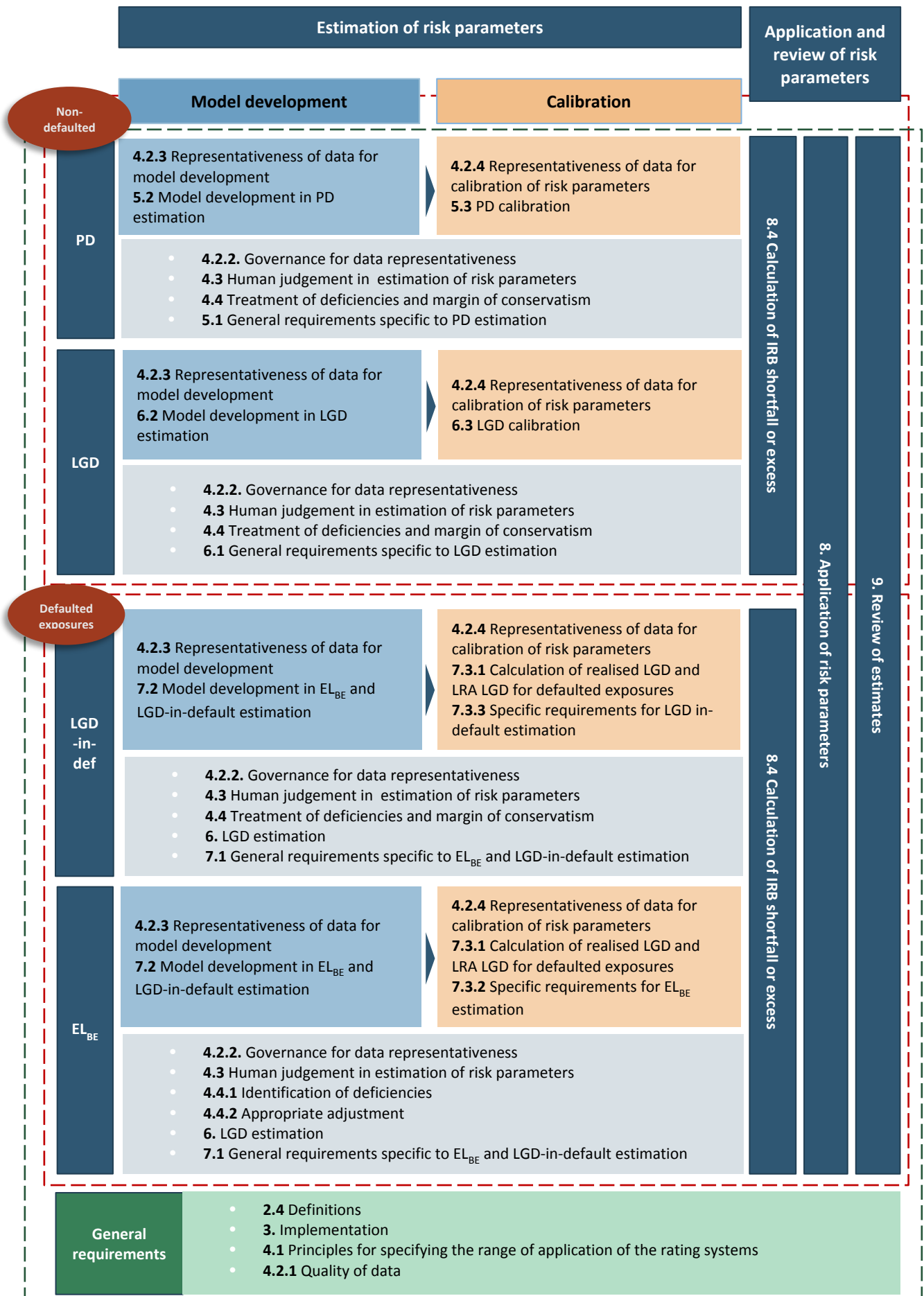
- model development – for the purpose of risk differentiation;
- calibration – for the purpose of risk quantification.

Both phases start with the preparation of an appropriate set of data and the verification of the quality of data. However, the scope of data and the assessment of representativeness are different in each phase. In principle, data used for model development is a selection of an appropriate sample which is highly representative of the application portfolio, and hence provides the best basis for effective risk differentiation. This sample should contain information on all relevant risk drivers. On the other hand, the data used for calculating long-run average default rate or LGD for the purpose of calibration has to contain all observations from the relevant historical observation period. In this case, the lack of sufficient representativeness cannot provide the basis for excluding the data from the calculation. Instead, any identified issues are assessed from the perspective of their influence on risk quantification and, if a bias in risk quantification is identified, it has to be addressed through an appropriate adjustment and margin of conservatism (MoC).

Once the appropriate data sample has been prepared the phase of model development consists of finding the relevant risk drivers and using them, on the basis of a chosen methodology, to rank or differentiate the obligors or exposures to grades or pools, according to the level of risk. In the case of LGD, this includes in particular analysis of the available collaterals. Institutions may use various methodologies, and they may in particular combine different ranking methods under one PD model. Depending on the model design, the phase of model development may also entail estimation of intermediate risk parameters. This is a common approach in particular in the case of LGD models, where the design of the model may include components such as cure rate, work-out recovery rate, etc. These components would in this case be referred to as intermediate parameters subject to separate estimation in the phase of model development.

The phase of calibration has an objective of assigning adequate levels of risk parameters to grades or pools, or, in the case of direct estimates on a continuous rating scale, to individual obligors or exposures. The adequate levels of PD should be reflective of the long-run average default rate, whereas adequate levels of LGD should be the higher of the LGD based on the long-run average LGD and the LGD reflective of the downturn conditions. In practice, this is often achieved by applying a downturn adjustment to the estimate based on the long-run average LGD. In some cases, the calibration phase may include the design of grades or pools; this may be the case in particular where a master scale with fixed parameters is used. Under this methodology, the phase of model development is focused only on the ranking of obligors or exposures, and the boundaries of the grades are defined only in the phase of calibration based on the predefined levels of the risk parameters.

Figure 3: Structure of the guidelines



As the PD calibration is based on the long-run average default rate, this phase entails calculation of measures such as one-year default rates, observed average default rate and long-run average default rate. While the observed average default rate is based on all available one-year default rates, the long-run average default rate should reflect the likely range of variability of default rates and hence may be based on a different observation period, or may require certain adequate adjustments. In the case of LGD the calibration phase includes the calculation of realised LGD, for each defaulted observation, the observed average LGD based on all closed defaulted observations and the long-run average LGD, which also includes incomplete recovery processes.

Calibration has the purpose of ensuring that the estimates are reflective of the long-run average at a grade or pool level. This may be achieved either by providing the grades and pools retrospectively over the whole historical observation period and subsequently estimating long-run averages by grades or pools, or – where, for example, data or resources are not available to ensure reliable ratings for the whole historical observation period – by estimating the long-run average at the level of the calibration segment. Where direct estimates are used and where default rates per grade or pool may not be well defined for lack of individual grades, the latter method should be used. For LGD and LGD in-default, institutions also have to consider downturn conditions and use the estimates reflective of downturn conditions if these are more conservative than those based on the long-run average LGD. For EL_{BE} the additional calibration step is related to the consideration of current economic circumstances.

The aspects specified in the GL and presented in the grey boxes in Figure 3 are applicable to both phases of model development and calibration. This includes in particular the governance around the representativeness of data, including specification of adequate policies and the use of human judgement, which may be necessary at any stage of the estimation process. Another overarching aspect is MoC. Although MoC is expected to be added to the best estimate of the risk parameter, i.e. after the calibration phase, it should cover any deficiencies of data or methods that may be identified at any stage of the estimation process that may bias risk quantification.

Finally, for risk parameters for defaulted exposures, all requirements specified for LGD in Chapter 6 apply, unless explicitly specified otherwise. A major aspect which differentiates EL_{BE} and LGD in-default from LGD for non-defaulted exposures is the concept of reference dates, which have to be taken into account both in model development and in calibration, given that the calibration has to be performed separately for each reference date. Furthermore, specific requirements regarding calibration apply in particular to EL_{BE} , which has to reflect current economic circumstances rather than downturn conditions; also in this case institutions may explore certain relations between EL_{BE} and specific credit risk adjustments used for accounting purposes.

It has to be noted that although the structure of the GL differentiates the stages of model development and calibration, the steps taken by institutions in the estimation of risk parameters do not have to be taken in the same order as that presented in the GL. These GL do not require any particular sequence of actions, but rather set out the requirements related to certain steps of the process. It is therefore possible, for instance, that one-year default rates are calculated in the stage of model development if this is necessary for the purpose of appropriate risk differentiation.

In addition, the final chapters of the GL specify selected aspects related to the application and review of risk parameters. In the application of risk parameters, i.e. in assigning current obligors or exposures to adequate grades or pools and allocating to them an adequate level or risk parameters, it may be necessary to apply an override or additional conservatism (which should not be confused with MoC quantified in the estimation of risk parameters). This additional conservatism is usually obligor or exposure specific, and may be related in particular to the diminished quality of data used in application of the risk parameter. Instead, an override would typically be appropriate if there are individual circumstances, related to a given obligor or exposures, which the model reasonably cannot take into account. Such adjusted risk parameters are then used for the purpose of calculating own funds requirements, for internal purposes and for the calculation of IRB shortfall or excess, which influences the level of own funds included in the calculation of capital adequacy ratio.

Finally, the risk parameters have to be regularly reviewed to ensure that adequate estimates are used both for own funds requirements calculation and for internal purposes. Where, as a result of such review, institutions identify a need to change the model, such changes should be implemented in accordance with the requirements specified for the estimation of risk parameters. The life cycle of a model is presented in a schematic manner in Figure 1.

Rationale for the requirements included in the guidelines

The following sections present in more detail the rationale for the main policy decisions reflected in the requirements of the GL, presented using the same structure as the provisions of the GL.

Chapter 1: Compliance and reporting obligations

The first chapter is based on a standardised template for EBA guidelines which sets out the ‘comply or explain’ procedure. After the publication of the GL, and until the specified date, competent authorities will have to notify the EBA of whether or not they intend to comply with the GL. If a competent authority decides not to comply with the whole or part of the GL it has to justify its decision. The notifications of the competent authorities will be made public on the EBA website.

Chapter 2: Subject matter, scope and definitions

These GL apply to all models for which an institution received permission to use under the IRB Approach. Where institutions do not use own estimates of LGD (in accordance with the ‘Foundation’ IRB Approach) Chapters 6 and 7 do not apply, but all other requirements, including those specified in Chapters 4, 5, 8 and 9, apply with regard to PD estimates. The applicable requirements are expected to be assessed by the competent authorities within the process of granting initial permission to use the IRB Approach, assessment of material changes to the rating systems in accordance with Article 143(3) of the CRR, or ongoing reviews of the use of the IRB Approach.

The definitions specified in this section are used throughout the GL. The terms ‘PD model’ and ‘LGD model’ have been defined in a broad manner, referring to all data and methods related to both risk differentiation and risk quantification. In the case of LGD models, it has to be noted that the definition encompasses not only the data and methods used to derive LGD estimates for non-defaulted exposures, but also the risk parameters applicable to defaulted exposures such as EL_{BE} and

LGD in-default. This is based on the CRR requirements, which have also been defined jointly for performing and defaulted exposures.

The definitions also specify the main stages of the estimation of risk parameters, including model development and calibration, as well as the application of risk parameters. These definitions are particularly relevant for understanding which parts of the GL apply to which processes, as also presented in the overview section. These definitions do not refer to the design of grades or pools, as this aspect may be part of model development or of calibration, depending on the applied methodology.

Chapter 3: Implementation

The date of application of these GL is set consistently as for all other regulatory products developed as part of the EBA's regulatory review of the IRB Approach. The implementation date is relatively distant, as it is expected that the implementation of these products, including these GL, will lead to material changes in many rating systems currently in use. To facilitate the implementation process as well as the assessment and approval of these changes by competent authorities, for instance by including multiple aspects in one change request, the implementation deadline is the same for all required changes. To ensure sufficient time for supervisory assessment and implementation within the deadline, institutions should agree with their competent authorities the latest date for submitting the application for the necessary changes in the rating systems.

Chapter 4: General estimation requirements

Principles for specifying the range of application of the rating systems

The segmentation principles aim to provide guidance on the highest level of rating system design. These principles are particularly relevant to changes in the range of application of certain rating systems, for example where an existing rating system is rolled out to an acquired portfolio, or a portfolio that is otherwise not yet treated under the IRB Approach. Among other things, the GL require in this regard the availability of fundamentally comparable credit-related information, meaning that, with respect to the obligors or exposures to which the rating system is extended, the relevant information has a similar nature and is available for the purpose of rating assignment, or is at least possible to obtain. For instance, as the information available for business clients and for natural persons is fundamentally different, these should not be covered by the same rating system.

A rating system is a broad concept which includes both PD and LGD models. Obligor and exposures covered by a rating system should be homogeneously managed, including in particular the use of common obligor and facility rating scales. Although a rating system may comprise more than one PD and LGD model, and although these models may comprise multiple calibration segments, the results of all calibrations within a rating system have to be reflected in the single obligor rating scale and a single facility rating scale applicable within the rating system. It is also crucial that the definition of default is used identically for the purpose of calibration of all models within a rating system.

Data requirements

Good quality of data is a fundamental condition for developing a robust rating system. The data requirements in this general part apply to model development, risk quantification and application of all risk parameters and contain clarifications regarding the assessment of accuracy, completeness and appropriateness of data. More detailed requirements, especially regarding the scope of required data specific to PD or LGD estimation, and to LGD-in-default or EL_{BE} estimation, are described within the relevant chapters of these GL.

Representativeness of data

Representativeness of data may influence the accuracy of the estimates; where the underlying historical data is less representative of the current portfolio the estimates may be less adequate. To ensure good performance of the models and their good predictive power, institutions should have adequate policies, processes and methods for assessing the representativeness of data used for the purpose of estimation of risk parameters, and they should pay particular attention to situations where data from different sources are used. While the methods of assessment may in some cases differ for data from different sources, especially because of the structure and availability of information, the applied standards should be the same for all data used in the estimation process.

The dimensions of representativeness specified in the GL include the scope of application of the model, definition of default, distribution of the relevant risk drivers, current and foreseeable economic and market conditions, and lending standards and recovery policies. The requirements for data representativeness are split into two sub-sections, namely requirements for data used in model development and for data used in calibration of risk parameters (i.e. for the data used to calculate the long-run average default rate and the long-run average LGD). This split is consistent with the structure of the CRR, where data requirements regarding model development are treated in sub-section 1 of Section 6 in Chapter 3 of Part Three, Title II of the CRR, and data requirements for risk quantification (calibration) are treated in sub-section 2 of the same section. This split has also been consistently followed in Chapters 7 and 8 of the RTS on IRB assessment methodology respectively.

The data requirements for risk differentiation and risk quantification differ both in terms of the methods for analysis and with regard to required actions where the analysis reveals insufficient data representativeness. In particular, for the purpose of model development, institutions may, subject to certain requirements, use a definition of default other than that specified in Article 178 of the CRR. However, they should closely analyse the ranges and distributions of key risk characteristics within the historical observations as compared with the current portfolio, because, for the purpose of model development, material observed differences in these characteristics should be avoided by selecting an appropriate sample of data, for instance by using a shorter observation period. On the other hand, for the purpose of calculating long-run average default rate and long-run average LGD, the definition of default has to strictly reflect the requirements of Article 178 of the CRR, whereas the comparability of the ranges of the key risk characteristics is necessary only to a required degree. Furthermore, requirements regarding the representativeness of current and foreseeable market and economic conditions are included only for data used in calibration, and are related to the requirements for estimating long-run average default rate for PD models, and long-run average LGD as well as downturn considerations for LGD.

The steps that should be taken where significant non-representativeness of data is identified are also different in terms of model development and calibration. Whereas in model development non-representativeness is normally addressed by the adequate choice of a sample, the non-comparability of the historical data underlying risk quantification should not lead to any data exclusions, but should trigger an appropriate adjustment and increased MoC. The same principle should be followed where adjustments to the observed average default rate are necessary to meet the requirements laid down in Section 5.4. Thus data exclusions may be a tool to quantify adjustments to the observed average default and loss rates where these are necessary; however, they should never be taken into account for the purpose of calculating the observed average default rate.

The principles described above also apply to the specific case of the disposal of the portfolio of non-performing exposures and to the way these cases are reflected in the LGD estimation. This means that, while all defaulted observations, including those subject to the sale, have to be included in the calculation of long-run average LGD for the purpose of LGD calibration, institutions may decide not to include these observations in the sample used for the purpose of risk differentiation, for instance in the design of relevant pools. As specified in the GL, the LGD estimation methodology should be consistent with the collection and recovery policies adopted by the institution and adequate to the type of exposures to which LGDs are applied. One of the possible risk estimation methods includes specification of possible recovery scenarios and their probabilities, where the probability of each scenario would be a component of the model and would be determined taking into account relevant risk drivers, which may influence the frequency of use of a certain scenario. Another possibility would be to discard (some of) the default observations of sold credit obligations in the model development, whereas all default observations, including those related to sold credit obligations, should be included directly in the LGD calibration. In other words, where (some of) the observations subject to the sale would not be included in the phase of model development, they should provide the basis for the adequate adjustment in the calibration phase in order to reflect the calibration target, i.e. the long-run average LGD, which should always be based on all observed defaults.

Human judgement in estimation of risk parameters

Development of a robust rating system cannot be a purely statistical process, but to some extent also has to involve human judgement, to make sure that the models are appropriate for current and foreseeable portfolios and conditions, and that the models are acceptable for business users. Expert judgement may be necessary in particular with respect to the verification of model assumptions, and whether or not these are in line with economic expectations, to the design of the model, to the choice of risk drivers, etc. However, to ensure high quality of the models, expert judgement has to be appropriately documented and justified. This way, the judgemental elements of the model can be appropriately challenged and verified both by the validation function and by competent authorities. Therefore, this part of the GL clarifies the requirements regarding human judgement, including its documentation, in the estimation of risk parameters.

Treatment of deficiencies and margin of conservatism

When estimating risk parameters, institutions should identify any deficiencies that may lead to a bias in the quantification of risk parameters, or to increased uncertainty that is not fully captured by the general estimation error. These deficiencies may be related to data and methodology issues (defined

in the GL as category A), or to the changes in relevant processes or external environment which may lead to additional uncertainty in the quantification of risk parameters (specified as category B). Within category B, institutions should also consider whether or not any changes in legal environment may lead to changes in default or loss rates, in particular changes to bankruptcy law and any regulations related to legal collection processes. However, this does not refer to changes in legal regulations on internal models or definition of default. Any data deficiencies related to the definition of default or any weaknesses in methods used in internal models should be classified under category A. Categories A and B are expected to be non-overlapping, i.e. each identified deficiency should be classified in only one of the categories.

The same rules should also be applied to any deficiencies related to the representativeness of data. The classification will therefore depend on the nature of the identified deficiency. Any missing data, including missing information on certain risk drivers in historical observations should be classified under category A. However, any changes in the distribution of risk characteristics in the application portfolio due to, for instance, changes in the underwriting standards, will be classified under category B.

As a general principle, institutions are required to address the identified deficiencies via appropriate adjustments and MoC. As an example, adjusting the data where deficiencies have been identified may involve rectifying the identified errors, for instance where missing data points are filled in with the most probable information, or the inaccuracies in data are corrected. Appropriate adjustment in the case of changes in the underwriting standards may take the form of an adequate shift of the estimated risk parameters. In any case, the objective of the appropriate adjustment is to achieve the most accurate estimates possible. To avoid excessive use of adjustments, institutions should be able to demonstrate that this objective has actually been achieved by a certain adjustment. They should also document any adjustments that have been applied, and regularly monitor their adequacy.

MoC should be applied on top of the best estimate of the risk parameter (i.e. a parameter after applying all appropriate adjustments). This also applies to situations where a predefined master scale is used; in this case, MoC is applied on top of the parameters defined in the master scale. While for internal purposes institutions may use best estimates of risk parameters if this is more appropriate, for own funds requirements calculation the final risk parameters, including MoC, should be taken into account.

MoC should be quantified for all deficiencies that could not be rectified by appropriate adjustment. However, even if the appropriate adjustment has been applied, the estimates are subject to additional uncertainty resulting from the application of the adjustments and its potential inaccuracy. Institutions should quantify MoC related to the identified deficiencies in the same categories used to classify deficiencies (categories A and B). In addition, they should quantify a general estimation error and present it in a separate category (category C). In future, this categorisation will help increase transparency with regard to the levels and underlying reasons for MoC.

The quantification of MoC related to categories A and B should reflect the additional uncertainty resulting either from the application of the adjustments or, where no adjustments are possible, from the uncertainty driven by the deficiencies in the relevant category. The quantification of the MoC for

the general estimation error should reflect the dispersion of the distribution of the statistical estimator. The reference to statistical variance has been avoided in order to not impose a fixed methodology, which might for example lead to disproportionate MoC for low default portfolios.

The GL require that the final MoC to be added to the best estimate of the risk parameter be the sum of MoC for categories A, B and C. This proposal is based on an expectation that the categories will in general be non-overlapping. Nevertheless, the assumption of independence between MoC related to these categories would not be correct, as the appropriate adjustments which are made in relation to deficiencies stemming from categories A and B may influence the general estimation error. Therefore, for the purpose of harmonisation and in order not to impose over sophistication, it has been decided to require the aggregation of MoC between the categories based on a simple sum. However, different aggregation techniques may be used within each of the categories. Here, flexibility is left for the institutions to address in an adequate manner different types of deficiencies and their potential interrelations. All methods used for quantification and aggregation of MoC should be documented and regularly monitored.

Example of appropriate adjustment and margin of conservatism

Assume a change in regulatory requirements regarding the materiality threshold for detecting defaults triggered by the 90 days past due criterion. Assume the institution under consideration has stored the information regarding outstanding exposures monthly rather than daily. Thus the date of default and the exposure value cannot be retrieved historically. Even though some calculations could be made based on the monthly data, the 90 days may have been reached during a particular month and the default may not be visible based on monthly data. Therefore the institution has decided to set up a parallel default detection according to the new trigger, and to estimate MoC starting from the difference of the amount of defaults detected according to the old trigger and the new trigger.

An appropriate adjustment could be derived as follows: calculating the relative change in the number of defaults triggered according to the old and the new 90 days past due criterion compared with all defaults (i.e. taking into account all triggers) on a monthly basis. Thus an average correction factor can be estimated and applied retrospectively. As a result, the number of defaults according to the new 90 days past due trigger can be estimated for the available historical data.

The additional MoC could be derived, for example, from the 90% confidence interval around the average of the new default rates. However, this method is only an example, and institutions may use other methods for deriving MoC if these are deemed more appropriate.

Chapter 5: PD estimation

The GL on PD estimation aim to provide, among other things, more detailed guidance on the calculation of observed default rates and on the estimation of the long run average default rate. Moreover, they clarify how risk drivers and rating criteria should be chosen, and which requirements should be fulfilled where ratings serve as input to the PD estimation. Other aspects touched upon are the rating philosophy and how the long-run average default rates relate to the final PD estimation of a grade or pool.

General requirements specific to PD estimation

It is clarified that each natural or legal person that has exposures within the scope of the IRB Approach should be rated including where there is unfunded credit protection. The rationale for this is that, for the purpose of model development, risk quantification and validation the assignment to a pool or grade after the application of unfunded credit protection would bias risk differentiation and default rate calculation. Even in the case of a rating transfer from a third party to the obligor, therefore, the initial rating of the obligor without taking into account the support of a third party should be available.

Model development in PD estimation

The requirements for model development include clarifications regarding data used for this purpose, as well as requirements for risk drivers and rating criteria, to be taken into account in statistical models or other mechanical methods to assign exposures to obligor grades. These risk drivers may include in particular the rating of a third party which has certain organisational or contractual relations with the obligor.

The data requirements for building the model for assigning exposures or obligors to grades or pools clarify that the reference points in time at which risk drivers are evaluated for the purpose of developing the model should be considered taking into account the dynamics and the update frequency of the information in question. The rationale for this is to avoid unjustified burden as well as to avoid biases in analysis due to autocorrelation. For example, obligor characteristics might be fairly static over time, whereas financial data from balance sheets is usually updated annually.

Risk drivers and rating criteria

The GL clarify that the selection of certain risk drivers and rating criteria should be based not only on statistical analysis, but that the relevant business experts should be consulted on the business rationale and risk contribution of the risk drivers under consideration. The background of this requirement is to ensure that the proper risk drivers and rating criteria are taken into account in the model.

An additional characteristic that should be considered as a potential risk driver is the number of loans of the same type of facility that have been granted to an obligor. In particular, where an institution chooses for its retail portfolios to assign PDs at exposure level and to identify default at facility level, it should be ensured that the PDs are adequate for PD estimates by obligor grade or pool, as required in Article 180(1)(a) and 180(2)(a) of the CRR. The rationale is that, in the latter case, the underlying one-year default rates in a grade or pool may vary significantly if based on largely one-to-one or one-to-x relations (where one-to-x relations reflect obligors carrying multiple (x) facilities of the same type in a certain grade or pool). However, if the number of loans of the same type of facility which have been granted to one obligor does not constitute a risk driver, there may as well be no difference in risk.

Another aspect, which should be taken into account when selecting and designing risk drivers and rating criteria, relates to the loss of reliability as information ages. The rationale for this requirement

is that the loss of information value over time with respect to certain risk drivers or rating criteria, and in particular information which stems from the credit application and which is usually not updated during the life time of the credit products under consideration, leads to increased uncertainty, which should be appropriately reflected in the design of grades and pools, and the corresponding PD estimates.

The last requirement specified in the GL with respect to risk drivers and rating criteria relevant for PD estimation is that risk drivers and rating criteria should be used consistently with respect to the relevant time horizon in model development, model calibration and model application. This is because any inconsistency in the time horizons could lead to significant bias in the resulting PD estimates. If, for example, an institution considers days-past-due buckets as pools in its rating model, it nevertheless has to ensure that the ranking model for the pool of obligors without any past due obligations provides PD estimates appropriate for a one-year time horizon, as this is the relevant time horizon for the application portfolio.

Treatment of ratings of third parties

Regarding the use of third party ratings in obligors' PD estimates, the GL specify the principles for the use of third party internal or external ratings in the estimates of the PD of an obligor. It is clarified that institutions may use an internal rating of a guarantor instead of a rating of an obligor for the purposes of own funds requirements calculation where there is no difference in risk between the relevant obligor or exposure and the relevant third party, given the existence of explicit guarantees (this is referred to as a rating transfer). Furthermore, the rating of a related third party may be taken into account as a risk driver or rating criterion in the ranking method, to reflect the support from a third party to the obligor. Finally, the third party's rating may be considered for the purpose of overriding the assignment of an obligor to a pool or grade provided by a ranking method.

Among the important aspects clarified in this chapter is the provision that the considered obligor or exposure in whose PD estimate the third party rating is considered should remain in its exposure class. Even where the PD of the obligor is fully substituted by the PD of the third party because there is no difference in risk, the exposure should remain in the exposure class applicable to the obligor. Moreover, it is required that any changes to the rating of the third party should be reflected in the PD estimate incorporating the third party rating in a timely manner.

Rating philosophy

Depending on the methods and risk drivers used to assign obligors or exposures to grades or pools, changes in the portfolio's default rate caused by changes in economic conditions will be reflected through either, or a combination, of the following:

- migrations across risk grades or pools;
- changes in the yearly default rates of each grade or pool.

Where the rating assignment process is highly sensitive to economic conditions, grade assignment will change significantly, while default rates of each grade will re-main relatively stable. In contrast,

when the assignment is less sensitive to economic conditions, the yearly default rates per grade component will capture the cyclical nature of the global default rate.

The requirements in this section aim mainly at increasing institutions' awareness and understanding of the relationship between the definition of risk drivers, the number of grades, migrations across risk grades, changes in the one-year default rates over time, and the dynamics and volatility of capital requirements. To achieve that objective, the GL allow institutions to decide on the philosophy underlying the grade or pool assignment and the risk drivers, but require that a number of criteria be taken into account, including, among others, that institutions need to monitor their choice of rating philosophy, to apply that philosophy consistently over time, to understand its impact on the dynamics and volatility of capital requirements, and to take the rating philosophy into account for back-testing purposes.

PD calibration

Data requirements for observed default rates calculation

For the data for calculating default rates to be complete, it has to include the criteria to identify the relevant type of exposures covered by the rating system. The rationale for this is that the institution should take into account all defaults with respect to the relevant type of exposures, independently of the existence of a rating assignment. Moreover, data covering the risk drivers and rating criteria need to be available for the purpose of calculating default rates per grade and pool. Where relevant risk drivers or rating criteria are missing, for example because the relevant information has not been collected from the obligors in the past, institutions should apply appropriate adjustments and increase MoC. Moreover, banks should make efforts to minimise the proportion of missing data over time. The rationale for this is that the missing information increases uncertainty around the default rates per grade in the past, so institutions should ensure that obligors or exposures are appropriately assigned to grades and pools, taking into account the identified risk drivers and rating criteria.

The GL also clarify that all data relevant for identifying the non-defaulted exposures at the beginning of a one-year observation period has to be available, in addition to all relevant default information as required in Article 178 of the CRR. This clarification was considered necessary because emphasis is often put on the data collection related to defaulted exposures, but for the purpose of default rate calculation, the accurate and complete identification and collection of data for non-defaulted exposures are equally important.

Calculation of the one-year default rates

The section on the calculation of observed one-year default rates clarifies in more detail which obligors should be taken into account in the numerator and denominator for the purpose of calculating a one-year default rate.

While the general calculation of a one-year default rate is already outlined in the CRR and the RTS on IRB assessment methodology, the GL clarify this calculation for a number of specific situations. In particular, the denominator should contain the obligors of the relevant model or calibration

segment, with any credit obligation at the beginning of the observation period. The rationale is to ensure accurate measurement of one-year default rates, as an obligor can also default if there is no repayment obligation during the observation period, for example because of bankruptcy filing. Moreover, it should be noted that guarantors which do not carry a credit obligation are excluded from this specification of one-year default rate calculation⁶, as by definition they cannot be subject to the same default identification process as the institution's obligors. However, the information stemming from defaults of guarantors or any other relevant data on external default rates should be taken into account in the estimation of the long-run average default rates if this is necessary to meet the requirements in Section 5.3.4. Where obligors whose obligations stem solely from non-credit products fall under the scope of application of the relevant model and are treated in accordance with the institution's internal default definition, these should form a separate calibration segment in the rating system, in order not to bias the default rate of obligors with credit facilities. Similarly, with regard to obligors or facilities only with committed but undrawn credit lines, these might have to be treated in a separate calibration segment in the rating system, to avoid lowering unduly the default rate of obligors with drawn credit lines.

It is clarified that, for the purpose of calculation of the one-year default rate by grade or pool, institutions should refer to the obligors assigned to grades or pools at the beginning of the one-year observation period, where the assignment to a grade may be based on an override. However, where the assignment to a grade is the effect of a rating transfer from a provider of unfunded credit protection, the obligor and potential default should be taken into account with respect to the grade to which the obligor was assigned before the rating transfer. The rationale for this is that the default rate of lower rating grades would be biased if the defaults of those obligors that received credit protection were not taken into account for the respective default rate calculation. The same rationale holds true for the requirement that *ex post* conservative adjustments should not be taken into account for the purpose of one-year default rate calculations, as obligors that are downgraded for the purpose of capital requirements calculation, for example because of a missing re-rating, could unduly lower the default rate of the resulting (worse) grade.

Finally, and with respect to one-year default rate calculation, it is clarified that all obligors carrying a credit obligation at the beginning of the observation period should be included in the denominator and, if applicable, the numerator of the default rate, calculated for the grade the obligor has been assigned to at the beginning of the observation period. This also holds true where obligors migrated to a different grade or pool, or to a different rating system, during the observation period, and also where the credit obligation was sold, written off, repaid or otherwise closed during the observation period. The rationale for this is to achieve a harmonised and well-defined notion of one-year default rate. However, in case of concerns that the inclusion of these obligors could lead to a biased observed average default rate, for example because of a missing information on the rating at the beginning of the observation period, appropriate adjustments may be applied and MoC should be added to the best estimate of the risk parameter.

⁶ And thus also from the calculation of the observed average default rate

Calculation of the observed average default rate

The GL require institutions to justify their approach to calculating the average of one-year default rates taking into account, in particular, analysis of the effect of short-term contracts or specific calculation dates. The rationale for the required analysis is to ensure that institutions are aware of the impact of the chosen calculation method and of fast-growing or shrinking portfolios on the observed average default rate and that they apply appropriate adjustments and MoC where necessary. Moreover, it is clarified that the observed average of one-year default rates should be calculated as the arithmetic average of all one-year default rates, except for retail portfolios, where the observed average default rate may be calculated as a weighted average of one-year default rates if more recent data is a better predictor of losses.

Long-run average default rate

Regarding the long-run average default rate, the GL clarify that this should be calculated as the average of observed one-year default rates if the historical observation period is representative of the likely range of variability of one-year default rates and, in particular, if the historical observation period contains an appropriate mix of good and bad years. If the one-year default rates are not representative of the likely range of variability, institutions should estimate the long-run average default rate by estimating an appropriate adjustment to the average of observed one-year default rates.

For the purpose of clarity the existence, lack or prevalence of bad years should be considered with respect to economic indicators which are relevant for the considered type of exposure. In particular it is clarified that, where bad years are over-represented in the historical observation period, institutions may consider downward adjustments of the observed average of default rates, based on an appropriate method taking into account the correlation between economic indicators relevant for the considered portfolio and the underlying observed default rates.

To limit possible variability stemming from the application of downward adjustments, a benchmark is proposed, namely the maximum of the average of one-year default rates over the most recent five years and the average of one-year default rates over the whole available observation period. Institutions may still estimate long-run average default rates below this benchmark, but this should be duly justified and eventually trigger additional MoC.

Calibration to the long-run average default rate

The process of PD calibration is performed on a calibration sample, namely the sample to which the ranking or scoring method is applied to assign the long-run average default rate estimates to the grades and pools provided by the ranking or scoring method. One of the issues clarified in this context is that the calibration sample should be comparable to the current portfolio in terms of obligor and transaction characteristics, but should reflect at the same time the likely range of variability of default rates.

The choice and understanding of the rating philosophy underlying the methods and drivers used to assign obligors or exposures to grades or pools is closely related to the calibration and re-calibration

process and methodology an institution has chosen in that regard. The objectives behind the chosen calibration and re-calibration process and methodology, including the design of the calibration sample, can be referred to as calibration philosophy. The extent to which capital requirements are sensitive to changes in the economic environment depends on both the rating as well as the calibration philosophy.

Institutions that have a ranking method in place which is very sensitive to macroeconomic conditions, reflecting point-in-time (PIT) rating philosophy but also aiming to obtain more stable through-the-cycle (TTC) PD estimates in their calibration and recalibration process (to ensure a certain degree of stability of capital requirements over the credit cycle), might show the same cyclicity of capital requirements as institutions that incorporate risk drivers less sensitive to the economic environment into their ranking method. The extent to which calibration influences the sensitivity of PD estimates to the economic environment depends in particular on:

- whether institutions aim to ensure that the long-run average default rate equals the PD estimates at calibration segment or portfolio level or at rating grade level; and
- the design of the calibration sample.

Table 1 outlines various combinations of rating and calibration philosophy including an indication of whether or not such combinations would be compliant with the requirements set out in these GL and other relevant regulations (i.e. the CRR and the RTS on IRB assessment methodology). For example, if the grades or pools of a model were based predominantly on risk drivers that are insensitive to economic conditions (such as the obligors jurisdiction or sector), thus constituting a TTC rating philosophy, and at the same time the PD estimates were based on the last available ('current') one-year default rate ('PIT A') these estimates would not be applicable for the purpose of own funds requirements calculation. This is because the requirements of Section 5.3.4 of these GL would not be met. For the same reason, a ranking or scoring method reflecting a PIT rating philosophy where the PD estimates by grade or pool were based on the current default rate ('PIT B') would not be compliant with the relevant requirements for the IRB Approach.

On the other hand, with a model based on a TTC rating philosophy where the PD estimates per grade or pool reflect long-run average default rates ('TTC A'), the resulting PD estimates may be applicable for own funds requirements calculation if all other requirements are met, in particular those set out in Articles 170(4) and 179(1)(a) of the CRR, where the incorporation of all relevant information (including, for example, on delinquency) is required.

An institution might use a more complex combination, for example by using risk drivers that are quite sensitive to economic conditions in a statistical default prediction model providing PD estimates for individual obligors, (i.e. a PIT rating philosophy), but applying a two-step approach for the purpose of calibration, namely by evaluating these PD estimates on a more recent point in time and subsequently adjusting them such that the average of these estimates reflects the long-run average default rate at the level of the relevant calibration segment (or even portfolio – if there is only one calibration segment). This would be an example of a 'TTC B' calibration, as indicated in Table 1, and would be applicable for own funds requirements calculation if all other requirements are met, in particular those on the calibration sample (the chosen point in time would need to reflect a sample

comparable to the current portfolio and representative of the likely range of variability of one-year default rates).

The difference between calibration approaches ‘TTC B’ and ‘TTC C’ in Table 1 is that, for the latter, the calibration sample would consist of multiple points in time covering the whole historical observation period. Another example would be if an institution estimates PDs per grade but is able to assess these grades historically for only a part of the historical observation period (‘TTC D’); for example, it might not be possible to assess retrospectively the correct grades for all obligors over the whole observation period. In this case, the ranking method would require expert-based qualitative assessments, and experts would need to historically review every rating of every obligor subject to the ranking method within the historical observation period. The PD estimates based on the available grades and pools would be adjusted to reflect a long-run average default rate of the relevant pool, covering the whole historical observation period.

Finally, the approach ‘TTC E’ reflects an example where the grades and pools are evaluated on only one or a few points in time, and the PD estimation of a grade or pool incorporates the use of migration matrices for the purpose of estimating long-run average default rates covering the full historical observation period.

Table 1: Rating and calibration philosophies

Rating philosophy	Calibration philosophy	Applicable for the purpose of own funds calculation
TTC: Explicit lack of sensitivity to economic conditions through selection of risk drivers	PIT A: Calibrate rating grades or portfolio to ‘current’ default rates	No
	TTC A: Calibrate grades or portfolio to LRA DR (*)	Yes, to the extent that all requirements are satisfied
PIT: Explicit use of risk drivers providing high sensitivity to economic conditions	PIT B: Use of direct PD estimates reflecting the current default rate (direct use of output or calibrate to current default rate)	No
	TTC B: Adjust PD on portfolio level to LRA DR; use of current average PD estimates	Yes, to the extent that all requirements are satisfied and the current average PD estimates reflect the likely range of variability of one-year default rates
	TTC C: Adjust PD on portfolio level to LRA DR; use of average PD over historical observation period	Yes, to the extent that all requirements are satisfied

Rating philosophy	Calibration philosophy	Applicable for the purpose of own funds calculation
	TTC D: Adjust PD on rating grade level to LRA DR; use historically observed grades to the extent possible ⁷	Yes, to the extent that all requirements are satisfied
	TTC E: Adjust PD on rating grade level to LRA DR; use simulated historical grades for current portfolio ⁸	Yes, to the extent that all requirements are satisfied

(*) LRA DR – long-run average default rate

For the purpose of aligning terminology, the GL define calibration in relation to PD estimation as the process of ensuring that the PDs assigned to grades or pools reflect the long-run average default rate at the level relevant to the applied calibration method.

For the avoidance of doubt, it is clarified that where banks apply scoring models and specify score intervals representative of a common level of risk, and where obligors or exposures whose scores fall into such an interval receive the same PD estimate, this process may be considered part of the calibration.

Moreover, the GL provide an overview of the calibration methods mentioned in the CRR, and state to which type of exposures, for instance retail, non-retail or purchased receivables, they are applicable. In addition, the GL clarify that each calibration method may consider the long-run average default rate at the level of the calibration segment, or at grade or pool level. Where there is only one calibration segment in a portfolio, calibration at the level of the calibration segment corresponds to calibration at portfolio level. To incentivise understanding and awareness of these different levels of calibration, and to limit RWA variability stemming from these choices, the GL require that institutions perform additional calibration tests at the level of the calibration segment where calibration is performed at the grade or pool level, and vice versa. For portfolio calibration, where the grades or pools are not available, this additional calibration test would require grouping of ranked exposures into artificial grades to allow performing the calibration test at the level of these grades. For this purpose, the grouping may be the same as for back-testing.

Regardless of the chosen level of calibration the objective is to obtain PDs at grade level that are representative of the long-run average default rate. In this sense, the portfolio level calibration is a method to obtain this long-run average default rate at a grade level, for instance where institutions do not have information at grade level for the whole historical observation period. It could therefore be seen as a two-step calibration, i.e. the first step would be to obtain the portfolio default rate representative of the long-run average, and the second step would be to derive the PDs at grade level. With direct estimates in accordance with Article 169(3) of the CRR, the risk estimates assigned

⁷ For example, where the re-calibration incorporates some amendment to a qualitative module of the rating model, it might not be possible to assess the correct grade retrospectively for all obligors, as experts would have to historically review every rating of every obligor subject to this module within the historical observation period.

⁸ Methods should be carefully assessed to ensure that they do not contain survivor bias.

to individual obligors or exposures may be seen as estimates assigned to grades on a continuous rating scale. Where calibration includes steps performed on a portfolio level, and on a grade or pool level, the additional calibration tests should be applied to the last calibration step.

Furthermore, these GL contain a definition of the calibration sample, which is defined as the data set on which the PD estimates are evaluated to perform the calibration. This notion is introduced because the GL refer to this data set and require that institutions find an appropriate balance between the calibration sample being comparable to the current portfolio, in terms of obligor and transaction characteristics, and it reflecting the likely range of variability of default rates.

Another important aspect that is clarified with respect to calibration is that calibration should be performed before the application of MoC and floors on PD, as required by Articles 160(1) and 163(1) of the CRR (PD floors), and after taking overrides into account. The rationale for this is that the application of MoC or PD floors in the calibration could lead to significant underestimation of final PD estimates of a grade or pool. For example, where an institution estimates PDs as simple averages of default probability estimates in a given grade in accordance with Article 180(1)(g) of the CRR, a group of obligors with significantly different levels of default risk could be grouped into one grade or pool if MoC or PD floors were applied before calibration. It should be noted that this provision clarifies that, even where a bank has a current portfolio fully representative of the historic portfolio and of the likely range of default rates, and where the calibration sample therefore corresponds to the current portfolio, it is still expected that the final PD estimate is higher than the average of default risk probabilities due to MoC and PD floors. Moreover, overrides should be taken into account to the extent relevant and observed for the ranking method underlying the grades and pools for which the calibration is performed.

The GL acknowledge that, regarding the policy on rating philosophy and calibration outlined above, there is a wide range of practices. However, the distinction between model development (leading to risk differentiation) and calibration, including estimation of long-run average default rates (leading to risk quantification), should not prohibit institutions from using methods where some aspects of both stages are combined.

Chapter 6: LGD estimation

General requirements specific to LGD estimation

LGD estimation methodologies

General requirements for LGD estimation outline the scope of methodologies that can be used for the purpose of LGD estimation. In this context, workout LGD based on the institution's experience in terms of recovery processes and losses is considered to be the main, superior methodology that should be used by institutions. It is essential that LGD estimates be based on the institutions' own loss and recovery experience, to ensure that estimates are adequate for the institutions' portfolios and policies, and in particular that they are consistent with recovery processes. Therefore, although internal experience may be supplemented with external data, institutions should not use methodologies that are based only on external data, such as so called market LGD and market-

implied LGD, which are based on the market prices of financial instruments such as marketable loans, bonds or credit default instruments.

An alternative methodology that is available for retail exposures and purchased corporate receivables is that of deriving LGD estimates from realised losses and appropriate estimates of PD. However, in this case too, institutions should ensure that the estimates are sufficiently robust. This is ensured where both realised losses and PD estimates meet all relevant requirements. In particular, to ensure comparability of LGD estimates based on this methodology with other LGD estimates, the calculation of total losses has to be consistent with the concept of economic loss used for the purpose of workout LGD.

In accordance with point (b) of Article 52 of the RTS on IRB assessment methodology, and to achieve correct LGD estimates, institutions should assess whether two defaults related to the same exposure are independent. The less time between defaults, the less likely it is that the default events were independent. In particular, it was specified that institutions cannot consider a new default on an exposure, occurring within nine months from the return to non-defaulted status, independent from with the first default. For the purpose of LGD estimation, they should treat this situation as if the exposure was constantly defaulted from the first moment when default occurred. These nine months should not be confused with the probation period defined in the EBA Guidelines on the application of the definition of default, which ensures a prudent ongoing management of defaulted exposures. The minimum independence period should be considered in addition to the probation period (not including it). This independence period does not impact the default rate computation, not to bias PD estimates.

Data requirements for LGD estimation

As the LGD estimates should be based on the institution's own experience, it is important that all relevant data be properly recorded and stored. The scope of data necessary for proper LGD estimation is very broad, and entails not only the date of default and all cash flows and events after default, but also all relevant information on the obligors and transactions that could be used as risk drivers in the model development. The reference data set (RDS) should include all information necessary for the model development as well as for calibration. For the purpose of LGD estimation, it should include complete information for all defaulted facilities observed during the historical observation period.

To ensure that the estimates are adequate for the existing portfolio, it is essential that the information about risk drivers be used consistently in the LGD estimation and in the application of LGD estimates. Hence, as the LGD estimates are applied to non-defaulted exposures, institutions should use the values of risk drivers from before the moment of default in the estimation of LGD.

One of the most important risk drivers in the LGD estimation is the existence of collaterals. The RDS should include all relevant information about the collaterals and the process of their realisation. In this context, it should be added that, as the observed and estimated recovery rates relate to the value of the collateral, the timing and type of valuation is a key aspect that may significantly influence the estimates. Although a more up-to-date valuation that was performed after default or in relation to default may be available, this information should not be used in the estimation of LGD

because this valuation is not comparable to the valuation of collateral for non-defaulted exposures. Valuations performed after default are often more conservative, so the use of such information could lead to overestimation of recovery rates.

In some cases, the information necessary for the LGD estimation may be collected by institutions on a portfolio rather than on an individual basis. This may take place in particular in the case of indirect costs and sales of portfolios of credit obligations. The relevant information about costs and recoveries has to be adequately allocated to individual exposures whenever this is a necessary step for the purpose of LGD model development and, in any case, for the calculation of the long-run average in the calibration phase. In any case, the allocation methodology should not lead to a bias in the estimation of LGD. The simplest methodologies used for this purpose may be based on the exposure values. However, in some cases more sophisticated approaches may be necessary. In particular, in the case of the sale of credit obligations, the methodology for the allocation of recoveries should take into account possible significant heterogeneity of exposures subject to the sale, and the need to preserve their specificities as relevant drivers for the expected recoveries. In addition, in the case of the sale of secured credit obligations, institutions may allocate the value of recoveries (i.e. part of the sale price) to the existing collaterals. However, the need to use this additional allocation of recoveries to collaterals will depend on the regularity of occurrence of the sales of credit obligations as a recovery scenario, as well as on the estimation methodology chosen by the institution.

Recoveries from collaterals

It has been clarified that, for the purpose of LGD estimation, the recoveries realised with the use of collaterals have to be treated as such regardless of the form of the realisation of the collateral. This might include not only workout processes through court proceedings but also sale of the collateral by the obligor, normally with the consent of the institution, or the sale of the credit obligation where the collateral is reflected in the price. The list of possible ways of realising the collateral provided in the GL is non-exhaustive and includes only the most common forms. However, depending on the type of collateral and on the applicable legal framework, other eligible methods should also be recognised by institutions to identify cash flows stemming from realising the collaterals.

Broader clarification has been provided for a specific case where the collateral is repossessed by the institution, in exchange for decreasing the credit obligation. It is proposed that this event should be treated as recovery, as from an economic perspective such an event is equivalent to receiving a cash payment and investing it in an asset. However, as the value of repossession does not always reflect accurately the market value of the asset, this uncertainty should be addressed by applying an appropriate haircut to the value of repossession. Although institutions may have different strategies with regard to the repossessed assets, and in particular in some cases they may decide to keep the asset on their balance sheet for speculative purposes, these different strategies should not influence the value of the recovery. Therefore, it has been specified that the haircut should be estimated on the assumption that the institution intends to sell the repossessed asset as soon as reasonably possible. Wherever sufficient past experience with regard to repossession of collaterals exists, the haircuts should be supported by historical observations and regularly back-tested. In the absence of

such experience, the assessment will have to be performed on a case-by-case basis, but this will require more conservatism, as the assessment will be less reliable.

Furthermore, clarification has been provided with regard to the treatment of situations where institutions sell credit obligations, and these obligations may be secured by collaterals. As it is often not possible to allocate part of the price received for the credit obligation to the value of collateral in a reliable manner, it is possible under certain circumstances to exclude these observations from the sample used for the purpose of model development. However, such allocation is not necessary for the purpose of calculation of realised LGD. In any case, realised LGD has to be calculated for each defaulted observation, and all observations have to be taken into account in calculating long-run average LGD.

Model development in LGD estimation

Risk drivers

The GL do not prescribe any specific methodology that should be used in the estimation of LGD. It has been recognised that various methodologies may be valid, depending on specific circumstances, portfolios and processes. However, it was considered appropriate to specify certain principles that should be adhered to regardless of the methodology that is chosen.

As part of these general principles, it has been specified which types of potential risk drivers should be taken into account by institutions. These include factors related to transactions and obligors but also to institutions themselves, in particular in terms of the organisation of recovery processes, as well as external factors such as legal frameworks, especially where models apply to exposures in various countries. It is important that institutions duly analyse potential risk drivers and choose those that meaningfully differentiate risk of transactions. In addition, the risk drivers should be analysed at an appropriate reference date that is representative of the realisations of the given risk driver within a year before default. This has the purpose of ensuring consistency between the estimation and the application of LGD, where the estimates will apply to non-defaulted exposures.

Eligibility of collaterals

Based on Article 108(2) of the CRR, it has been clarified that, for the purpose of LGD estimation, institutions may take into account any type of collateral as long as the requirement of Article 181(1)(f) of the CRR is met. It has been further clarified in the RTS on IRB assessment methodology that, to meet this requirement, the institution's internal policies should be at least fully consistent with the requirements of Section 3 of Chapter 4, Part Three, Title II of the CRR with regard to legal certainty and regular valuation of collateral. It is also envisaged that, for the purpose of LGD estimation, institutions may use specific types of collaterals that are not explicitly described in the mentioned Chapter 4 of the CRR. In these cases, the policies and procedures relating to internal requirements for valuation and legal certainty should be appropriate to the type of collateral in question.

The existence of collateral is one of the main aspects that affect the recovery processes and their results. As institutions are required to incorporate in their LGD estimates all relevant data,

information and methods in accordance with Article 179(1)(a) of the CRR, it has been specified that information on at least the main types of collaterals used for a given type of exposures should be considered relevant and included in the LGD estimates. This means, however, that for the main types of collaterals the requirement of Article 181(1)(f) of the CRR will have to be met as specified above.

Inclusion of collaterals in the LGD estimation

The GL specify general principles for reflecting the effect of collaterals in the LGD estimates, without prescribing any specific methodology. These principles include avoiding bias in the LGD estimates, which may stem from inappropriate treatment of cash flows realised with the use of collaterals, or from inappropriate valuation of the collateral.

LGD calibration

Calculation of economic loss and realised LGD

Definition of economic loss and realised LGD

The concepts of economic loss and realised LGD are the basis for LGD estimation and any differences in the calculation may lead to significantly different and non-comparable LGD estimates. Therefore, it was considered essential to specify these concepts in detail, including the treatment of fees, interest and additional drawings after default, discounting rate, and costs. The specification was based on the definitions included in the CRR, but provides more detailed clarifications on the practical application of these definitions.

In particular, additional clarification is provided on the calculation of realised LGD for the observations that returned to non-defaulted status. It is considered that an assumption that these cases are always related to zero loss would not be prudent. Instead, institutions should calculate the loss realised on these exposures in the same manner as for all other defaulted observations, with the only difference being that an artificial cash flow is added to the calculation in the amount of the outstanding obligation at the moment of the return to non-defaulted status. Therefore, for the purpose of calculating the realised LGD, the exposure that returned to non-defaulted status would be treated in the same manner as if it was fully repaid at the date of the change of status.

The additional artificial cash flow should be discounted to the moment of default in the same manner as all other cash flows. This not only will ensure consistency with the fully repaid observations, but is also consistent with the concept of discounting factor, which reflects uncertainty around the cash flows on defaulted exposures that existed at the moment of default.

Treatment of fees, interest and additional drawings after default

With regard to the treatment of fees, interest after default and additional drawdowns after default (referred to in the CRR as additional drawings), it was considered that, to reflect correctly the level of loss, these should also be included in the calculation up to the moment of default. Therefore, all fees and interest outstanding at the moment of default should be included in the amount of outstanding obligation at the moment of default. In this sense, the treatment of fees and interests should be

consistent, as the economic sense of these measures is similar, and whether the obligors in default are charged interest or fees may only depend on the institution's pricing policy.

Furthermore, in specifying the treatment of additional drawings after the moment of default, it was considered that the resulting measure of realised LGD should be consistent with the exposure value that will be used for the purpose of calculation of capital requirements. Hence, where additional drawings after default are included in the conversion factors, the outstanding amount in the denominator of the realised LGD should also include such drawings. However, in the case of retail exposures, where the conversion factors do not include any drawings after the moment of default, the denominator of the realised LGD should also reflect only the outstanding amount at the moment of default. As a result, lower exposure value (based on lower conversion factors) will be compensated for by higher LGD.

Similarly, in the case of additional fees or interests that are capitalised after the moment of default, as these are generally not included in the conversion factors they should not increase the amount outstanding at the moment of default. It is also considered that, as such fees and interests are not related to outgoing cash flow, they should not increase the economic loss in the numerator of the realised LGD. However, where these additional fees cover costs that were incurred by the institution, these should be included in the calculation of economic loss as costs. It is assumed that the unrealised gains from fees and interest should not be considered losses if they are not related to any expenses incurred by the institution. However, recoveries on those items are profits realised by the institution and hence can decrease the economic loss. Therefore, all recovery cash flows realised on a given exposure should be included in the calculation of realised LGDs.

To keep consistency between the LGD and exposure value, including conversion factors, different calculation of the denominator of the realised LGD is proposed, depending on whether or not additional drawings after default are included in the estimation of conversion factors or not. However, this optionality does not refer to the measure of economic loss, i.e. the numerator of the realised LGD, as this should be an objective value that adequately reflects the actual value of loss experienced by the institution. As additional drawings after default are related to an outflow of cash from an institution, they should always be included in the calculation of economic loss in the numerator of realised LGD.

Discounting rate

The EBA has considered various possibilities with regard to the discounting rate, and analysed various practices in that regard. Approaches used by institutions include the use of discounting factors based on effective interest rates of the underlying loans, various add-ons in the range of 0 to 10% and even higher in some cases, and various underlying internal and external interest rate benchmarks. As significantly different approaches are currently used by institutions, the discounting factor was recognised as one of the main drivers of non-risk-based variability of the LGD estimates. The proposed solution of using interbank funding rates and a 5% add-on has the advantage of being simple and contributing to increased comparability of LGD estimates. It is considered appropriate that the discounting rate should not depend on the credit standing of the institution, so the discounting rate does not reflect funding costs but rather is focused on the uncertainty inherent in the recovery processes and the time value of money.

For exposures in currencies other than the euro, and for observations from before the adoption of euro, an equivalent interest rate should be used that is applicable for the currency of the exposure. This comparable rate should be sufficiently liquid to reflect the level of risk at the date of default in a correct manner.

The discounting rate specified in the GL is expected to reflect the average economic conditions that are adequate for the purpose of the long-run average LGD. It is not considered to be associated with downturn conditions. The downturn adjustment should be specified in accordance with the requirements of the RTS on the nature, severity and duration of economic downturn, which will be specified on the basis of Article 181(3)(a) of the CRR.

While the level of the add-on is consistent with the results of the IRB survey carried out across the institutions and reflects a balanced figure between the discounting rates applied within and outside the euro area, the adequacy of the 5% add-on will be further analysed and, if necessary, reviewed before the date of application of these GL. Furthermore, the EBA will also aim to publish a list of equivalent interbank rates for currencies other than euro, which should be used for the purpose of realised LGD calculation for exposures denominated in those currencies.

Direct and indirect costs

With regard to costs to be included in the calculation of the economic loss the proposal follows the distinction between direct and indirect costs, depending on whether or not they are directly attributable to a given exposure. It has been specified that all direct costs should be considered material, whereas immaterial indirect costs may be excluded from the calculation.

To reflect the full level of loss, it is proposed that institutions should look into costs not only after the moment of default but also before that date. If the costs incurred by the institution due to diminished credit quality of the exposures but before recognition of default are not included in the exposure value at the moment of default, they should be taken into account in the calculation of economic loss. Otherwise these costs would not be accounted for in the estimation of risk parameters, and LGD would be underestimated.

Long-run average LGD

Historical observation period

The specification of the historical observation period is based on the assumption that it should be as broad as possible, and should contain data from various periods with differing economic circumstances. These differing economic circumstances refer not only to the moment of default but also to the moment of realising recoveries from different sources. In this context, it was deemed inappropriate to allow elimination of any data that reflects an institution's internal experience, as this would lead to a loss of valuable information. Hence, it was specified that all available internal data should be taken into account in the long-run average LGD. This internal experience may additionally be supplemented by external data where necessary.

Calculation of long-run average LGD

It has been clarified that the long-run average should be calculated as an arithmetic average of realised LGDs on all observations from the specified historical observation period, and that it should be weighted by the number of defaults. The only exemption from this rule under the CRR is specified in Article 181(2) of the CRR, according to which institutions may apply higher weights to more recent data in the case of retail exposures. However, the use of this exemption requires appropriate justification and evidence that it leads to better LGD estimates.

Treatment of incomplete recovery processes

In accordance with Article 181(1)(a) of the CRR, all observed defaults have to be taken into account in the calculation of long-run average LGD; hence, incomplete recovery processes should also be included. These incomplete processes carry valuable information, in particular about the most recent observations, and cases that are particularly difficult and therefore require longer recovery processes. Exclusion of this information would not only lead to loss of relevant, up-to-date information, but could also lead to underestimation of LGD, and this was therefore considered inappropriate.

However, to obtain a realistic value of long-run average LGD, the incomplete recovery processes should be included with future recoveries that are expected to be realised. The value of future recoveries is not an objective, observed measure but has to be estimated based on the recoveries factually observed on those cases that are already closed. As a result, the 'long-run average LGD' will also be a measure that is not fully objective, as it contains components that are estimated.

To obtain a fully objective intermediate measure, it is proposed that institutions should also calculate the 'observed average LGD' taking into account realised LGDs only on those defaults that are related to closed recovery processes, including those that are treated as closed because they have reached a certain threshold in terms of the time in default, i.e. a maximum length of the recovery process during which additional recoveries can be reasonably expected. Although this objective measure will not include any elements of estimation, it has to be kept in mind that it may not accurately reflect the real experience, as the cure and high-recovery cases may be over-represented. More difficult cases usually stay longer in recovery processes, and therefore they are likely not to be included in the 'observed average LGD'.

Therefore, the 'observed average LGD' has to be adjusted to account for the most recent experience based on the incomplete recovery processes, to obtain an adequate long-run average LGD. For this purpose, institutions should estimate the most likely future recoveries on cases where the processes are not yet complete. As such estimates can be provided only where sufficient data exists to support them, it is proposed that institutions should estimate future recoveries only until a certain point in time, i.e. the maximum length of the recovery process during which a sufficient number of recoveries were actually observed in similar cases. The assumptions underlying the expected future costs and recoveries should be adequately justified and back-tested.

Treatment of cases with no loss or positive outcome

Finally, it is also proposed that where the calculation of realised LGD results in a negative number, i.e. where profit has been realised on a defaulted exposure, this should be floored at zero in the calculation of observed average LGD and long-run average LGD. This floor should be applied at the level of individual observation, as it would not be appropriate to allow any netting effects in that regard between the observations included in the RDS, especially where these observations may have been observed in different periods of time.

Calibration of the estimates to long-run average LGD

While the flexibility is left for institutions to choose an appropriate estimation methodology, it is also necessary that, regardless of this choice, the estimates be calibrated to the long-run average LGD. The calibration may be performed either on a portfolio level or on a grade or pool level, depending on the chosen estimation methodology. In both cases, the calibration sample, i.e. the sample of exposures used to compare the average LGD estimates with the long-run average LGD, should be the same as the sample used to calculate the long-run average LGD. In accordance with Article 181(1)(b) of the CRR, these estimates reflecting the long-run average LGD should be used whenever they are more conservative than the estimates reflecting the downturn conditions.

Chapter 7: Estimation of risk parameters for defaulted exposures

General requirements specific to EL_{BE} and LGD in-default

Estimation methodologies for EL_{BE} and LGD in-default

The treatment of defaulted assets was identified as one of the major drivers of variability of the own funds requirements across institutions. Clarification has already been provided in the RTS on IRB assessment methodology, in particular in Article 54(2)(c), that direct estimation of LGD in-default should be consistent with the LGD for non-defaulted exposures, to avoid potential cliff effects. Following this approach, it has been further clarified in the GL that, for the purpose of estimating EL_{BE} and LGD in-default, institutions should use the same estimation methods used for estimating LGD for non-defaulted exposures, as they are in fact part of the LGD model. Thus, Chapter 7 generally refers to the requirements on LGD estimation set out in Chapter 6, as well as general estimation requirements set out in Chapter 4, and the requirements on the application of risk parameters specified in Chapter 8. Chapter 7 provides guidance only on those specific aspects where different treatment for defaulted exposures in terms of loss rate estimation is justified.

Reference dates

The difference between the LGD in-default and the EL_{BE} is used for computing the risk weight in accordance with Article 153(1)(ii) of the CRR, which is then applied to the current outstanding exposure value to obtain the risk-weighted exposure amount. Moreover, the EL_{BE} is compared with credit risk adjustments for the purpose of calculating IRB shortfall / excess, where credit risk adjustments are again computed with respect to the current value of exposures. Thus, for the purpose of computing realised LGDs for defaulted exposures, institutions should use reference points in time that will be relevant for the current outstanding obligations of defaulted exposures.

The concept of current outstanding exposure is clearly defined in Article 166(1) of the CRR and should be used also for defaulted exposures in the application of the EL_{BE} and LGD in-default. However, given data limitations, the continuous concept of current exposure amount may not be suitable for estimation purposes. The GL therefore suggest that institutions should set discrete relevant reference dates at which the realised LGDs should be computed. This way, it should be feasible to estimate the parameters for defaulted exposures that are appropriate for their current status. To ensure adequacy of the estimates, institutions should set the reference dates according to the recovery patterns observed on a specific type of exposures. Such reference dates may either be event based, e.g. linked with the realisation of collateral, or reflect certain time periods during which exposures have been in default.

For the purpose of application of the estimated LGD in-default and EL_{BE} to a given defaulted exposure in the current portfolio, institutions should first evaluate which reference date is relevant for the exposure under consideration. In accordance with Article 158(5) of the CRR, the amount of expected loss to be assigned to the defaulted exposure under consideration should be calculated as the product of the EL_{BE} relevant at the selected reference date, in percentage terms, and the current exposure value.

Data requirements for EL_{BE} and LGD in-default

As for non-defaulted exposures, EL_{BE} and LGD in-default estimates should be based on the institutions' own experience. The scope of data necessary for proper EL_{BE} and LGD in-default estimation includes not only those required for LGD for non-defaulted exposures, but also all relevant information obtained during the recovery process and, in particular, at each reference date used in the estimation. This implies that, for the purpose of the treatment of defaulted exposures, institutions should additionally store data including relevant risk drivers, which may become relevant after default, and outstanding exposure amounts and values of collaterals at each reference date.

Model development in the estimation of EL_{BE} and LGD in-default

This section specifies which types of potential risk drivers should be taken into account in estimating EL_{BE} and LGD in-default on top of those used for non-defaulted exposures. Article 54(2) of RTS on IRB assessment methodology prescribes that the LGD in-default and EL_{BE} estimation methods take into account the information on the time in default and recoveries realised so far. In this respect, the GL clarify that the information on recoveries realised so far and on time in default may be taken into account either directly, as risk drivers, or indirectly, in setting the reference dates for estimation purposes. Moreover, to ensure that the information after default is taken into account in a timely manner, it is clarified that the relevance of risk drivers should be re-evaluated for the relevant periods after default, until the date of termination of the recovery process. This implies, for example, that new risk drivers might become relevant after the date of default.

Calibration of EL_{BE} and LGD in-default

Calculation of realised LGD and long-run average LGD for defaulted exposures

One major difference between the calculation of realised LGDs for the purpose of estimation of risk parameters for defaulted and non-defaulted exposures is that the former should be performed at each relevant reference date, rather than at the date of default, as described above. Other than this, to calculate realised LGDs for defaulted exposures institutions should follow the same requirements as those set out in Chapter 6. This implies that institutions should calculate for each defaulted exposure in the RDS the realised LGDs according to each reference date that is relevant for estimation purposes.

Another important aspect clarified in this section concerns the treatment of incomplete recovery processes for the purposes of calculation of long-run average LGD for defaulted exposures. The approach to the long-run average LGD is aligned with that prescribed in Section 6.4, with the exception that incomplete recovery processes should be used only for those reference dates for which observations of recoveries and costs are available at least until the next reference date. The rationale for this exception is to avoid a circular reference in the estimates and to ensure that each observation included in the calculation brings additional information. In fact, incomplete recovery processes on which EL_{BE} and LGD in-default are estimated should not take part in the estimation itself and will be therefore excluded, if only those incomplete recovery processes for which later reference dates are relevant are taken into account.

The application of the same requirements for the treatment of incomplete recovery processes, as specified in Section 6.4, also means that no further recoveries should be estimated beyond the maximum length of the recovery processes specified for the specific type of exposures. However, relevant exposure-specific information may be taken into account in the process of application of the risk parameters, and may provide the basis for an override of the model output where justified.

Similarly in the case of partial write-offs performed on a defaulted exposure, while the estimation of the risk parameters should be based on a full outstanding credit obligation, the information on the partial write-off on a specific exposure may provide the basis for an override of the output of the model. Such an override would have the purpose of achieving consistency between the estimation and the application of the risk parameters, taking into account the fact that the risk weight and the expected loss amount will be calculated on the basis of the accounting value of the exposure, determined in accordance with Article 166 of the CRR.

Example on the treatment of incomplete recovery processes

Table 2: Example of observed recoveries and costs

Reference Dates (time in default)	Incomplete recovery processes - factually observed recoveries and costs			
	A – 60 months in default	B – 50 months in default	C – 40 months in default	D – 24 months in default
t=0	0	0	10	0
t=10	0	0	-5	0
t=20	5	0	0	10

t=30	-5	5	0	
t=40	-5	10	0	
t=50	10	5		
t=60	-5			
t=70				

Reference date t=10 months in default:

When calculating the long-run average LGD relevant for the reference date t=10 months after default, institutions should take into account all observations (A, B, C and D), as in all these cases recoveries and costs at the next reference date (here t=20 months) are observed. It should be noted that the observations included in the calculation comprise case B, despite the observed zero costs and zero recoveries up to t=20 months after default, and case C, despite zero cash flows after the reference date of 10 months after default. All these cases carry useful information and are relevant for the estimation.

Figure 4: Example for observations taken into account at the reference date = 10 months



Reference date t=20 months in default:

In the estimation relevant for the reference date t=20 months in default observations A, B and C are clearly included. Although observation D is in default for longer than 20 months, it is not included in the sample because the observations of costs and recoveries at the next reference date (here t=30 months) are not yet available. However, if observation D had been closed 24 months after default, this observation would be included in the calculation of the long-run average LGD relevant for the reference date t=20 months in default.

Reference date t=50 months in default:

In this case only observation A is used. In all other observations the cash flows beyond the reference date t=50 months are not yet known, so these observations do not carry any additional information which could be used to estimate the expected loss relevant for the reference date t=50 days in default.

Figure 5: Example for observations taken into account at the reference date = 20 months

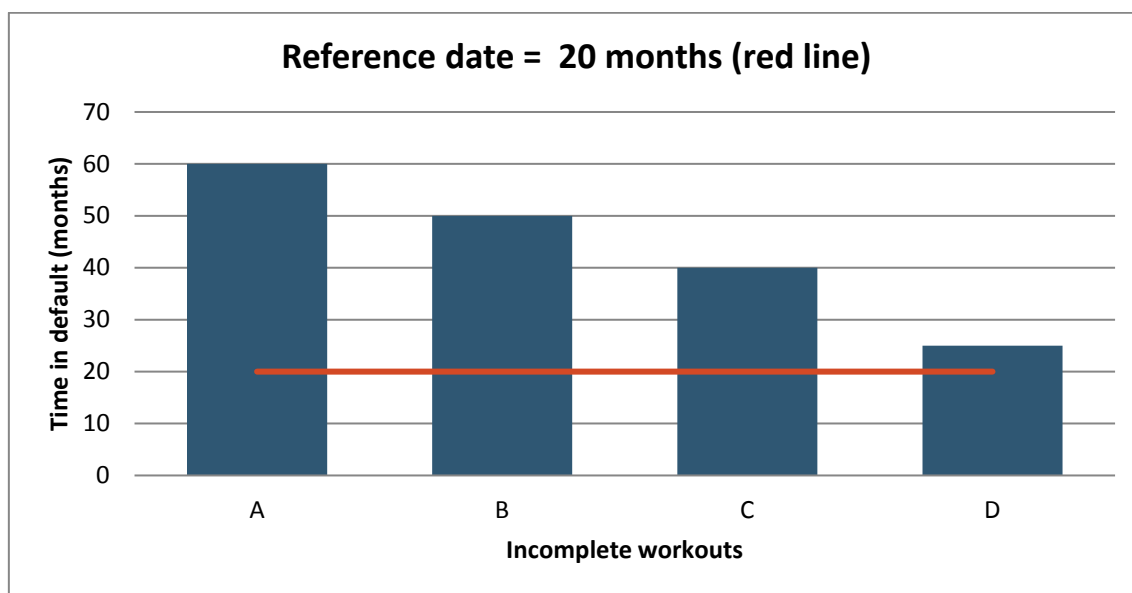
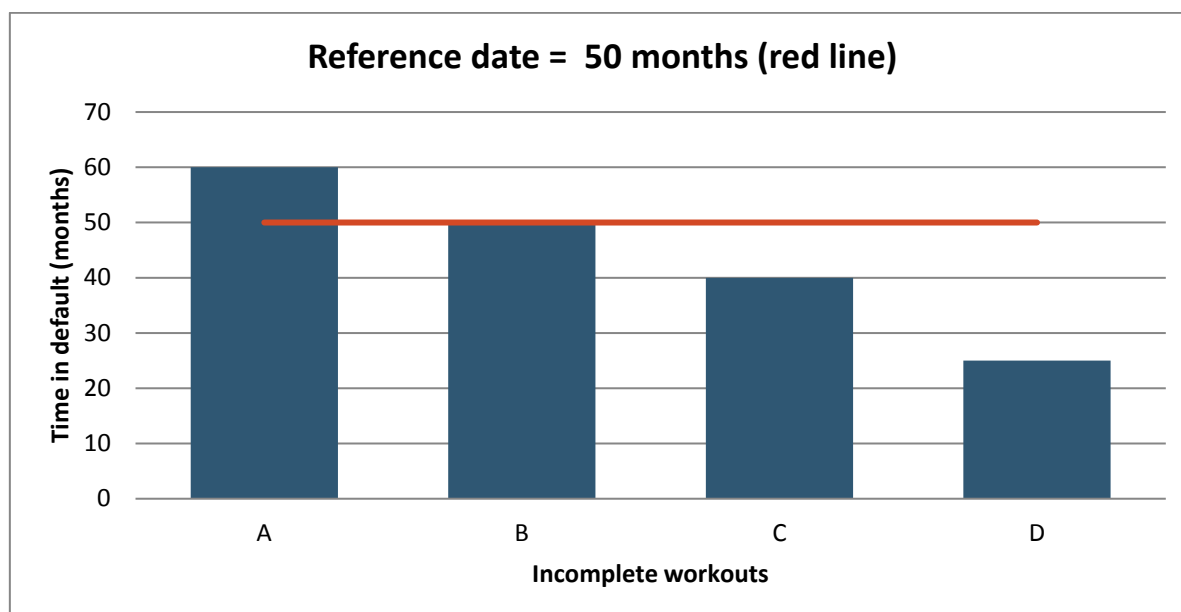


Figure 6: Example for observations taken into account at the reference date = 50 months



Specific requirements for EL_{BE} estimation

Consideration of MoC in EL_{BE} estimation

In accordance with Article 181(1)(h) of the CRR, the EL_{BE} estimation methods should take into account all currently available and relevant information and, in particular, consider current economic circumstances and exposure status. Taking this into consideration, the GL clarify that the EL_{BE} should not include any MoC, as this would not be in line with the best estimate concept. Adding conservativeness does not increase the accuracy of the estimates, but rather covers for the risk that the estimates might be too optimistic.

Current economic circumstances

For the purposes of considering current economic circumstances, the GL clarify that institutions should take into account economic factors, including macroeconomic and credit factors, that are relevant for the type of exposures under consideration. In this context, institutions should obtain their EL_{BE} estimates through an adjustment to the long-run average LGD for defaulted exposures, where necessary, consistently with the estimation of LGD in-default, such that a meaningful application of the risk weight formula is ensured. The difference between LGD in-default and EL_{BE} determines the level of unexpected loss, which is used for computing the risk weight. Therefore, the GL aim to ensure consistency of the estimation approaches used for the two risk parameters.

To avoid excessive use of adjustments and hence increased subjectivity of resulting estimates, it is specified in the GL that the adjustment should be applied only where necessary. The adjustment may be necessary where the observed sensitivity of realised LGDs to economic conditions is not reflected in the EL_{BE} estimates, either through direct use of macroeconomic factors in the model or through risk drivers which are sensitive to economic conditions. In all other cases, it is considered that the EL_{BE} estimates based on the long-run average LGD for defaulted exposures sufficiently reflect current economic conditions, and that no further adjustments to address this issue should be made. Where the adjustment is applied, it should be adequately documented, including its rationale and calculation.

Relation of EL_{BE} to specific credit risk adjustments

The calculation of the IRB excess/shortfall in accordance with Article 159 of the CRR is based on a comparison between expected losses and credit risk adjustments. In this context, using accounting provisions as EL_{BE} estimates is a frequent practice observed within European institutions. However, this approach is considered inappropriate, as it does not ensure compliance with the CRR requirements. To ensure consistency between the EL_{BE} and LGD in-default estimates, the GL restrict the use of provisions as EL_{BE} to two specific circumstances. The first refers to those cases where a model used to determine accounting provisions respects all the requirements for own LGD estimates set out in the CRR and in these GL, or where the provisions can be adjusted to meet those requirements, in particular those related to the concept of economic loss. The second possibility refers to those cases where provisions are individually assessed, so there is no model behind them. In these circumstances, the information of the individual assessment could be used as a potential reason for an override of the EL_{BE} model outcomes where institutions are able to prove that this improves the accuracy of the estimation for a given exposure. For this purpose, individually assessed provisions should be adjusted to be consistent with the requirements on economic loss set in these GL.

Specific requirements for LGD in-default estimation

According to Article 54(1) of the RTS on IRB assessment methodology, institutions may estimate LGD in-default either directly or as a sum of EL_{BE} and an add-on that captures the unexpected loss that might occur during the recovery period. Irrespective of the approach, it is expected that the method for the estimation of LGD for exposures in default should consider a possible adverse change in economic conditions during the expected length of the recovery process, in accordance with Article

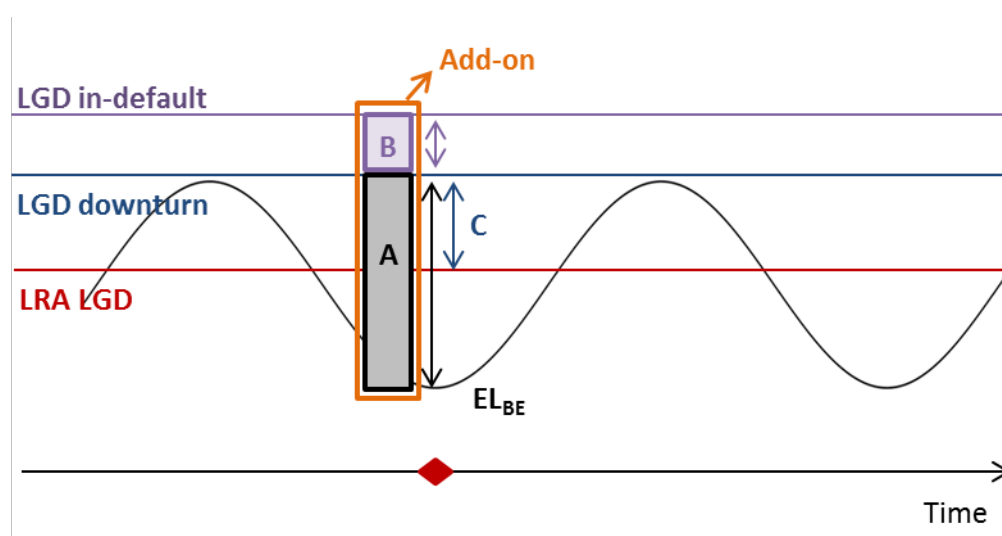
54(2)(a) of the RTS on IRB assessment methodology. It is clarified in the GL that, to reflect the adverse change in economic conditions, institutions should reflect in their LGD in-default estimates at least downturn conditions. This is in line with Article 181(1)(b) of the CRR, as LGD in-default is in fact part of an LGD model. However, estimates of LGD in-default reflecting downturn conditions do not preclude the inclusion of additional sources of uncertainty that are not related to economic conditions during the recovery process. For the purpose of considering additional unexpected losses mentioned in Article 181(1)(h) of the CRR, institutions may therefore need to increase the LGD in-default over the downturn level. Finally, like the LGD for non-defaulted exposures, the LGD in-default should also include adequate MoC. In this context, irrespective of which of the approaches is used for LGD in-default estimation, institutions should always be able to document:

- the breakdown of the LGD in-default into its components: the EL_{BE} and the add-on; and
- the breakdown of the add-on into its components: the downturn adjustment, MoC, and, where relevant, any component covering for additional unexpected losses during the recovery period.

Figure 7 presents in graphical form two possible approaches to estimating LGD in-default, which, however, should lead to the same results:

- directly, increasing the long-run average LGD adjusted for downturn conditions (LGD downturn in Figure 7, or long-run average LGD + C) by the MoC and additional potential unexpected losses (B in Figure 7); or
- as the sum of the EL_{BE} and the add-on, where the add-on is given by summing up the downturn conditions component (A in Figure 7) to the MoC and the additional potential unexpected losses, if any (B in Figure 7).

Figure 7: LGD in-default estimation, direct estimation or EL_{BE} + add-on*



LRA LGD – long-run average LGD

As the relation between EL_{BE} and LGD in-default is crucial for the adequate determination of risk weights, potential overrides have to be considered and applied consistently as well. It is therefore specified in the GL that to the extent that the reason for overriding the EL_{BE} also applies to the LGD in-default an override of the LGD in-default should be triggered.

Chapter 8: Application of risk parameters

Conservatism in the application of risk parameters

While the MoC described in Chapter 4 addresses any weaknesses in data or methods in the process of model development and risk quantification, additional conservatism referred to in Chapter 8 is meant to address any weaknesses in the implementation of the models and application of the risk estimates to the currently existing exposures. These weaknesses may include, in particular, missing or outdated information necessary for the rating assignment in accordance with the model (for example missing update of the financial statement of the obligor), missing rating or update of the rating of the obligor. Institutions should be able to detect and monitor these situations to make sure that the risk is reflected correctly, including additional conservatism where necessary.

Human judgement in the application of risk parameters

The proposed rules for the use of human judgement in the application of risk parameters are based on Article 172(3) of the CRR, which allows the overriding of both inputs to and outputs from the process of assignment of obligors or exposures to grades or pools. The requirements for overrides apply equally to PD and LGD models, including EL_{BE} and LGD in-default. In any case, where institutions want to apply the overrides, this should be based on an appropriate internal framework to make sure that the weaknesses of the assignment are identified consistently, that the overrides are applied within certain limits and that they are appropriately justified, approved and monitored. As a large number of overrides may indicate certain weaknesses of the model, institutions should analyse these situations carefully, taking into account the reasons for overrides. Where necessary, such analysis should result in the improvement of the model, for instance by including additional risk drivers, increasing granularity of categorisation or changing the weights of risk drivers, or in the improvement of data collection or data quality management processes.

Use of internal ratings and default and loss estimates

The concept of use test was introduced in the IRB Approach to ensure high quality of risk parameters, under the assumption that institutions would not use the estimates of risk parameters for internal risk management if they did not believe that these estimates appropriately reflect the actual level of risk. However, for the purpose of own funds requirements it is important not only to accurately assess the obligors and exposures, and to rank them according to the level of risk, but also to ensure certain level of conservatism. These additional prudential requirements may lead to the parameters less accurately reflecting the actual level of risk under certain economic circumstances. It is therefore specified in the GL that, for internal purposes, institutions may decide, where this is justified, to use the estimates of the risk parameters without MoC, without regulatory floors or, in the case of LGD, without downturn adjustment.

Furthermore, where this is justified for a specific area of use, it may be necessary to use a different calibration method for internal purposes. This different method may in particular involve specifying a different calibration target (for instance, the use of lifetime horizon instead of a one-year time horizon on PD estimates, where this is required by the applicable accounting standards), or may aim to have the parameters more accurately reflect the current economic circumstances. The calibration method may also include additional risk drivers applied at the stage of calibration. In any case, however, the rank ordering of obligors or exposures should remain the same as used for the purpose of own funds requirements, apart from possibly different grouping of exposures into grades. The change in rank ordering would mean that not only different estimates but also different internal ratings are used internally, so the use test requirement would not be met.

The requirements for use test specified in these GL should be read together with the RTS on IRB assessment methodology, which in Articles 18 to 21 specify obligatory and optional areas of use test. While the GL provide an exhaustive list of possible deviations from the parameters used for own funds requirements calculation, the use of parameters in both obligatory and optional areas of use test does not preclude taking into account the information from other sources as well. The combination of the information on internal ratings or risk parameters and any other relevant information should lead to an appropriate management decision in accordance with the institution's policy.

Calculation of IRB shortfall or excess

Apart from the calculation of risk-weighted exposure amounts the risk parameters are also used for regulatory purposes in the calculation of the expected loss and so-called IRB shortfall or IRB excess, which is then used to correct the value of own funds used in the calculation of capital adequacy ratios. Article 159 of the CRR requires institutions to calculate the difference between, on one hand, credit risk adjustments, additional value adjustments, and, on the other hand, own funds reductions and expected loss amounts. The GL refer to IRB excess where this calculation results in a positive amount, i.e. where provisions are in excess of expected loss, and to IRB shortfall where it results in a negative amount, i.e. there is a shortfall of provisions given the expected loss. It has been clarified in Article 73(h) of the RTS on assessment methodology that this difference should be calculated at an aggregate level separately for the portfolio of defaulted exposures and the portfolio of exposures that are not in default. This separation is necessary to ensure that the IRB excess resulting from the calculation performed for the defaulted portfolio is not used to offset IRB shortfall resulting from the calculation performed for the portfolio of exposures that are not in default, as prescribed in Article 159 of the CRR. However, the IRB excess from the overall non-defaulted portfolio may be used to cover any IRB shortfall from the overall defaulted portfolio. It is furthermore clarified that, if the calculation required by Article 159 of the CRR results in an IRB excess for both the defaulted and the non-defaulted portfolio, the limit for adding the overall IRB excess to Tier 2 capital set out in Article 62(d) of the CRR, i.e. up to 0.06% of risk-weighted exposure amounts, should be applied to the sum of the two IRB excesses.

Furthermore, the treatment of partial write-offs has been clarified in accordance with the interpretation provided earlier in the Q&A Question ID 2014_1064. In accordance with Annex V, Part 2, paragraphs 49 and 50 of Regulation (EU) No 680/2014 (Implementing Technical Standards (ITS) on

supervisory reporting), write-off should be understood as the amount of principal and past due interest of any debt instrument that an institution no longer recognises because it is considered uncollectible. These ITS also clarify that write-offs can be caused both by reductions of the carrying amount of financial assets recognised directly in profit or loss, and by reductions in the amounts of the allowance accounts for credit losses taken against the carrying amount of financial assets. Such partial write-offs do not constitute impairment, irrespective of the method (specific loan loss provision or direct reduction of the carrying amount) chosen to book impairment in the financial statements of the asset, because any amounts written-off following a derecognition will not affect the carrying amount of the financial asset (unlike a reversal of impairment losses). For that reason, a partial write-off would not be included in the calculation of general and specific credit risk adjustments.

Chapter 9: Review of estimates

This chapter provides additional guidance for institutions with regard to their policies on the maintenance of the models, including regular review of estimates. To ensure that the deterioration of the model performance is detected and addressed in a timely manner, the GL clarify what institutions should consider in their internal frameworks for annual reviews, as required by Article 179(1)(c) of the CRR, and what should be the minimum scope of analysis that institutions conduct during this annual review. The review of estimates is required when new information comes to light, and at least on an annual basis. Moreover, institutions are asked to define a cycle for a fundamental review of models depending on the materiality of the models considered. In accordance with the GL, the scope of annual review includes the analysis of representativeness, the performance of the model, its stability over time and its predictive power. Full reviews including model design may be performed on a less frequent basis.

While the annual reviews referred to in Article 179(1)(c) of the CRR may be performed either by the model development function, which is part of the credit risk control unit or units (CRCU) or by the validation function, the required scope and frequency of validation is not within the scope of these GL. The role of independent validation has been further clarified in the RTS on IRB assessment methodology, in particular in Article 10 of these RTS, which specifies criteria for the independence of the validation function from model development, and in Article 11, which clarifies the minimum frequency and scope of validation. Therefore the requirements included in the GL are focused on the reviews of estimates in accordance with Article 179(1)(c) of the CRR.

The more fundamental reviews of models which in accordance with the GL should be performed on a regular basis may also be carried out as part of the validation function, or by the CRCU, which retains overall responsibility for the oversight and performance of the rating systems, in accordance with Article 190 of the CRR. In this sense, both the annual reviews and full reviews of estimates can be seen as part of the ongoing reviews by the CRCU as specified in Article 190(2)(h) of the CRR, even if partly or fully performed by the validation function, as long as the CRCU is provided with the results of validation.

The appropriate remediation of any of the identified weaknesses may lead to changes in the models. These changes should be appropriately classified and approved in accordance with Commission Delegated Regulation (EU) No 529/2014.

3. Guidelines on PD estimation, LGD estimation and the treatment of defaulted exposures

1 Compliance and reporting obligations

Status of these guidelines

1. This document contains guidelines issued pursuant to Article 16 of Regulation (EU) No 1093/2010⁹. In accordance with Article 16(3) of Regulation (EU) No 1093/2010, competent authorities and financial institutions must make every effort to comply with the guidelines.
2. Guidelines set out the EBA's view of appropriate supervisory practices within the European System of Financial Supervision or of how Union law should be applied in a particular area. Competent authorities as defined in Article 4(2) of Regulation (EU) No 1093/2010 to whom guidelines apply should comply by incorporating them into their practices as appropriate (e.g. by amending their legal framework or their supervisory processes), including where guidelines are directed primarily at institutions.

Reporting requirements

3. In accordance with Article 16(3) of Regulation (EU) No 1093/2010, competent authorities must notify the EBA as to whether they comply or intend to comply with these guidelines, or otherwise give reasons for non-compliance, by ([dd.mm.yyyy]). In the absence of any notification by this deadline, competent authorities will be considered by the EBA to be non-compliant. Notifications should be sent by submitting the form available on the EBA website to compliance@eba.europa.eu with the reference 'EBA/GL/201x/xx'. Notifications should be submitted by persons with appropriate authority to report compliance on behalf of their competent authorities. Any change in the status of compliance must also be reported to the EBA.
4. Notifications will be published on the EBA website, in line with Article 16(3).

⁹ Regulation (EU) No 1093/2010 of the European Parliament and of the Council of 24 November 2010 establishing a European Supervisory Authority (European Banking Authority), amending Decision No 716/2009/EC and repealing Commission Decision 2009/78/EC, (OJ L 331, 15.12.2010, p.12).

2 Subject matter, scope and definitions

2.1 Subject matter

5. These guidelines specify the requirements for the estimation of probability of default (PD) and loss given default (LGD), including LGD for defaulted exposures (LGD in-default) and best estimate of expected loss (EL_{BE}) in accordance with Part Three, Title II, Chapter 3, Section 6 of Regulation (EU) No 575/2013, Article 159 of that Regulation and the EBA final draft regulatory technical standards on the IRB assessment methodology EBA/RTS/2016/03 [RTS on IRB assessment methodology] of 21 July 2016¹⁰.

2.2 Scope of application

6. These guidelines apply in relation to the IRB Approach in accordance with Part Three, Title II, Chapter 3 of Regulation (EU) No 575/2013 for all methods based on own estimates of PD and LGD. Where, for exposures other than retail, an institution has received permission to use the IRB Approach but has not received permission to use own estimates of LGD in accordance with Article 143(2) in conjunction with Article 151(8) to (9) of that Regulation, all parts of these guidelines apply, except Chapters 6 and 7. These guidelines do not apply to the calculation of own funds requirements for dilution risk in accordance with Article 157 of Regulation (EU) No 575/2013.

2.3 Addressees

7. These guidelines are addressed to competent authorities as defined in point (i) of Article 4(2) of Regulation (EU) No 1093/2010 and to financial institutions as defined in Article 4(1) of Regulation (EU) No 1093/2010.

2.4 Definitions

8. Unless otherwise specified, terms used and defined in Regulation (EU) No 575/2013 and Directive 2013/36/EU have the same meaning in these guidelines. In addition, for the purposes of these guidelines, the following definitions apply:

Risk parameters	One or all of the following: PD, LGD, EL_{BE} and LGD in-default
Reference data set (RDS)	All the datasets used for the purpose of estimation of risk parameters, including the datasets relevant for model development as well as the datasets used for calibration of a

¹⁰ References to Articles of the RTS on IRB assessment methodology will be replaced with references to the Delegated Regulation adopting the EBA final draft RTS on IRB assessment methodology, once that is published in the Official Journal of the EU.

	risk parameter.
PD model	All data and methods used as part of a rating system within the meaning of Article 142(1) point (1) of Regulation (EU) No 575/2013, which relate to the differentiation and quantification of own estimates of PD and which are used to assess the default risk for each obligor or exposure covered by that model.
Ranking method of a PD model	The method, forming part of a PD model, used to rank the obligors or exposures with respect to the risk of a default.
Scoring method of a PD model	A ranking method of a PD model which assigns ordinal values ('scores') to rank obligors or exposures.
LGD model	All data and methods used as part of a rating system within the meaning of Article 142(1) point (1) of Regulation (EU) No 575/2013, which relate to the differentiation and quantification of own estimates of LGD, LGD in-default and EL_{BE} and which are used to assess the level of loss in the case of default for each facility covered by that model.
EL_{BE}	Expected loss best estimate for defaulted exposures as referred to in Article 181(1)(h) of Regulation (EU) No 575/2013.
LGD in-default	Loss given default for defaulted exposures as referred to in Article 181(1)(h) of Regulation (EU) No 575/2013.
Scope of application of a PD or LGD model	The type of exposures in the meaning of point (2) of Article 142(1) of Regulation (EU) No 575/2013 covered by a PD model or an LGD model.
Estimation of risk parameters	The full modelling process related to the risk parameters including the selection and preparation of data, model development and calibration.
Model development	The part of the process of the estimation of risk parameters that leads to an appropriate risk differentiation by specifying relevant risk drivers, building statistical or mechanical methods to assign exposures to obligor or facility grades or pools, and estimating intermediate parameters of the model, where relevant.
PD calibration sample	The data set on which the ranking or pooling method is applied in order to perform the calibration.
Calibration segment	A uniquely identified subset of the scope of application of the PD or LGD model which is jointly calibrated.



PD calibration	The part of the process of the estimation of risk parameters which leads to appropriate risk quantification by ensuring that when the PD ranking or pooling method is applied to a calibration sample, the resulting PD estimates correspond to the long-run average default rate at the level relevant for the applied method.
LGD calibration	The part of the process of the estimation of risk parameters which leads to appropriate risk quantification by ensuring that the LGD estimates correspond to the long-run average LGD, or to the downturn LGD estimate where this is more conservative, at the level relevant for the applied method.
Application of risk parameters	The assignment of risk parameters estimated in accordance with the PD or LGD model to the current exposures, performed either automatically with the use of a relevant IT system or manually by qualified personnel of an institution.
Application portfolio	The actual portfolio of exposures within the scope of application of the PD or LGD model at the time of the estimation of a risk parameter.

3 Implementation

3.1 Date of application

9. These guidelines apply from 1 January 2021. Institutions should incorporate the requirements of these guidelines in their rating systems by that time, but competent authorities may accelerate the timeline of this transition at their discretion.

3.2 First application of the Guidelines

10. The internal validation function should verify the changes which are applied to the rating systems as a result of the application of these guidelines and the regulatory technical standards to be developed in accordance with Article 144(2) of Regulation (EU) No 575/2013, and the classification of the changes in accordance with Commission Delegated Regulation (EU) No 529/2014¹¹.
11. Institutions that need to obtain prior permission from competent authorities in accordance with Article 143(3) of Regulation (EU) No 575/2013 and Regulation (EU) No 529/2014 for the changes in the rating systems required to incorporate these guidelines for the first time by the deadline referred to in paragraph 9 should agree with their competent authorities the final deadline for submitting the application for such prior permission.

¹¹ OJ L 148, 20.5.2014, p. 36.

4 General estimation requirements

4.1 Principles for specifying the range of application of the rating systems

12. A rating system in the sense of point (1) of Article 142(1) of Regulation (EU) No 575/2013 should cover all those exposures where the obligors or facilities show common drivers of risk and credit-worthiness and fundamentally comparable availability of credit-related information. The PD and LGD model within a rating system may comprise various calibration segments. Where all obligors or exposures within the range of application of the PD or LGD model are jointly calibrated the whole scope of application of the model is considered one calibration segment.
13. Exposures covered by the same rating system should be treated similarly by the institution in terms of risk management, decision making and credit approval process and should be assigned to a common obligor rating scale for the purposes of Article 170(1)(b) of Regulation (EU) No 575/2013 and a common facility rating scale for the purposes of Article 170(1)(e) of that Regulation.
14. For the purpose of quantification of various risk parameters within a rating system, institutions should apply the same definition of default for the same historical observations used in different models. Institutions should also apply the same treatment of multiple defaults of the same obligor or exposure across internal, external and pooled data sources.

4.2 Data requirements

4.2.1 Quality of data

15. In order to comply with the requirement of Article 76 of the RTS on IRB assessment methodology that institutions should have sound policies, processes and methods for assessing and improving the quality of data used for the purpose of credit risk measurement and management processes, institutions should ensure that those policies apply to all data used in model development and calibration, as well as to the data used in the application of the risk parameters.
16. In order for the data used in the model development and in the application of risk parameters as inputs into the model to meet the requirements of accuracy, completeness and appropriateness specified in Article 174(b) of Regulation (EU) No 575/2013, it should be sufficiently precise to avoid material distortions of the outcome of the assignment of exposures to obligors or facility grades or pools, and it should not contain any biases which make the data unfit for purpose.

4.2.2 Governance for data representativeness

17. In order to comply with the requirement of the representativeness of data used in the PD and LGD models specified in Articles 174(c), 179(1)(d) and 179(2)(b) of Regulation (EU) No 575/2013 as well as in Articles 40 and 45 of the RTS on IRB assessment methodology, institutions should have sound policies, processes and methods for assessing the representativeness of data used for the purpose of estimation of risk parameters. Institutions should specify in their internal policies the statistical tests and metrics to be used for the purpose of assessing the representativeness of data used for risk differentiation and, separately, for data underlying the risk quantification. Institutions should also specify methods for qualitative assessment of data for the cases, defined in their policies, where the application of statistical tests is not possible.
18. Institutions should use the same standards and methods for the assessment of representativeness of data stemming from different sources, including internal, external and pooled data or a combination of these, unless different methods are justified by the specificity of the data source or availability of information.
19. Where external or pooled data are used institutions should obtain sufficient information from the data providers to assess the representativeness of such external or pooled data to the institutions' own portfolios and processes.

4.2.3 Representativeness of data for model development

20. Institutions should analyse the representativeness of data in the case of statistical models and other mechanical methods used to assign exposures to grades or pools, as well as in the case of statistical default prediction models generating default probability estimates for individual obligors or facilities. Institutions should select an appropriate dataset for the purpose of model development to ensure that the performance of the model on the application portfolio, in particular its discriminatory power, is not significantly hindered by insufficient representativeness of data.
21. For the purposes of ensuring that the data used in developing the model for assigning obligors or exposures to grades or pools is representative of the application portfolio covered by the relevant model, as required in Article 174(c) of Regulation (EU) No 575/2013 and Article 40(2) of the RTS on IRB assessment methodology institutions should analyse the representativeness of the data at the stage of model development in terms of all of the following:
 - (a) the scope of application;
 - (b) the definition of default;
 - (c) the distribution of the relevant risk characteristics;
 - (d) lending standards and recovery policies.

22. For the purpose of paragraph 21(a) institutions should analyse the segmentation of exposures and consider whether there were any changes to the scope of application of the considered model over the period covered by the data used in developing the model for assigning obligors or exposures to grades or pools. Where such changes were observed institutions should analyse the risk drivers relevant for the change of the scope of application of the model by comparing their distribution in the RDS before and after the change as well as with the distribution of those risk drivers in the application portfolio. For this purpose institutions should apply statistical methodologies such as cluster analysis or similar techniques to demonstrate representativeness. In the case of pooled models the analysis should be performed with regard to the part of the scope of the model that is used by an institution.
23. For the purpose of paragraph 21(b) institutions should ensure that the definition of default underlying the data used for model development is consistent over time and, in particular, that it is consistent with all of the following:
 - (a) that adjustments have been made to achieve consistency with the current default definition where the default definition has been changed during the observation period;
 - (b) that adequate measures have been adopted by the institution, where the model covers exposures in several jurisdictions having or having had different default definitions;
 - (c) that the definition of default in each data source has been analysed separately;
 - (d) that the definition of default used for the purposes of model development does not have a negative impact on the structure and performance of the rating model, in terms of risk differentiation and predictive power, where this definition is different from the definition of default used by the institution in accordance with Article 178 of Regulation (EU) No 575/2013.
24. For the purpose of paragraph 21(c) institutions should analyse the distribution and range of values of key risk characteristics of the data used in developing the model for risk differentiation in comparison with the application portfolio. With regard to LGD models, institutions should perform such analysis separately for non-defaulted and defaulted exposures.
25. Institutions should analyse the representativeness of the data in terms of the structure of the portfolio by relevant risk characteristics based on statistical tests specified in their policies to ensure that the range of values observed on these risk characteristics in the application portfolio is adequately reflected in the development sample. Where the application of statistical tests is not possible, institutions should carry out at least a qualitative analysis on the basis of the descriptive statistics of the structure of the portfolio, taking into account the possible seasoning effects referred to in Article 180(2)(f) of Regulation (EU) No 575/2013. When considering the results of this analysis, institutions should take into account the sensitivity of the risk characteristics to economic conditions. Material differences in the key risk characteristics between the data sample and the application portfolio should be



addressed, for example by using another data sample or a subset of observations or by adequately reflecting these risk characteristics as risk drivers in the model.

26. For the purpose of paragraph 21(d) institutions should analyse whether, over the relevant historical observation period, there were significant changes in their lending standards or recovery policies or in the relevant legal environment, including changes in insolvency law, legal foreclosure procedures and any legal regulations related to realisation of collaterals, which may influence the level of risk or the distribution or ranges of the risk characteristics in the portfolio covered by the considered model. Where institutions observe such changes they should compare the data included in the RDS before and after the change of the policy. Institutions should ensure comparability of the current underwriting or recovery standards with those applied to the observations included in the RDS and used for model development.
27. Within the PD model the representativeness of data used in developing the model for risk differentiation does not require that the proportion of defaulted and non-defaulted exposures in this dataset be equal to the proportion of defaulted and non-defaulted exposures in the institution's application portfolio. However, institutions should have a sufficient number of defaulted and non-defaulted observations in the development dataset and they should document the difference.

4.2.4 Representativeness of data for calibration of risk parameters

28. In order for institutions to ensure that the data used in risk quantification is representative of the application portfolio covered by the relevant model in accordance with Sub-section 2 of Section 6 of Chapter 3 in Part Three of Regulation (EU) No 575/2013 and Article 45(2) of the RTS on IRB assessment methodology, institutions should analyse the comparability of the data used for the purpose of calculating long-run average default rates or long-run average LGDs as referred to in Article 179(1)(d) of Regulation (EU) No 575/2013 and, where relevant, the representativeness of the pool in accordance with Article 179(2)(b) of that Regulation, in terms of all of the following:
 - (a) the scope of application;
 - (b) the definition of default;
 - (c) the distribution of the relevant risk characteristics;
 - (d) the current and foreseeable economic or market conditions;
 - (e) lending standards and recovery policies.
29. For the purpose of paragraph 28(a) institutions should perform an analysis as specified in paragraph 22.
30. For the purpose of paragraph 28(b) and in order to ensure that the definition of default underlying the data used for risk quantification from each data source is consistent with the requirements of Article 178 of Regulation (EU) No 575/2013, institutions should compare the

definition of default applied by the institution currently with the definitions used for the observations included in the dataset used for risk quantification. Where the definition of default has changed during the historical observation period institutions should assess the representativeness of historical data included in the RDS and used for risk quantification in the same way as specified for external data in Chapter 6 of the EBA Guidelines on the application of the definition of default under Article 178 of Regulation (EU) No 575/2013. Where the definition of default has changed during the historical observation period more than once, institutions should perform the analysis of each of the past definitions of default separately.

31. For the purpose of paragraph 28(c) institutions should perform an appropriate analysis to ensure that at the level of the calibration segment the ranges of values of the key risk characteristics in the application portfolio are comparable to those in the portfolio constituting the reference data set for risk quantification to the degree required to ensure that the risk quantification is not biased.
32. For the purpose of paragraph 28(d) institutions should perform the analysis of the market and economic conditions underlying the data in the following manner:
 - (a) with regard to the PD estimation, in accordance with section 5.3.4;
 - (b) with regard to the LGD estimation, in accordance with section 6.3.2 and taking into account the consideration of economic downturn as required by Article 181(1)(b) of Regulation (EU) No 575/2013.
33. For the purpose of paragraph 28(e) institutions should analyse whether there were significant changes in the lending standards or recovery policies over the relevant historical observation period that may influence the level of risk or the distribution or ranges of the characteristics of relevant risk drivers in the portfolio covered by the considered model. Where institutions observe such changes they should analyse the potential bias in the estimates of risk parameters resulting from these changes in the following manner:
 - (c) with regard to the PD estimation, in terms of the level of default rates and the likely range of variability of default rates;
 - (d) with regard to the LGD estimation, in terms of loss rates, average duration of the recovery processes, frequencies of use of certain recovery scenarios and the loss severity distributions.
34. Where the representativeness of data assessed in accordance with paragraphs 28 to 33 is insufficient and leads to a bias or increased uncertainty of risk quantification, institutions should introduce an appropriate adjustment to correct the bias and they should apply a margin of conservatism in accordance with section 4.4.

4.3 Human judgement in estimation of risk parameters

35. In order for institutions to complement their statistical models with human judgement, as referred to in Articles 174(b), 174(e), 175(4), 179(1)(a) and 180(1)(d) of Regulation (EU) No 575/2013, they should do all of the following:

- (a) assess the modelling assumptions and whether the selected risk drivers contribute to the risk assessment in line with their economic meaning;
- (b) analyse the impact of the human judgement on the performance of the model and ensure that any form of human judgement is properly justified;
- (c) document the application of human judgement in the model, including at least the criteria for the assessment, rationale, assumptions, experts involved and description of the process.

4.4 Treatment of deficiencies and margin of conservatism

4.4.1 Identification of deficiencies

36. Institutions should identify all deficiencies related to the estimation of risk parameters that lead to a bias in the quantification of those parameters or to an increased uncertainty that is not fully captured by the general estimation error, and classify each deficiency into one of the following categories:

- (a) Category A: Identified data and methodological deficiencies;
- (b) Category B: Relevant changes to underwriting standards, risk appetite, collection and recovery policies and any other source of additional uncertainty.

37. For the purposes of identifying and classifying all deficiencies referred to in paragraph 36 institutions should take into account all relevant deficiencies in methods, processes, controls, data or IT systems that have been identified by the credit risk control unit, validation function, internal audit function or any other internal or external review and should analyse at least all of the following potential sources of additional uncertainty in risk quantification:

- (a) under category A:
 - (i) missing or materially changed default triggers in historical observations, including changed criteria for recognition of materially past due credit obligations;
 - (ii) missing or inaccurate date of default;
 - (iii) missing, inaccurate or outdated rating assignment used for assessing historical grades or pools for the purpose of calculation of default rates or average realised LGDs per grade or pool;

- (iv) missing or inaccurate information on the source of cash flows;
 - (v) missing, inaccurate or outdated data on risk drivers and rating criteria;
 - (vi) missing or inaccurate information used for the estimation of future recoveries as referred to in paragraph 159;
 - (vii) missing or inaccurate data for the calculation of economic loss;
 - (viii) limited representativeness of the historical observations due to the use of external data;
 - (ix) potential bias stemming from the choice of the approach to calculating the average of observed one year default rates in accordance with paragraph 80;
 - (x) necessity of adjusting the average of observed one-year default rates in accordance with paragraph 86;
 - (xi) missing information for the purpose of estimating loss rates or for the purpose of reflecting economic downturn in LGD estimates;
- (b) under category B:
- (i) changes to underwriting standards, collection or recovery policies, risk appetite or other relevant internal processes;
 - (ii) unjustified deviations in the ranges of values of the key risk characteristics of the application portfolio compared with those of the dataset used for risk quantification;
 - (iii) changes to market or legal environment;
 - (iv) forward-looking expectations regarding potential changes in the structure of the portfolio or the level of risk, especially based on actions or decisions that have already been taken but which are not reflected in the observed data.

4.4.2 Appropriate adjustment

38. In order to overcome biases in risk parameter estimates stemming from the identified deficiencies referred to in paragraphs 36 and 37, institutions should apply adequate methodologies to correct the identified deficiencies to the extent possible. The impact of these methodologies on the risk parameter ('appropriate adjustment'), which should result in a more accurate estimate of the risk parameter ('best estimate'), represents either an increase or a decrease in the value of the risk parameter. Institutions should ensure and provide evidence that the application of an appropriate adjustment results in a best estimate.
39. Institutions should document the methods used to apply appropriate adjustments to rectify the identified deficiencies, where relevant, as well as their justification.

40. Institutions should regularly monitor the adequacy of appropriate adjustments. The adoption of an appropriate adjustment by institutions should not replace the need to address the identified deficiencies.

4.4.3 Margin of conservatism

41. In relation to the requirement that institutions should add a margin of conservatism ('MoC') that is related to the expected range of estimation errors as required by Articles 179(1)(f) and 180(1)(e) of Regulation (EU) No 575/2013, institutions should implement a framework for quantification, documentation and monitoring of estimation errors.
42. The final MoC on a risk parameter estimate should reflect the uncertainty of the estimation in all of the following categories:

Category A: MoC related to data and methodological deficiencies identified under category A as referred to in paragraph 36(a);

Category B: MoC related to relevant changes to underwriting standards, risk appetite, collection and recovery policies and any other source of additional uncertainty identified under category B as referred to in paragraph 36(b);

Category C: the general estimation error.

43. In order to quantify MoC institutions should do all of the following:
- (a) quantify MoC for the identified deficiencies referred to in paragraphs 36 and 37, to the extent not covered by the general estimation error, at least for each of the categories A and B at the level of the calibration segment ensuring that:
 - (i) where appropriate adjustments in the sense of paragraph 38 are used, the MoC accounts for any increase in the uncertainty or additional estimation error associated with these adjustments;
 - (ii) the MoC at category level related to the appropriate adjustments is proportionate to the uncertainty around these adjustments;
 - (iii) the MoC is applied to address the uncertainty of the risk parameter estimate stemming from any deficiencies among those referred to in paragraphs 36 and 37 that have not been corrected via appropriate adjustments as referred to in point (i);
 - (b) quantify the general estimation error of category C referred to in paragraph 42 associated with the underlying estimation method at least for every calibration segment; the MoC for the general estimation error should reflect the dispersion of the distribution of the statistical estimator.

44. For the purpose of paragraph 43(a) and for each of the categories A and B, institutions may group all or selected deficiencies, where justified, for the purpose of quantifying MoC.
45. Institutions should quantify the final MoC as the sum of:
 - (a) the MoC under category A as referred to in paragraph 43(a);
 - (b) the MoC under category B as referred to in paragraph 43(a);
 - (c) the MoC for the general estimation error (category C) as referred to in paragraph 43(b).
46. Institutions should add the final MoC to the best estimate of the risk parameter.
47. Institutions should ensure that the impact of the final MoC does not result in lowering the risk parameter estimates and in particular that:
 - (a) the MoC stemming from the general estimation error is greater than zero;
 - (b) the MoC stemming from each of the categories A and B is proportionate to the increased uncertainty in the best estimate of risk parameters caused by the identified deficiencies listed in each category. In any case, the MoC under each of the categories A and B should be greater than or equal to zero.
48. Institutions should consider the overall impact of the identified deficiencies and the resulting final MoC on the soundness of the model and ensure that the estimates of the risk parameters and the resulting own funds requirements are not distorted by the necessity for excessive adjustments.
49. For each rating system, the MoC applied should be documented in the relevant model documentation and methodology manuals. The documentation should contain at least the following:
 - (a) a complete list of all identified deficiencies, including errors and uncertainties, and the potentially affected model components or risk parameters;
 - (b) the category under which these deficiencies are classified, as referred to in paragraph 42;
 - (c) a description of the methods for quantification of the MoC related to identified deficiencies as referred to in paragraph 43(a) and in particular the methodologies used to quantify the MoC per category.
50. Institutions should regularly monitor the levels of the MoC. The adoption of a MoC by institutions should not replace the need to address the causes of errors or uncertainties, or to correct the models to ensure their full compliance with the requirements of Regulation (EU) No 575/2013. Following an assessment of the deficiencies or the sources of uncertainty,



institutions should develop a plan to rectify the data and methodological deficiencies as well as any other potential source of additional uncertainty and reduce the estimation errors within a reasonable timeframe, taking into consideration the materiality of the estimation error and the materiality of the rating system.

51. When reviewing the levels of the MoC institutions should ensure all of the following:
- (a) that the MoC stemming from categories A and B referred to in paragraphs 36 and 37 is included in internal reporting separately for each category and may be reduced over time and eventually eliminated once the deficiencies are rectified in all parts of the rating system that were affected;
 - (b) that the MoC stemming from the general estimation error referred to in paragraph 43(b) is included in internal reporting in a separate category ('C');
 - (c) that the level of the MoC is assessed as part of the regular reviews referred to in Chapter 9 and in particular that the level of MoC related to the general estimation error remains appropriate after the inclusion of the most recent data relevant for the risk parameter estimation.
52. Institutions should ensure that necessary changes in the MoC are implemented in a timely manner.

5 PD estimation

5.1 General requirements specific to PD estimation

53. For the purpose of assigning obligors to an obligor grade as part of the credit approval process in accordance with Article 172(1)(a) of Regulation (EU) No 575/2013 as well as for the purpose of the review of those assignments, in accordance with Article 173(1)(b) of that Regulation, institutions should ensure that each and every natural or legal person towards whom an IRB exposure exists is rated by the institution with the model approved to be used on a given type of exposures. This model should fit the single original obligor within the applicable rating system, including exposures secured by unfunded credit protection as referred to in Article 161(3) of that Regulation.
54. For the purpose of assigning retail exposures to a grade or pool as part of the credit approval process in accordance with Article 172(2) of Regulation (EU) No 575/2013 as well as for the purpose of the review of those assignments in accordance with Article 173(2) of that Regulation, institutions should ensure that each and every IRB exposure is rated by the institution with the model approved to be used on a given type of exposures. This model should fit the single original obligor or exposure within the applicable rating system, including exposures secured by unfunded credit protection as referred to in Article 164(2) of that Regulation.
55. A PD model can contain several different methods for ranking the obligors or exposures as well as various calibration segments.

5.2 Model development in PD estimation

5.2.1 Data requirements specific for model development

56. For the purpose of model development, institutions should ensure that the RDS contains the values of the risk drivers for appropriate points in time. These points in time may vary between different risk drivers. In the selection of appropriate points in time institutions should take into account the dynamics as well as the update frequency of the risk drivers throughout the whole period in which an obligor was in the portfolio and, in the case of a default, throughout the year prior to default.

5.2.2 Risk drivers and rating criteria

57. In the process of selecting risk drivers and rating criteria, institutions should consider a broad set of information relevant to the type of exposures covered by the rating system. Potential risk drivers analysed by institutions should include in particular the following:



- (a) obligor characteristics, including sector and geographic location for corporates;
 - (b) financial information, including financial statements or income statements;
 - (c) trend information, including growing or shrinking sales or profit margin;
 - (d) behavioural information, including delinquency and the use of credit facilities.
58. Institutions should ensure that for the purpose of selecting risk drivers and rating criteria the relevant experts from business areas of the institution are consulted with respect to the business rationale and risk contribution of the considered risk drivers and rating criteria.
59. Institutions should ensure that the decrease of reliability of information over time, for instance of information on obligor characteristics obtained at the time of the loan origination, is appropriately reflected in the PD estimation. Institutions should also ensure that the model estimates the proper level of risk with respect to all relevant, currently available and most up-to-date information and that an adequate MoC is applied where a higher degree of uncertainty exists due to the lack of up-to-date information. In particular the model or the assignment process should provide for an adequate and conservative adjustment in both of the following situations:
- (a) in accordance with Article 24(1)(g) of the RTS on IRB assessment methodology, in case of financial statements older than 24 months where information stemming from these financial statements is a relevant risk driver;
 - (b) in the case of credit bureau information that is older than 24 months, if still relevant at that point in time, where credit bureau information is a relevant risk driver.
60. Institutions should use the risk drivers and rating criteria consistently, in particular with respect to the considered time horizon, in model development, model calibration and model application.
61. Where there is a significant proportion of customers using multiple facilities of the same type within a considered retail rating system institutions should analyse the level of risk of such customers compared with customers carrying only one facility of the relevant type and, where necessary, reflect the difference in the level of risk in the model through appropriate risk drivers.

5.2.3 Treatment of ratings of third parties

62. Institutions should have clear policies specifying the conditions under which the rating of a third party who has a contractual or organisational relation with an obligor of the institution may be taken into account in the assessment of risk of the considered obligor. Such policies should take into account the following possible manners in which the rating of such a third party may be taken into account in the assessment of risk of the considered obligor:



- (a) the rating of such third party being transferred to a relevant obligor ('rating transfer'), where there is no difference in risk between the obligor and the related party because of the existence of an appropriate guarantee and the rating of a third party is assigned internally in accordance with the rating system for which the institution has received permission in accordance with Article 143(2) of Regulation (EU) No 575/2013;
 - (b) the rating of a such third party being taken into account as an indication for an override of the assignment of the relevant obligor to a grade or pool;
 - (c) the rating of such a third party serving as an input to the PD model, reflecting contractual support of the related party for the obligor.
63. In order for an internal or external ratings of a third party to be incorporated into a PD model, institutions should ensure all of the following:
- (a) that the rating of a third party fulfils all the requirements for relevant risk drivers set out in section 5.2.2;
 - (b) that other relevant obligor and transaction risk characteristics are properly reflected in the model in accordance with Articles 170(1)(a) and 170(3)(a) of Regulation (EU) No 575/2013, and that no material biases are introduced by a high weighting of the internal or external rating information;
 - (c) that there is no double counting of effects of any relations to third parties.
64. A rating transfer should not change the assignment of exposures to exposure classes, rating systems or models, but should only affect the assignment to grades or pools. Rating transfers should be set up in such a way that any changes to a rating of a third party which is material information on the obligor or exposure with regard to Article 173(1)(b) of Regulation (EU) No 575/2013 is reflected in all influenced ratings in a timely manner.
65. The material contractual support granted by an obligor to a third party should be seen as diminishing the free financial strength of the supporting obligor, including the strength to repay all obligations to the institution in full. This should be reflected in the rating of the supporting obligor.

5.2.4 Rating philosophy

66. Institutions should choose an appropriate philosophy underlying the assignment of obligors or exposures to grades or pools ('rating philosophy') taking into account all of the following principles:
- (a) Institutions should assess whether the method used to quantify the risk parameter is adequate for the rating philosophy and understand the characteristics and dynamics of the assignment of obligors or exposures to grades or pools ('rating assignment') and of the risk parameter estimates that result from the method used.



- (b) Institutions should assess the adequacy of the resulting characteristics and dynamics of the rating assignment and risk parameter estimates that result from the method used, with regard to their various uses and should understand their impact on the dynamics and volatility of own funds requirements.
 - (c) The rating philosophy should also be taken into account for back testing purposes. Philosophies sensitive to economic conditions tend to estimate PDs that are better predictors of each year's default rates. On the other hand, philosophies less sensitive to economic conditions tend to estimate PDs that are closer to the average PD across the various states of the economy, but that differ from observed default rates in years where the state of the economy is above or below its average. Deviations between observed default rates and the long-run average default rate of the relevant grade will hence be more likely in rating systems less sensitive to economic conditions. In contrast, migrations among grades will be more likely in rating systems which are more sensitive to economic conditions. These patterns should be taken into account when assessing the results of back-testing and, where relevant, benchmarking analysis.
67. Institutions should apply the chosen rating philosophy consistently over time. Institutions should analyse the appropriateness of the philosophy underlying the assignment of obligors or exposures to grades or pools ('rating philosophy'), taking into account all of the following:
- (a) design of risk drivers;
 - (b) migration across grades or pools;
 - (c) changes in the yearly default rates of each grade or pool.
68. Where institutions use different rating systems characterised by different rating philosophies, they should use the information on the rating assignments or risk parameters estimates with caution, especially when making use of rating information or default experience obtained from external rating agencies. Where institutions use different rating systems with different characteristics, such as different philosophies or different levels of objectivity, accuracy, stability, or conservatism, they should ensure that the rating systems have an appropriate level of consistency and that any differences between them are well understood. Such understanding should at least enable the institution to define an appropriate way to combine or aggregate the information produced by the various rating systems when this is necessary according to the institution's policies. Institutions should have full understanding of the assumptions and potential inaccuracies arising from such a combination or aggregation.

5.2.5 Homogeneity of obligor grades or pools

69. In order to comply with the requirements of Article 170(1) and 170(3)(c) of Regulation (EU) No 575/2013 and of Article 38 of the RTS on IRB assessment methodology, institutions should check the homogeneity of obligors or exposures assigned to the same grades or pools. In particular, grades should be defined in such a manner that each obligor within each grade or

pool has a reasonably similar risk of default and that significant overlaps of the distributions of the default risk between grades or pools are avoided.

5.3 PD calibration

5.3.1 Data requirements for the calculation of observed default rates

70. For the purpose of calculating the one-year default rate defined in point (78) of Article 4(1) of Regulation (EU) No 575/2013, institutions should ensure the completeness of the quantitative and qualitative data and other information in relation to the denominator and numerator as outlined in paragraphs 73 and 74 and used for the calculation of the observed average default rate. In particular, institutions should ensure that at least the following data for the relevant observation period referred to in paragraphs 82 to 83 is properly stored and available:
- (a) the criteria for identifying the relevant type of exposures covered by the PD model under consideration;
 - (b) the criteria for identifying the calibration segments;
 - (c) the risk drivers used for risk differentiation; where a newly relevant risk driver has been included in the model for which no historical data is available institutions should, make efforts to minimise missing data on risk drivers over time as outlined in paragraph 51(a), and apply an appropriate adjustment and a MoC in accordance with section 4.4;
 - (d) all identification numbers of obligors and exposures relevant for default rate calculation, taking into account situations where the identification number has changed over time, including changes due to restructuring of exposures.
71. Exclusion of observations from the one-year default rate calculation should be undertaken only in the following two situations:
- (a) obligors wrongly included in the data set of defaults, as they did not default in the meaning of the definition of default pursuant to Article 178 of Regulation (EU) No 575/2013 as further specified in the Guidelines on the application of the definition of default of an obligor under that Article should not be included in the numerator of the one-year default rate;
 - (b) obligors wrongly assigned to the considered rating model, despite not falling in the range of application of that rating model, should be excluded from both the numerator and the denominator of the one-year default rate.
72. Institutions should document all data cleansing in accordance with Article 32(3)(b) of the RTS on IRB assessment methodology, with respect to the one-year default rate calculation and in particular:

- (a) for non-retail PD models, a list of all observations within the dataset that were excluded according to paragraph 71, with a case-by-case justification;
- (b) for retail PD models, information on the reasons and quantity of exclusions of observations made in accordance with paragraph 71.

5.3.2 Calculation of one-year default rates

73. For the purpose of calculating the one-year default rate referred to in point (78) of Article 4(1) of Regulation (EU) No 575/2013, institutions should ensure both of the following:
- (a) that the denominator consists of the number of non-defaulted obligors with any credit obligation observed at the beginning of the one-year observation period; in this context a credit obligation refers to both of the following:
 - (i) any on balance sheet item, including any amount of principal, interest and fees;
 - (ii) any off-balance sheet items, including guarantees issued by the institution as a guarantor.
 - (b) that the numerator includes all those obligors considered in the denominator that had at least one default event during the one-year observation period.
74. When assigning the obligors or exposures to grades or pools for the purpose of the one-year default rate calculation, institutions should take overrides into account, but they should not reflect in this assignment any substitution effects due to credit risk mitigation, nor any ex post conservative adjustments introduced in accordance with section 8.1. Where the one-year default rate is calculated by rating grade or pool, the denominator should refer to all obligors assigned to a rating grade or pool at the beginning of the observation period. Where the one-year default rate is calculated at the portfolio level, the denominator should refer to all obligors assigned to the relevant calibration segment at the beginning of the observation period.
75. Institutions should calculate the one-year default rate also for the subset of obligors with any credit obligation that did not have a rating at the start of the relevant observation period, but which were within the range of application of the model under consideration ('missing ratings'), even if these obligors were assigned to a rating grade or pool in a conservative manner for the purpose of calculation of own funds requirements. Obligor whose ratings are based on missing or partly missing information or where the rating is outdated but still deemed valid by the institution should not be considered as missing ratings.
76. For the purposes of paragraphs 73 to 75 an obligor has to be included in the denominator and, where relevant, numerator, also in the case of a migration to a different rating grade, pool or rating model, rating system or approach to calculation of capital requirements within the observation period or where the corresponding credit obligations were sold, written off,

repaid or otherwise closed during the observation period. Institutions should analyse whether such migrations or sales of credit obligations bias the default rate and, if so, they should reflect this in an appropriate adjustment and consider an adequate MoC.

77. In any case institutions should ensure that each defaulted obligor is counted only once in the numerator and denominator of the one-year default rate calculation, even where the obligor defaulted more than once during the relevant one-year period.
78. In order to choose an appropriate calculation approach as required by paragraph 80, institutions should evaluate the observed one year default rates within the historical observation period at least quarterly.

5.3.3 Calculation of the observed average default rate

79. The observed average of one-year default rates ('observed average default rate') should be calculated for each rating grade or pool and additionally for the type of exposures covered by the relevant PD model as well as for any relevant calibration segment.
80. Institutions should choose an appropriate approach between an approach based on overlapping and an approach based on non-overlapping one-year time windows, to calculate the observed average default rate based on a documented analysis. This analysis should include at least the following:
 - (a) an analysis of possible bias due to the proportion of short-term and terminated contracts that cannot be observed during the relevant one-year periods;
 - (b) an analysis of possible bias due to the specific calculation dates chosen;
 - (c) for institutions using overlapping one-year time windows, an analysis of potentially significant bias due to implicit over-weighting of the overlapping time period;
 - (d) an analysis of potentially significant bias due to seasonal effect related to the chosen calculation dates.
81. For the purposes of paragraphs 79 and 80 institutions should calculate the observed average default rates as the arithmetic average of all one year default rates calculated in accordance with paragraphs 73 to 76. In the case of PD models for retail exposure class institutions may calculate the observed average default rate as a weighted average of one-year default rates where an institution does not give equal importance to historic data because more recent data is a better predictor of losses in accordance with Article 180(2)(e) of Regulation (EU) No 575/2013.

5.3.4 Long-run average default rate

82. For the purpose of determining the historical observation period referred to in Articles 180(1)(h) and 180(2)(e) of Regulation (EU) No 575/2013, additional observations to the most recent 5 years, at the time of model calibration, should be considered relevant when these



observations are required in order for the historical observation period to reflect the likely range of variability of default rates of that type of exposures as referred to in Article 49(3) of the RTS on IRB assessment methodology.

83. For the purpose of assessing the representativeness of the historical observation period referred to in paragraph 82 for the likely range of variability of one-year-default rates, institutions should assess whether the historical observation period contains a representative mix of good and bad years, and they should take into account all of the following:

- (a) the variability of all observed one-year-default rates;
- (b) the existence, lack or prevalence of one-year default rates relating to bad years as reflected by economic indicators that are relevant for the considered type of exposures within the historical observation period;
- (c) significant changes in the economic, legal or business environment within the historical observation period.

84. Where the historical observation period referred to in paragraph 82 is representative of the likely range of variability of the default rates, the long-run average default rate should be computed as the observed average of the one-year default rates in that period.

85. Where the historical observation period referred to in paragraph 82 is not representative of the likely range of variability of default rates as referred to in Article 49(4) of the RTS on IRB assessment methodology, institutions should apply the following:

- (a) where no or insufficient bad years are included in the historical observation period the average of observed one year default rates should be adjusted in order to estimate a long-run average default rate;
- (b) where bad years are over-represented in the historical observation period, the average of observed one-year default rates may be adjusted to estimate a long-run average default rate where there is a significant correlation between economic indicators referred to in paragraph 83(b) and the available one-year default rates.

Institutions should ensure that, as a result of the adjustments referred to in points (a) and (b), the adjusted long-run average default rate reflects the likely range of variability of default rates.

86. In the exceptional case where the long-run average default rate is below the average of all observed one-year default rates due to any adjustment made in accordance with paragraph 85, institutions should compare their adjusted long-run average default rates with the higher of the following:

- (a) the observed average of the one-year default rates of the most recent 5 years;
- (b) the observed average of all available one-year default rates.

Institutions should justify the direction and magnitude of the adjustment, including the adequacy of the considered MoC, in line with the requirement in Article 49(4)(b) of the RTS on IRB assessment methodology and section 4.4. In addition, where the adjusted long-run average default rate is lower than the higher of the two values referred to in points (a) and (b), they should specifically justify why these two values are not appropriate.

5.3.5 Calibration to the long-run average default rate

87. Institutions should have sound and well-defined processes in place which ensure sound calibration by including all of the following in their calibration process:

- (a) quantitative calibration tests by rating grade or pool;
- (b) quantitative calibration tests on calibration segment level;
- (c) supplementary qualitative analyses such as expert judgements on the shape of the resulting obligor distribution, minimum obligor numbers per grade and avoidance of undue concentration in certain grades or pools.

88. Institutions should store and describe in the documentation of the PD model the calibration sample associated with each calibration segment. In order to ensure compliance with Article 180(1)(a) or 180(2)(a) of Regulation (EU) No 575/2013, institutions should find an appropriate balance between the comparability of the calibration sample with the application portfolio in terms of obligor and transaction characteristics and its representativeness of the likely range of variability of default rates as referred to in section 5.3.4.

89. Institutions should conduct the calibration after taking into account any overrides applied in the assignment of obligors to grades or pools, and before the application of MoC or floors to PD estimates as referred to in Articles 160(1) and 163(1) of Regulation (EU) No 575/2013. Where a ranking method or overrides policy has changed over time, institutions should analyse the effects of these changes on the frequency and scope of overrides and take them into account appropriately.

90. The process of grouping ranked obligors or exposures to grades or pools, in particular where institutions conduct this grouping by identification of intervals of score values reflecting a predefined PD level assigned to a grade of a master scale, may be performed during the calibration.

91. Taking into account the availability of data, the structure of the model and portfolio as well as the business requirements, institutions should choose an appropriate method to perform the calibration in accordance with the following principles:

- (a) institutions may choose one of the following types of calibration:
 - (i) a calibration in accordance with Article 180(1)(a) or 180(2)(a) of Regulation (EU) No 575/2013;



- (ii) a calibration in accordance with Article 169(3) of Regulation (EU) No 575/2013 in combination with Article 180(1)(a) or 180(2)(a) of that Regulation if a continuous rating scale is used;
 - (b) for exposures to corporates, institutions, central governments and central banks and for equity exposures where an institution uses the PD/LGD approach set out in Article 155(3) of Regulation (EU) No 575/2013, institutions may choose one of the following types of calibration:
 - (i) a calibration based on a mapping to the rating scale used by an external credit assessment institution (ECAI) or similar organisation in accordance with Article 180(1)(f) of Regulation (EU) No 575/2013;
 - (ii) for a statistical default prediction model, in accordance with Section 4 of the RTS on IRB assessment methodology, where the PDs are estimated as simple averages of default probability estimates for individual obligors in a given grade or pool in accordance with Article 180(1)(g) of Regulation (EU) No 575/2013, a calibration at the level of appropriate calibration segments of the relevant default probability estimates;
 - (c) for retail exposures institutions may choose a calibration based on total losses and LGDs in accordance with Articles 180(2)(b) and 180(2)(d) of Regulation (EU) No 575/2013;
 - (d) for corporate purchased receivables institutions may choose a calibration based on expected losses and LGDs in accordance with Articles 180(1)(b) and 180(1)(c) of Regulation (EU) No 575/2013.
92. For the purpose of determining the PD estimates referred to in paragraph 91, the calibration should consider either:
- (a) the long-run average default rate at the level of grade or pool, in which case institutions should provide additional calibration tests at the level of the relevant calibration segment; or
 - (b) the long-run average default rate at the level of the calibration segment, in which case institutions should provide additional calibration tests at the level of the relevant grades or pools or, where they use direct PD estimates in accordance with Article 169(3) of Regulation (EU) No 575/2013, at a level that is appropriate for the application of the probability model.
93. Irrespective of which of the approaches mentioned in paragraph 92 institutions choose, they should assess the potential effect of the chosen calibration method on the behaviour of PD estimates over time.



94. For the purpose of determining PD estimates based on a mapping to an external rating scale as referred to in paragraph 91(b)(i)), institutions should base the default rates observed for the external organisation's grades on a time series representative of the likely range of variability of default rates for the grades and pools of the given portfolio.
95. Where institutions derive PD estimates from the estimates of losses and LGDs in accordance with Articles 161(2) and 180(2)(b) of Regulation (EU) No 575/2013 they should use a RDS that includes realised losses on all defaults identified during the historical observation period specified in accordance with section 6.3.2.1 and relevant drivers of loss.
96. In order to use direct PD estimates for the calculation of own funds requirements in accordance with Article 169(3) of Regulation (EU) No 575/2013, institutions should demonstrate that the theoretical assumptions of the probability model underlying the estimation methodology are met to a sufficient extent in practice and that the long-run average default rate is retained. In particular, all data and representativeness requirements should be met, including those in Article 174(c) of Regulation (EU) No 575/2013, and the definition of default should be applied in accordance with Article 178 of Regulation (EU) No 575/2013. Under no circumstances should the use of continuous PDs or any smoothing of default rates be adopted in order to overcome the lack of data, low discriminatory capacity or any other deficiencies in the rating assignment or PD estimation process, or to reduce the own funds requirements.
97. Institutions may split exposures covered by the same PD model into as many different calibration segments as needed where one or more subsets of these exposures carry a significantly different level of risk. For this purpose institutions should use relevant segmentation drivers and they should justify and document the use and scope of the calibration segments.
98. Where scoring methods are used, institutions should ensure that:
 - (a) where there is a change in the scoring method used, the institutions consider whether it is necessary to recalculate scores of obligors or exposures based on the original dataset instead of using scores that were calculated based on previous versions of the scoring method, and, where such recalculation is not possible, that institutions assess potential effects and take those effects into account via an appropriate increase of the MoC to their PD estimates;
 - (b) where Article 180(1)(g) of Regulation (EU) No 575/2013 applies, the PD estimates which were derived as a simple average of individual PD estimates are adequate for relevant grades, by applying calibration tests to these estimates at a grade level, on the basis of one-year default rates representative of the likely range of variability of default rates.
99. The calibration should not influence the rank ordering of obligors or exposures within a calibration segment other than within each grade or pool.

6 LGD estimation

6.1 General requirements specific to LGD estimation

6.1.1 LGD estimation methodologies

100. Institutions that have obtained permission to use own estimates of LGD in accordance with Article 143(2) of Regulation (EU) No 575/2013 should assign an LGD estimate to each non-defaulted exposure and an estimate of LGD in-default and EL_{BE} to each defaulted exposure within the range of application of the rating system subject to such permission in accordance with Articles 172 and 173 of Regulation (EU) No 575/2013. Institutions should estimate LGDs for all facility grades of the distinct facility rating scale or for all pools that are incorporated in the rating system. For the purpose of LGD estimation institutions should treat each defaulted facility as a distinct default observation, unless more than one independent defaults were recognised on a single facility which do not meet the conditions of paragraph 101.
101. For the purpose of LGD estimation, with regard to defaults recognised on a single facility, where the time between the moment of the return of the exposure to non-defaulted status and the subsequent classification as default is shorter than nine months, institutions should treat such exposure as having been constantly defaulted from the first moment when the default occurred. Institutions may specify a period longer than nine months for the purpose of considering two subsequent defaults as a single default in the LGD estimation, if this is adequate to the specific type of exposures and reflects the economic meaning of the default experience.
102. Institutions should estimate their own LGDs based on their own loss and recovery experience, as it is reflected in historical data on defaulted exposures. Institutions may supplement their own historical data on defaulted exposures with external data. In particular, institutions should not derive their LGD estimates only from the market prices of financial instruments, including, but not limited to, marketable loans, bonds or credit default instruments, but they may use this information to supplement their own historical data.
103. Where in the case of retail exposures and purchased corporate receivables institutions derive LGD estimates from realised losses and appropriate estimates of PDs in accordance with Articles 161(2) and 181(2)(a) of Regulation (EU) No 575/2013 they should ensure that:
 - (a) the process for estimating total losses meets the requirements of Article 179 of Regulation (EU) No 575/2013 and the outcome is consistent with the concept of LGD as set out in Article 181(1)(a) of this Regulation, as well as with the requirements specified in Chapter 6, in particular with the concept of economic loss as specified in section 6.3.1;

- (b) the process for estimating PD meets the requirements of Articles 179 and 180 of Regulation (EU) No 575/2013 as well as the requirements specified in Chapter 5.
104. An LGD model can contain several different methods, especially with respect to different types of collateral, which are combined to arrive at an LGD for a given facility.
105. Institutions should be able to demonstrate that the methods that they choose for the purpose of LGD estimation are appropriate to their activities and the type of exposures to which the estimates apply and they should be able to justify the theoretical assumptions underlying those methods. The methods used in the LGD estimation should in particular be consistent with the collection and recovery policies adopted by the institution and should take into account possible recovery scenarios as well as potential differences in the legal environment in relevant jurisdictions.
106. The methods used by the institution in the LGD estimation, the assumptions underlying these methods, the institution's consideration of any downturn effect, the length of data series used, the MoC, the human judgement and, where applicable, the choice of risk drivers, should be adequate to the type of exposures to which they are applied.

6.1.2 Data requirements for LGD estimation

107. For the purpose of LGD estimation institutions should use an RDS covering all of the following items:
- (a) all defaults identified during the historical observation period specified in accordance with section 6.3.2.1;
 - (b) all data necessary for calculating realised LGDs in accordance with section 6.3.1;
 - (c) relevant factors that can be used to group the defaulted exposures in meaningful ways and relevant drivers of loss, including their values at the moment of default and at least within the year before default when available.
108. Institutions should include in the RDS information on the results of the recovery processes, including recoveries and costs, related to each individual defaulted exposure. To this end institutions should include:
- (a) information on the results of incomplete recovery processes until the reference date for the LGD estimation;
 - (b) information on the results of recovery processes at portfolio level, where such aggregation of the information is justified, and in particular in the case of indirect costs and sale of a portfolio of credit obligations.
 - (c) information on external or pooled data used in the estimation of LGDs.

109. The RDS should contain at least the following information:

- (a) obligor-related, transaction-related and institution-related risk characteristics as well as external factors as referred to in paragraph 121 that are potential risk drivers at the relevant reference dates as specified in paragraph 122;
- (b) moment (date) of default;
- (c) all default triggers that have occurred, including both past due events and unlikelihood to pay events, even after the identification of default; in the case of exposures subject to distressed restructuring the amount by which the financial obligation has diminished calculated in accordance with the EBA Guidelines on the definition of default;
- (d) the outstanding amount of the exposure at the moment of default including principal, interest and fees;
- (e) the amounts and timing of the additional drawings after default;
- (f) the amounts and timing of write-offs;
- (g) the values of collaterals associated with the exposure and, where applicable, the type of valuation (such as market value or mortgage lending value as defined in points (74) and (76) of Article 4(1) of Regulation (EU) No 575/2013), date of valuation, a flag of whether the collateral has been sold and the sale price;
- (h) information on any dependence between the risk of the obligor and the risk of the collateral or collateral provider;
- (i) the types, amounts and maturities of unfunded credit protection including the specification and credit quality of the protection provider;
- (j) the amounts, timing and sources of recoveries;
- (k) the amounts, timing and sources of direct costs associated with recovery processes;
- (l) a clear identification of the type of termination of the recovery process;
- (m) where applicable, currency mismatches between two or more of the following elements: the currency unit used by the institution for financial statements, the underlying obligation, any funded or unfunded credit protection and any cash flows from the liquidation of the obligor's assets;
- (n) amount of realised loss.

110. In accordance with Article 229(1) of Regulation (EU) No 575/2013 institutions may use various methods for the valuation of the collateral in the form of immovable property

including in particular market value or mortgage lending value as defined in points (74) and (76) of Article 4(1) of that Regulation. Where institutions use various valuation approaches with regard to immovable properties that secure exposures included in the range of application of a certain rating system, they should collect and store in the RDS the information on the type of valuation and they should use this information consistently in the LGD estimation and in the application of LGD estimates.

111. Where institutions derive LGD estimates from realised losses and appropriate estimates of PDs in accordance with Articles 161(2) and 181(2)(a) of Regulation (EU) 575/2013 they should use a RDS that includes realised losses on all defaults identified during the historical observation period specified in accordance with section 6.3.2.1 and relevant drivers of loss.
112. Where aggregated information is collected and stored, institutions should develop an appropriate methodology for the allocation of recoveries and costs to individual defaulted exposures and should apply this methodology consistently across exposures and over time. In any case institutions should demonstrate that the process of allocation of recoveries and costs is effective and that it does not lead to biased LGD estimates.
113. Institutions should demonstrate that they collect and store in their databases all information required to calculate direct and indirect costs. All material indirect costs should be allocated to the corresponding exposures. This cost allocation process should be based on the same principles and techniques that institutions use in their own cost accounting systems. For the purpose of indirect cost allocation institutions may use methods based on exposure weighted averages, or statistical methods based on a representative sample within the population of defaulted obligors or facilities.
114. Institutions should take reasonable steps to recognise the sources of the cash flows and allocate them adequately to the specific collateral or unfunded credit protection that has been realised. Where the source of the cash flows cannot be identified, institutions should specify clear policies for the treatment and allocation of such recovery cash flows, which should not lead to a bias in LGD estimation.

6.1.3 Recoveries from collaterals

115. Institutions should recognise the recoveries as stemming from collaterals in all of the following situations:
 - (a) the collateral is sold by the obligor and the obtained price has been used to cover parts or all of the outstanding amount of the defaulted credit obligation;
 - (b) the collateral is repossessed or sold by the institution, the parent undertaking or any of its subsidiaries on behalf of the institution;
 - (c) the collateral is sold in a public auction of the property by court order or in a similar procedure in accordance with the applicable legal framework;



- (d) the credit obligation is sold together with the collateral and the sale price for the credit obligation included the existing collateral;
 - (e) in the case of leasing, the leasing object is sold by the institution;
 - (f) the collateral is realised by any other method that is eligible under the legal framework of the relevant jurisdiction.
116. For the purpose of point (b) of paragraph 115 institutions should determine the value of repossession as the value by which the credit obligation of the obligor has been diminished as a result of the repossession of the collateral, and with which the repossessed collateral was recorded as an asset on the balance sheet of the institution. Where these values are different institutions should consider the lower of the two the value of repossession. The value of repossession should be considered a value of recovery at the date of repossession and should be included in the calculation of the economic loss and realised LGD in accordance with section 6.3.1.
117. Institutions should consider whether the value of repossession adequately reflects the value of the repossessed collateral, consistently with any established internal requirements for collateral management, legal certainty and risk management. Where the collateral repossessed meets the criteria for high quality liquid assets at Level 1, as defined in Article 10 of Commission Delegated Regulation (EU) 2015/61, institutions may take into account directly as a realised recovery the market value of the collateral at the time of the repossession. In all other cases institutions should apply an appropriate haircut to the value of repossession and include in the calculation of economic loss a recovery in the amount of the value of repossession after applying the appropriate haircut. Institutions should estimate this haircut taking into account all of the following conditions:
- (a) the haircut should reflect possible errors in the valuation of the collateral at the moment of repossession taking into account the type of the valuation available at the moment of repossession, the date it was performed and the liquidity of the market for this type of asset;
 - (b) the haircut should be estimated with the assumption that the institution intends to sell the repossessed collateral to an independent third party and should reflect the potential price that could be achieved from such sale, the costs of the sale and the discounting effect for the period from the sale to the moment of repossession taking into account the liquidity of the market for this type of assets;
 - (c) where there are observations available regarding the repossessions and subsequent sales of similar types of collaterals the estimation of the haircut should be based on these observations and should be regularly backtested; for this purpose institutions should take into account all of the following:



- (i) the difference between the value of repossession and the sale price, especially where there were no significant changes in market and economic conditions between the moment of the repossession and the moment of the sale;
 - (ii) any income and costs related to this asset that were observed between the date of repossession and the moment of the sale;
 - (iii) discounting effects;
 - (iv) whether the institution repossessed the collateral with the intention of immediate sale or whether another strategy was adopted.
 - (d) where historical observations regarding the repossessions and subsequent sales of similar types of collaterals are not available the estimation of the haircut should be based on a case-by-case assessment, including the analysis of the current market and economic conditions;
 - (e) the fewer data an institution has on previous repossessions and the less liquid the market for the given type of assets is, the more uncertainty is attached to the resulting estimates, which should be adequately reflected in the MoC in accordance with section 4.4.3.
118. In any case the repossession of collateral should be recognised at the moment of repossession and should not prevent the institution from closing the recovery process in accordance with paragraph 155.
119. Any sale of credit obligations in accordance with point (d) of paragraph 115 should be included in the LGD estimation in a manner appropriate to the LGD estimation methodology taking into account all of the following conditions:
- (a) where institutions regularly sell credit obligations as part of their recovery processes, they should appropriately reflect the observations related to credit obligations subject to the sale in the model development process;
 - (b) where institutions do not regularly sell credit obligations as part of their recovery processes and the allocation of the part of the price related to collaterals is too burdensome to make or too unreliable, they may decide not to take these observations into account in the process of model development;
 - (c) institutions should not treat recoveries from the sales of the secured credit obligations as recoveries realised without the use of collaterals unless they can demonstrate that the recoveries related to these collaterals are immaterial;
 - (d) in any case institutions should include all observations, including the sales of credit obligations, in the calculation of long-run average LGD.

120. In accordance with point (f) of paragraph 115 institutions may specify and recognise any other forms of realising collaterals adequate to the types of collaterals used by the institution that are eligible under the applicable legal framework. When recognising such other forms of realising collateral, institutions should take into account the fact that the collateral may take various forms and that various forms of collaterals may be related to the same asset. Where different forms of collateral refer to the same asset but the realisation of one of the collaterals does not decrease the value of the other, institutions should consider them separate collaterals in the process of LGD estimation. In particular, institutions should recognise separately the form of collateral which gives a right to repossess or sell the asset (such as a mortgage) and the form of collateral which gives a right to collect cash flows generated by the asset (such as a cession of rent or fees).

6.2 Model development in LGD estimation

6.2.1 Risk drivers

121. Institutions should identify and analyse potential risk drivers that are relevant to their specific circumstances and to the specific characteristics of the type of exposures covered by the rating system. Potential risk drivers analysed by institutions should include in particular the following:

- (a) transaction-related risk characteristics, including type of product, type of collateral, geographical location of the collateral, unfunded credit protection, seniority, Loan-to-Value ratio (LtV), exposure size, seasoning, and recovery procedures;
- (b) obligor-related risk characteristics, including, where applicable, size, capital structure, geographical region, industrial sector, and line of business;
- (c) institution-related factors, including internal organisation and internal governance, relevant events such as mergers, and existence of specific entities within the group dedicated to recoveries;
- (d) external factors, including interest rates, legal framework and other factors influencing the expected length of the recovery process.

122. Institutions should analyse the risk drivers not only at the moment of default but also at least within a year before default. Institutions should use a reference date for a risk driver that is representative of the realisations of the risk driver within a year before default. When choosing the appropriate reference date for a risk driver institutions should take into account its volatility over time. Institutions should apply these practices also with regard to the reference date of the valuation of collateral; the value of the collateral at the reference date should not reflect the impact of the decrease in credit quality of the exposure shortly before default.

123. Institutions should specify or calculate the risk drivers in the application of LGD estimates in the same way as they are specified or calculated in the estimation of LGD.

6.2.2 Eligibility of collaterals

124. In accordance with Articles 170 and 181(1)(f) of Regulation (EU) No 575/2013 institutions may take into account in their LGD estimations the existence of any types of collaterals for which they have established internal requirements in terms of collateral management, legal certainty and risk management that are generally consistent with those set out in Section 3 of Chapter 4 of Title II in Part Three of that Regulation. In the case of the types of collateral that are not specified in Chapter 4 of Title II in Part Three of that Regulation institutions may use those types of collaterals in their LGD estimations where their policies and procedures relating to internal requirements for valuation and legal certainty of these collaterals are appropriate to the respective type of collateral.
125. To the extent that LGD estimates take into account the existence of unfunded credit protection institutions should specify the criteria and methodology for recognising and including in their LGD estimates the protection in the form of guarantees and credit derivatives that meet the criteria specified in Article 60 of the RTS on IRB assessment methodology.
126. Institutions should take into account as a risk driver or segmentation criterion information on all main types of collaterals that are used within the scope of application of the LGD model. Institutions should clearly define in their internal policies the main and other types of collaterals used for the type of exposures covered by the rating system and should ensure that, to the extent that LGD estimates take into account the existence of collateral, the policies regarding the management of these types of collateral comply with the requirement of Article 181(1)(f) of Regulation (EU) No 575/2013. Institutions should specify the main types of collaterals in such a way that the cash flows from the remaining types of collaterals will not significantly bias the estimation of recoveries that are realised without the use of collaterals.
127. Collaterals which do not meet the requirement of Article 181(1)(f) of Regulation (EU) No 575/2013 cannot be included as a risk driver in the LGD estimation and the cash flows received from those collaterals should be treated as if they had been received without the use of collaterals. Regardless of this treatment in the LGD estimation, institutions should collect the information about the source of the cash flows related to those collaterals and allocate them as related to those collaterals. Institutions should regularly monitor the levels of such cash flows as well as the extent to which the relevant types of collaterals are used. Where necessary, institutions should perform appropriate adjustments in order to avoid any bias in the LGD estimates.

6.2.3 Inclusion of collaterals in the LGD estimation

128. For the purpose of LGD estimation institutions may group the types of collaterals that are homogeneous in terms of recovery patterns taking into account both the average time of collection process and the recovery rates on these types of collaterals.
129. The approach developed by institutions to include the effect of collaterals in the LGD estimation should meet all of the following conditions:
- (a) institutions should avoid the bias that may stem from including the cash flows related to realisation of collateral in the estimation of recoveries that are realised without the use of collaterals and vice versa;
 - (b) where institutions estimate separate recovery rates for specific types of collaterals, they should avoid a bias that may stem from including in the estimation sample the observations where the exposure was secured by only a part of the value of the collateral. For this purpose institutions should take reasonable steps to obtain the data on the total value of the collateral and total sale price of the collateral and include this information in the estimation where it is available;
 - (c) where institutions estimate separate recovery rates for specific types of collaterals they should recognise and include in this estimation direct costs related to the collection on each of these specific types of collaterals separately as well;
 - (d) where institutions estimate separate recovery rates for specific types of collaterals they should include in this estimation all recoveries realised from a specific type of collateral including those realised on exposures where the realisation of the collateral has been completed but the overall recovery process has not yet been closed;
 - (e) where the same collateral covers several exposures, institutions should specify an adequate allocation methodology in order to avoid double counting of collaterals; the allocation methodology should be consistent between the LGD estimation and the application of LGD estimates and with the methodology used for accounting purposes;
 - (f) the estimates should not be based solely on the estimated market value of the collateral but they should also take into account the realised recoveries from past liquidations and the potential inability of an institution to gain control and liquidate the collateral. For this purpose, institutions should take into account in the estimation those historical observations where the collateral could not be realised or where the recovery process was longer than expected, due to inability or difficulty to gain control or liquidate the collateral. Where institutions estimate the recovery rates related to specific types of collaterals, they should take into account the time between the moment of default and the time when the cash flows related to the collection on these types of collaterals have been received and should include in the estimation those observations where the collateral has not been realised as a result of inability to gain control;

- (g) the estimates should take into account the potential decreases in collateral value from the point of LGD estimation to the eventual recovery, in particular those resulting from changes in the market conditions, the state and age of the collateral and, where relevant, currency fluctuations. Where institutions have experienced decreases in values of collaterals and these are already reflected in observed recoveries, no further adjustments to the LGD estimates based on these observations should be made. Where potential decreases in values of collaterals are not reflected in historical observations or where institutions predict further, potentially more severe decreases in the future, they should be included in the quantification of LGD estimates by means of an appropriate adjustment based on forward-looking expectations. However, the LGD estimates should not be adjusted to take into account any potential increases in collateral value;
- (h) the estimates should take into account in a conservative manner the degree of dependence between the risk of the obligor and the risk of the diminishing value of the collateral as well as the cost of liquidating the collateral.

6.2.4 Homogeneity of facility grades or pools

- 130. In order to fulfil the requirement of Article 38 of the RTS on IRB assessment methodology, institutions should assess the homogeneity of exposures assigned to the same grades or pools based on the data in the RDS and they should ensure, in particular, that grades are defined in such a manner that individual grades are sufficiently homogeneous with respect to loss characteristics.

6.3 LGD calibration

6.3.1 Calculation of economic loss and realised LGD

6.3.1.1 Definition of economic loss and realised LGD

- 131. For the purpose of LGD estimation as referred to in Article 181(1)(a) of Regulation (EU) No 575/2013, institutions should calculate realised LGDs for each exposure, as referred to in point (55) of Article 4(1) of that Regulation, as a ratio of the economic loss to the outstanding amount of the credit obligation at the moment of default, including any amount of principal, interest or fee.
- 132. For the purpose of paragraph 131, institutions should calculate the economic loss realised on an instrument (i.e. defaulted facility), as referred to in point (2) of Article 5 of Regulation (EU) No 575/2013 as a difference between:
 - (a) the outstanding amount of the credit obligation at the moment of default, without prejudice to paragraph 140, including any amount of principal, interest or fee, increased by material direct and indirect costs associated with collecting on that instrument discounted to the moment of default; and

(b) any recoveries realised after the moment of default discounted to the moment of default.

133. For the purpose of calculation of the economic loss realised on an exposure in accordance with paragraph 132 institutions should take into account all realised recoveries including the recoveries from unknown sources and recoveries related to collaterals that do not meet the requirement of Article 181(1)(f) of Regulation (EU) No 575/2013.
134. Where, relating to a default event, any part of exposure has been forgiven or written off before or at the date of default and the amount forgiven or written off is not included in the outstanding amount of the credit obligation at the moment of default the amount of the exposure that was forgiven or written off should be added to the outstanding amount of the credit obligation at the moment of default for both the calculation of economic loss as specified in paragraph 132 in the numerator, and the calculation of the outstanding amount of credit obligation in the denominator of the realised LGD.
135. In the case of exposures that return to non-defaulted status, institutions should calculate economic loss as for all other defaulted exposures with the only difference that an additional recovery cash flow should be added to the calculation as if a payment had been made by the obligor in the amount that was outstanding at the date of the return to non-defaulted status, including any principal, interests and fees ('artificial cash flow'). This artificial cash flow should be discounted to the moment of default in the same manner as all observed cash flows. Where the exposures meet the criteria of paragraph 101, the realised LGD should be calculated with the reference to the date of the first default event taking into account all cash flows observed from the date of the first default event, including those observed during the period between the first and the second defaulted status, without adding any artificial cash flows.
136. Where institutions open new facilities to replace previously defaulted facilities as part of restructuring or for technical reasons, they should calculate the realised LGDs based on the originally defaulted facilities. For this purpose, institutions should have a sound mechanism to allocate observed costs, recoveries and any additional drawings to original facilities.

6.3.1.2 Treatment of fees, interest and additional drawings after default

137. For the purpose of Article 181(1)(i) of Regulation (EU) No 575/2013, institutions should take into account in the calculation of realised LGD any fees for delays in payments that have been capitalised in the institution's income statement before the moment of default by including them in the outstanding amount of the credit obligation at the moment of default in the numerator and denominator of the realised LGD. Where the fees were extended to the obligor in order to recover direct costs already incurred by the institution and these costs are already included in the calculation of the economic loss, institutions should not add these amounts to the economic loss or outstanding amount again. Any fees capitalised after the moment of default should not increase the amount of economic loss or amount outstanding at the moment of default. However, all recoveries, including those related to fees capitalised after default, should be included in the calculation of economic loss.

138. Institutions should apply the treatment specified in paragraph 137 to any interest capitalised in the institution's income statement before and after the moment of default.
139. In accordance with Article 182(1)(c) of Regulation (EU) No 575/2013 institutions that obtained permission to use own estimates of LGD and conversion are required to reflect the possibility of additional drawings by the obligor up to and after the time of default in their estimates of conversion factors. In the case of retail exposures, in accordance with Articles 181(2)(b) and 182(3) of this Regulation institutions may reflect future drawings either in their conversion factors or in their LGD estimates. These future drawings should be understood as additional drawings by the obligor after the moment of default.
140. Where institutions include additional drawings by the obligor after the moment of default in their conversion factors they should calculate realised LGD as a ratio of the economic loss to the outstanding amount of the credit obligation at the moment of default increased by the amount of additional drawings by the obligor after the moment of default discounted to the moment of default.
141. For retail exposures, where institutions do not include additional drawings by the obligor after the moment of default in their conversion factors they should calculate realised LGD as a ratio of the economic loss to the outstanding amount of the credit obligation at the moment of default and they should not increase the denominator of the ratio by the value of additional drawings by the obligor after the moment of default.
142. Irrespective of whether institutions reflect future drawings in their conversion factors or in their LGD estimates they should calculate the economic loss used in the numerator of the realised LGD including the additional drawings after the moment of default and all realised recoveries discounted to the moment of default.

6.3.1.3 Discounting rate

143. For the purpose of the calculation of economic loss, in accordance with point (2) of Article 5 of Regulation (EU) No 575/2013, institutions should discount all recoveries, costs and additional drawings after the moment of default using an annual discounting rate composed of a primary interbank offered rate applicable at the moment of default increased by an addition of 5%-points. For this purpose the primary interbank offered rate should be considered the 3-month EURIBOR or a comparable liquid interest rate in the currency of the exposure.

6.3.1.4 Direct and indirect costs

144. For the purpose of the calculation of the realised LGDs, institutions should take into account all material direct and indirect cost related to the recovery process. Where any material direct or indirect costs relating to the collection on exposures and the default of the respective counterparty have been incurred before the moment of default institutions should include these costs in the LGD estimation unless at least one of the following conditions is met:

- (a) these costs are clearly included in the outstanding amount of the credit obligation at the moment of default;
 - (b) these costs are associated with the previous default of the same obligor, which is not considered a multiple default in accordance with paragraph 101.
145. Direct costs should include the costs of outsourced collection services, legal costs, the cost of hedges and insurances and all other costs directly attributable to the collection on a specific exposure. Institutions should consider all direct costs as material.
146. Indirect costs should include all costs stemming from the running of the institution's recovery processes, overall costs of outsourced collection services not included as direct costs, and all other costs related to the collection on defaulted exposures that cannot be directly attributed to collection on a specific exposure. Institutions should include in their estimation of indirect costs an appropriate percentage of other ongoing costs, such as institutions' overheads related to the recovery processes, unless they can demonstrate that these costs are immaterial.

6.3.2 Long-run average LGD

6.3.2.1 Historical observation period

147. The historical observation period should be as broad as possible and should contain data from various periods with differing economic circumstances. For this purpose institutions should at a minimum select a historical observation period in such a way that:
- (a) the length of the historical observation period, i.e. the timespan between the oldest default considered in the RDS and the moment of the LGD estimation, covers at least the minimum length specified in Article 181(1)(j) of Regulation (EU) No 575/2013 for exposures to corporates, institutions, central governments and central banks and, for retail exposures, the period specified in Article 181(2) subparagraph 2 of that Regulation and, where applicable, Commission Delegated Regulation adopting technical standards laid down in Article 181(3)(b) of that Regulation;
 - (b) it ensures that the RDS includes a sufficient number of closed recovery processes in order to provide robust LGD estimates;
 - (c) it is composed of consecutive periods and includes the most recent periods before the moment of LGD estimation;
 - (d) it includes the full period for which the institution is reasonably able to replicate the currently applicable definition of default;
 - (e) all available internal data is considered 'relevant', as referred to in Articles 181(1)(j) and 181(2) subparagraph 2 of Regulation (EU) No 575/2013 and is included in the historical observation period.

148. In assessing whether the RDS includes a sufficient number of closed recovery processes in accordance with paragraph 147(b), institutions should take into account the number of closed recovery processes in the total number of observations.

6.3.2.2 Calculation of long-run average LGD

149. In accordance with letter (a) of Article 181(1) of Regulation (EU) No 575/2013 institutions are required to calculate the long-run average LGD separately for each facility grade or pool. In this context institutions should calculate the long-run average LGD also at the level of the portfolio covered by the LGD model. In the calculation of long-run average LGD institutions should use all defaults observed in the historical observation period that fall within the scope of the LGD model.
150. Without prejudice to Article 181(2) of Regulation (EU) No 575/2013 institutions should calculate the long-run average LGD as an arithmetic average of realised LGDs over a historical observation period weighted by a number of defaults. Institutions should not use for that purpose any averages of LGDs calculated on a subset of observations, in particular any yearly average LGDs, unless they use this method to reflect higher weights of more recent data on retail exposures in accordance with Article 181(2) of Regulation (EU) No 575/2013.
151. Where institutions do not give equal importance to all historical data for retail exposures in accordance with Article 181(2) of Regulation (EU) No 575/2013 they should be able to demonstrate in a documented manner that the use of higher weights for more recent data is justified by better prediction of loss rates. In particular where zero or very small weights are applied to specific periods this should be duly justified or lead to more conservative estimates.
152. In specifying the weights in accordance with paragraph 151 institutions should take into account the representativeness of data assessed in accordance with section 4.2.4 as well as the economic and market conditions that are represented by the data.

6.3.2.3 Treatment of incomplete recovery processes

153. For the purposes of letter (a) of Article 181(1) of Regulation (EU) No 575/2013, in relation to the use of all defaults observed during the historical observation period within the data sources for LGD estimation, institutions should ensure that the relevant information from incomplete recovery processes is taken into account in a conservative manner. The LGD estimation should be based on the long-run average LGD.
154. Institutions should calculate the observed average LGD for each facility grade or pool and at the level of the portfolio covered by the LGD model taking into account realised LGDs on all defaults observed in the historical observation period related to closed recovery processes in accordance with paragraphs 155 to 157 without including any expected future recoveries. The observed average LGD should be weighted by the number of defaults included in the calculation.

155. Institutions should clearly specify in their internal policies the moment of closing the recovery processes. All recovery processes that have been closed should be treated as such for the purpose of the calculation of the observed average LGD.
156. Institutions should define the maximum period of the recovery process for a given type of exposures from the moment of default that reflects the expected period of time observed on the closed recovery processes during which the institution realises the vast majority of the recoveries, without taking into account the outlier observations with significantly longer recovery processes. The maximum period of the recovery processes should be specified in a way that ensures sufficient data for the estimation of the recoveries within this period for the incomplete recovery processes. The length of the maximum period of the recovery processes may be different for different types of exposures. The specification of the maximum period of the recovery process should be clearly documented and supported by evidence of the observed recovery patterns, and should be coherent with the nature of the transactions and the type of exposures. Specification of the maximum period of the recovery process for the purpose of the long-run average LGD should not prevent institutions from taking recovery actions where necessary, even with regard to exposures which remain in default for a period of time longer than the maximum period of the recovery process specified for this type of exposures.
157. For the purpose of the calculation of the observed average LGD, institutions should recognise without undue delay as closed recovery processes all exposures in default which fall into at least one of the following categories:
- (a) exposures for which the institution does not expect to take any further recovery actions;
 - (b) exposures that remain in defaulted status for a period of time longer than the maximum period of the recovery process specified for this type of exposures;
 - (c) exposures fully repaid or written-off;
 - (d) exposures that have been reclassified to non-defaulted status.

With regard to the defaulted exposures falling under the categories in points (a) and (b), all recoveries and costs realised before or at the time of estimation should be considered for the purpose of the calculation of the observed average LGD, including any recoveries realised after the maximum period of the recovery processes.

158. Institutions should obtain the long-run average LGD by adjusting the observed average LGD taking into account the information related to processes that were not closed ('incomplete recovery processes') and where the time from the moment of default until the moment of estimation is shorter than the maximum period of the recovery process specified for this type of exposures. For these processes, institutions should comply with both of the following:

- (a) they should take into account all observed costs and recoveries;
 - (b) they may estimate future costs and recoveries, both those stemming from the realisation of the existing collaterals and those to be realised without the use of collaterals within the maximum period of the recovery processes.
159. The estimation referred to in paragraph 158(b) should comply with the following principles:
- (a) for the purpose of estimation of the future costs and recoveries institutions should analyse the costs and recoveries realised on these exposures until the moment of estimation, in comparison with the average costs and recoveries realised during a similar period of time on similar exposures; for this purpose institutions should analyse the recovery patterns observed on both closed and incomplete recovery processes, taking into account only costs and recoveries realised up to the moment of estimation;
 - (b) the assumptions underlying the expected future costs and recoveries as well as the adjustment to the observed average LGD should be:
 - i. proven accurate through back-testing;
 - ii. based on a reasonable economic rationale;
 - iii. proportionate, taking into consideration that LGD estimates should be based on the long-run average LGD that reflects the average LGDs weighted by the number of defaults using all defaults observed during a historical observation period.
 - (c) in estimating the future recoveries institutions should take into account the potential bias stemming from incomplete recovery processes being characterised by longer average recovery processes or lower average recoveries than closed recovery processes;
 - (d) in estimating the future recoveries stemming from the realisation of the existing collaterals institutions should take into account the legal certainty of the claims on the collateral and realistic assumptions regarding the possibility of its realisation;
 - (e) the adjustment of the observed average LGD may be estimated at the level of individual exposures, at the level of grade or pool or at the level of portfolio covered by the LGD model;
 - (f) any uncertainty related to the estimation of the future recoveries on incomplete recovery processes should be reflected in an adequate MoC applied in accordance with section 4.4.

6.3.2.4 Treatment of cases with no loss or positive outcome

160. Where institutions observe that they realised profit on their observations of defaults, the realised LGD on these observations should equal zero for the purpose of calculation of the

observed average LGD and the estimation of the long-run average LGD. Institutions may use the information on the realised LGDs before the application of this floor in the process of model development for the purpose of risk differentiation.

6.3.3 Calibration to the long-run average LGD

161. Institutions should calibrate their LGD estimates to the long run average LGD calculated in accordance with section 6.3.2. For this purpose institutions should choose a calibration method that is appropriate for their LGD estimation methodology from the following approaches:
 - (a) the calibration of LGD estimates to the long-run average LGD calculated for each grade or pool, in which case they should provide additional calibration tests at the level of the relevant calibration segment;
 - (b) the calibration of LGD estimates to the long-run average LGD calculated at the level of calibration segment, in particular where they use direct LGD estimates in accordance with Article 169(3) of Regulation (EU) No 575/2013, including where they use LGD estimation methodology based on intermediate parameters. In this case institutions should at least compare this long-run average LGD with the average LGD estimate applied to the same set of observations as those used for calculating the long-run average LGD and, where necessary, correct the individual LGD estimates for the application portfolio accordingly, for instance by using a scaling factor. Where realised values are higher than estimated values at the level of calibration segment, institutions should correct the estimates upwards or readjust their estimation in order to reflect their loss experience.
162. Where institutions observe extremely high values of realised LGDs much above 100%, especially for exposures with small outstanding amounts at the moment of default, they should identify relevant risk drivers to differentiate these observations and adequately reflect these specific characteristics in the assignment to grades or pool. Where institutions use a continuous rating scale in the LGD estimation, they may create a separate calibration segment for such exposures.
163. In order to comply with the requirement of Article 181(1)(a) of Regulation (EU) No 575/2013 to use all observed defaults in LGD quantification, institutions should not exclude any defaults observed in the historical observation period that fall within the scope of application of the LGD model.
164. In the analysis of the representativeness of data in accordance with section 4.2.4, institutions should take into account not only the current characteristics of the portfolio but also, where relevant, the changes to the structure of the portfolio that are expected to happen in the foreseeable future due to specific actions or decisions that have already been taken. Adjustments made on the basis of the changes expected in the foreseeable future should not lead to a decrease in the estimates of LGD parameter.

7 Estimation of risk parameters for defaulted exposures

7.1 General requirements specific to EL_{BE} and LGD in-default estimation

7.1.1 Estimation methodologies for EL_{BE} and LGD in-default

165. Institutions that have obtained permission to use own estimates of LGD in accordance with Article 143(2) of Regulation (EU) No 575/2013, should assign an EL_{BE} estimate and an LGD in-default estimate to each defaulted exposure within the range of application of the rating system subject to such permission.
166. Institutions should estimate EL_{BE} and LGD in-default for each of the facility grades of the distinct facility rating scale or for each of the pools that are used within the rating system.
167. For the purposes of EL_{BE} and LGD in-default estimation, and unless otherwise specified in this Chapter, institutions should use the same estimation methods used for estimating LGD on non-defaulted exposures, as set out in Chapter 6.
168. Institutions should take into consideration all relevant post-default information in their EL_{BE} and LGD in-default estimates in a timely manner, in particular where events from the recovery process invalidate the recovery expectations underlying the most recent estimates.
169. Institutions should assess and duly justify situations where the estimates of LGD in-default shortly after the date of default systematically deviate from the LGD estimates immediately before the date of default at the facility grade or pool, where these deviations do not stem from the use of risk drivers that are applicable only from the date of default onwards.
170. Institutions should perform back-testing and benchmarking of their EL_{BE} and LGD in-default estimates in accordance with points (b) and (c) respectively, of Article 185 of Regulation (EU) No 575/2013.

7.1.2 Reference dates

171. For the purposes of EL_{BE} and LGD in-default estimation, institutions should set the reference dates to be used for grouping defaulted exposures in accordance with the recovery patterns observed. These reference dates should be used in the estimation of EL_{BE} and LGD in-default instead of the date of default. For the purposes of setting the reference dates



institutions should use information only on closed recovery processes taking into account costs and recoveries only if observed up to the date of estimation.

172. Each of the reference dates referred to in paragraph 171 could be any of the following:
- (a) a specific number of days after the date of default; this option would be appropriate in particular where the estimation refers to a portfolio of exposures showing a stable recovery pattern through time;
 - (b) a relevant date associated with a specific event at which significant breaks in the recovery profile are observed; this option would be appropriate in particular where the estimation refers to a portfolio of exposures that are subject to significant changes of the recovery patterns associated with certain specific events, for instance at the date of realisation of collateral;
 - (c) any combination of the cases referred to in points (a) and (b) that better reflects the recovery patterns; this option would be appropriate in particular where the estimation refers to a portfolio of exposures showing a stable recovery pattern through time but for which breaks in such recovery patterns are observed around certain specific events, for instance at collection, and where the reference dates following those events are defined as a specific number of days after the recovery event, rather than after the date of default;
 - (d) where appropriate, the reference date can have any value between zero and the number of days until the end of the maximum period of the recovery process set by the institution for the type of exposures in question.
173. For the purposes of EL_{BE} and LGD in-default estimation the same defaulted exposures in the RDS should be used at all relevant reference dates considered in the model.
174. Institutions should monitor on a regular basis potential changes in the recovery patterns and in the relevant recovery policies which may affect the estimation of EL_{BE} and LGD in-default at each reference date.

7.1.3 Data requirements for EL_{BE} and LGD in-default estimation

175. For the purposes of EL_{BE} and LGD in-default estimation, institutions should use the same RDS referred to in section 6.1.2, complemented by any relevant information observed during the recovery process and at each reference date, specified in accordance with paragraphs 171 to 174 and, in particular at least the following additional information:
- (a) all relevant factors that can be used to group defaulted exposures, and all relevant drivers of loss, including those that may become relevant after the date of default and at each reference date;
 - (b) the amount outstanding at each reference date;

- (c) the values of any collateral associated with the defaulted credit obligations and their dates of valuation after the date of default.

7.2 Model development in the estimation of EL_{BE} and LGD in-default

176. For the purposes of taking into account the information on the time in-default and recoveries realised so far, in accordance with Article 54(2)(b) of the RTS on IRB assessment methodology institutions may take into account this information either directly as risk drivers or indirectly, for instance by setting the reference date for estimation, as referred to in paragraphs 171 to 174.
177. For the purpose of EL_{BE} and LGD in-default estimation, institutions should analyse the potential risk drivers referred to in paragraph 121 not only until the moment of default but also after the date of default and until the date of termination of the recovery process. Institutions should analyse also other potential risk drivers that might become relevant after the date of default, including in particular the expected length of the recovery process and the status of the recovery process. Institutions should use the values of risk drivers as well as the values of collateral adequate to the reference dates specified in accordance with paragraphs 171 to 174.

7.3 Calibration of EL_{BE} and LGD in-default

7.3.1 Calculation of realised LGD and long-run average LGD for defaulted exposures

178. For the purposes of EL_{BE} and LGD in-default estimation, institutions should calculate the realised LGDs for defaulted exposures, in accordance with section 6.3.1 with the only difference that this should be done with regard to each of the reference dates specified in accordance with paragraphs 171 to 174, rather than the date of default. In the calculation of the realised LGD at a given reference date institutions should include all fees and interest capitalised before the reference date and they should discount all subsequent cash flows and drawings to the reference date.
179. Where, after the moment of default, institutions write-off part of the exposure the calculation of the economic loss and the realised LGD should be based on the full amount of the outstanding credit obligation, without taking into account the partial write-off. However, where institutions regularly write-off parts of exposures based on a consistent policy in terms of the time and proportion of the write-off, they may include this information in the calibration of final EL_{BE} and LGD in-default. Where institutions perform write-offs in a less regular manner, they may reflect the information about the partial write-off of a specific exposure in the application of these parameters to this exposure by overriding the output of the rating assignment process in accordance with section 8.2 in order to ensure consistency between the LGD estimation and the application of the LGD estimates.

180. For the purposes of EL_{BE} and LGD in-default estimation, institutions should calculate the long run average LGD of the realised LGDs for defaulted exposures, referred to in paragraph 178, following the requirements set out in section 6.3.2 with the only exception that, for each reference date, incomplete recovery processes should be used only if their relevant reference date for the application of the EL_{BE} and LGD in-default parameters is posterior to the reference date under consideration for the estimation.
181. In accordance with section 6.3.2.3 institutions should not estimate any future recoveries for exposures that remain in defaulted status for a period of time longer than the maximum length of the recovery process as specified by the institution. However, relevant information regarding specific exposures, in particular information about existing collateral, may be reflected in the application of these parameters by overriding the output of the rating assignment process in accordance with section 8.2.

7.3.2 Specific requirements for EL_{BE} estimation

7.3.2.1 Consideration of MoC in EL_{BE} estimation

182. For the purpose of Article 181(1)(h) of Regulation (EU) No 575/2013 the EL_{BE} should not include any MoC in the sense of section 4.4.3.

7.3.2.2 Current economic circumstances

183. For the purposes of considering current economic circumstances in their EL_{BE} estimates, as required by Article 181(1)(h) of Regulation (EU) No 575/2013, institutions should take into account economic factors, including macroeconomic and credit factors, relevant for the type of exposures under consideration.
184. The EL_{BE} should be estimated on the basis of the long-run average LGD, referred to in paragraph 180 and no further adjustments to reflect current economic conditions should be performed where any of the following conditions is met:
- (a) the model includes directly at least one macroeconomic factor as a risk driver;
 - (b) at least one material risk driver is sensitive to economic conditions;
 - (c) the realised LGD for defaulted exposures, referred to in paragraph 178, is not sensitive to the economic factors relevant for the type of exposures under consideration.
185. Where none of the conditions listed in paragraph 184 is met, institutions should adjust the long run average LGD for defaulted exposures to reflect current economic conditions. In this case institutions should document separately the long-run average LGD for defaulted exposures, referred to in paragraph 180, and the adjustment to current economic conditions.

7.3.2.3 Relation of EL_{BE} to specific credit risk adjustments

186. Where the model used for credit risk adjustments satisfies or can be adjusted to satisfy the requirements for own-LGD estimates set out in Part Three, Title II, Chapter 3, Section 6 of Regulation (EU) No 575/2013, institutions may use specific credit risk adjustments as EL_{BE} estimates.
187. Where specific credit risk adjustments are assessed individually for a single exposure or a single obligor, institutions may override the EL_{BE} estimates based on specific credit risk adjustments, where they are able to prove that this would improve the accuracy of the EL_{BE} estimates and that the specific credit risk adjustments reflect or are adjusted to the requirements set in section 6.3.1 on the calculation of economic loss.
188. For the purposes of justifying situations where the specific credit risk adjustments exceed the EL_{BE} estimates in accordance with Article 54(2)(f) of the RTS on IRB assessment methodology, institutions should ensure consistency of the EL_{BE} estimates with the economic loss components described in section 6.3.1 as well as with the definition of default set out in Article 178 of Regulation (EU) No 575/2013 and analyse any differences in that regard from the definitions and methods used for the purpose of determining specific credit risk adjustments. In particular, institutions should take into account, the possible differences in the discounting rate, the presence of collateral that is not eligible under Article 181(1)(f) of Regulation (EU) No 575/2013, different treatments of costs and the application of different definitions of default.

7.3.3 Specific requirements for LGD in-default estimation

189. For the purpose of considering the possible adverse change in economic conditions during the expected length of the recovery processes referred to in Article 54(2)(a) of the RTS on IRB assessment methodology the LGD in-default should reflect at least downturn conditions, where the estimates of LGD in-default that are appropriate for an economic downturn are more conservative than the long-run average LGD for defaulted exposures, referred to in paragraph 180.
190. For the purpose of Article 181(1)(h) of Regulation (EU) No 575/2013 the LGD in-default should be increased above the level referred to in paragraph 189 where this is necessary to ensure that the difference between the LGD in-default and the EL_{BE} covers for any increase of loss rate caused by possible additional unexpected losses during the recovery period.
191. For the purpose of ensuring that the LGD in-default is higher than the EL_{BE} , or is in exceptional cases equal to the EL_{BE} for individual exposures, in accordance with Article 54(2)(d) of the RTS on IRB assessment methodology institutions should analyse and correct the LGD in-default in those situations where the EL_{BE} was obtained using specific credit risk adjustments, in accordance with paragraph 186, and is above the LGD in-default obtained



through direct estimation in accordance with Article 54(1)(a) of the RTS on IRB assessment methodology.

192. To the extent that the reasons for overriding the outputs of EL_{BE} estimation are relevant also to LGD in-default a consistent override should also be applied to the assignment of LGD in-default in such a way that the add-on to the EL_{BE} covers for any increase of loss rate caused by possible additional unexpected losses during the recovery period in accordance with Article 181(1)(h) of Regulation (EU) No 575/2013.
193. Irrespective of which of the two approaches referred to in points (a) and (b) of Article 54(1)(a) of the RTS on IRB assessment methodology is used for the purposes of estimating LGD in-default institutions should document separately all of the following:
- (a) the break-down of the LGD in-default into its components: the EL_{BE} and the add-on;
 - (b) the break-down of the add-on into all of the following components:
 - (i) the downturn conditions component calibrated on the downturn adjustment to the long-run average LGD as specified in paragraph 189;
 - (ii) the MoC component, referred to in section 4.4;
 - (iii) any component covering for potential additional unexpected losses during the recovery period referred to in Article 181 (1)(h) of Regulation (EU) No 575/2013; this component should only be included in exceptional circumstances where the potential additional losses are not sufficiently reflected in the components referred to in points (i) and (ii).

8 Application of risk parameters

194. In the application of the PD or LGD model and where institutions receive new information with respect to a relevant risk driver or rating criterion, they should take this information into account in the rating assignment in a timely manner, in particular by ensuring both of the following:

- (a) that the relevant IT systems are updated as soon as possible and that the corresponding rating and PD or LGD assignment is reviewed as soon as possible;
- (b) where the new information relates to the default of an obligor, that the PD of the obligor is set to 1 in all relevant IT systems in a timely manner and in accordance with paragraph 108 of the Guidelines on the application of the definition of default under Article 178 of Regulation (EU) No 575/2013.

8.1 Conservatism in the application of risk parameters

195. For the purpose of Article 171(2) of Regulation (EU) No 575/2013 institutions should apply additional conservatism to the outcomes of the rating assignment where any deficiencies are identified related to the implementation of the model in the IT system or to the process of assignment of risk parameters to obligors or facilities in the current portfolio (application of risk parameters), especially when those deficiencies relate to data used in the rating assignment process. They should do so by establishing a framework that consists of the following phases:

- (a) identification of deficiencies of implementation of the model in the IT system or application of risk parameters;
- (b) specification of the form of conservatism to be applied and quantification of the appropriate level of conservatism;
- (c) monitoring of the deficiencies and correcting them;
- (d) documentation.

196. For the purpose of paragraph 195(a) institutions should have a robust process for identifying all implementation and application deficiencies in the assignment process, whereby each deficiency leads to additional conservative treatment in the affected assignment to a grade or pool. Institutions should consider at least the following triggers for additional conservatism:

- (a) missing data in the application portfolio;



- (b) missing updates of financial statements or credit bureau data as referred to in paragraph 59(h);
 - (c) outdated ratings in the application portfolio; where outdated rating should be understood as specified in Article 25(2)(b) of the RTS on IRB methodology;
 - (d) missing ratings, whereby an exposure is considered as being within the scope of application of the IRB model but is not rated by it.
197. For the purpose of paragraph 195(b) institutions should ensure that the occurrence of any of the triggers referred to in paragraph 196 results in the application of additional conservatism to the risk parameter for the purpose of the calculation of risk-weighted exposure amounts. Where more than one trigger occurs, the estimate should be more conservative. The additional conservatism related to each trigger should be proportionate to the uncertainty in the estimated risk parameter introduced by the trigger.
198. Institutions should consider the overall impact of the identified deficiencies and the resulting conservatism at the level of portfolio covered with the relevant model on the soundness of the assignments to grades or pools and ensure that the own funds requirements are not distorted by the necessity of excessive adjustments.
199. For the purpose of paragraph 195(c) institutions should regularly monitor the implementation and application deficiencies and the levels of additional conservatism applied in relation to them. Whenever possible, institutions should take steps to address the identified deficiencies. Following its assessment, the institution should develop a plan to rectify the deficiencies within a reasonable timeframe, taking into consideration the magnitude of the impact on the own funds requirements.
200. For the purpose of paragraph 195(d) institutions should specify adequate manuals and procedure for applying additional conservatism and should document the process applied in addressing implementation and application deficiencies. Such documentation should contain at least the triggers considered and the effects that the activation of such triggers had on the final assignment to a grade or pool, the level of risk parameter and on the own funds requirements.

8.2 Human judgement in the application of risk parameters

201. Institutions may use human judgement in the application of the model in the following cases:
- (a) in the application of the qualitative variables used within the model;
 - (b) via overrides of the inputs of the rating assignment process;
 - (c) via overrides of the outputs of the rating assignment process.



202. Institutions should specify clear criteria for the use of qualitative model inputs and they should ensure a consistent application of such inputs by all relevant personnel and a consistent assignment of obligors or facilities posing similar risk to the same grade or pool as required by Article 171(1)(a) of Regulation (EU) No 575/2013.
203. For the purpose of Article 172(3) of Regulation (EU) No 575/2013 institutions should specify the policies and criteria for the use of overrides in the rating assignment process. These policies should refer both to possible overrides of inputs and outputs of such process and should be specified in a conservative manner such that the scale of conservative overrides should not be limited. In contrast, the scale of potential decreases of the estimates resulting from the model, either by overriding the inputs or outputs of the rating assignment process, should be limited. In applying the overrides institutions should take into account all relevant and up-to-date information.
204. Institutions should document the scale and rationale of each override. Wherever possible institutions should specify a predefined list of possible justifications of the overrides to choose from. Institutions should also store information on the date of override and the person that performed and approved it.
205. Institutions should regularly monitor the level and justifications for overrides of inputs and outputs of the rating assignment process. They should specify in their policies the maximum acceptable rate of overrides for each model. Where those maximum levels are breached, adequate measures should be taken by the institution. The rates of overrides should be specified and monitored at the level of calibration segment. Where there is a high number of overrides institutions should adopt adequate measures to improve the model.
206. Institutions should regularly analyse the performance of exposures in relation to which an override of input or output of the rating assignment process has been performed in accordance with Article 172(3) of Regulation (EU) No 575/2013.
207. Institutions should regularly assess the performance of the model before and after the overrides of outputs of the rating assignment process. Where the assessment concludes that the use of overrides significantly decreased the model's capacity to accurately quantify the risk parameters ('predictive power of the model'), institutions should adopt adequate measures to ensure the correct application of overrides.

8.3 Use of internal ratings and default and loss estimates

208. In accordance with Article 144(1)(b) of Regulation (EU) No 575/2013 and Articles 18 to 21 of the RTS on IRB assessment methodology institutions should use the same estimates of risk parameters for the purpose of own funds requirements calculation and for internal purposes, including risk management and decision-making processes, unless all of the following conditions are met:

- (a) the deviation is justified and appropriate for the specific area of use;



- (b) the deviation does not lead to a change in rank ordering in the assignment of obligors or facilities to grades and pools within a calibration segment other than within each grade or pool;
 - (c) the deviation is due to the use of parameters for internal purposes without consideration of the MoC, without regulatory floors, without downturn adjustment in the case of LGD estimates or is due to the use of a different calibration method, which may entail specifying different calibration segments.
209. For the purpose of paragraph 208 it may also be considered adequate to group continuous risk parameter estimates into homogenous ranks for internal purposes.
210. Where institutions use for internal purposes estimates of risk parameters that are different from those used in the calculation of own funds requirements they should periodically reflect this in their internal reporting to senior management by providing information on both sets of parameters. In any case internal reporting should include all elements specified in Article 189(3) of Regulation (EU) No 575/2013 based on the estimates of risk parameters used for the purpose of calculation of own funds requirements.

8.4 Calculation of IRB shortfall or excess

211. For the purpose of this chapter the difference between, on the one hand, general and specific credit risk adjustments, additional value adjustments and other own funds reductions relating to these exposures and, on the other hand, expected loss amount in accordance with Article 159 of Regulation (EU) No 575/2013 should be considered IRB shortfall, if negative, and IRB excess, if positive.
212. Where the calculation for the overall non-defaulted portfolio referred to in Article 159 of Regulation (EU) No 575/2013 results in an IRB excess, institutions may use this IRB excess to cover for any IRB shortfall from the calculation carried out in accordance with that Article for the overall defaulted portfolio.
213. For the purposes of adding any IRB excess to Tier 2 in accordance with Article 62 (d) of Regulation (EU) No 575/2013, where the calculation referred to in Article 159 of Regulation (EU) No 575/2013 results in an IRB excess for both the defaulted and the non-defaulted portfolio, the sum of those two IRB excesses should be considered and added to Tier 2 in accordance with the limit referred to in Article 62(d) of Regulation (EU) No 575/2013.
214. For the purposes of Article 159 of Regulation (EU) No 575/2013 institutions should not include partial write-offs in the calculation of general and specific credit risk adjustments. However, as per Article 166(1) of Regulation (EU) No 575/2013, the calculation of the expected loss amount for the application of Articles 158 and 159 of Regulation (EU) No 575/2013 should be based on the exposure value gross of value adjustments but net of write-offs.

9 Review of estimates

215. Institutions should specify internal policies for changes of models and estimates of risk parameters used within a rating system. Such policies should provide that changes in the models should be made as a result of at least the following:

- (a) regular review of estimates;
- (b) independent validation;
- (c) changes in the legal environment;
- (d) internal audit review;
- (e) competent authority review.

216. Where material deficiencies are identified as a result of the procedures referred to in paragraph 215 institutions should take appropriate actions depending on the severity of the deficiency and apply a MoC in accordance with section 4.4.3.

217. For the purpose of regular reviews of estimates, institutions should have a framework in place which includes at least the following elements:

- (a) a minimum scope and frequency of analyses to be performed, including predefined metrics chosen by the institution to test data representativeness, model performance, its predictive power and stability;
- (b) predefined standards, including predefined thresholds and significance levels for the relevant metrics;
- (c) predefined actions to be taken in case of adverse results of the review, depending on the severity of the deficiency.

In their regular reviews of estimates institutions may rely on the results of independent validation where such results are up to date.

218. The reviews of estimates to be performed at least annually in accordance with Article 179(1)(c) of Regulation (EU) No 575/2013 should be performed taking into account the metrics, standards and thresholds defined by the institution in accordance with paragraph 217. The scope of such reviews should comprise at least the following elements:

- (a) an analysis of data representativeness, including all of the following:



- (i) an analysis of potential differences between the RDS used to quantify the risk parameter and the application portfolio, including the analysis of any changes in the portfolio or any structural breaks, in the manners of analysing the representativeness described in section 4.2.4;
 - (ii) an analysis of potential differences between the RDS used to develop the model and the application portfolio; for this purpose institutions should:
 - perform the analysis set out in paragraphs 24, 25, and 26;
 - consider that data used for model development is sufficiently representative in terms of points (a) and (b) of paragraph 21 if the performance of the model in the sense of paragraph 218(b) is sound;
 - perform the analysis set out in paragraphs 22 and 23 where the performance of the model in the sense of paragraph 218(b) is deteriorating;
- (b) an analysis of the performance of the model and its stability over time, which should have both of the following characteristics:
- (i) the analysis should identify any potential deterioration of the model performance, including the model's discriminatory power, through the comparison of its performance at the time of the development against its performance on each subsequent observation period of the extended data set as well as against the predefined thresholds; this analysis should be performed on relevant subsets, for instance with and without delinquency status in the case of PD estimates, or for various recovery scenarios in the case of LGD estimates;
 - (ii) the analysis should be performed with regard to the whole application portfolio, without any data adjustments or exclusions performed in model development; for comparison purposes, the performance at the time of development should also be obtained for the whole application portfolio, prior to any data adjustments or exclusions;
- (c) an analysis of the predictive power of the model, including at least:
- (i) an analysis of whether the inclusion of the most recent data in the dataset used to estimate risk parameters leads to materially different risk estimates and in particular:
 - for PD, whether including the most recent data leads to a significant change in the long-run average default rate; this analysis should take into account the appropriate redefinition of the period of likely range of

variability of default rates and of the mix of good and bad years, if necessary;

- for LGD, whether including the most recent data leads to a significant change in the long-run average LGD or downturn LGD;

- (ii) a back-testing analysis, which should include a comparison of the estimates used for the calculation of own funds requirements against observed outcomes for each grade or pool; for this purpose institutions may take into account the results of back-testing performed as part of the internal validation in accordance with Article 185(b) of Regulation (EU) No 575/2013 or they may perform additional tests, for instance with regard to a different timeframe of the dataset.

219. Institutions should specify conditions under which the analyses referred to in paragraph 218 should be performed more frequently than annually, such as major changes in the risk profile of the institution, credit policies or relevant IT systems. Institutions should perform the review of the PD or LGD model whenever they observe significant change in economic conditions as compared with the economic conditions underlying the dataset used for the purpose of model development.

220. For the purpose of performing the tasks referred to in Article 190(2) of Regulation (EU) No 575/2013 institutions should define a regular cycle for the full review of the rating systems, taking into consideration their materiality, and covering all aspects of model development, quantification of risk parameters and, where applicable, the estimation of model components. This review should include all of the following:

- (a) a review of the existing and potential risk drivers and an assessment of their significance based on the predefined standards of review referred to in paragraph 217;
- (b) an assessment of the modelling approach, its conceptual soundness, the fulfilment of the modelling assumptions and alternative approaches.

Where the results of this review recommend changes to model design, appropriate actions should be taken following the results from this analysis.

221. For the purpose of the review specified in paragraphs 217 to 220 institutions should apply consistent policies for data adjustments and exclusions and ensure that any differences in the policies applied to the relevant datasets are justified and do not distort the results of the review.

Accompanying documents

Impact assessment

The EBA considers it adequate to provide an impact assessment which analyses ‘the potential related costs and benefits’ of the policy provided in the GL. This analysis provides the reader with an overview of the findings as regards problem identification, options identified to remove problems and their potential impacts.

The following analysis consists basically of three parts, where the baseline scenario in terms of current practices and supervisory expectations starts from the analysis performed for the purpose of the reports on comparability and pro-cyclicality of capital requirements published by the EBA in December 2013. In terms of the regulatory environment, the baseline scenario is set out by the GL specified by the Committee of European Banking Supervisors (CEBS) in 2006 (GL 10), under the assumption that this guidance has been followed by institutions when developing their risk parameter estimation methodologies. The second part contains the options considered with respect to the major policy decisions that have been analysed and discussed in the finalisation of these GL. Finally, the draft cost-benefit analysis is based on the main policy changes in comparison with the currently applicable GL 10.

For the second part of this analysis, i.e. the options considered, a reference is included to the Report on the IRB modelling practices, which contains the impact assessment for the GLs on PD, LGD and the treatment of defaulted exposures based on the IRB survey results. Shortly after the publication of the Consultation Paper (CP) of these GLs, the EBA conducted a qualitative survey on institution’s current modelling practices (i.e. the IRB survey) on several of the policy choices addressed in these GL. A summary of the responses to this IRB survey will be published together with these GL. Given that the distribution of current modelling practices stemming from the IRB survey has been taken into account in several of the policy choices in these GL, the impact assessment, i.e. the analysis of the pros and cons of the policy options considered, is also presented in that report. Accordingly, the report is a joint report on the impact assessment for the GL and the results of the IRB survey. In order not to duplicate these analyses, in section D below (Options considered), the reader is referred to the relevant sections in the Report on the IRB modelling practices.

A. Problem identification

The EBA reports on comparability and pro-cyclicality of RWAs have identified significant non-risk-based variability of capital requirements calculated in accordance with the IRB Approach, and have provided recommendations on regulatory measures that should be taken to achieve greater comparability of risk parameters. All issues that have been considered while developing these GL refer to the identification and/or limitation of drivers of unjustified RWA variability in

the context of PD and LGD estimation, and the treatment of defaulted assets for IRB institutions.

B. Policy objectives

The objective of the GL is to establish convergence of institutions' and supervisory definitions related to PD and LGD estimation and the treatment of defaulted assets, as well as the convergence of institutions' methodological choices in developing PD and LGD models where these choices are considered to be drivers of unjustified RWA variability. The GL are complementary to the RTS on IRB assessment methodology (EBA/RTS/2016/03) where some technical choices related to PD and LGD estimation, as well as to the treatment of defaulted assets, are already regulated. In particular, provisions related to data requirements, the estimation of the long-run average PD and the calculation of the long-run average LGD as a simple average with respect to the number of defaults refer to the RTS on IRB assessment methodology as a starting point.

The GL aim to define common notions and criteria in the major policy fields including:

- a) a framework for the MoC;
- b) PD: one-year default rates (frequency of motoring);
- c) PD: long-run average default rates;
- d) LGD: additional drawings after default, and interest and fees capitalised after the moment of default;
- e) LGD: measurement of economic loss for a cured cases;
- f) LGD: discount rate;
- g) LGD: incomplete recovery processes;
- h) LGD: treatment of cases with no loss or positive outcome;
- i) LGD: recognition of recovery values in the calculation of the realised LGD.

C. Baseline scenario

The baseline scenario is specified on the basis of data collected from competent authorities in 2013 for the purpose of the Report on comparability of supervisory practices. The findings are summarised in the Table 3.

Table 3: Baseline scenario for supervisory practices

Paragraphs in the CP	Subject	Findings from Report on the comparability of supervisory rules and practices
PD estimation		
23-35	MoC (i.e. rules concerning the conservatism in the PD parameter and rating systems for data or model weaknesses)	In general, most competent authorities (CAs) confirm the requirement that conservatism should be applied for data and model issues, and none of the CAs provides guidance on the level of conservatism that is expected. Given this, the adequacy of the level of conservatism is mainly assessed on a case-by-case basis, and fewer than 30% of CAs have rules on this topic, most being non-public. These rules concern the following aspects: (i) one CA requires that a MoC be applied for low default portfolio models and for models primarily based on human judgement; (ii) one CA requires an explicit statistical approach to assess the MoC, combined with a qualitative adjustment when the defaults are fewer than 20; (iii) one CA requires that conservatism be applied to address the 'seasonal peak' for mortgages; (iv) another mentions that a non-compliant definition of default should be addressed by a MoC; (v) another mentions that institutions should have a methodology to assess the MoC, taking into account the results of the validation and the results of self-assessment; and finally (vi) one CA mentions that a supervisory add-on will compensate for institutions' lack of conservatism.
21, 45 and 48-63	Data requirements (i.e. rules regarding the use of internal default rates, mapping with external ratings or use of statistical PD model) and calculation of observed default rates	One third of the CAs specify rules concerning the PD estimation approach, almost all non-public. In general, the use of internal default rates or statistical approaches is promoted or requested as long as the data are relevant and representative. For low default portfolios, the mapping with external rating or expert models is usually tolerated, but (i) with the use of an additional level of conservatism, or (ii) where benchmarking should be performed with other approaches, and where the institutions are encouraged to collect data to develop statistical models in due time. Some CAs, however, allow all approaches without restriction.
59-63	Historical observation period (i.e. rules on the business cycle/'downturn period')	Whereas the majority of CAs reported rules on the topic, these rules were public and binding in only two cases. However these rules are usually not specific, but rather general and 'principle based'. A wide variety in requirements has been observed; examples are that institutions should generally include (i) good and bad

		<p>economic periods, (ii) periods when higher credit losses are experienced, (iii) at least one recession period, (iv) a complete economic cycle (good and bad years), or (v) specific periods in the datasets (e.g. 1991–2008). Only few CAs specify the years of reference for a recession period or a complete cycle. Some CAs mention that different weights can be applied to data (higher weights to more recent data) if adequately motivated.</p>
64-67	<p>Risk drivers and rating criteria (i.e. rules concerning the assessment of the choice of variables that influence the PD estimation)</p>	<p>Approximately one third of CAs have rules on this topic, most being non-public and general, in the sense that the most relevant variables should be included in the model and missing variables are challenged. In two Member States, there is a requirement that there should be risk drivers or rating criteria on some key groups of variables (such as characteristics of the borrower, terms of the transaction, collateral, unpaid amounts, etc). When it comes to assessing the information value of the risk drivers, some Member States specify a threshold for the p-value of the regression, whereas others specify more general rules regarding the adequacy of the discriminatory power.</p>
75-79	<p>Design of grades or pools</p>	<p>More than 40% of CAs have rules concerning the number of grades, which are usually public and binding. The majority stick to the minimum number of grades fixed by the CRD (seven plus default); one CA increases the number to 10 for wholesale portfolios.</p> <p>Related rules in some Member States require that the number of pools and grades should be high enough to allow adequate quantification and validation. In one Member State, the concentration across the rating scale should be assessed by the Hirschman-Herfindahl index. In another Member State, the concentration in one grade should not be greater than 30% unless the grade covers a reasonably narrow PD band. Another CA applies a 25% limit for the wholesale portfolios. These rules, however, do not apply to low default portfolios, where a case-by-case approach is typically allowed.</p>
75-79	<p>Rating philosophy (i.e. rules specifying how stable rating assignments should be during the economic cycle, or how much they should change with the economic context)</p>	<p>Very few CAs appeared to have rules on this topic, mostly non-public, and only one CA publicly requires ratings to be TTC. One CA explicitly assesses the stability of the ratings, and another specifically allows hybrid systems. Some of the other CAs note that they implicitly allow for all rating philosophies, leaving the choice to institutions. The CAs seem to focus on the inclusion of all relevant and recent information regarding the credit quality of obligors.</p>

	(Point-In-Time (PIT), Through-The-Cycle (TTC) or hybrid philosophies)	The CAs have also been asked whether or not they have rules concerning the dynamics of the transitions of exposures or clients among rating classes. However, only three CAs reported rules on the topic, all non-public. This means in particular that they monitor/challenge the migration matrices to assess their stability, at various stages of the economic cycle. For two CAs, analysis regarding the stability of migration matrices is conducted only during the approval process of the IRB Approach.
80	Calibration sample (i.e. rules concerning the data used for calibration of the PD estimate)	Around one third of the Member States have rules on this topic, some being public and binding, and some non-public. These rules usually mention the requirement of five years of representative data. When a shorter period is used, a MoC must usually be added to address the data issue. The answers appeared incomplete for several CAs, however, and therefore no robust conclusions could be drawn.
LGD estimation		
89-92	General requirements with regard to estimation methodologies	The majority of Member States do not have any specific rules with regard to estimation methodologies other than those specified in GL 10, but it was indicated by several respondents that workout LGD is mostly (or even solely) in use. Only in two jurisdictions were there public and binding rules in that regard, where workout LGD was prescribed in one jurisdiction - for mortgage portfolios, and in the other workout LGD was expected for corporate and retail portfolios, while market LGD was allowed for large corporate, institutions and sovereign exposures. A few Member States apply certain rules with regard to cure rates: one of them explicitly requires institutions to identify cure rates, and another imposes such a requirement where there is potentially a higher rate of technical defaults. In any case, the definition of cure is left for the institutions to specify.
112-127	Calculation of economic loss for the purpose of workout LGD, including discounting factor	Only a few Member States have any specific rules with regard to the calculation of economic loss and realised LGD and most of them are not public and cover only selected aspects, such as conservative approach to cost calculation and allocation. One of the CAs defined minimum types of data to be collected by the institution for the purpose of calculation of realised LGD while another specified that, in cases of collateral repossession, institutions have to estimate haircuts on the value of the collateral, taking into account the potential sale value and the time to sale.

		Four CAs specified specific rules for the discounting factor, which include the following approaches: (i) the discount rate that is applied should reflect the uncertainty at the time of default; (ii) the discount rate should not be lower than the risk-free rate; (iii) a risk premium should be calculated using an internal model or, in its absence, 400 basis points over the base rate; (iv) the discount rate should be at least 9%. Other CAs base their approach on the principles specified in GL 10 or in BCBS guidelines.
134-138	Length of workout period and treatment of incomplete workout cases	A few CAs specified some general rules with regard to the length of workout period, whereas one CA considers 95% of recovery rate to be a specific point to terminate the workout process for recovery curve calculation purposes. In addition, one CA requires institutions to take into account at least two complete recovery cycles. With regard to the treatment of incomplete cases, most of the Member States do not have any specific rules. Those few that do have such rules require including such cases in the calculation, and allow estimation of future cash flows.
140-144	Risk differentiation	Only two CAs have specific rules in terms of the granularity of risk differentiation, and in both cases they are not public. Institutions are required to ensure adequate segmentation within each portfolio to ensure a proper risk differentiation. More rules exist with regard to explanatory variables; in three jurisdictions such rules are public and binding, whereas in six others they are not public but are part of supervisory practices. While in some cases the rules refer to certain risk drivers that have to be used in model development, other CAs require that banks use the most relevant variables and that they adequately reflect the recovery processes.
128-133	Length of observation period	While rules regarding the length of the observation period exist in several jurisdictions, in a few of those cases they are reflective only of the minimum periods specified in the CRR. Other requirements specified by individual Member States include the following: (i) covering a complete business cycle; or (ii) covering at least two complete recovery cycles. In a few cases different weighting is allowed, for instance to address structural changes in data, but such weighting has to be sufficiently justified and conservatism has to be ensured. In addition, one CAs required including the downturn period of the 1990s.
145-155	Collaterals and	The rules on the treatment of collaterals and guarantees exist in several jurisdictions, but only in half of them are

	guarantees	these rules public. Examples of such rules include the following: (i) estimates have to be made for homogeneous pools of collateral, where similar recoveries can be expected and shown; (ii) foreign exchange risk must be considered; (iii) banks must establish internal standards for collateral management, consistent with those required under the Standardised Approach. With regard to valuation, there are various requirements across jurisdictions, which range from requiring that the valuation of real estate collateral be performed by an independent appraiser to allowing the use of statistical methods in determining the value of the real estate. In some cases, CAs required the application of haircuts, which are specified differently by different Member States. In addition, a few CAs specified rules with regard to minimum frequency of revaluations, which again differ across jurisdictions. While one CA requires annual reviews for real estate collaterals, and quarterly reviews for financial collaterals, others allow less frequent revaluations, at least in some cases.
156	Downturn LGD	In general, the calibration of the LGD parameter is affected by the downturn LGD calibration. However, only 35% of the CAs (seven CAs) define any rules concerning the methodology of downturn LGD. Among those CAs, in only one case is the rule public and binding. Moreover, most of the CAs confirm that banks should base their downturn LGD estimates on historical scenarios, and check for conservativeness of the estimation made at the institutional level.
23-35	Margin of conservatism	While a few CAs apply some rules in terms of the MoC, they are usually not very prescriptive in terms of the quantification of MoC, and are mostly focused on the general types of weaknesses that the MoC should address (data, methodologies). One CA requires specifically that MoC should cover additionally significant differences between the debtors and their guarantors, positive correlations, and currency mismatches between exposures and collaterals. In one Member State, it is required that MoC should be applied on top of the estimates, and another specifies that MoC can be established as an LGD floor (e.g. 45% in the case of large corporates) or specific add-ons (e.g. stressing the probability of incompletes).
Defaulted exposures		
157-179	EL _{BE}	Only 35% of the CAs (seven CAs) define a rule concerning the methodology of the EL _{BE} on defaulted assets.

		Moreover, the rules specified show divergence of practices; for example, some refer to the GL 10 rules, others align the methodology with the LGD for non-defaulted exposures, and some simply use provisions. Among those CAs that specify a rule, only three confirm that this rule is public and, in particular, in two cases is the rule also binding.
157-171 and 180-184	LGD in-default	Only 25% of the CAs (five CAs) define a rule concerning the methodology of LGD in-default calculation. Among those CAs in only one case is this rule public and binding. In terms of approach used, in most of the cases LGD in-default is obtained as $EL_{BE} + \text{add-on}$, or as LGD downturn.

D. Options considered

This section provides an overview of the technical options considered. Given that the distribution of current modelling practices stemming from the IRB survey has been taken into account in the analysis of the pros and cons of the policy options considered, this analysis has been included in the Report on the IRB modelling practices. In order not to duplicate these analyses, Table 4 provides an overview of the options that have been considered for each policy area, as well as a link to the relevant section in that report.

Table 4: Overview of policy options

Section in the EBA Report on the IRB modelling practices	Topic	Options
3.3.	MoC	Specifying a non-exhaustive long list of triggers for MoC as part of the GL.
		Specifying only the MoC categories, including a minimum list of triggers for each category in the GL.
4.6.	Frequency of calculating the one-year default rate	The one-year default rate should be calculated at least monthly for all retail exposures, and at least quarterly for all other exposures.
		The one-year default rate should be calculated at least quarterly for all exposures.
		The one-year default rate should be calculated at least quarterly for all retail exposures, and at least semi-

		annually for all other exposures.
5.2.	Recognition of recovery values in the calculation of the realised LGD	<p>Value of repossession: repossession of a collateral by an institution should be considered a recovery</p> <p>Value of sale: the recovery should be associated with only cash payments so in this case only the final price for which the institution sells the repossessed collateral should be taken into account.</p>
5.5.1.	Economic loss for a cured cases	<p>Using the same methodology as for other defaulted exposures, but not discounting additional recovery cash flows at the date of the return to non-defaulted status (i.e. no discounting of artificial cash flows).</p> <p>Using the same methodology as for other defaulted exposures, including the discounted additional recovery cash flows at the date of the return to non-defaulted status (i.e. artificial cash flows should be discounted like all other cash flows).</p>
5.5.2.	Unpaid late fees and capitalised interest	<p>Capitalised fees and interest after default included only in the numerator of realised LGD.</p> <p>Only fees and interest before default should be included: fees and interest after default should not be added to the economic, loss but the recovery cash flows are still included.</p> <p>Capitalised fees and interest after default included in both numerator and denominator of realised LGD.</p>
5.5.4.	Discounting rate	<p>Euribor (or comparable interbank rate in the countries from outside the euro area) + fixed add-on.</p> <p>Funding cost + add-on: discounting factor reflecting the funding costs of the institution, and an appropriate risk premium reflecting the uncertainties associated with the receipt of recoveries with respect to a defaulted exposure.</p> <p>Original effective interest rate: discounting factor is derived from facility-specific interest rates.</p>
5.6.3.	Treatment of incomplete recovery processes	Institutions should not estimate any future recoveries for the periods beyond the maximum length of the recovery process.

		Institutions should estimate future recoveries for the periods beyond the maximum length of the recovery process only if these recoveries will stem from the realisation of the existing collaterals.
5.6.4.	Treatment of cases with no loss or positive outcome	0% floor on LGD estimates. This would be the continuation of policy applied in GL 10, i.e. no obligatory floor at the level of individual realised LGD. Netting of gains and losses would be allowed but only where this is consistent with the business model of the institution (subject to the assessment of the competent authority).
		0% floor on realised LGD for the computation of the long-run average. This is the option specified in the CP of the GL.

E. Cost-benefit analysis

The guidance given in these GL regarding the development and maintenance of risk parameter estimation methodologies, as well as regarding the treatment of defaulted assets, will affect all areas of modelling PD, LGD, EL_{BE} and LGD in-default. Therefore it is expected that these GL will lead to model changes. For each individual policy aspect, the Report on IRB modelling practices contains an overview of the proportion of models (and the proportion of exposures covered by these models) for which the policy chosen in the GL will imply a change in practice (see section 4.10. for PD estimation, section 5.8. for LGD non-defaulted, section 6.6 for LGD in-default and EL_{BE} estimation). For most policy choices, the policy chosen in the GL represents the most common approach. This should ensure that the number of model changes is minimal, to the extent possible, since other (economic) arguments have also been taken into account in the final policy choices in the GL. The Report on IRB modelling practices also contains an overview of the number of aspects which will need to be changed in PD, LGD non-defaulted, LGD in-default and EL_{BE} estimation. From these results, it can be noted that the proportion of models which are already compliant with the GL, i.e. the proportion of models for which no model changes would be required, is very small (8% for PD, 1% for LGD non-defaulted, 4% for LGD in-default and 6% for EL_{BE} models). Given that these computations include only a minimum list of policy aspects (i.e. those for which a clear split can be made between models that would comply and those that would not comply), the above numbers are a lower bound to the true expected number of model changes. It is therefore safe to say that all models will probably need to be adjusted, in one way or another.

However, the main costs of implementing these GL are expected to be of one-off costs covering:

- the training of staff on these GL;
- the redevelopment or recalibration of models;

- the IT specification and implementation of the reviewed models;
- the set-up of monitoring reports, where the GL contain additional monitoring requirements;
- the costs for the regulatory approval process.

When analysing these costs of implementation, it has to be kept in mind that the other regulatory products within EBAs review of the IRB Approach, and in particular the RTS on IRB assessment methodology and the RTS on the materiality threshold for past due credit obligations, will also trigger material model changes. These are expected to be handled together with the model changes arising from these GL to the extent possible.

The expected impact of these GL can also be assessed on the basis of the changes proposed with regard to the currently applicable GL 10, which can serve as a proxy to assess the nature of the expected changes. The following analysis outlines the major policy changes with respect to GL 10, and provides initial indication of the direction of the severity of model changes expected.

The impact of the GL may be assessed by analysing the scope of the changes in comparison with the currently applicable GL 10. It is planned that relevant parts of GL 10 will be repealed by the time that the new EBA GL apply, along with the other regulatory products which are part of the EBA's review of the IRB Approach. The changes in the policy reflected in the EBA GL relative to GL 10 indicate the scope of the changes that will have to be introduced in the rating systems of institutions.

In principle GL 10 were more general than the currently proposed GL, and provided descriptions of possible approaches and challenges related to them rather than strict, normative rules. The final EBA GL on PD, LGD and defaulted exposures are more specific in most of the areas addressed, and therefore, even where no explicit change of policy is proposed, some changes may still be necessary to comply with the more detailed requirements.

The main areas where an explicit change in policy relative to GL 10 is identified include the following:

- a. Discounting factor – like GL 10, the GL are based on the principle that discounting rate should include risk-free rate and risk premium, but propose a fixed value of the risk premium; there is no possibility for institutions to estimate this premium themselves for specific portfolios. The GL are less flexible with regard to how the uncertainty should be addressed and suggest that it is no longer possible to include this uncertainty elsewhere, for instance in the recovery cash flows, instead of the discounting factor.

Currently institutions use various approaches for determining the discounting rate, ranging from the use of discounting factors based on effective interest rates of the underlying loans, and various add-ons with a wide range of values on top of various underlying internal and external interest rate benchmarks, to fixed discounting rates reflecting downturn conditions. In the light of these differences, it is expected that the policy decisions included in the GL may have a significant impact on the calculation of the realised LGDs for at least some of the institutions. Based on the responses to the IRB survey, change in policy will be required in around 40% of models (representing 34% of



exposure values) as regards the methodology for determining the discounting rate (i.e. current methodologies different from the proposed primary interbank offered rate applicable at the moment of default, increased by an add-on, represent around 34% - 40%)¹².

- b. Recovery processes with positive outcome – GL 10 recognise that some defaulted positions may generate no loss, or may even have positive outcomes in the recovery process, and specify that the estimated LGD used to calculate capital requirements must not be less than zero. However, GL 10 do not prescribe any specific treatment of individual positive realised LGDs, other than that these cases should be monitored. The GL introduce the rule that realised LGDs should be floored to zero at individual level.

It is expected that this policy should not have significant impact on the LGD estimates in general, as these estimates have to reflect downturn conditions. The evidence collected in the IRB survey supports this, and shows that a zero floor at the level of the individual default observation is applied in 73% of LGD models. However, for some specific portfolios that may systematically lead to positive outcomes, such as certain leasing portfolios, this proposal may lead to a significant change of the model.

- c. LGD estimation methodologies – GL 10 specify that the market LGD and implied market LGD, which are based on market data on the prices of certain instruments, are possible methodologies for estimating LGD in certain cases, especially where internal data is not sufficient, and capital markets are deep and liquid. However, it was also already recognised in GL 10 that these methods could potentially be used only in specific circumstances, and that LGD estimates based on an institution's own loss and recovery experience (the so called workout LGD) should in principle be superior to other types of estimates. According to the GL, methodologies based purely on market data will no longer be allowed, as these methodologies do not meet certain CRR requirements, in particular those related to the specification of the observation period and the representativeness of data. Market data may be used only to supplement internal data that reflects the institution's own experience.

In the light of the most recent proposals of the BCBS with regard to low default portfolios, and in particular the proposals for limiting the scope of application of the IRB Approach and LGD modelling, it is expected that the impact of the GL by the date of their application should not be significant. It seems that market-based methodologies are not widely used across the EU: among the institutions that participated in the IRB survey, it appears that only 8% have LGD models that are market based. For the LGD models in the sample of the IRB survey, the proportion of market implied LGD models for non-defaulted exposures is 2% (representing 4% of the exposure values).

- d. LGD in-default – GL 10 seem to allow that downturn adjustment may not be part of LGD estimation for defaulted exposures, as they state that downturn conditions should be

¹² These values represent a lower bound to the true proportion of models to be changed, because for 31% of models (representing 28% of exposures) it could not be assessed whether or not the current approach is different from the policy in the final GL.



taken into account in measuring the possibility of additional unexpected losses during the workout period, if they are relevant to a certain type of exposures. The GL are clear that LGD in-default should comply with all requirements for LGD estimation, and therefore it should also reflect downturn conditions.

As the GL provide more prescriptive requirements with regard to estimating LGD for defaulted exposures, it may necessitate adjusting the calibration of some of the models.

The above analysis does not include the analysis of the requirements for the estimation of downturn LGD, which may be another aspect where a change in policy is proposed. However, these aspects are not currently covered by the proposed text of the GL. The EBA continues to work on the aspects related to downturn adjustment by considering together the RTS on the nature, severity and duration of economic downturn and the possible additional section of the GL that will clarify how to apply the requirements of the RTS to derive the downturn LGD.

Views of the Banking Stakeholder Group (BSG)

The BSG generally supported the content of the draft GL, although a number of specific comments were raised. The BSG expressed support for the EBA's view that the existing risk-based (IRB) approach to measuring capital requirements has to be an integral part of the regulatory capital framework, stressing the need for risk sensitivity in capital requirements. The group also agreed, however, that the current flexibility in the IRB-framework has made comparability of capital requirements across institutions and jurisdictions difficult, and hence that there is a need for harmonisation of how models are developed and calibrated. The BSG was of the opinion that, in general, the draft GL did not specify in detail all of the requirements and definitions, and hence more clarifications would be welcome regarding key concepts in the final version of the GL. It was noted that the draft GL focused on high default portfolios, and clarifications were requested regarding the treatment of low default portfolios. It was also suggested that no potential BCBC decisions should be pre-empted by the GL.

Furthermore, the BSG underlined the need for increased transparency in relation to the IRB models, as this would contribute to enhancing trust in the models. In this context, it was suggested that institutions should disclose their general model concept in combination with a standardised validation test. Finally, increased harmonisation of the internal models and enhanced transparency should go hand in hand with strict procedures for authorisation and diligent supervision of the use of internal models by competent authorities.

While welcoming the harmonisation efforts, the BSG also mentioned that sufficient time should be granted for the implementation of the changes stemming from the GL, taking into account the time needed for assessment by competent authorities. In this context, a transitional grandfathering of existing models was suggested.

The BSG expressed concerns about the potential overall increase of capital requirements as a result of implementation of the GL. It was suggested that the impact should be carefully assessed to avoid unintended consequences. In this context additional clarifications were requested with regard to the application of the MoC to the risk parameters. Other specific comments related to the potential additional unexpected losses in the estimation of LGD in-default, the treatment of portfolio sales and the discounting rate.

Feedback on the public consultation and on the opinion of the BSG

The EBA publicly consulted on the draft proposal contained in this paper.

The consultation period lasted for three months and ended on 10 February 2017. Thirty three responses were received, of which twenty three were published on the EBA website.

This paper presents a summary of the key points and other comments arising from the consultation, the analysis and discussion triggered by these comments, and the actions taken to address them if deemed necessary.

In many cases, several industry bodies made similar comments or the same body repeated its comments in response to different questions. In such cases, the comments and EBA's analysis are included in the section of this paper where the EBA considers them most appropriate.

Changes to the draft GL have been incorporated as a result of the responses received during the public consultation.

Summary of key issues and the EBA's response

As the CP included 25 specific questions, the industry provided detailed feedback on the draft GL. There was general support for the GL, and in particular for the EBA's efforts to harmonise the main concepts underlying the modelling practices to ensure comparability of risk parameters, while at the same time preserving risk sensitivity in the own funds requirements. It was also clear, however, that the implementation of the changes will require sufficient time, and a phased-in approach was suggested. This aspect has already been considered by the EBA and previously consulted on with the industry. The conclusions were reflected in the EBA's Opinion on the implementation of the regulatory review of the IRB Approach (EBA/Op/2016/01), published in February 2016¹³. The date of application of the GL was specified in accordance with this Opinion so the GL will apply from 1 January 2021, which in the EBA's view gives sufficient time for institutions and competent authorities to implement and assess the changes to the rating systems.

Several respondents expressed concerns about the application of the GL to low default portfolios and specialised lending, and it was suggested that specific clarifications should be provided in this context. The EBA considered this aspect and decided that no specific rules should be specified for low default portfolios, as in this case the minimum requirements must also be met to receive permission to use the IRB Approach, and the CRR does not envisage any exemptions from these requirements for such portfolios. The requirements of the GL have been specified in a flexible manner, to accommodate various estimation methodologies and types of portfolios. Especially in the phase of model development, institutions may use data and methods that are considered most appropriate for a given portfolio. While human judgement is an integral element of all

¹³ <http://www.eba.europa.eu/documents/10180/1359456/EBA-Op-2016-01+Opinion+on+IRB+implementation.pdf>



models it is expected that in the case of models for low default portfolios it may be used to a greater extent.

Nearly all respondents commented on the concept of MoC included in the draft GL. While many respondents expressed general support for the proposal, the majority expressed operational concerns, especially regarding the quantification and aggregation of MoC relating to different identified deficiencies and categories. The aspect of low default portfolios was also mentioned in the context of potentially higher MoC due to lower data availability. It was considered counterintuitive that greater conservatism would have to be applied to less risky portfolios. The EBA has carefully considered the feedback received and adjusted the concept of MoC by simplifying the aspects of categorisation, quantification and aggregation, and by providing additional clarifications where necessary.

While there was broad agreement with the requirements specified for the estimation of risk parameters, many specific comments were expressed, especially in the context of LGD estimation. These included in particular aspects such as representativeness of data, treatment of interest and fees after default, discounting rate, and treatment of incomplete recovery processes. The feedback received was to a large extent included in the final text of the GL. In particular, more detailed clarifications were provided with regard to data representativeness, making a clear distinction between the phase of model development and calibration, as well as alignment between PD and LGD estimation. More detailed feedback with regard to these and other comments is provided in the table below.



Summary of responses to the consultation and the EBA's analysis

Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
General comments			
General support	<p>The majority of respondents expressed general support for the EBA's initiative to enhance trust in internal models, as well as for the content of the GL.</p> <p>While expressing support for the harmonisation effort, several respondents pointed out that unjustified variability of RWAs should be distinguished from justified variability based on the differing risk profiles and practices of the institutions.</p>	<p>While the scope of the GL remains unchanged, additional clarifications were provided where necessary. The objective of the GL is to limit unjustified variability of own funds requirements and ensure the comparability of risk parameters by providing common definitions underlying the modelling, while preserving the risk sensitivity of the parameters.</p>	No change
Implementation	<p>Many respondents pointed out that the implementation of the changes resulting from the GL and other related regulations would require sufficient time. Some respondents suggested a phased-in approach, while others requested grandfathering for existing models, proportionality or flexibility in the date of application. It was also proposed that supervisors should take into account the GL only after the implementation period and not in their upcoming inspections.</p> <p>Furthermore, some respondents suggested that some simplifications could be introduced in order to facilitate implementation.</p>	<p>This aspect has already been considered by the EBA and the industry has already been consulted. The conclusions were reflected in the EBA's Opinion on the implementation of the regulatory review of the IRB Approach (EBA/Op/2016/01), published in February 2016. The date of application of the GL was specified in accordance with this opinion, and hence the GL will apply from 1 January 2021, which in the EBA's view gives sufficient time for institutions and competent authorities to implement and assess the required changes to rating systems. In order to ensure a smooth implementation process and avoid significant cliff effects, competent authorities should take into account the GL even before the date of application and where necessary formulate</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		recommendations, with appropriate deadlines, for mitigating actions.	
Low-default portfolios	Several respondents expressed concerns about the application of the GL to low-default portfolios and specialised lending, and it was suggested that specific clarifications should be made in this context. Potential difficulties in the application of the GL to low-default portfolios were mentioned in particular in the context of MoC, in that higher MoC would apply to less risky portfolios due to more limited data availability.	In accordance with the CRR, in order to receive permission to use the IRB Approach all minimum requirements have to be met, and the CRR does not envisage any exemptions from these requirements for low-default portfolios. Therefore, the GL could not include any specific rules applicable to these types of exposures. However, the requirements of the GL have been specified in a flexible manner in order to accommodate various estimation methodologies and types of portfolios. In particular during the model development phase, institutions may use the data and methods that are considered most appropriate for a given portfolio. While human judgement is an integral element of all models, it is expected that in the case of models for low-default portfolios it may be used to a relatively large extent.	No change
Level of own funds requirements	A few respondents expressed concerns about the potential overall increase in own funds requirements as a result of the implementation of these GL. The objective should be the harmonisation of internal models rather than increasing RWAs in general.	The objective of the GL is to reduce unwarranted variability in own funds requirements. This may result in an increase in own funds requirements for some institutions and reduction in them for others. The aims of the GL are to ensure that the most appropriate methods are applied and to promote best modelling practices. In many cases, the requirements specified in the GL are based on the most common approaches currently in use.	No change
Use test	Several respondents suggested that the relation between costs and benefits should be taken into	Additional clarifications were provided in the GL in terms of possible divergences between the	New section 8.3



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>account. In this context, the importance of the possibility to use the parameters for internal purposes (and meeting the use test requirement) was also mentioned. As heavy investments may be necessary to implement the changes, the models should serve purposes other than just calculating capital requirements. It was suggested that the parameters should reflect an economic and not only a conservative approach, and that conservatism for capital calculations and for other purposes should be distinguished.</p>	<p>parameters used for the purpose of own funds requirements and the parameters used for internal purposes. It was specified in particular that for internal purposes institutions may use best estimates of risk parameters before the application of an MoC.</p>	
Consistency	<p>Several respondents pointed out the need for consistency with the Basel framework and accounting standards. In addition, clarification was requested with regard to the relation between these GL and the TRIM Guide provided by the ECB.</p> <p>Furthermore, some respondents were concerned about potential divergence in supervisory approaches, as a result of which stricter requirements may be imposed by some supervisors than by others. It was suggested that supervisory practices should be proportionate.</p>	<p>The EBA has followed closely developments with regard to the Basel reforms and has tried to avoid any inconsistencies. These GL will be complementary to the revised Basel framework and will apply to all models that remain within the scope of the IRB Approach. Full consistency with accounting standards is not possible due to the different objectives of accounting and prudential frameworks, and some differences are inevitable (e.g. downturn versus current economic conditions, or the time horizon of the parameters). However, as accounting standards are more principle-based, modelling for accounting purposes can leverage on rules set out for prudential purposes.</p> <p>The GL will be applicable to all institutions and competent authorities, including the SSM.</p> <p>The GL aim to promote not only harmonised modelling practices but also the convergence of supervisory expectations. In addition, the</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		consistency of supervisory practices should be increased by the adoption of the RTS on the IRB assessment methodology. However, some degree of supervisory discretion is embedded in the process of granting permission, during which supervisors have to ensure that all minimum requirements are met.	
Scope of application of the GL	<p>A few respondents noted that the GL do not address the estimation of conversion factors and asked about the EBA's intentions in that regard. It was also not clear whether the GL would apply to the slotting criteria approach for specialised lending.</p> <p>Furthermore, one respondent suggested that it should be clarified throughout the GL which requirements are general and which apply only to specific exposure classes (retail/non-retail).</p>	<p>Indeed the GL do not cover the estimation of conversion factors, and currently there are no plans to provide additional guidance in that regard; however, it cannot be excluded in the future.</p> <p>As the slotting criteria approach is considered a type of rating system, the GL apply to this approach, but only to the extent to which they are relevant. As the approach does not include the quantification of risk parameters, the requirements for risk quantification will not be applicable.</p> <p>Where the GL do not specify explicitly the scope of application of a certain requirement, it means that the requirement is relevant for all models across all exposure classes.</p>	No change
Models based on danger rate	<p>A few respondents enquired about the application of models based on 'danger rate' in the context of several requirements specified in the GL.</p>	<p>While it is not entirely clear how models based on 'danger rate' are designed and whether such models would be acceptable would have to be assessed on a case-by-case basis, it is explicitly clarified in the GL that the model design may be based in particular on the recovery scenarios or other relevant model components. In any case, however, regardless of the chosen model design, all the requirements specified in the CRR and in the GL will have to be met,</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		including in particular those related to the quantification of LGD.	
Annexes to the background and rationale	Several respondents requested clarification about the annexes included in the background and rationale section and whether they should be considered part of the requirements.	The annexes were included only as examples and were not intended to be part of the requirements. In order to avoid confusion, they have been removed from the final GL.	Changes to the background and rationale section
Clarifications	Many respondents requested clarification on detailed specific issues addressed in the GL and/or specific paragraphs.	The text of the GL has been reviewed in a comprehensive manner and the wording has been adjusted in many cases in order to provide more clarity, to the extent possible. In addition, the background and rationale section has been extended, providing additional clarifications as requested.	Changes throughout the GL and to the background and rationale section
4.1: Do you agree with the proposed requirements with regard to the application of appropriate adjustments and margin of conservatism? Do you have any operational concerns with respect to the proposed categorisation?			
MoC general framework	One respondent wondered whether the categories and examples included in the background and rationale section of the CP should be seen as a checklist of potential triggers of MoC, in the sense that the potential outcome for an institution may be a zero MoC for certain triggers. One respondent agreed that this should be the case, but another respondent argued that such a checklist would be strictly interpreted by supervisors as requiring an MoC for each individual category. This respondent disagreed with this annex.	Due to the confusion about the nature of the list of triggers of MoC in the background and rationale section of the CP, the list has been removed from the final GL. Due to the specificities of triggers of MoC, it is deemed more appropriate to allow institutions to specify a list of all identified deficiencies along with the categories in which they are classified, without including in the GL an example of what such list of triggers might look like. Nevertheless, the GL do contain a non-exhaustive list of triggers of MoC, which institutions should analyse under the relevant categories. Institutions should also create for each rating system a complete list of	Changes to the background and rationale section



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>Whereas several respondents welcomed the clarification of the MoC and adjustment framework set out in the GL, many raised concerns with respect to the practical feasibility of quantifying all MoCs for the individual categories. Some also mentioned that institutions currently already include adjustments and MoC in their estimations. Some respondents wondered whether the benefits of the proposed framework outweighed the costs. One bank argued that it would be operationally difficult to implement this framework by end-2020. One respondent argued that an MoC should only be applied as a last-resort measure, and that other ways to address a deficiency should be explored first. One respondent argued that the MoC framework introduced judgement and subjectivity, which comes at the expense of risk sensitivity.</p>	<p>all identified deficiencies, including the categories in which these deficiencies are classified.</p> <p>Based on this feedback, it has been decided to construct a different list of categories, which should facilitate the quantification of MoC by category, so that overlaps between triggers of MoC in different categories can be avoided. The new categories to be identified are the following: category A – MoC related to data and methodological deficiencies; category B – MoC related to relevant changes to underwriting standards, risk appetite, collection and recovery policies, and any other source of additional uncertainty; category C – general estimation error. The GL contain a non-exhaustive list of deficiencies that would fall into categories A and B.</p>	<p>Changes to section 4.4</p>
	<p>Some respondents opined that the scope of MoCs should be clarified, as should the methodologies that should be used (i.e. using confidence intervals or otherwise). Others mentioned that the GL should specify how the quantification should be performed.</p>	<p>Although the EBA considered specifying how MoC should be quantified, it has been taken into account that a wide variety of practices exists, which corresponds to the different possible natures of the potential deficiencies and uncertainties. Therefore, the preferred approach, taken in the GL, is to specify a list of minimum conditions for the quantification of MoCs in each category, without prescribing a detailed methodology. As regards the clarification of the scope of MoC, it should be mentioned that an MoC should cover at least the expected range of</p>	<p>Changes to section 4.4.3</p>



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		estimation errors, as required by Article 179(1)(f) and Article 180(1)(e) of the CRR. Since it would be impossible to anticipate all possible triggers of MoC, the GL contain a non-exhaustive list of potential deficiencies.	
	Several respondents requested that the GL clarify that an MoC may be zero.	It is specified in the GL that an MoC stemming from category C (general estimation error) should be greater than zero, whereas an MoC corresponding to category A or B should be greater than or equal to zero.	Changes to paragraph 47
	One respondent mentioned that the GL should clarify whether an adjustment may be negative, that an MoC may also be positive, and whether adjustments and MoC may or should be used together.	Paragraph 26 of the CP on the GL already makes clear that the appropriate adjustment may be either positive or negative. This clarification has been retained in the final GL in paragraph 39.	No change
	Some respondents requested clarification of the interaction between the use test and the MoC. Two respondents wonder whether it would still be possible to pass the use test after the implementation of the MoC framework under the GL. It was argued that institutions might typically want to use the model with the economic adjustment, and without the MoC, or with a lower MoC than the regulatory requirement, for their internal purposes.	A new section 8.3. has been inserted in the final GL in order to clarify aspects related to the use test. The GL provide an exhaustive list of possible deviations from the parameters used for own funds requirements calculation that can be applied for internal purposes. However, the use of parameters in both obligatory and optional areas of the use test does not preclude taking into account information from other sources as well. The combination of the information on internal ratings or risk parameters and any other relevant information should lead to an appropriate management decision in accordance with the institution's policy. The requirements for the use test specified in these GL should be read	New section 8.3



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		together with the RTS on IRB assessment methodology, which in Articles 18 to 21 specify obligatory and optional areas of the use test.	
	One respondent argued that the MoC framework proposed in the GL should be applied only to new model approvals and material model changes, and that it would be inappropriate to require retrospective application of the framework to existing models. Another respondent flagged this aspect as well, pointing out that the treatment of existing models is not clear from the GL.	The EBA issued its Opinion on the implementation of the revision of the IRB Approach ¹⁴ in February 2016; the expected implementation timeline is specified in it based on previous consultations. In this opinion, it is established that the full review of internal models should be implemented by end-2020. The MoC framework is an integral part of PD and LGD estimation, and hence all internal models will have to comply with the final GL as well as the other aspects of the new regulatory framework by end-2020.	No change
Identification of deficiencies	Several respondents argued that the EBA should provide definitions for the categories and methodological aspects of MoC estimation. It was mentioned that the differences between categories A, B, C and D were not clear. It was also suggested that further standardisation of the criteria for the adjustments and MoC identification and quantification should be provided. For some respondents, it was mainly category C that was unclear. Some mentioned that, without this clarification, the MoC framework would lead to even less comparable estimates among banks.	The EBA has further discussed the scope and definitions of the various categories. Based on the comments and difficulties associated with certain overlaps, it has been decided to redesign the categories and provide greater clarity where necessary. Note that paragraph 38 of the final GL contains a non-exhaustive list of potential deficiencies that should be analysed. Given the divergent nature of deficiencies and the multitude of possible methodologies that can be used to assess the appropriate adjustments and the MoC, it would not be beneficial to specify or limit methodologies for either the appropriate adjustments or the	Changes to section 4.4

¹⁴ <https://www.eba.europa.eu/documents/10180/1359456/EBA-Op-2016-01+Opinion+on+IRB+implementation.pdf>



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>Many respondents argued that it would be overly cumbersome to require an MoC for each and every trigger or deficiency. Some respondents argued that a proportional treatment (e.g. a materiality threshold) should be applied if an MoC has only a small impact on PD or LGD levels. One respondent argued that it should be allowable to set an MoC for each category in a harmonised manner for less material models. One respondent, furthermore, argued that it would be inappropriate to apply an adjustment and an MoC in the event that some data in the development sample were erroneous or not representative, and that in such a case it would be better to exclude these data from the development dataset.</p>	<p>quantification of the MoC.</p> <p>As the CRR requires that an MoC is included in risk parameters, covering the expected range of estimation errors and other sources of uncertainty, this requirement cannot be disregarded and hence institutions should identify all possible deficiencies. However, it is not necessary for an MoC to be quantified for each deficiency separately. The GL specify that institutions should quantify an MoC at least for each of the categories A, B and C at the level of the calibration segment, by taking into account the requirement specified in section 4.4.3. Within each of the categories A and B, identified deficiencies of a similar nature may be grouped and the quantification of MoC may be carried out on an aggregated basis.</p>	<p>No change</p>
	<p>Several respondents argued that it would be difficult and burdensome to classify and quantify MoCs, as required, into the four categories specified. It was argued that it would be impractical to break down adjustments and MoCs into individual components. Some respondents argued that the whole framework was too detailed and requested a more principle-based approach. Some respondents argued that the proposed framework would entail a significant operational burden.</p>	<p>Taking into account the feedback received, the proposed MoC framework has been redesigned and the number of categories has been reduced to three simplified and non-overlapping categories. Further simplifications were not considered appropriate, as the implementation of this framework is necessary in order to reduce the unjustified RWA variability stemming from MoC. Furthermore, it should be noted that the framework for quantifying adjustments and MoCs at category level is only principle-based, and the quantification methodology should be appropriate to the nature of the identified deficiencies.</p>	<p>Changes to section 4.4</p>



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>Some respondents expressed concerns about the wording ‘rank order estimation error’ in paragraph 25(c)(i) of the CP on the GL. One respondent suggested replacing ‘the rank order estimation error’ with ‘rank ordering errors that lead to distorted capital requirements’, because an institution could misclassify certain exposures, but, due to the very high separation power of the model, there would be no distortion in capital requirements. Another respondent wondered about the distinction between this deficiency and estimation error in the calibration. One respondent suggested changing the wording to ‘rank order estimation error leading to inappropriate calibration on portfolio, calibration segment or rating grade level’.</p>	<p>The reference to ‘rank order estimation error’ has been deleted from the final GL. Instead, it has been clarified that, while data and methodological deficiencies in the model development should be identified, they should be covered by MoC to the extent that they lead to bias in the quantification of risk parameters or to increased uncertainty that is not fully captured by general estimation error.</p>	<p>Changes to section 4.4.1</p>
<p>Quantification of estimation errors</p>	<p>Several respondents argued that it might sometimes be operationally difficult or impossible to exactly quantify the MoC at parameter level. Some respondents wondered how the estimation should be done, i.e. whether they should estimate the parameter with and without the corrected data, but they argued that this would be very burdensome and time-consuming. One respondent pointed out that this requirement was problematic in relation to the requirement in paragraph 81, which requires institutions to conduct the calibration before the application of MoCs. Another respondent argued that the requirement would be inconsistent with IFRS 9 rules, which</p>	<p>As regards the quantification of the MoC, the final GL do not prescribe a set methodology, given that the range of possible deficiencies is so diverse. The GL do, however, include more details on the conditions that should be met for the quantification. A clear separation has been introduced between appropriate adjustments and MoC (i.e. MoC should be added to best estimates of risk parameters). This also allows the calibration to be performed before the application of MoC (and PD floors). The GL further require that the total MoC at parameter level should be derived as the sum of the MoCs of the individual categories A, B and C.</p>	<p>Changes to section 4.4.3.</p>



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>require an unbiased forecast that corresponds to economic expectations. Some requested that the GL mention that the inclusion of an MoC at parameter level is not mandatory.</p>		
	<p>Some respondents argued that applying several MoCs could have a duplicative effect and could reintroduce unjustified RWA variability. It was also argued that the identified errors should be limited to categories A and B, and that category C would be more relevant to the monitoring process. Others argued that category C could only be integrated into model development or used as an adjustment in the calibration, and that it should therefore be removed. Some respondents argued that there would be an overlap between MoC and model risk (category C), or that a potential overlap effect could result from applying several conservative adjustments. Another respondent warned of a potential overlap between MoCs introduced in model development and those introduced in model application. Some argued that it should be allowable to apply a zero MoC if the institution can demonstrate that the deficiency itself leads to a conservative outcome. Others did not see the value of category D, as it was an open-ended category.</p>	<p>The potential overlaps between the different categories that were proposed in the CP have been discussed and have led to a redesign of the categories (see above). The final GL also differentiate between the MoC framework for the estimation of risk parameters and the additional conservatism that should be applied in the application of the model in relation to individual obligors or exposures in the current portfolio.</p>	<p>The MoC framework for the estimation of risk parameters is specified in section 4.4, while additional conservatism in the application of the model is described in section 8.1</p>
	<p>Several respondents wondered how and whether the sum of the individual MoCs should be computed, i.e. whether they should be linearly aggregated. Other respondents argued that such</p>	<p>The GL require that the final MoC to be added to the best estimate of the risk parameter is the sum of the MoCs for categories A, B and C. This proposal is based on the expectation that the categories will in</p>	<p>Changes to section 4.4.3</p>



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>an approach would be inappropriate, and that the non-linearity of the MoC should be taken into account in the aggregation. One respondent argued that it should be possible to specify one MoC for two or more deficiencies that are related. Some respondents argued that it should not be necessary to separately quantify MoCs for different uncertainties in relation to the same risk parameters.</p>	<p>general be non-overlapping. However, the assumption of the independence of MoCs related to these categories would be incorrect, as the appropriate adjustments that are made in relation to deficiencies stemming from categories A and B may influence general estimation error. Therefore, for the purpose of harmonisation and in order not to impose over-sophistication it has been decided to require the aggregation of the MoCs for the categories based on a simple sum. However, different aggregation techniques may be used within each of the categories. Here, institutions are allowed flexibility to address in an appropriate manner different types of deficiencies and their potential interrelations. All methods used for the quantification and aggregation of MoCs should be documented and regularly monitored.</p>	
	<p>One respondent requested clarification of the provision in paragraph 32 of the CP on the GL: ‘Institutions should consider the overall impact of the identified deficiencies and the resulting MoC on the soundness of the model and ensure that capital requirements are not distorted due to the necessity for excessive adjustments.’ Some other respondents praised the inclusion of this paragraph, because it should ensures that capital requirements are not distorted due to the necessity for excessive adjustments and MoCs. One respondent considered that this paragraph should be interpreted as meaning that the overall MoC can be determined in a holistic, qualitative</p>	<p>This clarification has been maintained in the final GL because it is necessary to have a backstop to prevent institutions applying too many adjustments and/or MoCs such that the parameter estimates no longer reflect an appropriate risk assessment and capital requirements are distorted. Whenever possible, identified deficiencies should be rectified and MoC should not be used as a reason not to do so.</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	manner on the basis of the individual components.		
Monitoring	Some respondents argued that an MoC should not be required for a modelling uncertainty that is only temporary. Some anticipated that the supervisors would be reluctant to reduce MoC over time.	The final GL specify that institutions should regularly monitor the level of the MoC and, whenever possible, they should address the causes of errors or uncertainties, correct the models to ensure their full compliance with the CRR, and rectify data and methodological deficiencies. After the necessary measures are adopted and deficiencies are rectified, the level of the MoC may be reduced.	Changes to paragraph 50
5.1: Do you see any operational limitations with respect to the monitoring requirement proposed in paragraph 53 of the Consultation Paper?			
	One respondent requested additional clarification of the term ‘homogeneous’, in the context of the requirement in the GL that exposures covered by one PD model should be managed homogeneously in terms of risk management, decision making and the credit approval process.	The paragraph has been redrafted in order to provide greater clarity.	Changes to paragraphs 123 and 13
	One respondent argued that the prescribed treatment for missing ratings was unclear with respect to the requirement that each and every natural or legal person that represents an IRB exposure should be rated. The respondent wondered whether these ratings should receive a specific PD calibration. The respondent suggested that these ratings be assigned to a conservative class that receives a specific PD calibration, and wondered whether this treatment would be consistent with the GL.	The GL specify that obligors with missing ratings should be assigned to a separate grade or pool for the purpose of the calculation of the one-year default rate (DR). As regards the question of whether a separate calibration is required for this grade or pool, it should be noted that this depends on the institution’s practice in relation to calibration, according to the GL. In particular, such a separate calibration would be required if the institution performed calibration at grade or pool level, in which case additional calibration tests should be performed at portfolio level. If, on the other hand,	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		the institution calibrated at portfolio level, the GL would require that additional calibration tests be performed at grade or pool level.	
	<p>Some respondents requested clarification on the requirement to ensure that, if new information becomes available, it is integrated into the rating calculation in a timely manner and that a review of the rating assignment be made within three months after the information becomes available.</p> <p>One respondent wondered whether this requirement related only to the one-year DR calculation, or whether it should also include the revision of the rating grade, because, the respondent argued, this would be impossible for models that include a qualitative component. Another respondent wondered whether this referred to the cases of the default of a counterparty. Another respondent assumed that the three-month period would start from the day of publication of financial statement information, and pointed out that this three-month time-window would be particularly short for corporate exposures.</p>	<p>The EBA acknowledges that certain aspects of the requirement needed to be clarified, and has therefore redrafted this paragraph, differentiating clearly between the requirements that relate to any new information and those that relate to new information on the default of an obligor. Furthermore, the requirement that the new information should be incorporated within three months has been reconsidered and, to accommodate various circumstances, no specific deadlines are now defined. New information should be reflected in the relevant IT system as well as the resulting review of the rating or LGD assignment as soon as possible. When the new information relates to the default of an obligor, the PD of the obligor should be set to 1 in all relevant IT systems in a timely manner.</p>	Changes to paragraph 194
	<p>Two respondents requested clarification on the requirement that an MoC should be added if there is a lack of homogeneous pools of exposures. One respondent wondered why an MoC should be added in this situation, since the CRR already requires that sufficiently homogeneous exposures</p>	<p>Where grades or pools are not sufficiently homogeneous, this can be considered a methodological deficiency and should be considered in the context of MoC to the extent that it could lead to bias in the quantification of risk parameters or to increased uncertainty that is not fully captured by</p>	Changes to section 4.4.1



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	are assigned to grades and pools, in Article 170(3)(c) of the CRR.	the general estimation error.	
	One respondent stated that the specifications regarding the one-year DR calculations were unclear and wondered whether a client (a support provider) whose rating was needed only for the purpose of evaluating the third party should be rated. Another respondent argued against this requirement and wondered about the rationale for it.	The GL mention that, where the one-year DR is calculated by grade or pool, the denominator should refer to all obligors assigned to a rating grade or pool at the beginning of the observation period with any credit obligation, excluding any substitution effects due to credit risk mitigation. Hence the GL are already clear that those persons or entities that do not have direct exposures but are rated only as providers of credit risk mitigation should be excluded from the calculation of one-year DR. In addition, it has been further explained in the background and rationale section that, where obligors whose obligations stem solely from non-credit products fall within the scope of application of the considered model and are treated in accordance with the institution's internal default definition, then they should form a separate pool in the rating system to avoid biasing the default rate of obligors with credit facilities. This requirement is necessary in order to ensure that PD estimates reflect the default risk of the obligor and are not biased by the different risk profiles of the protection providers, especially where limited information is available on the credit behaviour of the protection providers.	No change
	One respondent mentioned that the definition of the one-year default rate was problematic, because customers that do not have exposures on the reference date should be excluded from the	The GL do indeed require that the denominator of the one-year DR consists of the number of non-defaulted obligors with any credit obligation observed at the beginning of the one-year	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>one-year DR calculation. Another respondent considered the paragraph in question unclear. In addition, the respondent pointed to the complexity of the IT system that would be necessary to implement such a rule.</p>	<p>observation period. Therefore, whenever a credit obligation of an obligor is originated during the one-year observation period, that obligor will be included in the next one-year observation period. Depending on how frequently one-year default rates are calculated (at least quarterly, according to the final GL), it may therefore take a maximum of one quarter minus one day for such an obligor to be included in the subsequent one-year DR calculation.</p> <p>As regards the operational costs (i.e. IT costs) of ensuring that this information is available in the system, it is acknowledged that changing the IT system may entail costs; however, it is deemed that this information is necessary in order to ensure a harmonised and coherent DR calculation across institutions.</p>	
	<p>Two respondents were concerned about the treatment of committed but undrawn credit lines. One respondent mentioned that the GL are not consistent with the background and rationale section, since it states that obligors or facilities with just committed but undrawn credit lines should be excluded and assigned to a separate pool, whereas the GL state that a credit obligation refers to any amount of principal, interest and fees as well as to any off-balance-sheet items, including guarantees.</p>	<p>In accordance with the GL, institutions should consider splitting the obligors or exposures within the scope of application of a model into calibration segments where certain sub-portfolios represent fundamentally different levels of risk. It has been clarified in the background and rationale section that the need to use separate calibration segments may occur in particular in a situation where obligors' obligations stem solely from non-credit products, in order to avoid biasing the default rate of obligors with credit facilities. Similarly, with regard to obligors or facilities with just committed but undrawn credit lines, these might have to be treated in a separate calibration segment in the rating</p>	<p>Changes to the background and rationale section</p>



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		system to avoid unduly lowering the default rate of obligors with drawn credit lines.	
	Two respondents mentioned that the provisions specifying the treatment of obligors that migrate to a different rating grade, pool or rating model, or obligors whose credit obligations have been sold, should be further clarified. One of the respondents argued that the rating of an obligor whose exposure has been sold is often not available after the sale. Another respondent pointed out the difficulties of including an obligor in the calculation if the obligor is no longer rated under the model at the time of default, and wondered what methods would be permitted for performing such an appropriate adjustment and add an MoC. In particular, the respondent argued that obligors that migrate or whose exposures are sold should be included in the denominator of the one-year DR only pro rata for the period during which they were included in the observation period.	It is specified in the GL that the calculation of the one-year default rate should take into account all obligors or exposures classified to a given grade or pool at the beginning of the one-year period, even if these exposures later migrate to different grade, were sold or were written off. The one-year default rate should be an objective measure calculated as set out in the GL. However, institutions should analyse whether migrations or sales of credit obligations lead to bias in the estimation of the PD and, if so, adjust this bias by applying an appropriate adjustment to the estimates and applying an MoC as specified in section 4.4 of the GL. The EBA acknowledges that there are different approaches to such adjustments, and, given that the appropriate adjustment will depend on the specific bias, these GL do not specify how this adjustment should be done in the event of bias. In any case, an appropriate adjustment should be documented and justified.	No change
	Two respondents pointed out that the wording 'if relevant' in paragraph 51 was confusing and asked for clarification on this aspect.	Paragraph 51 of the CP on the GL states that 'with regard to paragraphs 48 to 50 an obligor has to be included in the denominator, and numerator as well, if relevant', whereas paragraph 48 specifies what constitutes the numerator and denominator of the one-year default rate. Therefore, the meaning of 'if relevant' is consistent with the meaning of paragraph 48, in that only the number of obligors included in the denominator with at least one	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>The majority of respondents stated either that they either already calculated the one-year DRs at a quarterly frequency, and therefore did not have any operational concerns regarding the requirement for quarterly monitoring, or that they usually calculated one-year default rates at least annually, and more often for some exposure classes, arguing that therefore the monitoring requirement would entail only a small operational burden.</p> <p>Some respondents stated that they usually calculated one-year default rates at least annually, and more often for some exposure classes, argued that it would generate significant costs and therefore stated that they would prefer this requirement to be removed. Some suggested having an annual review, but based on quarterly data.</p> <p>One respondent argued that the GL should specify that the quarterly calculation and monitoring of the one-year DR should coincide with the quarterly reporting dates of the institution.</p> <p>Several respondents requested additional clarification of the rationale for the quarterly monitoring requirement, or of what was meant by 'monitoring the appropriateness of the PD estimates'. One respondent assumed that this referred to a plausibility check of the default</p>	<p>default event should be included in the nominator.</p> <p>The requirement to calculate the one-year DR at least quarterly was included in the CP on the GL because this quarterly frequency allows an assessment of whether there have been any significant changes in the one-year DR within the one-year observation period, and therefore allows institutions to choose between overlapping and non-overlapping time windows when calculating the observed average DR, thereby avoiding potential biases that might stem from one of those calculation approaches. In order to clarify that this is the objective of this quarterly calculation frequency, this aspect has been included in the GL. Because the choice between overlapping and non-overlapping windows should be made when the observed average DR is to be recalculated, quarterly recalculation would not necessarily be an ongoing task, but would be required for the purpose of choosing and reviewing the appropriateness of an approach based on overlapping or non-overlapping windows.</p> <p>The EBA further acknowledges that a quarterly calculation frequency may be too restrictive for low-default portfolios, and hence the wording of this requirement has been softened in the final GL, which now require institutions only to 'evaluate the one-year DRs within the historical observation period at least quarterly'.</p> <p>With regard to the suggestion that the quarterly</p>	<p>Changes to paragraph 78</p>



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>prediction. Another respondent assumed that it meant either (i) monitoring changes in default rates at a relevant level (portfolio, calibration segment and grade level) or (ii) monitoring the appropriateness of the calibration (but the latter would require a quarterly update of the long-run average DR). Respondents also wondered what conclusions should be drawn from these quarterly calculations.</p> <p>Some argued that the quarterly monitoring requirement was too much for low-default portfolios in which it is unlikely that there would be a significant difference in the one-year DR, or, if there was, this requirement would lead to unstable measurements. Respondents therefore proposed that institutions be given the option to apply annual monitoring if they are able to demonstrate that annual monitoring is appropriate due to a lack of new information on a quarterly basis.</p>	<p>frequency for the one-year DR should coincide with quarterly reporting, it is up to the institution to determine whether this is appropriate. The GL do not specify this aspect, hence institutions may choose the start of the one-year observation periods as they see fit.</p>	
5.2: Do you agree with the proposed policy for calculating observed average default rates? How do you treat short-term contracts in this regard?			
	<p>One respondent argued against the requirement to calculate the observed average DR at different levels: by rating grade or pool, at the level of the portfolio covered by the corresponding PD model, and for the relevant calibration segment.</p>	<p>The fact that the majority of respondents were silent on this aspect means that this is only a minority view. Furthermore, the section on calibration has been redrafted in the final GL and contains the additional requirement that, where institutions calibrate at the level of the grade or pool additional calibration tests should be performed at the level of the relevant calibration segment, and where institutions calibrate at the level of the calibration</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		<p>segment, additional calibration tests should be performed at the level of the grade or pool. In order to perform these additional calibration tests, the long-run average DR at grade or pool level as well as at the level of the relevant calibration segment should be available. The requirement to calculate the observed average DR at these different levels will facilitate an analysis of whether the historical observation period is representative of the likely range of variability.</p>	
	<p>Several respondents expressed their agreement with the proposed approach to overlapping versus non-overlapping windows.</p> <p>Some respondents would favour a harmonisation measure that would allow only non-overlapping windows, because, they argued, this would be simpler and would allow more efficient management of multiple defaults. One respondent even proposed prescribing that these non-overlapping windows coincide with calendar years.</p> <p>One respondent would favour a harmonisation measure that would allow only overlapping windows.</p> <p>Some respondents argued that there could not be bias due to the use of overlapping versus non-overlapping windows if the historical observation period were long enough. Some respondents argued that any bias at the beginning or end of the historical observation period would be negligible</p>	<p>The number of respondents expressing their agreement with the proposal in the CP on the GL exceeds the number of respondents who would favour either overlapping or non-overlapping windows. Furthermore, it would depend on the composition and characteristics of the portfolio whether any of these approaches might result in bias. Finally, it can be shown that bias due to the implicit overweighting of overlapping periods can be significant even if the historical observation period is more than five years.</p> <p>In addition, with respect to potential bias due to the choice of reporting dates in the case of non-overlapping windows, several examples illustrate that the bias stemming from this choice can be significant, even in the case of long-term loans. An example would be agricultural loans, where defaults occur more often after the summer harvest, after it has become apparent that the revenue from crops will be insufficient.</p>	<p>Changes to section 5.3.3</p>



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>given that the historical observation period should cover at least five years.</p> <p>Some respondents argued that there would not be any bias due to the choice of reporting dates for non-overlapping windows, or that such bias would be negligible. Some respondents argued that any bias due to the choice of the specific reporting dates could occur only in the case of a historical observation period that did not cover a full economic cycle. Some respondents argued that, when choosing non-overlapping windows, any bias due to seasonal effects would not be possible at all, or would not be possible specifically in the case of long-term loans, and they argued that it should be possible to provide qualitative arguments instead of the required analysis.</p>	<p>Therefore, the proposal in the CP on the GL has been maintained, but has been redrafted for greater clarity.</p>	
	<p>Most respondents stated that they did not apply a specific treatment to short-term contracts. Some respondents argued that this is justified when the characteristics of short-term contracts are representative of the portfolio. For some respondents this lack of specific treatment of short-term contracts is consistent with the one-year floor to the maturity parameter in the supervisory formula. Some stated that they did not have any short-term contracts.</p> <p>Some respondents requested clarification on the treatment of short-term contracts and wondered whether and in what sense these should be treated differently. One respondent proposed a</p>	<p>In relation to the comment that no specific treatment should be applied to short-term contracts because the maturity parameter contains a one-year floor, it should be mentioned that, regardless of the calibration of the risk weight function, the PD estimates should reflect the probability that the obligor will default at least once within a one-year horizon, and this default may happen at any moment during the one-year period. Furthermore, the possibility of default on a short-term contract is not limited to the original maturity of the contract, given that default may be recognised only after 90 days past due. Therefore, the problem should rather be analysed from the perspective of whether such</p>	<p>No change</p>



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>policy whereby such short-term contracts would be included in the denominator of the one-year DR only pro rata for the period when the short-term contract was available during the one-year observation window.</p> <p>One industry association mentioned that some of its members applied corrections for the presence of short-term contracts, but they applied different methodological techniques.</p> <p>A few respondents argued that short-term contracts should not be included (most of these institutions mentioned that they used non-overlapping windows). One respondent explained that the existence of short-term contracts was very rare in their institution.</p> <p>Some respondents argued against the requirement for an adjustment and an MoC to be applied in case the presence of short-term contracts introduces bias into the DR. One respondent argued that the specialised activity of consumer credit deals almost exclusively with short-term contracts. Another respondent argued that it was not clear what was meant by an economic adjustment.</p>	<p>short-term contracts introduce bias in the observed average DRs compared with portfolios in which there are no short-term contracts. The CP on the GL (like the final GL) specifies that a specific treatment should be applied only if the presence of these short-term contracts causes bias. This may, for instance, occur if loans are regularly granted in March, whereas a large share of these loans usually defaults before December, and the institution, for instance, calculates one-year DRs using non-overlapping windows coinciding with calendar years.</p> <p>The GL specify that institutions should analyse, inter alia, if there is bias due to the share of short-term and terminated contracts that cannot be observed during the relevant one-year periods. The GL also specify that, if such bias is found to exist, institutions should apply appropriate adjustments and MoC. Even though most respondents argue that they do not apply a specific treatment where these short-term contracts are present, the above requirement is necessary to ensure that the observed average DR is comparable across institutions and portfolios.</p> <p>Regarding the request for greater clarity on which adjustments would be allowed to correct the bias due to short-term contracts, it is deemed that institutions should choose the most appropriate method themselves, and therefore the GL avoid including specific approaches, since not every approach may be suitable for all types of bias introduced by short-term contracts.</p>	



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>Several respondents agreed with the proposed method of calculating the observed average DR.</p> <p>A few respondents pointed out that the requirement that defaults be not weighted but counted as 1 for the purpose of calculating the observed average DR was not clear.</p> <p>Two respondents argued against the requirement that the observed DR should be calculated as the equally weighted average of one-year DRs. It was argued that it was necessary to include the number of observations in each non-overlapping window, in order to accurately reflect the DR in the case of corporate portfolios with few observations in some pools, or in general in the case of low-default portfolios.</p>	<p>The provision has been redrafted and has been clarified that the observed average DR should be calculated as the arithmetic average of all one-year DRs, except for retail portfolios where an institution does not give equal importance to historic data because more recent data are a better predictor of losses, for which the observed average DR may be calculated as the weighted average of one-year DRs.</p> <p>With respect to the criticism that the method of calculating the observed average DR is not appropriate for low-default portfolios, it should be noted that the GL require the observed average DR to be calculated in the way specified in the GL in order to achieve a metric that is comparable across institutions, portfolios and calibration segments, as well as grades or pools. Nevertheless, the EBA acknowledges that in the case of low-default portfolios, the equally weighted average of one-year default rates may not be an accurate reflection of the likely range of variability, and therefore the GL allow, under specific conditions, specific adjustments to be made to obtain the long-run average DR on the basis of the observed average DR. These adjustments should ensure that the long-run average DR reflects the likely range of variability of DRs.</p>	<p>Changes to paragraph 81</p>

5.3: Are the requirements on determining the relevant historical observation periods sufficiently clear? Which adjustments (downward or upward), and due to which reasons, are currently applied to the average of observed default rates in order to estimate the long-run average default rate? If possible, please order those adjustments by materiality in terms of RWA.



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>Several respondents mentioned that it was not clear how the historical observation period and long-run average DR should be determined. They questioned whether the text implies that the historical observation period should cover a whole economic cycle. Others questioned whether institutions can extend their time series of internal one-year default rates using external default rate series for which a high correlation can be found, or whether the internal time series of one-year default rates can be extended by estimating DRs based on macroeconomic indicators. Some respondents complained about the lack of a detailed specification and quantification regarding the use of the indicators to assess the historical observation period.</p> <p>Several respondents considered that the specifications with regard to determining the long-run average default rate were sufficiently clear.</p>	<p>Given the heterogeneity of business cycles across EU Member States, as well as the differences in one-year default rates across exposure types and portfolios across institutions, it is impossible to establish hard and quantitative criteria that would lead to an appropriate assessment of the historical observation period across all institutions. Therefore, the proposed approach must, naturally, incorporate qualitative aspects, which the GL already tried to achieve in the guidance on assessing whether the historical observation period is representative of the likely range of variability of the default rates of a given type of exposures. Related to this, the term ‘economic cycle’ has been avoided in the text of the GL, given the difficulty of providing an accurate specification of this term.</p> <p>In response to the other comments on this section, it has been clarified that the average of the observed one-year default rates may be adjusted if there is an overrepresentation of downturn years. Although the GL do not specify how this adjustment may be done, an extension by means of external default rates and/or based on macroeconomic indicators may be allowed, if the conditions mentioned in the GL are met.</p> <p>Some respondents requested additional clarity on how the quantification on the basis of economic indicators would work; however, this aspect is deliberately not specified in the GL, since it is up to the institution to come up with a meaningful and</p>	<p>Changes to section 5.3.4</p>



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		<p>risk-sensitive approach, and it is up to the supervisor to assess whether this approach meets the minimum requirements.</p> <p>The CP on the GL stated clearly that the long-run average default rate should be calculated as the observed average of the one-year default rates in that period if the historical observation period is representative of the likely range of variability, and this paragraph has been maintained in the final GL. The text of the GL has been clarified, and now differentiates between (a) situations where no or insufficient bad years are included in the historical observation period, and (b) situations where bad years are overrepresented in the historical observation period. With regard to the latter situation, additional conditions are included in the GL, and it is clearly stated that it should be ensured that the adjusted long-run average default rate reflects the likely range of variability of default rates.</p> <p>The benchmark has been maintained in the final GL, but its wording has been amended, to clarify that a situation where the adjusted long-run average DR is below the average of observed DRs should be exceptional.</p>	
	<p>Several respondents opined that it was not clear how 'downturn period' should be understood, or that it was not clear what would be an appropriate mix of good and bad years. Some of these respondents wondered what the proportion of downturn years within the historical observation</p>	<p>The term 'downturn period' was used in the CP on the GL in the context of the historical observation period in order to ensure that long-run average default rates are obtained in a sufficiently prudent manner. As the word 'downturn' proved to be misleading, it was redrafted to provide greater</p>	<p>Changes to section 5.3.4</p>



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>period should be. Some of them suggested that a definition of ‘downturn period’ would be useful, or suggested further clarifying what constitutes an appropriate mix of good and bad years. Others argued that it should be permissible to make downward adjustments to the average of observed DRs if there is an overrepresentation of downturn years. Others argued that the requirement to include downturn periods in the historical observation period was not necessary, since the long-run average DR should reflect average economic conditions.</p>	<p>clarity regarding the assessment of the historical observation period, by referring to ‘an appropriate mix of good and bad years’. Unfortunately, it was not possible to define these terms in more detail, due to the heterogeneity of business cycles across EU Member States, as well as the differences in one-year default rates across exposure types and portfolios across institutions. Therefore, naturally enough, some judgement will need to be exercised in institutions’ assessments of the historical observation period.</p> <p>Regarding possible adjustments, it has been clarified that, whereas upward adjustments should be made whenever there are no or insufficient bad years in the historical observation period, downward adjustments in the opposite situation may be made only under specific conditions.</p> <p>While the GL do not specify what is an appropriate mix of good and bad years, they do include guidance on how institutions should assess whether the historical observation period is representative of the likely range of variability, by referring to (a) the variability of one-year default rates, (b) the existence, lack or prevalence of one-year default rates relating to bad years, and (c) significant changes in the economic, legal or business environment within the historical observation period.</p>	
The benchmark	Several respondents expressed their disagreement with the benchmark, pointing to a potential	As regards the comment that the average of the most recent five-year default rates constitute the	Changes to



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>misalignment between the concept of the long-run average DR and the five-year benchmark. Some argued that the CRR requirement of five years is a minimum requirement, and that the establishment of the benchmark transforms this into the 'norm', whereas longer time series should be used if they are available. Some respondents requested clarification on the rationale for including the benchmark. Some respondents pointed to difficulties that might arise if structural or non-structural breaks are observed during the historical observation period. Some argued that the mere availability of one-year default rates from downturn periods would determine the level of the long-run average DR. Some respondents complained about the multitude of DRs that would need to be calculated. Some argued that it would be inappropriate to set the calibration target at the average DR of the latest five years.</p>	<p>'norm' in the GL, whereas this is only a minimum requirement in the CRR, it should be mentioned that this benchmark should be applied only where the adjusted long-run average default rate is below the average of the observed average DR. In this situation, it is necessary to include a backstop in the GL, since allowing downward adjustments could potentially open the door to inappropriate, imprudent long-run average DRs. The average of the most recent five-year default rates is included in the benchmark in order to ensure that increased DRs in recent periods are not seen as an exceptional situation that will not repeat itself, and the average of the available one-year default rates is included because the prior expectation is that available one-year default rates are representative of the likely range of variability.</p> <p>As regards concerns about the multitude of DRs that institutions will need to calculate, it should be noted that the DRs that constitute the benchmark are to be calculated only when the institution makes a downward adjustment to the average of observed one-year default rates.</p> <p>As regards concerns relating to the calibration target, it should be mentioned that the section on calibration contains specific guidance on how institutions should select the calibration sample.</p>	<p>section 5.3.4</p>
	<p>Some respondents pointed to the complexity of the proposed approach to assessing the long-run average for back-testing purposes, for instance</p>	<p>Whenever the long-run average default rate differs from the most recent DRs, it is logical that this leads to deviations in back-testing, due to the shifts that</p>	<p>Changes to paragraph 66(c)</p>



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	when the latest default rate observed is higher than the PD estimate (since the current approach does not take the most recent tendencies of default rates into account).	are applied in the calibration to the long-run average. Hence the GL clarify that institutions should take the rating philosophy into account for back-testing purposes.	
5.4: How do you take economic conditions into account in the design of your rating systems, in particular in terms of:			
a. definition of risk drivers			
	<p>Several respondents pointed out that most of the risk drivers included in the model are sensitive to economic conditions (e.g. financials), and argued therefore that these are reflected implicitly in the model. One respondent stated that macroeconomic indicators do not differentiate between obligors but only between different points in time. Another respondent noted that macroeconomic variables may impact the model's calibration level but not its design. One respondent stated that their risk drivers were largely PiT rather than TTC. Stale information such as financial data updated once a year is considered to be a TTC risk driver, whereas behavioural data are considered to be a PiT risk driver. One respondent noted that financial ratios are included in the model as such without adjustments, which means that they are PiT. It was mentioned that some non-financial information is used for large corporates, which is rather TTC.</p> <p>Some respondents noted that economic conditions are not taken into account in their definitions of</p>	<p>The EBA discussed the possibility of providing further guidance on the definitions of risk drivers to be included in the models, with a view to limiting unjustified variability due to the cyclicity of capital requirements stemming from PiT or TTC definitions of risk drivers. It appears to be particularly difficult to limit these definitions without unduly limiting institutions' choices with regard to how they build proper risk sensitivity into the model.</p> <p>The requirement already included in the CP (in paragraph 67), whereby institutions should ensure that risk drivers and rating criteria are used consistently, in particular with regard to the time horizon considered, in model development, calibration and application, has been maintained but not extended further in the final GL. Furthermore, it is required that institutions analyse the appropriateness of the philosophy underlying the assignment of obligors or exposures to grades or pools ('rating philosophy'), by taking into account, inter alia, the design of risk drivers.</p>	No change



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	<p>risk drivers.</p> <p>Some respondents mentioned that whether economic conditions affect their risk drivers depends on the portfolio, the available historical data and whether a downturn is experienced.</p>		
b. definition of the number of grades			
	<p>Several respondents stated that the number of grades did not depend on the economic conditions. Some stated that it depended on how statistically significant the differences between the various grades are, the granularity of the portfolios, the design of internal processes or the risk management practices that are in place.</p> <p>Some respondents stated that they designed the number of grades in order to maintain robustness in terms of sample size and risk ranking, taking into account changes in the economic environment.</p> <p>One industry association stated that the numbers of grades of its members varied between 12 and 34. It pointed out that the use of a master scale is quite common for non-retail exposures.</p> <p>Some respondents stated that they used a common master scale.</p>	<p>The EBA discussed the possibility of providing further guidance on the choice of the number of grades, with a view to ensuring harmonisation with regard to the degree of RWA cyclicity stemming from changes in economic conditions. It was, however, decided that it would be preferable not to limit this choice at this stage. Hence the GL aim rather to enhance understanding and awareness of the impact of the option chosen on the rating philosophy, for instance by requiring that institutions should understand the characteristics and dynamics of the assignment of obligors or exposures to grades or pools ('rating assignment') and of the risk parameter estimates that result from the method used.</p>	No change
c. definition of the long-run average of default rates			
	<p>Some respondents stated that the long-run average DR equals the calibration target for most</p>	<p>The EBA discussed the different approaches to PD calibration, which resulted in further clarification in</p>	Changes to



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	<p>of their members. Some also pointed out that the long-run average DR does not encompass a full economic cycle for most of their members, and is more sensitive to macroeconomic conditions; this differentiates the long-run average DR from the TTC PD estimate, which does span a full economic cycle. It was argued that calibration to the long-run average tends to stabilise the average portfolio risk level. One respondent requested that the GL clarify further the requirement that the calibration target should equal the long-run average DR.</p>	<p>the GL on (i) the calibration process and its requirements, including its distinction from model development (leading to risk differentiation), and (ii) how institutions should determine a historical observation period that will be representative of the likely range of variability. In addition, a definition of the term 'PD calibration' has been included in the final GL.</p>	section 2.4
	<p>Several respondents pointed out that the long-run average DR reflects a complete economic cycle, covering a mix of upturn and downturn years.</p> <p>Some respondents clarified that the long-run average includes a downturn period; some apply a 10-20% weight to downturn periods and others estimate the DRs for downturn years if they are not available.</p> <p>Some respondents mentioned that economic conditions are included only in the long-run average DR (i.e. not in the definition of risk drivers or in the definition of the number of grades).</p>	<p>Although the CP on the GL already included guidance on the determination of the historical observation period, as well as on the computation of the long-run average default rate, this section has been revised on the basis of the industry feedback. See question 5.3. for an analysis of the main responses and the resulting changes to the GL.</p>	See question 5.3
5.5: Do you have processes in place to monitor the rating philosophy over time? If yes, please describe them.			
	<p>Two industry associations pointed out that there should first be common definitions of PiT and TTC before the rating philosophy can be assessed. It was furthermore suggested that the PiT-ness of</p>	<p>Although the EBA discussed the possibility of providing exact definitions of these terms, it would appear to be too difficult to achieve such harmonisation at this stage. Hence it has been</p>	<p>The background and rationale section clarifies the distinction between</p>



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	<p>the rating model, as well as the PiT-ness of the calibration, could be assessed by means of common metrics, and that a multidimensional approach to a validation test could be agreed on, based on a traffic light approach using different quantitative and qualitative assessments.</p>	<p>decided to aim at rather to foster an understanding of (i) the differences between rating philosophy and calibration philosophy, (ii) the link between portfolio versus grade calibration and the cyclicity of capital requirements, and (iii) the impact of the data selected for the calibration sample on the cyclicity of capital requirements. In the background and rationale section, the different possible approaches to the rating and calibration philosophies are explained. Furthermore, the GL require an assessment of the potential effect of portfolio versus grade calibration on the behaviour of PD estimates. As regards the selection of data for the calibration sample, the GL require institutions to find an appropriate balance between the comparability of the calibration sample to the application portfolio in terms of obligors and transaction characteristics and its representativeness of the likely range of variability of default rates.</p>	<p>rating philosophy and calibration philosophy</p>
	<p>Some respondents stated that the rating philosophy was assessed during model validation and/or regular monitoring. One respondent stated that it regularly verified whether a PiT rating system was producing estimates that were appropriate to the current observed default levels. One respondent stated that monitoring of the calibration level was performed on an annual basis. Another mentioned that such monitoring included an assessment of the development of the central tendency. Some respondents stated that such</p>	<p>The GL include requirements in the section on the review of estimates in Chapter 9 whereby institutions are to analyse whether the inclusion of the most recent data leads to a significant change in the long-run average default rate, and whether this leads to materially different risk estimates. This assessment should be done at least annually.</p>	<p>Changes to paragraph 218(c)</p>



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	<p>monitoring was done at least annually.</p> <p>Some respondents mentioned that the rating philosophy was not monitored, partly because the assessment is qualitative.</p>		
	<p>One industry association indicated that different practices exist with regard to this aspect: some conduct yearly updates of estimates, whereas others carry out a migration matrix analysis to verify rating stability.</p> <p>Several respondents mentioned that they studied rating migrations.</p>	<p>With regard to model development, the GL require that institutions analyse the appropriateness of the philosophy underlying the assignment of obligors or exposures to grades or pools ('rating philosophy') taking into account migration across grades or pools.</p>	No change
5.6: Do you have different rating philosophy approaches to different types of exposures? If yes, please describe them.			
	<p>Some respondents agreed that differing rating and calibration philosophies is an important area that contributes to RWA variability, and which should be investigated and addressed. One industry association pointed out that the importance of this topic is growing, given the divergences between IFRS 9, which is PiT, and prudential requirements, which are supposed to be TTC.</p> <p>However, some other respondents supported continued flexibility in modelling with regard to PiT versus TTC, and argued that the law allows such different practices.</p> <p>Some respondents emphasised the importance of differentiating between rating philosophy and</p>	<p>Although the EBA discussed several options for harmonising differing rating and calibration philosophies, it was concluded that no specific limitations in that regard should be included in the GL. Therefore, the GL aim to achieve harmonisation by other means, i.e. (i) by providing clarity on the differences between rating philosophy and calibration philosophy in the background and rationale section, (ii) by requiring institutions to analyse the appropriateness of the chosen rating philosophy by taking into account the design of risk drivers, migrations across grades or pools and changes in the yearly default rate for each grade or pool, (iii) by providing a list of the different calibration methodologies that are allowed under the CRR, (iv) by setting requirements for the</p>	<p>Clarification on the difference between rating philosophy and calibration philosophy has been included in the background and rationale section of the GL</p>



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	calibration philosophy.	calibration sample, (v) by requiring institutions to perform calibration tests both at portfolio and at grade or pool level, and finally (vi) by requiring institutions to assess the potential effects of the chosen calibration method on the behaviour of PD estimates over time.	
	Some respondents pointed out the different effects that portfolio calibration versus grade calibration have on the cyclicalities of capital requirements. They noted that some of their members used portfolio calibration, which ensures that the PD estimates correspond to the long-run average at portfolio level, thereby leading to very stable capital requirements. However, some institutions perform calibration at grade level, i.e. they ensure that the PD estimates for each grade correspond to the long-run average for each grade. This usually entails a PiT rating system with many migrations over time, where the PD assigned to a rating is usually stable over time; however, the PD at portfolio level and the capital requirements will fluctuate with changing economic conditions. One institution pointed out that the difference between these two approaches could result in PD levels under one approach that would be twice as high as those under the other.	The EBA has discussed this comment in depth, including with regard to the effects on the cyclicalities of capital requirements, and has reached the conclusion that both portfolio and grade (or pool) calibration should be allowed. However, whenever institutions apply portfolio calibration, they should perform additional calibration tests at the grade or pool level, and whenever they perform grade or pool calibration, they should perform additional calibration tests at the portfolio level (or, more specifically, at the level of the relevant calibration segment). Furthermore, institutions are required to assess the potential effect of the chosen calibration method on the behaviour of PD estimates over time.	Changes to section 5.3.5
	One respondent suggested that the EBA should clarify that the calibration sample should be comparable to the current portfolio in terms of obligor and transaction characteristics. It was also	The CP on the GL required (in paragraph 80(d)) that the calibration sample should be comparable to the current portfolio in terms of obligor and transaction characteristics but should reflect at the same time	Changes to paragraph 88



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	mentioned that the calibration sample could not be both comparable to the current portfolio and representative of the likely range of variability of default rates.	the likely range of variability of default rates. The EBA acknowledges the difficulty of meeting both requirements at the same time, and which requirement should be retained in the GL was discussed. In this regard, it was considered that meeting one or the other requirement determines, inter alia, the cyclicalities of capital requirements. It was therefore concluded that institutions should strike an appropriate balance between both requirements, with the aim of eliminating the most extreme approaches in terms of RWA cyclicalities.	
	<p>Some respondents stated that they do not use different rating philosophies. Some mentioned that this was because their exposures were quite homogeneous (e.g. only mortgage loans, or only consumer credit).</p> <p>One industry association stated that 46% of its banks use a TTC PD for mortgages and 37% use a hybrid PD. For corporate exposures, 54% reported using a TTC PD, whereas 40% reported using a hybrid PD.</p> <p>Some respondents stated that their rating philosophies tend to be PiT or hybrid for retail exposures, for which they rely more on behavioural information, including current accounts and days past due, than they do for non-retail exposures, for which TTC philosophies are usually used. One respondent mentioned that for unsecured personal loans a PiT rating system is generally appropriate as a consequence of their</p>	The GL do not disallow certain rating philosophies per se, but it is required (as was specified in the CP in paragraph 79) that, where institutions use different rating systems characterised by different rating philosophies, different levels of objectivity, accuracy, stability or conservatism, they ensure that the rating systems have an appropriate level of consistency and that any differences between them are well understood, such that they are able to define an appropriate way of combining or aggregating the information produced by the different rating systems when this is necessary.	No change



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	<p>being relatively short-term loans (5-10 years), whereas for secured loans portfolios a hybrid rating systems tend to be used, reflecting the longer term nature of these loans.</p> <p>Several respondents mentioned that a variety of practices are being used among institutions.</p> <p>Several institutions stated that their rating system was hybrid.</p>		
5.7: Would you expect that benchmarks for number of pools and grades and maximum PD levels (e.g. for exposures that are not sensitive to the economic cycle) could reduce unjustified variability?			
	<p>One industry association agreed that limiting the number or grades or pools could reduce RWA variability but opined that this topic should first be investigated further. It thought that imposing a common master scale might be one way to foster transparency and comparability.</p> <p>Several respondents disagreed that limiting the number of grades or pools or applying benchmarks would reduce unjustified RWA variability because such variability is indicative of a firm's ability to differentiate risk, as well as the bank's structure of exposure classes, collateral types, industries and products. These respondents would prefer a principle-based approach. Some argued that such benchmarks would penalise low-risk banks. One respondent argued that such benchmarks could be useful only if benchmarking were performed on a name-by-name basis (i.e. similar to the approach</p>	<p>The EBA has analysed the possibility of setting benchmarks for the number of pools and grades. However, based on the feedback received, it was concluded that no further conditions in that regard, apart from those specified already in the CRR, should be specified.</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	taken by a credit bureau).		
	<p>One institution agreed that setting a maximum PD would be a good way to reduce unjustified RWA variability.</p> <p>Some institutions disagreed that setting a maximum PD would be a good way to reduce unjustified RWA variability.</p>	<p>Similarly, with regard to the possibility of setting a maximum PD, it has been decided not to introduce such a limit, because of concerns that this could limit RWA variability at the expense of risk sensitivity.</p>	No change
Other comments on PD estimation			
	<p>One respondent argued against the requirement for an MoC to be applied whenever there is lack of up-to-date information, arguing that retail models that usually rely on credit application information are seldom updated.</p>	<p>Since the uncertainty around older information is higher, it is appropriate to reflect this higher expected range of estimation error, by including an appropriate MoC.</p>	No change
	<p>Some respondents noted that the requirement that the incorporation of external or internal ratings of connected clients should be purely statistically based was impossible to fulfil, because expert judgement is usually also taken into account.</p>	<p>The requirement that the weighting of the internal or external rating of a connected client in the statistical model should be purely statistically based has been removed, because it is agreed that the external or internal ratings of third parties may be incorporated into both the statistical and the non-statistical parts of the model.</p>	Changes to section 5.2.3
	<p>One respondent argued against the requirement that only an internal IRB rating of a connected client may be incorporated into the non-statistical part of the PD model through the use of overrides, if not already incorporated into the statistical part. The respondent argues that there may be relevant</p>	<p>The EBA acknowledges that all relevant information should be incorporated into the PD model, and if it is not incorporated into the model such information may be the basis for an override. The GL have been redrafted in order to clarify that it is permissible to take either an internal or an external rating of a third</p>	Changes to section 5.2.3



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	credit assessments other than IRB ratings (i.e. external ratings), and that it should also be permissible to take these into account.	party into account as the basis for an override. However, institutions should in any case ensure that there is no double counting of the effects of any relations with third parties.	
6.1: Do you agree with the proposed principles for the assessment of the representativeness of data?			
Not fully representative observations	Many respondents expressed their concerns about disallowing the possibility of removing not fully representative observations, even if fully attributable to data quality. Examples provided were exposures related to an expiring portfolio and products no longer sold. In addition, several respondents requested that the EBA clarify the expectation of consistency between PD and LGD databases, as disallowing the exclusion of non-representative data in the LGD development would create a misalignment with the requirements set out for PD estimates.	In line with the suggestions, the requirements with regard to the representativeness of data have been aligned between PD and LGD models and moved to Chapter 4, which specifies general requirements.	
	Some respondents suggested that the historical observation period could be adjusted in line with the PD models without the need to apply an MoC.	In addition, clarifications have been provided regarding the representativeness of potentially different datasets used in the modelling process, namely the dataset used in model development for the purpose of risk differentiation and the dataset used for calculating long-run average LGD.	
	Several respondents suggested analysing the interaction between the notion of time-series LGD being ‘as broad as possible’ and the GL (e.g. ‘all available internal data should be taken into account’) in light of: representativeness considerations, anomalies, missing values, outliers, MoC requirements and the entire framework for consistency (e.g. the inclusion/exclusion of years	It has been clarified that for the purpose of risk differentiation it is possible to exclude data that is considered not representative or for the quality of which is not sufficient. The development sample should be suitable for achieving the good performance of the model.	Extended clarifications on data representativeness moved to section 4.2
		However, when calculating long-run average LGD, and in the case of PD estimation long-run average default rate, all data has to be used. Article 181(1)(a) of the CRR requires that the average realised LGDs are calculated using all observed defaults, and hence no exclusions are allowed. This includes also incomplete recovery processes. As specified in	



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>with structural changes in recovery processes)</p> <p>Clarifications were requested by some respondents regarding extraordinary/unconventional recovery processes (e.g. massive disposal of NPLs, M&A). Some specific treatments were proposed (e.g. proper weighting, flexibility on exclusion, full sterilisation for a limited period of time).</p>	<p>section 4.2.4, where insufficient representativeness of the data used in the calibration leads to bias or uncertainty in risk quantification, this should be addressed through a documented and justified appropriate adjustment to correct the bias and MoC to cover the additional uncertainty.</p> <p>In the case of M&A, institutions have to reconsider the scope of application of the model. The calculation of the long-run average LGD should be based on all historical observations within the scope of application of the model. A massive disposal of NPLs, where the performing exposures of the same type remain on the balance sheet of the institution, would not change the scope of application of the model. This situation should be addressed by appropriate choices of model design and calibration methodology, for instance by the use of recovery scenarios and their probabilities.</p>	
Appropriate adjustment	<p>Some respondents expressed their concerns on adjustments (and subsequently MoC) to be made if all defaults should be included, including those arising from statistical uncertainty or data quality (e.g. in the case of young defaults). A suggested solution was excluding unrepresentative data so as not to incur an MoC requirement.</p> <p>In particular, several respondents requested that the EBA clarify the inconsistency between paragraphs 99-110 and paragraph 111. The main concerns related to the mandatory use of all observed defaults and the related appropriate</p>	<p>The relevant requirements have been moved to Chapter 4 and aligned with the requirements for PD estimation. With regard to the data used for risk quantification, no data exclusions are allowed, as explained above. Where the representativeness of data is not sufficient in the sense that it may bias quantification of risk, an appropriate adjustment is necessary.</p> <p>Data quality issues should not be considered in the context of data representativeness but should be addressed in accordance with the requirements specified in section 4.4. Data deficiencies may lead</p>	Changes to section 4.4



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	adjustments and MoC.	to bias in risk quantification or increased uncertainty of estimates. In order to correct the bias, institutions have to apply an appropriate adjustment. In order to address increased uncertainty, including uncertainty related to the appropriate adjustment, institutions should apply an MoC.	
Representativeness assessment	A few respondents indicated that the representativeness assessment would be costly (e.g. in the case of data limitations to be mitigated by an industry-wide long-run data series including LGD expectations). One suggestion was to revise the term 'recovery policies', as these might entail high IT costs.	The term 'recovery policies' is used consistently throughout the GL to refer to the processes leading to recovering credit obligations from obligors, which might include soft reminders or restructuring as well as hard collection processes. This should not be confused with IT recovery policies, which are not in the scope of these GL.	No change
		The representativeness of data has to be verified not only to fulfil the requirements specified in the CRR but more particularly to ensure the good performance of the model and the correct quantification of risk parameters.	
	A few respondents requested that the EBA clarify if adjustments leading to decreased LGD parameters based on paragraph 100(e) can be justified in the event of improvements in economic and market conditions and/or when specific actions or decisions are taken (e.g. in the case of a prolonged downward period such that it can be reasonably estimated that a reversal is due to happen).	In the case of LGD estimation, considerations related to economic conditions should not be the basis for any data exclusions or any adjustments to the long-run average LGD, which should be based on all available observations within the historical observation period. The PD estimation is based on the long-run average default rate reflecting the likely range of variability of default rates and an appropriate adjustment may be applied if necessary in accordance with the requirements specified in section 5.4. In LGD	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		estimation, a similar approach was not considered appropriate, as in this case not only the time of default but also economic conditions during the recovery process are relevant. It was deemed more relevant to ensure as broad a dataset as possible for the purpose of calculating long-run average LGD, especially taking into account that in the case of LGD the final estimate should be appropriate for an economic downturn if it is more conservative than long-run average LGD.	
	One respondent pointed out the difference in assessing data representativeness in the case of theoretical models (e.g. specialised lending) and in the case of statistical models. The GL should specify the specificities of theoretical models.	As the CRR does not envisage any exemptions from the minimum requirements, the GL cannot provide such exemptions for any specific type of model. The GL were specified in a flexible manner in order to accommodate various estimation methodologies; however, the minimum requirements for the use of the IRB Approach have to be met in any case.	No change
	One respondent requested that the GL allow for the possibility of assessing representativeness only on a qualitative basis (in some cases).	Quantitative analysis of representativeness is required when possible. However, it is also clear that in some situations such an analysis cannot be performed in a reliable manner. In these cases, qualitative assessment is sufficient if properly justified and documented.	No change
6.2: Do you agree with the proposed treatment of additional drawings after default and interest and fees capitalised after the moment of default in the calculation of realised LGDs?			
Additional drawings	The majority of the respondents agreed with the proposed treatment of additional drawings. Some expressed their disagreement and suggested a	The proposed approach was specified with the objective of maintaining consistency between LGD and EAD. As in the case of retail exposures, the CRR	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>different treatment.</p> <p>A few respondents stated that drawings after default should be included directly in the LGD computation instead of in the EAD, the default being a breaking point between EAD and LGD. Others suggested that, if it is confirmed that drawings after default have to be included in the EAD, it would be advisable to permit the fixing of a limited period for drawings after default computation.</p>	<p>allows flexibility with regard to whether additional drawings should be included in the estimation of conversion factors; this flexibility is also reflected in the principles for the computation of realised LGDs.</p> <p>In order to ensure consistent treatment of all additional drawings after default, no fixed period has been introduced.</p>	
Unpaid late fees and interest	<p>Most respondents disagreed with the proposed treatment of unpaid late fees and interest. The main reasons were:</p> <ul style="list-style-type: none"> all the cash-in should be considered without any specific treatment for late fees and interest; it would lead to double counting of the discounting effect (in particular for contractual interests); there is no need to be concerned by negative LGD due to the 0% floor; the priority rules for the cash-in repartition decided by the bank (capital, interest, etc.) should not distort the economic loss estimation, and the same recoveries should lead to the same nominal losses; some additional recoveries charged by 	<p>The EBA agrees that all recovery cash flows should be included in the computation of realised LGD; this was already part of the proposal in the CP and is also reflected in the final GL. This prevents differences in calculation depending on the policy on the allocation of payments.</p> <p>Other arguments were taken into consideration and as a result the proposal has been modified. It is now specified that Article 181(1)(i) of the CRR should be understood as referring to unpaid fees for delayed payments capitalised before default or, in the case of defaulted exposures, before the relevant reference date. Other late fees or interest capitalised after default or after the relevant reference date should not be taken into account in the calculation of realised LGD, i.e. they do not increase the amount outstanding at the moment of default or the economic loss. However, any recoveries related to these fees and interest are included in the realised</p>	Changes to section 6.3.1.2



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>banks to borrowers correspond to an economic gain (they are recognised in the income statement);</p> <ul style="list-style-type: none"> fees should instead be included in the denominator. 	<p>LGD as recovery cash flows.</p> <p>This treatment reflects the difference between the fees and interest and the costs. As costs are related to the cash flow out of the institution, they have to be included in the calculation; due to the non-cash character of the calculated fees and interest, they should not increase the loss or exposure after default or the relevant reference date.</p>	
Definition of fees	For some respondents, 'fee' was a misleading concept, and they could see no clear difference between fees and interest and costs. Therefore, they requested clear definitions and examples.	Regardless of the internal taxonomy used by an institution, the main difference between fees and costs is that costs are related to outgoing cash flows while fees are not, and they may be associated with incoming cash flows only once they are paid.	No change
Contractual interest	A few respondents indicated that, until the beginning of a default event, contractual interest (interest accrued on capital based on terms and conditions contractually agreed with the client) are included not only in the economic loss but also in the denominator of the LGD.	The difference in the treatment of interest before and after default reflects the difference in the certainty of the profits based on interest. Furthermore, the calculation of the realised LGD should be made in relation to the status at the moment of default or at the relevant reference date, and therefore the treatment of interest capitalised before and after that date is different.	No change
6.3: Do you agree with the proposed specification of the discounting rate? Do you agree with the proposed level of the add-on over risk-free rate? Do you think that the value of the add-on could be differentiated by predefined categories? If so, which categories would you suggest?			
RWA variability	While most respondents agreed that there was a need for harmonisation in this aspect, some were concerned about the far-reaching simplification. The issue was in general considered complex and	As the discounting rate has been identified as one of the main drivers of non-risk-based variability of LGD estimates, a compromise solution is necessary in order to address this variability. It is clear that the	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>there was no consensus among practitioners regarding the most appropriate approach to limiting RWA variability. One respondent disagreed that there was a general need to lay down rules for harmonisation.</p>	<p>unified discounting rate as specified does not ensure the risk sensitivity of this element. However, while the discounting factor will be based on a standardised rate reflecting the average uncertainty around defaulted cash flows, the differences in risk profiles between portfolios and institutions can still be reflected in LGD estimates through the estimated levels and timing of recoveries, as well as through the specification of appropriate risk drivers.</p>	
Historical rate	<p>Most respondents agreed with using a historical base rate for the calculation of the LGD discounting factor. One of the arguments was that this would reduce the divergence between discounting effect for LGD computation and contractual interest with the related recoveries, where such divergence could cause negative LGDs. One respondent suggested using the most appropriate term structure of risk-free rates.</p> <p>However, a few respondents argued against using a historical rate. Some stated that it would penalise banks having long historical series (the years before the introduction of the euro were characterised by high volatility of risk-free rates). Other respondents considered the proposal inconsistent with the forward-looking perspective that has to be taken into account, as emphasised by the BCBS.</p> <p>It was also mentioned by some respondents that if a historical rate was used the same nominal losses would be evaluated with a different LGD only</p>	<p>It is specified in the GL that the discounting rate should be based on a historical rate applicable at the date of default. It was decided not to suggest any averaging, as the calculation of realised LGD should reflect the uncertainty at the moment of default.</p> <p>A forward-looking discounting rate applicable at the moment of estimation was not considered appropriate, as this would result in the absence of a stable measure of loss; the loss would have to be recalculated on all observations at the time of each re-estimation. This would undermine the principle of estimating LGD based on past losses and would lead to potential variability of realised LGD in the calibration phase.</p> <p>Back-testing methods are outside the scope of the GL, which focus on the estimation of risk parameters. However, the discounting rate is intended not to introduce additional conservatism but, rather, to reflect the uncertainty of the cash flows related to defaulted exposures.</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>because the default started in a different year.</p> <p>A few respondents suggested that the base rate in the discounting factor should be defined as an average of the most recent years in order to reduce volatility.</p> <p>Finally, some respondents indicated the need to more clearly separate the requirements for calculating realised LGDs for back-testing purposes from those used as model inputs, as historical LGDs used for back-testing should not include any conservatism above the real loss.</p>		
Add-on	<p>Almost all the respondents agreed with the inclusion of the add-on. Many respondents supported the idea of differentiating it by predefined categories, in particular the following:</p> <ul style="list-style-type: none"> product or portfolio specific and specific to each institution (e.g. each loan with its own add-on or several segments with different add-ons reflecting current spreads of the bank by segment and product type; the add-on could reflect different types of activities, such as specialised lending, corporate banking, SME financing, retail markets, mortgage loans, etc.) based on the average of the 'market equilibrium model' (based on asset correlation multiplied by a component for 	<p>The EBA considered various possibilities for differentiating the add-on, but each of them would be problematic in terms of definitions. As this could lead to further variability and the possibility of regulatory arbitrage, it is proposed that one fixed add-on should be used. In addition, in order to avoid unwarranted variability the add-on has been specified as a fixed value rather than a floor.</p> <p>With regard to the level of the add-on, the results of the IRB survey confirmed that the initial proposal with regard to calibration was in line with the average level of the discounting rate in the EU. However, in order to ensure appropriate calibration of the add-on, the proposed level will be reviewed before the final date of application of the GL.</p> <p>The discounting rate specified in the Guidelines on the application of the definition of default is to be used only to compare the expected cash flows</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>the market risk premium);</p> <ul style="list-style-type: none"> aligned with accounting standards. <p>With regard to the proposed fixed add-on, some respondents indicated that 5% was a fair amount, while several respondents considered it too high. More generally, clarification was requested regarding what the add-on should represent.</p> <p>A very few respondents disagreed that there was a need for an add-on, noting that Euribor is not a risk-free rate but already incorporates a funding cost, and that no spread for missed payments by the customer is needed since this would be reflected in the LGD model itself (e.g. by including cases without recovery payments in the recovery rate).</p> <p>One of the responses included the suggestion that the add-on should be specified as a floor instead of a prescribed value, as this would avoid frequent changes to the discount rate and a direct correlation between interest rates and capital requirements.</p> <p>Finally, one respondent suggested that the discounting rate should be consistent with that used for distressed restructuring in the Guidelines on definition of default.</p>	<p>before and after restructuring in order to determine whether the credit obligation has diminished. For that purpose, the same discount rate should be used for the cash flow before and after restructuring, and for pragmatic reasons a discounting rate consistent with accounting standards was suggested. However, this discounting rate is not considered appropriate for the computation of the economic loss for the purpose of LGD estimation.</p>	
Euribor	Some respondents expressed their concern about the use of Euribor, considering that there would be problems in application, as Euribor was not defined	The currency of the base rate of the discounting factor should be appropriate for the currency of the exposure. If the currency of the exposure is not	Changes to paragraph 143



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	before 1999.	euros, then a rate equivalent to Euribor in the relevant currency should be used. Similarly, for exposures that defaulted before the introduction of the euro an equivalent rate applicable to the currency of the exposure at that time should be used.	
6.4: Do you agree with the proposed approach with regard to the specification of the historical observation period for LGD estimation?			
Economic circumstances	<p>Most of the respondents agreed with the proposed approach regarding the historical observation period.</p> <p>A few respondents requested clearer rules on identifying the economic circumstances. The main concerns related to the definition and length of downturn and what is expected in terms of gauging 'range of variability'. For the sake of harmonisation, respondents proposed that national competent authorities could set a prescribed starting date for the observation period, as well as the downturn years. It was suggested that an alternative approach based on economic indicators should be considered, as the observation period would be specified in such a way that it would reflect the likely range of variability of loss rates. This would decouple the definition of the relevant historical observation period from the historical data at the disposal of an individual bank.</p>	<p>The EBA believes that the simpler approach based on the availability of data rather than on economic circumstances is more appropriate for the estimation of the LGD. Due to the prevalence limitations in data for the purpose of LGD estimation, it is considered that a sufficiently broad sample of data is more important than the exact specification of the historical period that reflects an economic cycle. This would be particularly challenging, as in the case of LGD not only the date of default but also the whole period of the recovery process, which may span several years, are relevant. Furthermore, institutions are in any case required to estimate LGD using parameters consistent with economic downturn conditions. The principles for the identification of the downturn period will be specified in the RTS on the nature, severity and duration of economic downturn.</p>	No change
Sufficient number of closed	A few respondents requested clarification of the	The 'sufficient number' should be understood in the	Changes to



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
recoveries	meaning of a 'sufficient' number of closed recovery processes to ensure a robust LGD estimation.	context of the results of the estimation and the possibility of achieving robust LGD estimates based on the available data. It was not possible to specify hard thresholds in this regard, as this may depend on the type of portfolio covered by the model (in particular its homogeneity), as well as on the estimation methodology.	paragraph 148
6.5: Do you agree with the proposed treatment of incomplete recovery processes in obtaining the long-run average LGD?			
Collateral	Many respondents requested clarification of paragraph 138(a) to allow the estimation of future recoveries stemming from collateral for open cases on which collateral has not yet been exercised, subject to enforceability conditions. These respondents were of the opinion that collateral should always be reflected in the estimation of recoveries.	The requirements included in the GL take into account the prudential consideration that where the collateral has not been realised within the specified period it may indicate some problem with the collateral that could prevent its realisation. Furthermore, beyond the maximum length of the recovery process specified for a given type of exposures, there is not sufficient data to present reliable estimates. However, with regard to individual exposures that remain in default longer than the specified maximum period, it is possible to take the existing collateral into account in the override of the assignment of the exposure to a grade or pool for the purpose of achieving appropriate EL_{BE} and LGD in-default.	Changes to paragraph 181
Minimum period of observation	Several respondents proposed adding a minimum period in default for triggering the inclusion of an observation in the sample. It was considered that young defaults would bring no added value to the estimation, as all costs and recoveries have to be estimated. The suggestions for the specification of	In line with the current text of the CRR, all defaults should be taken into account and hence there is no possibility of excluding observations that remain in default for a short period of time. The EBA considers this an appropriate approach, as specifying a minimum period in default may lead to the exclusion	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>the minimum period included the following:</p> <ul style="list-style-type: none"> ▪ specified as a proportion of the maximum period; ▪ requiring at least a 12-month period in default, in line with consideration of cures; ▪ excluding open defaults with a duration shorter than a reasonable period; ▪ considering the EBA's recommendation in the process of CRR 2 revision. 	<p>of valid information. Various potential approaches to specifying a minimum time in default were considered, but all of them were considered inappropriate at least in some cases, as they could lead to a loss of valid information.</p>	
Recovery patterns	<p>Some respondents requested clarification of paragraph 138(c) related to the analysis of the observed recovery patterns. Concerns were expressed that institutions with a higher portion of incomplete workouts would have an LGD model based mainly on estimated projected recoveries. As the long-run average LGD would not be a fully objective measure, it might lead to more unwarranted RWA variability. The overall proposal relies on the strong assumption that closed processes are fully representative of incomplete ones, but this may not be the case. Furthermore, the GL could be strengthened in terms of the required homogeneity among LGD, LGD in-default and EL_{BE}.</p>	<p>As the CRR requires that all observed defaults are taken into account, it is not possible to exclude incomplete recovery processes from the calculation of long-run average LGD. Closed recovery processes may not be fully representative of incomplete processes, and therefore basing the LGD estimation only on these would not be sufficient. In particular, closed recovery processes may include a higher share of cures and shorter (more successful) recovery processes than incomplete processes, which are more likely to include the most difficult cases. Any bias stemming from such differences should be avoided.</p> <p>The GL specify two measures that should be used for the purpose of LGD, LGD in-default and EL_{BE}:</p> <ul style="list-style-type: none"> ▪ observed average LGD, which is fully objective and based only on closed recovery processes and only recoveries and costs 	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals
		<p>realised (i.e. factually observed) up to the moment of estimation;</p> <ul style="list-style-type: none"> long-run average LGD, which is based on all observed defaults and hence includes an element of estimated future recoveries and costs of incomplete recovery processes. 	references to final GL
Maximum recovery period	<p>Several respondents were concerned about the maximum recovery period for the purpose of LGD estimation, as it would be used only for incomplete workout processes and not for observed LGD calculation. According to the respondents, delays in payment may be due only to, for example, resistance by debtors, and hence they suggest more flexibility to allow the inclusion, at least in some cases, of estimated recoveries after a maximum recovery period. This could, for instance, be used to reflect the legal environment in some countries or be used where there is a justifiable expectation that for some loans the recoveries will continue until the scheduled end date, or at least beyond any 'general' time for the recovery process. Furthermore, institutions would most likely define extremely long periods to avoid the risk of not considering recoveries from the realisation of collateral.</p>	<p>The requirement for the specification of the maximum length of the recovery process for a given type of exposures has the objective of ensuring robust and prudent LGD estimates and is consistent with the general principle specified in Article 179(1)(a) of the CRR that the fewer data an institution has, the more conservative it should be in its estimates. The robust estimation of future recoveries on incomplete cases is only possible if sufficient data exist about recoveries realised in a given time after default, and this consideration should be the basis for the specification of the maximum length of the recovery process. With such a limitation, the specified maximum period of a recovery process cannot be extremely long, as beyond a certain length there would surely be too few historically observed recoveries to form the basis for a robust estimate. On the other hand, it was also specified that institutions should define the maximum period of the recovery process for a given type of exposures from the moment of default taking into account the period of time, observed in closed recovery processes, during which the institution realises the vast majority of recoveries.</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		<p>Furthermore, CAs should ensure that the concept of the maximum length of the recovery process is not misused and that the lengths specified by institutions are not excessively long for a specific type of exposures.</p> <p>The maximum period specific for a given type of exposures should be based on previous experience and hence it should reflect the specific legal environment. However, with regard to individual exposures that remain in default longer than the specified maximum period, any specific information such as the existence of valid collateral may be taken into account in the override of the assignment of the exposure to a grade or pool for the purpose of achieving appropriate EL_{BE} and LGD in-default.</p>	
Incomplete workouts	<p>Some respondents requested more flexibility in the treatment of incomplete recovery processes. The following cases were mentioned as potentially requiring more flexible measures:</p> <ul style="list-style-type: none"> ▪ low-default portfolios; ▪ outliers excluded in the process of data vetting; ▪ disposal of NPLs in extraordinary operations; ▪ information on closed recovery processes and provisions can be extrapolated to incomplete recovery processes; ▪ available data can be taken into account 	<p>The CRR requirement that all observed defaults have to be taken into account applies to all LGD models under the IRB Approach, and hence no data exclusions are possible in the calculation of long-run average LGD. Furthermore, in the case of low-default portfolios the minimum requirements have to be met in order to receive permission to use the IRB Approach, and the CRR does not envisage any exemptions from these requirements for such portfolios.</p> <p>In the case of disposal of NPLs, the treatment of incomplete recovery processes is not relevant any more. Where credit obligations have been sold, they constitute closed recovery processes and as such should be included in the calculation of both the</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>to avoid excessive model complexity;</p> <ul style="list-style-type: none"> cases of obligors in and out of default might be excluded without closing the first default. 	<p>observed average LGD and the long-run average LGD.</p> <p>The estimation of future costs and recoveries on incomplete recovery processes should in general be based on experiences of closed recovery processes. However, in this estimation institutions should consider the representativeness of these closed processes in relation to more recent incomplete processes in order to avoid any bias, and hence simple mechanical extrapolation may not be sufficient.</p>	
Data quality issues	A few respondents expressed concerns related to data quality issues (e.g. missing data) with regard to recovery processes, as well as uncertainty and arbitrariness in estimates that might lead to increased complexity due to the application of MoC.	The estimation of future costs and recoveries in relation to incomplete recovery processes is an integral part of the LGD estimation process and hence general rules regarding MoC apply.	No change
Homogeneous loss class	A few respondents expressed concern that the proposed treatment could lead to bias in the long-run average LGD for each exposure class. Clarification was requested on how homogenous loss classes should be built without taking into account incomplete recovery processes.	It was clarified in the GL that, while all observed defaults have to be taken into account in the calculation of long-run average LGD, more flexibility is granted with regard to the choice of the sample used for the purpose of risk differentiation. The sample used in model development should be sufficiently representative of the application portfolio.	Clarifications in section 4.2
Harmonisation	<p>Further harmonisation was suggested with regard to the following aspects:</p> <ul style="list-style-type: none"> definition of resolved loan for inclusion in 	Additional clarifications have been added to the GL. In particular, it was further specified which observations should be treated as closed recovery	Changes to section 6.3.2.3



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>LGD modelling;</p> <ul style="list-style-type: none"> ▪ treatment of recoveries after 'resolved' status is formally triggered; ▪ method of treating unresolved loans in historical LGD and LGD estimates. 	<p>processes. It was also clarified that, regardless of whether a case is open or closed, all recoveries realised up to the moment of estimation should be taken into account in calculating realised LGDs, including those realised after the maximum length of the recovery process. Only the estimation of further, not yet observed, recoveries beyond this point in time is not allowed.</p> <p>The GL specify how to include incomplete recovery processes in the calculation of the long-run average LGD, as this is considered important for the comparability of LGD estimates. More flexibility is granted in relation to the treatment of such cases in model development for the purpose of risk differentiation, as for this purpose the appropriate solution may depend on the chosen estimation methodology.</p>	
6.6: Do you agree with the proposed principles on the treatment of collateral in LGD estimation?			
Allocating cash flows; secured versus unsecured exposures	<p>Many respondents generally agreed with the proposed principles on the treatment of collateral. However, several respondents highlighted the possibility of operational challenges when allocating cash flows to collaterals, especially where the recovery process is managed at borrower level and collaterals could cover several exposures. Furthermore such an allocation might not be possible for old data.</p> <p>For these reasons, it was suggested that the use of a joint recovery rate for the secured and unsecured</p>	<p>The GL do not prescribe any specific methodology with regard to LGD model development and in particular do not require a separate LGD estimation for the secured and unsecured parts of an exposure. Nevertheless, institutions should be aware of the sources of cash flows in order to be able to choose the most appropriate estimation methodology and relevant risk drivers.</p> <p>At the model development stage, institutions have the flexibility to choose not only the appropriate methodology but also the set of data to be used for</p>	Clarifications in section 4.2



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>parts should be allowed. Some respondents indicated that LGD approaches should not unnecessarily separate the treatment of collateralised and unsecured exposures, as the recovery process is often managed at borrower level. In these cases, distinguishing between collateral recovery cash flows and other recovery cash flows will lead to artificial complications and will bring no added value to risk modelling. In addition, it was mentioned that a distinction between LGD ratios for the secured and unsecured parts of loan exposures would not be appropriate for asset-based finance.</p>	<p>the purpose of risk differentiation. Hence, where data quality issues exist, this may be addressed by an appropriate choice of representative sample.</p> <p>In the calibration of LGD, in particular in the calculation of long-run average LGD, all observed defaults have to be used, but in this case the allocation of cash flows to collaterals is not necessary, as all cash flows are equally included in the calculation of realised LGDs.</p>	
Effect of collateral on LGD estimates	<p>Some respondents made specific comments on paragraph 149, stating in general that these requirements can be understood as limiting modelling choices, making the assumption that banks will estimate LGD for unsecured and collateral recoveries separately. It was noted that some of the requirements in this paragraph were relevant only for specific LGD estimation methodologies. For this reason, it was suggested that the provisions in this paragraph should include a 'where appropriate' statement in order to be more generally applicable.</p> <p>Some respondents requested clarifications concerning the proposal related to the LGD estimation approach based on the use of recoveries stemming from different types of collateral; in particular, it was not clear if</p>	<p>The GL do not prescribe any specific methodology with regard to LGD model development and in particular do not require a separate LGD estimation for the secured and unsecured parts of an exposure. The GL specify only principles according to which collateral can be recognised in LGD estimates. For instance, regardless of the chosen estimation methodology, the LGD estimates should not be biased by inappropriate allocation of cash flows. Several requirements are specified with regard to the specific situation where institutions estimate recovery rates related to specific types of collateral separately; this, however, does not preclude the use of other methodologies.</p> <p>Realised LGD has to be calculated for each observation, i.e. each defaulted facility. For this purpose, the allocation of recoveries to specific</p>	Changes to section 6.1.3



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	paragraphs 148 and 149 referred to the calculation of recovery rates in terms of realised LGDs computed separately for each type of collateral.	collaterals is not necessary. However, any recoveries from collaterals covering several exposures have to be allocated to specific facilities in order to allow the calculation of realised LGD.	
	Concerns were expressed with regard to the proposal that, if exposure is secured by only a part of the value of the collateral, the estimation should be based on the total value and total sale price of the collateral. Even though the respondents agreed in principle, it was argued that under certain circumstances the required information might not be available. In these cases, it should be permitted to use the known partial value.	It has been clarified in the GL that institutions should make a reasonable effort to obtain the required information. If the required data are not available, then partial information can be used, taking into account the potential biases that may result from this lack of information and any additional uncertainty of the estimates.	Changes to paragraph 129(b)
Eligibility of collateral	A few respondents requested additional clarifications regarding the eligibility of collateral and specifically advocated recognition of exposures secured by durable goods (e.g. equipment leases and motor finance) as physical collateral for credit risk mitigation purposes, because the assets on which the lending is secured exist in liquid markets with transparent and publicly available pricing and can be realised quickly. One respondent suggested that legal enforceability should be recognised as a sufficient condition for the recognition of collateral and that the LGD models should reflect the range of recovery practices. Another respondent inquired about the possibility of using automated valuation models or indexed revaluation for the purpose of eligibility in accordance with Article 181(1)(f) of the	In accordance with Article 108(2) of the CRR, institutions that estimate their own LGDs may use credit risk mitigation in accordance with Chapter 3. This means that all collateral that meets the requirements of Article 181(1)(f) of the CRR are considered eligible to be recognised in own LGD estimates. This refers to all forms of collateral, including those not explicitly listed in Chapter 4. If own estimates of LGD are used, the requirements specified in Chapter 4 apply only to the extent that they are explicitly referred to in Chapter 3. The requirements of Article 181(1)(f) of the CRR have been further clarified in the RTS on IRB assessment methodology as referring specifically not only to legal certainty but also to appropriate valuation of collateral. The methods of assessment	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	CRR.	used for this purpose should be appropriate for the specific type of collateral under consideration.	
Ineligible collateral	<p>Some respondents suggested that it should be made clear that recovery cash flows from collateral not eligible according to Article 181(1)(f) of the CRR should be taken into account and how this should be done. It was suggested that in recovery processes such collateral usually creates additional cash flows that can be taken into account either in the unsecured recovery rates or in the secured recovery rates from specific non-CRR compliant collateral.</p> <p>One respondent stated that when developing models non-eligible collateral and cash flows from its liquidation should also be included in the recovery cash flows in addition to the proceeds from collateral liquidations.</p>	<p>Additional clarifications were included in the GL to make clear that, while cash flows from ineligible collateral can be included in the estimation of unsecured LGD, institutions should also monitor the extent of use of such collateral over time in order to avoid any bias. Collateral that does not meet the requirements of Article 181(1)(f) of the CRR cannot be included in the LGD model as a risk driver.</p>	Changes to section 6.2.2
Potential inability to gain control	<p>One respondent was concerned about how to take into account past liquidations and potential inability to gain control and liquidate the collateral. With regard to the time of recovery as a risk driver in the estimation, such a risk driver cannot be used in the application of LGD to performing exposures.</p>	<p>Additional clarifications were included in the GL to make clear that these aspects should in general be included in LGD estimates based on past experience reflected in historical data. Increased time to recovery will influence the relevant recovery rates but cannot be used as a risk driver in the application of LGD.</p>	Changes to paragraph 129(f)
Value of collateral	<p>According to some respondents, paragraph 149(e) suggests that only market value should be used for the estimation of collateral, which is deemed to be methodologically difficult. Collateral is not</p>	<p>The market value of collateral may be determined not only through the sale of the collateral but also through an appropriate valuation. It has been clarified in the GL that different forms of collateral</p>	New paragraph 120



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	necessarily sold on a market, it may also be a source of future cash flows, over its whole life (e.g. in the case of specialised lending). It was mentioned that banks would not always have to repossess collateral. The benefit of collateral can also be achieved through the extension of the loan maturity thanks to a residual asset life and an extension of the lease of the asset with an existing or new lessee. It was suggested that haircuts should be calibrated in order to take into account all these possibilities for generating cash flows.	may be recognised with regard to the same object or the same property. These different types of collateral should be adequately reflected in LGD estimates. In any case, the estimation methodology should be consistent with the institution's collection and recovery policies.	
Purpose of collateral	According to some respondents, the GL assume that the only purpose of collateral is repossession and liquidation, without recognising that the purpose of obtaining collateral from corporate customers is to improve the bank's ranking in the creditor hierarchy, resulting in lower loss rates during a restructuring process. The objective of this approach is to allow the firm to remain a going concern so that it can repay its debts. In some cases, liquidation of collateral (usually company assets) would be counterproductive and possibly increase losses.	<p>The GL explicitly specify various forms in which collateral can be realised. Repossession and liquidation are not the only possible forms mentioned; the list provided is non-exhaustive, recognising that, depending on the type of collateral, other means of realising it may also be possible under a given legal framework.</p> <p>Furthermore, it is required that the LGD estimation methodology is consistent with the collection and recovery policies of the institution. If an institution does not in general realise collateral but rather uses it to strengthen its position against other creditors or to motivate the obligor to repay the obligations, and the institution observes higher recoveries on secured exposures, it could be recognised as a risk driver in the LGD model.</p>	No change
Potential decrease in collateral value	Some respondents requested clarifications to paragraph 149(f) and noted that recognition of a	Additional clarification has been provided in the GL specifying that this requirement should be	Changes to paragraph 129(g)



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>potential increase in collateral value should be allowed. In fact, it seems impossible to isolate the effect of the increase in market value until the moment of recovery. It was proposed that the estimated recovery should not exceed the collateral value, in order to prevent an overly optimistic estimated recovery.</p> <p>Some respondents asked for clarification regarding the meaning of 'conservative collateral valuations' (valued after the customer's default). It was considered unclear if this also included (conservative) updates of the collateral values due to changes in real estate market conditions, or the state and age of the collateral.</p>	<p>considered from a forward-looking perspective. Expected significant decreases in the value of collateral should be reflected in the LGD estimates. Recognising potential future increases in value in the same way would not be considered prudent. However, there is no need to disentangle the effect of the increased value of collaterals from historical observations, even if this would lead to higher recoveries on some exposures.</p>	
Reference date for collateral valuation	<p>Several respondents did not agree with the proposal to consider the valuation of the collateral before the entry into default, as this should reflect the loss figure at the moment of default and it could also be covered by the downturn adjustment. Specialised lending should also be kept in mind here. In their view, however, it should be clarified how updated collateral valuations may be taken into account for the purposes of LGD estimation, especially if these updates of collateral valuations capture only real estate market conditions. One proposal is that consistent collateral and LGD values could be used in estimation and application.</p>	<p>The objective of the proposed policy was to ensure consistency between the estimation and the application of LGD. As LGD estimates are applied to non-defaulted exposures and current collateral values are used in the application of LGD, collateral values should be used also in the process of LGD estimation as applicable before defaulted status. If the valuation of collateral decreases after default, the recovery rate related to this lower value will be high. If this higher recover rate is later applied to a higher value of collateral, this will result in underestimation of LGD.</p> <p>It has been clarified in the GL that collateral and its value should be treated like any other risk driver in LGD estimation. This means that the reference date for a risk driver is appropriate for estimating LGD for</p>	Changes reflected in paragraph 107(c) and 110



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		<p>non-defaulted exposures if it is representative of the value of this risk driver within a year before default. This follows the assumption that LGD parameters reflects the estimated level of loss an institution would face if the exposure defaulted within a year from the moment of estimation.</p> <p>In the case of defaulted exposures, for the purpose of estimating EL_{BE} and LGD in-default, the valuation should be chosen that is appropriate for the relevant reference date.</p> <p>In any case, in the application of LGD, LGD in-default and EL_{BE}, the most up-to-date value of collateral should be used.</p>	
Haircuts versus downturn adjustment	Some respondents expressed concerns about possible double counting of the effects of adverse economic conditions through collateral haircuts and downturn adjustments.	The GL specify principles for achieving the best estimate of LGD parameters based on the long-run experience. While this estimation has to take into account the level of uncertainty through adequate MoCs or haircuts where necessary, the best estimate of LGD based on the long-run average LGD should not explicitly reflect the impact of adverse economic conditions. Such effects should be included in the LGD estimates reflecting economic downturn.	No change
6.7: Do you agree with the proposed treatment of repossessions of collateral? Do you think that the value of recovery should be updated in the RDS after the final sale of the repossessed collateral?			
Updating the value of recovery	Several respondents expressed general agreement with the proposed treatment of repossessions; a few others requested further clarification. Views with regard to whether the value of recovery	The EBA decided to keep the initially proposed policy that the value of the recovery should be determined based on the value of repossession subject to the haircut. However, information on the sale prices	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>should be updated after the sale of an asset were mixed:</p> <ul style="list-style-type: none"> Several respondents suggested that the value of the final sale should be reflected in the RDS for future updates of LGD estimates (i.e. after the sale, the recovery should be updated to reflect the value of the sale). Two respondents argued that unless the repossession is aimed at own institution use or benefit, for instance through renting, the moment of the asset sale should be relevant, rather than that of repossession. This would make the collateral valuation less subjective, since the repossession value has to be estimated while the sale price is an objective value. One respondent suggested that the value of recovery should be updated only if the sale was close to repossession. Several respondents were of the opinion that the value of recovery should not be updated. The majority of respondents commented that the final sale price should be stored and used for back-testing the haircut. In this case, the value of recovery would not be updated; rather, the adequacy of the haircut would be checked based on the 	<p>should still be collected and used for the purpose of back-testing haircuts in order to make sure that they appropriately reflect the uncertainty of the value of the asset at the moment of repossession.</p>	



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	realised sales.		
Leasing	<p>Some respondents made specific comments related to the repossession of collateral in the case of leasing.</p> <p>In leasing contracts, the 'leased asset' is recorded in the lessor's balance sheet from the start. The respondents pointed out that the moment at which the leased asset is returned to the bank by the lessee cannot be considered in the same way as in a typical repossession, which requires the inscription of the asset in the bank's balance sheet. Furthermore, in LGD models built on leasing financial activities, the resale of the leased asset is normally the main source of recovery from the defaulted exposures. Therefore, it is important to properly consider it as part of the recovery process.</p>	<p>Regardless of the terminology used internally by institutions for the purpose of the application of these GL, the term 'repossession' should be understood as defined in the GL. The situation where an asset has been recorded on the institution's balance sheet since the beginning of the leasing contract does not meet the definition of repossession specified in the GL, and hence any further requirements in that regard, especially requirements in relation to haircuts, do not apply to this situation. In this case, the collateral is realised by the sale of an asset owned by an institution, and that is how it should be recognised in the LGD model. This additional clarification has been added to the GL.</p>	Changes to section 6.1.3
Repossession of collateral	<p>Some respondents asked for clarification of the concept of repossession. A few respondents noted that the value of the repossessed collateral is adjusted by haircuts to reflect the potential price that could be achieved from a sale, so the uncertainty would be double-counted: first, in the LGD model of the institution and, second, on the books of the institution that repossesses the collateral, in the form of an investment risk.</p>	<p>LGD parameters reflect only estimates of potential future losses in the event that an exposure defaults, and hence they should also reflect the uncertainty of the potential recovery process. As a result of an investment in the repossessed asset, an institution may realise either a loss or a gain.</p>	No change
Alternative approaches	<p>One respondent pointed out that this treatment should not prejudice the option for a bank to</p>	<p>It is not a given that an approach based on total cash flows including cash flows related to the sale of</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	consider total cash flows (a more conservative approach) within its modelling approach. LGD models based solely on cash flows rather than assumptions of repossession and sale should be permissible.	<p>repossessed collateral would be more conservative than the proposed approach. This would depend on the evolution of market prices and the time between the repossession and the sale. In some cases, collateral is repossessed by institutions in the expectation that the value of the asset will increase in the future. Under these circumstances, the approach based on total cash flows would be less conservative.</p> <p>The objective of the GL is to ensure comparability of LGD estimates. Under the alternative approach, the LGD estimates would use a different concept of economic loss and would include an aspect of investment risk after repossession. Regardless of whether it would be more conservative or not, such LGD estimates would not be comparable with LGD estimates based on the requirements included in the GL and therefore should not be allowed.</p>	
6.8: Do you think that additional guidance is necessary with regard to the specification of the downturn adjustment? If yes, what would be your proposed approach?			
Banks' expectations	<p>Almost all the respondents indicated a need for additional guidance on the downturn adjustment. Some of them indicated aspects that might be considered in the GL:</p> <ul style="list-style-type: none"> ▪ criteria for identifying the downturn period; ▪ whether calibration of LGDs to downturn conditions should be based on recoveries 	While the EBA agrees that these are valid questions that should be considered, this specification requires more time for discussion and can be decided on only once the RTS on the nature, severity and duration of economic downturn are finalised.	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>realised during this period or on defaults identified in the downturn period;</p> <ul style="list-style-type: none"> approaches based on macroeconomic indicators and how these relate to loss rates; whether downturn corrections are expected to be based on observed recovery experience only or explicitly related to a macroeconomic scenario in a 'stressed LGD' framework; factors to be considered in computing the downturn adjustment and how idiosyncratic factors of the loss rates should be considered (i.e. not dependent on the economic cycle but strongly influencing the loss rates observed); a proper definition of downturn conditions; if minimum or maximum impacts of the downturn factor are expected. 		
	<p>Some respondents made more specific comments and proposals, especially with regard to:</p> <ul style="list-style-type: none"> the use of macroeconomic factors; the use of model components in the computation of downturn adjustment; identification of the downturn period; 	<p>The EBA will carefully analyse all the comments and proposals and will provide more detailed feedback in this regard together with further guidance on the estimation of downturn LGD. It is envisaged that this further guidance will be provided once the RTS on the nature, severity and duration of economic downturn are finalised.</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<ul style="list-style-type: none"> the different sensitivities of portfolios to downturn conditions; the possibility of using a simple add-on as a downturn adjustment. 		
Other specific comments regarding LGD estimation			
Multi-default exposures	<p>Several respondents asked the EBA to clarify how the treatment of multi-default exposures should be combined with the probation period that the RTS on the definition of default specify and with the PD treatment in the GL (i.e. one default for LGD and two defaults for PD). It was also considered unclear what the treatment should be in the event that an exposure returns to performing status but a 12-month period after the reclassification is not observable.</p> <p>A few respondents requested clarification on the treatment of multiple defaults and consistency between PD, LGD and conversion factors as required by the RTS on IRB assessment methodology. It was suggested that the treatment should be specified in the general part of the GL.</p> <p>Finally, a few respondents stated that the proposed threshold of one year was too conservative. They argued that internal data should be used in order to set a more reasonable threshold after the probation period, as in the Guidelines on the definition of default.</p>	<p>The probation period specified in the Guidelines on the application of the definition of default relates to defaulted status. Exposures have to remain in defaulted status at least until the end of the probation period. This probation period aims to limit the frequency of changes in status; institutions should reclassify exposures from defaulted to non-defaulted status only when they have observed, during a probation period, a consistent improvement in the financial situation of an obligor, and hence subsequent classification back to defaulted status is less likely. However, where the situation of multiple defaults on a given exposure nevertheless occurs and the time during which the exposure was considered not defaulted is less than the specified dependence period, it is considered that the default events are related and, for the purpose of LGD estimation, the exposure should be treated as constantly defaulted.</p> <p>Exposures that returned to non-defaulted status should be treated as closed recovery processes also within the period directly after the return to non-defaulted status. Only where a subsequent default is observed does the treatment change to that of an</p>	Changes to paragraph 101



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		<p>open recovery process.</p> <p>The treatment of multiple defaults as a continuous defaulted status for the purpose of LGD estimation does not imply a change in the required historical data. Information about all default events still has to be stored by institutions. Consistency with PD estimation should be ensured by the use of the same database of default events.</p> <p>Finally, after further consideration and taking into account the feedback received, the minimum length of the dependence period has been shortened from one year to nine months.</p>	
Data requirements	One respondent stated that the default event often takes place before the credit cancellation date, and so it will not always be possible to gather information on cash-flow sources from the obligor.	If the payment is realised before the cancellation of the credit, and after the payment all collaterals related to the credit are still available for the institution, it indicates that the payment was not related to the realisation of the collateral, and hence it should be allocated as own payment by the obligor.	No change
0% floor	Concern was expressed in one of the responses about the proposed 0% floor to individual realised LGDs. It was argued that this floor would arbitrarily raise LGDs for types of lending that are generally characterised by low risk, such as leasing. Lease payments are based on the valuation curve of the underlying asset and are systematically designed to result in a potential gain on defaults towards the end of the contract. It was suggested that the 0% floor should be applied to estimated LGD only for	As LGD estimates should reflect the potential losses of the institution and not its potential gains, the proposed 0% floor on realised LGDs has been retained. This floor is applicable in the calculation of long-run average LGD in order to ensure the appropriate calibration of the parameter. However, for the purpose of model development, institutions may use any information that proves relevant for the appropriate risk differentiation. If the realised LGDs before the application of the floor are more relevant	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	capital requirements purposes.	for this purpose, they may be used in model development.	
7.1: Do you agree with the proposed approach to the EL _{BE} and LGD in-default specification? Do you have any operational concerns with respect to these requirements? Do you think there are any further specificities of EL _{BE} and LGD in-default that are not covered in this chapter?			
Consistency between defaulted and non-defaulted exposures	<p>Many respondents were in favour of consistency between direct estimation of LGD in-default and the methodology set for LGD for non-defaulted exposures in order to avoid potential cliff effects.</p> <p>Some respondents disagreed with the consistency requirements, arguing that different methodologies could be applied, e.g. unexpected loss could be directly estimated and added to EL_{BE}.</p> <p>Other respondents disagreed with the consistency requirements based on the consideration of specialised credit institutions (granting instruments such as consumer credit, leasing, guarantees, etc.), as they do not manage current bank accounts and do not have access to precise customer behaviour information. Models for LGD for non-defaulted exposures would be less precise than models for LGD in-default, and this could lead to cliff effects.</p>	<p>The GL require institutions to use consistent methodologies for the estimation of LGD for defaulted and non-defaulted exposures, as in either cases the methodology should be appropriate for the particular type of exposures as well as the internal collection and recovery policies of the institution. However, they also explicitly require that all relevant risk drivers should be used, including those that may become relevant after the date of default. This means that the models for defaulted and non-defaulted exposures will not be exactly the same, as more information is available at certain reference dates after default, which should be adequately reflected in the estimates of LGD in-default and EL_{BE}.</p> <p>Furthermore, both the GL and the RTS on IRB assessment methodology also acknowledge that LGD in-default may be estimated either directly or by estimating an add-on over EL_{BE}. However, regardless of which of the approaches is used, the results should be consistent such that the difference between LGD in-default and EL_{BE} reflects the downturn adjustment, the MoC and other unexpected losses.</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
Provisions as EL _{BE}	<p>Many respondents advocated consistency between EL_{BE} and accounting provisions, rather than consistency between the estimates for defaulted and non-defaulted exposures. They were of the opinion that it should be permissible to use provisioning models for the purpose of EL_{BE} estimation. They argued that it would be too burdensome to develop two sets of models for accounting and for prudential purposes, taking into account that the proportion of defaulted assets is usually small. Some respondents suggested that some kind of materiality threshold could be introduced for requiring an own EL_{BE} model in addition to the provisioning model.</p> <p>Furthermore, it was mentioned that a treatment of EL_{BE} consistent with the provisions on NPL has to be achieved, because the IRB excess/shortfall depends on this comparison.</p> <p>Some respondents stated that the CRR is independent of provisioning, while others suggested that the range of circumstances under which firms are able to use provisioning models should be broadened.</p>	<p>The EBA does not consider the use of accounting provisions appropriate. It was considered both legally and operationally problematic to specify what constitutes immaterial defaulted portfolios and define simplified rules for these portfolios.</p> <p>The estimation of parameters for defaulted exposures is required only of those institutions that use LGD models for non-defaulted exposures. Since EL_{BE} and LGD in-default are expected to be based on similar methodologies, it should not be too burdensome for institutions to develop such models, especially given that the A-IRB Approach is mostly applied by large institutions.</p> <p>Furthermore, from a legal perspective the introduction of simplified rules was considered to be problematic. The CRR already provides certain alternative solutions for situations where LGD cannot be modelled, such as F-IRB for non-retail exposures or estimation based on total losses for retail exposures and purchased receivables. For all other situations, the CRR specifies that permission to use internal models can be granted only if all minimum requirements are met. It is therefore not possible to specify in the GL provisions contradicting this requirement.</p> <p>The CRR requires the calculation of IRB excess/shortfall in order to ensure that the own funds reflect the expected loss estimated in accordance with prudential rules even where the accounting provisions do not meet prudential</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		requirements. The use of provisions as EL_{BE} would invalidate this requirement and therefore this possibility cannot be included in the GL.	
Add-on over EL_{BE}	Several respondents would welcome additional details regarding the three components of the add-on over EL_{BE} , in particular the additional unexpected loss. The respondents argued that the variability of recovery rates due to negative macroeconomic conditions was already addressed by the downturn component and that the remaining volatility typically underlay the estimate of the MoC. They argued that it should therefore be clarified in the GL that the unexpected loss component was intended as something exceptional, and that it could be equal to zero.	Where all identified uncertainty and potential unexpected losses are sufficiently covered by the downturn adjustment and MoC, the component of the add-on reflecting potential additional losses may be zero. However, these additional potential sources of unexpected losses have in any case to be analysed by the institution and reflected adequately where necessary. In particular, this additional component of the add-on may be applied to the whole portfolio, to a subset of exposures (e.g. selected pools) or to individual exposures.	No change
7.2: Do you agree with the proposed reference date definition? Do you currently use the reference date approach in your EL_{BE} and LGD in-default estimation?			
	Most of the respondents agreed with the proposed definition of the reference date. However, further clarification of the concept was requested, in particular: <ul style="list-style-type: none"> whether it would be possible to use ‘the time since default’; whether the reference date depends on the definition of default used by the institution. 	The concept of reference dates is specified in the GL in a flexible manner that allows various approaches to the specification of the relevant reference dates depending on the type of exposures under consideration and the observed recovery patterns. In particular, it is possible for the reference dates to reflect the time since the moment of default. The date of default can be considered the first reference date and is the starting point for the consideration of the relevant reference dates.	No change
	Very few respondents disagreed with the proposal;	The GL do not preclude the use of a statistical	



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>those who did indicated that:</p> <ul style="list-style-type: none"> there is no need for such a standardisation, it would not deliver any discernible benefits; a statistical approach based on a cluster analysis in order to identify proper segmentation by time into default would be preferable. 	<p>approach in specifying the relevant reference dates. These dates may be determined based on a cluster analysis.</p>	
7.3: Do you agree with the proposed approach with regard to the treatment of incomplete recovery processes for the purpose of estimating LGD in-default and EL_{BE}?			
Different reference dates	<p>Many respondents generally agreed with the proposed approach. However, more clarification was requested regarding the statement in paragraph 169 that incomplete recovery processes should be used 'only with respect to reference dates beyond which factual recovery and costs have been already observed'.</p> <p>More generally, the respondents requested that consistency with the treatment of incomplete recovery processes for the LGD for performing exposures be sought. It was argued that the use of different references dates was methodologically questionable and would be highly onerous to implement.</p>	<p>The requirement included in the GL was not intended to introduce different reference dates for defaulted and non-defaulted exposures. Rather, this provision was specified to ensure that only those incomplete recovery processes are used that bring additional relevant information for the estimation at a certain reference date. The wording of the GL was adjusted for greater clarity. In addition, an extensive explanation with examples was included in the background and rationale section.</p>	Changes to paragraph 180
RWA variability	<p>Some respondents noted potential distortion in the estimates, as open recovery processes would have an increasing weight in the total sample going</p>	<p>Consistency between the treatment of incomplete recovery processes for the purpose of LGD for non-defaulted and defaulted exposures requires that</p>	No change.



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	<p>forward on the timeline, and would therefore strongly influence the estimates. If an observation with an estimated loss is treated in the same way as an observation with an observed loss, this may lead to an underestimation of the variance of the sample. One suggestion was to consider the use of only closed defaults as the basis for the best inference of future recoveries.</p>	<p>open cases are also included in the estimation. As LGD in-default and EL_{BE} are in fact part of the LGD model, all the requirements for such models specified in the CRR have to be met. This includes the need to use all observed defaults in the quantification of these parameters.</p> <p>The inclusion of open recovery processes brings valuable information, including information on the most difficult cases with longer recovery periods, as well as the most recent trends. Therefore, omitting these observations would lead to less robust estimates. However, institutions should also make sure that estimates of future recoveries on incomplete recovery processes are well justified and prudent in order to avoid any distortions in the final estimates of risk parameters due to the use of uncertain information.</p>	
7.4: Which approach do you use to reflect current economic circumstances for EL_{BE} estimation purposes?			
	<p>Several respondents reflect current economic conditions in the EL_{BE} estimates by considering risk drivers that are sensitive to relevant economic and credit risk factors. Other approaches adopted by some respondents include the following:</p> <ul style="list-style-type: none"> • the use of incomplete cases, as they reflect current economic conditions; • the use of provisions as EL_{BE}; • a short-term average approach instead of 	<p>The EBA has considered the approaches described by the respondents and decided that the most appropriate solution is to consider risk drivers sensitive to economic conditions or even incorporate macroeconomic variables directly into the model. The use of incomplete cases is not a sufficient solution, as this is a requirement for all estimates, including those based on the long-run average. The use of provisions is not considered appropriate either, as explained above. It was concluded that EL_{BE} should be based on the long-run experience, like</p>	<p>Changes to section 7.3.2.2</p>



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>a long-run average approach;</p> <ul style="list-style-type: none"> no reflection of current economic conditions at all, and the use of the long-run average instead; selection of data reflecting current economic conditions. 	<p>all other risk parameters. Where an adjustment to reflect current economic conditions is necessary, this may be done on the basis of a sample of data reflecting current economic conditions, for instance by selecting the most recent observations. However, this limited sample cannot be used as the sole basis for the estimates.</p>	
Consistency in calibration between EL _{BE} and LGD in-default	<p>A few respondents mentioned the aspect of consistency between the required downturn calibration of LGD in-default and the calibration of EL_{BE} to current economic conditions. Further guidance on downturn LGD was requested to enable institutions to address specific LGD in-default and point-in-time EL_{BE} calibration requirements in a consistent way. The respondents advocated a comprehensive approach linking IFRS 9 PiT calibration, stress testing, EL_{BE} PiT calibration and downturn LGD estimates. It was, however, also noted that such an approach may not be the most appropriate to be implemented, as recovery processes may span different economic scenarios and require specific calibration for different purposes.</p>	<p>As accounting provisions are not within the scope of these GL, a comprehensive approach such as that described by the respondents could not be specified. However, the analysis of economic conditions should be consistent for the purpose of EL_{BE} (to reflect current economic conditions) and for the purpose of LGD and LGD in-default (to reflect downturn conditions). In particular, such consistency can be ensured by analysing the impact of the same credit and economic factors for each specific portfolio under consideration.</p>	No change
7.5: Do you currently use specific credit risk adjustments as EL_{BE} estimates or as a possible reason for overriding EL_{BE} estimates? If so, how?			
	<p>The responses reflect a wide variety of approaches currently in use. While the majority of respondents do not use specific credit risk adjustments as EL_{BE} estimates, many respondents report using such an approach. A few respondents use provisions as a</p>	<p>As specified in the GL, the models for accounting provisions can only be used for the purpose of EL_{BE} estimation where these models meet all the requirements of the CRR and of these GL, in particular where the definition of economic loss</p>	No change



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
	<p>reason for overrides; others make use of provisions only if they are based on an individual assessment.</p> <p>In addition, some respondents requested clarification of the justification required to support override/substitution of EL_{BE}.</p>	<p>underlying the estimates is consistent with the concept specified in these GL. This encourages consistency between the risk parameters used for prudential purposes, but also consistency with the models used for provisioning.</p> <p>Another possibility is to use accounting provisions as a reason for an override. However, this possibility is available only where the provisions bring additional, relevant exposure-specific information that is not sufficiently reflected in the EL_{BE} model. This may be the case where the provisions are specified based on an individual assessment of the exposures and expected future cash flows. Furthermore, in this situation the final EL_{BE} has to reflect the appropriate definition of economic loss.</p>	
Other specific comments regarding the treatment of defaulted exposures			
Downturn LGD in-default	<p>Several respondents argued against the requirements to reflect downturn conditions in LGD in-default/EL_{BE}. It was argued that this would overstate the total potential losses of the bank, as the suggested approach would not reflect portfolio and diversification effects. Not all transactions are sensitive to macroeconomic parameters, not all defaults occur in downturn periods and, finally, any downturn effect should be considered over the life of the exposures, i.e. considering cycles that may include possible periods of economic recovery. Therefore, clarification was requested regarding how the downturn notion should be applied.</p>	<p>The GL do not require that downturn conditions be reflected in EL_{BE} estimates, as these should rather reflect current economic conditions, as required by Article 181(1)(h) of the CRR.</p> <p>LGD in-default should be estimated under the same requirements as those for LGD for non-defaulted exposures specified in Article 181 of the CRR. Therefore, in the absence of a specific exemption as in the case of EL_{BE}, the requirement of Article 181(1)(b) that the estimates should reflect economic downturn if this is more conservative than the long-run average also applies.</p>	No change



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	<p>Some respondents considered that the inclusion of a downturn conditions component amounted to gold-plating of the rules prescribed in the CRR, as Article 181(1)(h) only refers to additional unexpected losses during the recovery period.</p> <p>In addition, it was not clear to respondents why the downturn component was linked to EL_{BE} estimation if this component was to be added only for the LGD in-default.</p>		
MoC in EL_{BE}	<p>One respondent argued against the requirement that EL_{BE} should not include any MoC, arguing that this would artificially increase RWA for defaulted exposures and that there is no justification for a different treatment of EL_{BE} and LGD in-default.</p>	<p>The policy reflected in the GL is based on the concept of best estimate, which should reflect the most accurate estimate possible of expected loss. MoC does not increase the accuracy of an estimate but only adds conservatism. Hence MoC should not be included in EL_{BE}.</p>	No change
8.1: Do you see operational issues with respect to the proposed requirements for additional conservatism in the application of risk parameter estimates?			
Operational issues	<p>Many respondents generally supported the proposal and did not envisage operational issues arising from additional conservatism in the application of risk parameter estimates.</p> <p>Some other respondents highlighted potential operational issues; in particular, they argued that:</p> <ul style="list-style-type: none"> the proportionality principle should apply and some sort of materiality assessment could be implemented; the investment required to establish a 	<p>The internal processes of the institution, and in particular data quality policies and procedures, should allow the identification of cases where additional conservatism in the application of risk parameters is necessary. It is considered important that institutions are able to identify these triggers in order to ensure that the risk estimates used in the calculation of own funds requirements are adequate and that any deficiencies are remedied without undue delay.</p>	No change



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	<p>comprehensive framework and monitoring will not create benefits outweighing the associated costs;</p> <ul style="list-style-type: none"> the treatment is questionable for retail exposures. 		
Clarifications	<p>Some respondents requested additional clarifications and guidance on how to apply the concept and on the implementation deficiencies that would lead to additional conservatism in the application of risk parameters.</p> <p>In addition, confirmation was requested that, as the triggers are remediated, the conservatism should be removed without a further supervisory assessment (i.e. without material model change).</p>	<p>It was clarified in the GL that implementation deficiencies should be understood as deficiencies related to the implementation of the model in the IT system, where relevant. This may be the case where the IT system does not reflect the model in an exact manner and hence may indicate different rating assignments of risk estimates from those assumed by the model.</p> <p>Conservatism in the application should not be considered part of the model; therefore, the removal of the conservatism once the trigger has been remediated should not be considered a change in the model. However, any changes in the institution's policy on how and when this additional conservatism should be applied can be considered a change to the rating system and should be notified to the competent authority in accordance with the Regulation (EU) No 529/2014.</p>	Changes to section 8.1
MoC	<p>Several respondents stated that the concept of additional conservatism in the application of risk parameters could be confused with MoC.</p> <p>Some respondents suggested specifying that MoC is related to past events, while Chapter 8 is</p>	MoC is part of the estimation of risk parameters and addresses the uncertainty of the estimates due to deficiencies in the historical data that underlies the model or methodological deficiencies such as unrealistic assumptions.	No change



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	<p>relevant for the use of current information, e.g. missing bureau scores used in the application rating due to system failures.</p> <p>Other respondents pointed out the need to avoid double counting with MoC.</p>	<p>Additional conservatism in the application of risk parameters is related to the current information and rating processes, where the deficiencies may lead to an inappropriate application of the model.</p> <p>As the MoC relates to historical observations in the estimation process, and additional conservatism addresses current data and rating processes, there is no overlap between these two concepts.</p>	
9.1: Do you agree with the proposed principles for the annual review of risk parameters?			
General comments	<p>The vast majority of respondents agreed with the proposed principles for the annual review of risk parameters.</p>	-	No change
	<p>Some respondents argued that the GL should provide definitions of recalibration, redevelopment and re-estimation, in particular with respect to LGD.</p>	<p>The final GL include definitions of ‘model development’, ‘PD calibration’ and ‘LGD calibration’, as well as of ‘estimation of risk parameters’. This distinction was necessary because different requirements apply to various stages of the modelling process. However, in the final GL the notions of recalibration, redevelopment and re-estimation were avoided and instead the GL require in a more general manner that institutions should take appropriate steps as a result of the review of estimates, depending on the nature and severity of the identified weaknesses.</p> <p>In this context, it should be kept in mind that changes in the models and estimates may stem from different sources such as, in particular, (a) the conclusions of the regular review of estimates, (b)</p>	Changes to section 2.3 and to Chapter 9.



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		independent validation, (c) changes in the legal environment, (d) recommendations made by internal audit or (e) review by a competent authority. Any changes to the estimates that stem from any of these sources will fall within the scope of the GL and will have to be implemented in accordance with the requirements specified in the GL.	
Frequency	A few respondents argued that a full review should not be performed on a regular cycle basis, and that it should instead be event-driven. It was stated that the requirements set out in paragraphs 198-203 were considered the best approach for model monitoring.	Although it is necessary to specify which events would trigger a review of estimates ((a) regular review of estimates, (b) independent validation, (c) changes in the legal environment, (d) internal audit review and (e) competent authority review), it is also necessary to specify a minimum frequency, as well the minimum scope of this review, in order to ensure consistency across institutions and fulfil the requirement specified in Article 179(1)(c) that the reviews have to be performed at least on an annual basis.	No change
	Some institutions wondered what was the expected frequency of monitoring (quarterly or yearly), and argued that the frequency for the review of estimates should be aligned with the materiality of the portfolio. Respondents noted that banks already have in place a framework for annual reviews complying with the principles.	The final GL clarify that the reviews of estimates should be performed at least annually in accordance with Article 179(1)(c) of the CRR. However, in the case of some models, especially material models for high default portfolios, it may be necessary to perform monitoring more frequently. Institutions are requested to specify the situations in which reviews are to be performed more frequently than annually in their internal policies. It is also required that institutions perform ad hoc reviews when necessary, in particular whenever a significant change in	No changes to Chapter 9; paragraph 78 has been redrafted



Comments	Summary of responses received	EBA analysis	Amendments to the proposals references to final GL
		<p>economic conditions is observed.</p> <p>The GL also specify a minimum list of aspects to be reviewed at least annually, while a full review may be carried out less frequently. Institutions are required to define a regular cycle for the full review of rating systems, taking into consideration their materiality, covering all aspects of model development, quantification of risk parameters and, where applicable, the estimation of model components.</p> <p>It should also be mentioned that the requirements in Chapter 9 should not be confused with the requirement specified in paragraph 79 (to evaluate the one-year default rates at least quarterly). One-year DRs calculated at least quarterly should be available to enable an appropriate choice between overlapping or non-overlapping windows or a reassessment of the appropriateness of this choice during the review of estimates.</p>	
Specific comments	<p>Two respondents suggested a redrafting of paragraph 200(c), substituting ‘a dedicated and structured process to manage adverse results in any of the analyses’ for ‘predefined actions to be taken in case of adverse results in any of the analyses’, because there was likely to be significant heterogeneity in the triggers, as well as in the severity of triggers (materiality considerations).</p>	<p>The EBA acknowledges that the predefined action may be dependent on the severity of the deficiency, and hence has redrafted the relevant provisions in the GL. The predefined action may in particular consist in further analysis or a more in-depth review before the final decision on potential redevelopment of the model or recalibration of the estimates is taken.</p>	Changes to Chapter 9
	<p>Two respondents requested clarification regarding ‘with and without delinquency dates’ in</p>	<p>Additional clarification has been included in this paragraph, which now refers to delinquency status</p>	Changes to



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	paragraph 202(b)(i). They argued that this was too burdensome if it was not risk driven, and that it might not even be possible for historic cases.	rather than delinquency days, giving more flexibility in terms of the criterion across which the portfolio may be split for the purpose of this analysis. The analysis should be performed where it may lead to the identification of bias in the estimates of PD.	paragraph 218(b)(i)
	Two respondents requested clarification regarding 'whole application portfolio with and without data exclusion' in paragraph 202(b)(ii). The respondents asked whether this referred to the excluded data referred to in paragraph 21(c) and (d), and argued that this would distort the validation results.	Additional clarification has been included in this paragraph, stating that the analysis should be performed with regard to the whole application portfolio, without any data adjustments or exclusions performed in model development.	Changes to paragraph 218(b)(ii)
	Two respondents mentioned that the LGD treatment was unclear with respect to paragraph 202 (in particular with regard to the type of back-testing).	Additional clarification has been included in this paragraph with regard to the review of LGD estimates. Where this paragraph requires a certain analysis without referring to a specific parameter, it should be understood as applicable to both PD and LGD. It has also been clarified that, for the purpose of back-testing, institutions may take into account the results of such an analysis performed by the validation function or they may perform additional tests, for instance with regard to a different timeframe of the dataset.	Changes to paragraph 218
Other	Some respondents argued that the purpose of Annex IV should be clarified. It was argued that including this table as an example would be preferable to including the table as a minimum requirement. Some respondents argued that the	In order to avoid potential confusion regarding the nature and application of the table, it has been decided to remove it from the background and rationale section.	The table in Annex IV has been removed from the final GL



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	triggers in Annex IV are not useful, and hence they should be modified or deleted.		
	Several respondents expressed their concerns with respect to the workload stemming from the review of estimates.	It is required by Article 179(1)(c) of the CRR that reviews of estimates are performed at least annually. Although the scope of the annual reviews does not have to include all aspects of the modelling process, the reviews should at least ensure that the estimates remain adequate. The GL specify the minimum scope of the analyses that have to be performed at least on an annual basis.	No change
10.1: Do you agree with the clarifications proposed in the guidelines with regard to the calculation of IRB shortfall or excess?			
	<p>While the majority of respondents generally agreed with the proposed GL, several respondents disagreed with the proposed treatment of partial write-offs. Some respondents suggested that this issue should not be treated within the scope of these GL and that it should instead be included in a separate document in the context of the implementation of IFRS 9 and the prudential treatment of provisions.</p> <p>The treatment of partial write-offs seems to be particularly important in some jurisdictions. It was pointed out that the proposed treatment was not aligned with the Basel framework, according to which partial write-offs are included in the calculation of general and specific CRAs.</p>	The treatment of partial write-offs was specified in accordance with the clarification provided previously in the Q&A process. Partial write-offs cannot be treated in the same way as SCRA if they lead to a decrease in gross exposure value. It was, however, considered necessary to provide clarifications regarding this aspect in these GL, as it impacts the estimation of risk parameters for defaulted exposures. Additional clarifications in this regard have been provided in Chapter 7 of the GL.	New paragraph 179



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11.1: How material would be in your view the impact of the proposed guidelines on your rating systems? How many of your models do you expect to require material changes that will have to be approved by the competent authority?			
General comments	<p>Several institutions argued for a transitional or phase-in period. It was argued that a phase-in approach for models that have to be reworked would be appropriate.</p> <p>Others argued that grandfathering for existing models with regard to the MoC concept should be considered, or that general 'transitional' grandfathering should be considered. It was also suggested that flexibility and proportionality should be introduced for the transitional phase.</p> <p>Finally, it was suggested that the implementation should be managed more efficiently, e.g. by preapproving foreseeable steps. One institution assumed that there would not be a relevant impact on RWA and regulatory capital, since current models are in line with the CRR. If this was not the case, it was stated, it would be bad for the reputation of both supervisors and banks, and would lead to reduced trust in internal models.</p>	<p>The aspect of the timing of the implementation of changes to internal models has been discussed and consulted on already in the context of the EBA's revision of the IRB Approach. In particular, the EBA published a discussion paper¹⁵, a report¹⁶ and an opinion¹⁷ in February 2016 in which timelines and expectations regarding the implementation process were specified. The effective implementation of the changes in all areas should be finalised by the end of 2020. Approval of material model changes will be required in accordance with Regulation (EU) No 529/2014 of 12 March 2014.</p>	No change
Caveats	Several respondents argued that the MoC concept	The comments specifically related to the MoC	No change

¹⁵ <https://www.eba.europa.eu/regulation-and-policy/credit-risk/discussion-paper-on-the-future-of-the-irb-approach>

¹⁶ <https://www.eba.europa.eu/documents/10180/1360107/EBA+Report+on+the+regulatory+review+of+the+IRB+Approach.pdf/4f4891fa-79a3-4f0e-97c7-fa974a410688>

¹⁷ <https://www.eba.europa.eu/documents/10180/1359456/EBA-Op-2016-01+Opinion+on+IRB+implementation.pdf>



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	<p>was too burdensome, and would be the main reason for reworking the models. One respondent expected a capital impact due to increased conservatism in the models. One respondent opined that the main changes would stem from the expected downturn guidance.</p>	<p>framework have been taken into account in the revision of the MoC categories. In particular, fewer and clearer categories should facilitate classification and quantification, and reduce the burden on institutions. As regards the impact due to the downturn guidance, the EBA has discussed both regulatory products in parallel, and is envisaging an amendment to the final GL at the point of finalisation of the RTS on the nature, severity and duration of economic downturn. A separate report has been developed in order to take into account industry practices on the main policy areas in the GL, as well as to assess the costs and benefits of these policies. The impact assessment of the RTS on the nature, severity and duration of economic downturn will be included in those RTS.</p>	
	<p>One respondent recommended carefully assessing the overall impact of the draft GL to avoid unintended increases in capital requirements.</p>	<p>The EBA acknowledges the importance of assessing the impact of its regulatory products. For the purpose of these GL, a precise quantification of the impact of the GL would require that institutions carry out a full redevelopment and recalibration of their PD and LGD models to ensure consistency with the GL. Given that such an exercise would be overly burdensome, the EBA has approached this issue differently, i.e. by asking specific, qualitative, questions on modelling practices. Based on these responses, the EBA obtained a view on the distribution of industry practices. For most policy choices, the policy chosen in the GL represents the most common approach observed. On an aggregate basis, we expect the impact of the proposal to be</p>	<p>The impact assessment of the final GL includes references to the relevant sections of the Report on IRB modelling practices</p>



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		neutral for the models surveyed, as the specifications in the GL take into account current practices for those models. Furthermore, it would be impossible to predict the impact on capital requirements on the basis of the responses to the IRB survey, because internal models feature many possible modelling choices. As a result, the final impact of these GL will be known only after the redevelopment and recalibration of the models. This aspect supports the need to monitor the impact of the implementation of these GL.	
	Two respondents argued that no cost-benefit analysis had been provided.	A preliminary cost-benefit analysis has been included in the CP on the GL. However, the EBA conducted a survey on IRB modelling practices between mid-December 2016 and the end of January 2017. On the basis of the input received to that survey, a detailed report has been developed, which includes a cost-benefit analysis for several other policy areas, and which is published together with these GL.	The impact assessment of the final GL includes references to the relevant sections of the Report on IRB modelling practices
Extent of model changes	A majority of respondents stated that the majority of models would need to be reworked. Some respondents stated that all their models would have to be reworked materially. One respondent stated that at least one quarter of all its models would require a material model change. Some respondents expected a significant implementation burden, in relation to not only the models but also the processes that would have to be adjusted. One respondent acknowledged that it expected a material impact on its models but also welcomed	The EBA carried out an assessment of the number of models that would need to be changed. In particular, the responses to the IRB survey were used to assess the proportion of models (and exposures) that would need to be changed for each policy aspect. The report on IRB modelling practices contains a summary of the proportion of models (and exposures) for which at least one, two, three, etc., aspects would need to be changed. From this analysis, it appears most likely that all models will need to be changed, at least in one aspect. However,	No change



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	the changes proposed in the GL, since they will ensure a more consistent interpretation of the CRR rules across institutions.	the materiality of these changes will have to be assessed individually on the basis of Regulation (EU) No 529/2014.	
Other issues	A majority of respondents pointed out that the main sources of changes would be the estimation of LGD, LGD in-default and EL _{BE} . Some respondents argued that the operational cost of enhancements to documentation, justifications and changes to processes would be significant. One respondent argued that the costs of complying with these GL would be very heavy, especially in respect of IT systems.	The EBA acknowledges that the implementation of the GL in particular, and the IRB review package in a broader sense, entails an operational burden on institutions, owing to the redevelopment and recalibration of models, changes in processes and changes to IT systems in general. However, a cost-benefit analysis has been conducted (see the impact assessment of the GL), in which the benefits resulting from, inter alia, reduced unjustified RWA variability, have been taken into account.	No change