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

European Banking Authority (EBA)

List of abbreviations

Abbreviations	Meaning
CAs	Competent Authorities
CRD IV	Capital Requirements Directive
CRR	Capital Requirements Regulation
EBA	European Banking Authority
EL_{BE}	Best estimate expected loss
GL	Guidelines
IRB	Internal Rating-Based Approach
LTV	Ratio Loan-to-value
MoC	Margin of Conservatism
RDS	Reference Data Set (all data set and for the purpose of risk parameters to estimation)
RTS	Regulatory Technical Standards

Index

Introduction

In November 2017 the EBA published final Guidelines on PD estimation, LGD estimation and the treatment of defaulted assets, with the aim of harmonising the concepts and methods used in the estimation of credit risk parameters for the IRB approach

Introduction

In February 2016, the EBA published a Report on the regulatory review of the IRB Approach, outlining the initiatives to reduce the unjustified variability in the outcomes of internal models deemed to stem from the lack of sufficiently specified requirements with regard to certain aspects of the IRB Approach while preserving the risk sensitivity of capital requirements.

- In this regard, EBA has published in November 2017 final **Guidelines (GL) on PD and LGD estimation and the treatment of defaulted exposures**.
- These Guidelines (GL) are focused on the definitions and modelling techniques used in the estimation of risk parameters for both non-defaulted exposures (PD and LGD) and for defaulted exposures (LGD-in default and EL_{BE}).
- In particular these GL aim at:
  - Aligning the terminology and definitions, and provide clarification on the application of certain regulatory requirements that were until now interpreted in various ways.
  - Specifying 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, etc.
  - Highlighting some requirements for estimating parameters in order to determine and calibrate the capital requirements in an objective manner.

This **Technical Note** includes an analysis of the requirements arising from the GL.

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Executive summary

These Final GL on estimation of credit risk parameters for IRB provide guidance on the following aspects: i) general estimation requirements; ii) PD estimation; iii) LGD estimation; iv) estimation of risk parameters for defaulted exposures; and v) other aspects

Executive summary

Scope of application

- **Institutions** using the **IRB approach** and subject to the Capital Requirements Directive (CRD IV) and to the Capital Requirements Regulation (CRR).

Regulatory context

- **CRR**, published by the European Parliament and the Council in June 2013.
- **Final RTS** on assessment methodology for IRB published by the EBA in July 2016[1].

Next steps

- These GL apply from **1 January 2021**, but earlier implementation is encouraged.

Main content

General estimation requirements

Principles for specifying the range of application, data requirements, human judgement, and treatment of deficiencies (MoC).

PD estimation (non-defaulted exposures)

General requirements, model development (e.g. data requirement or risk drivers) and PD calibration (e.g. one-year default rates).

LGD estimation (non-defaulted exposures)

General requirements (e.g. estimation methodologies), model development (e.g. eligibility of collaterals) and LGD calibration.

Estimation of risk parameters for defaulted exposures

General requirements specific for ELBE and LGD in-default estimates, model development and calibration.

Other aspects

Application of risk parameters (conservatism, human judgement, internal ratings and default and loss estimates, and calculation of IRB shortfall or excess) and review of estimates.

(1) EBA/RTS/2016/03

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Detail
General estimation requirements

The final GL includes general estimation requirements in relation with the range of application, the data requirements…

General estimation requirements (1/2)

Range of application

- A **rating system** 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**.
- **Exposures covered by the same rating** system should be **treated similarly** in terms of risk management, decision making and credit approval process and should be assigned to a common obligor rating scale.
- Institutions should apply the **same definition of default** across parameters for the same historical observations used in different models and also apply the **same treatment of multiple defaults** of the same obligor or exposure across internal, external and pooled data sources.

Data requirements

- **Quality of data**. Institutions should have **sound policies, processes and methods** for assessing and improving the quality of data and ensure that those policies apply to all data used in model development, calibration, and application of the risk parameters.
- **Governance for data representativeness**. Institutions should have sound policies, processes and methods including statistical tests and metrics for assessing the representativeness of data for risk differentiation and quantification. Same standards and methods should be used for different sources.
- **Representativeness of data for model development**. Institutions should analyse the representativeness of the data in terms of: i) scope of application; ii) definition of default; iii) distribution of the relevant risk characteristics; and iv) lending standards and recovery policies.
- **Representativeness of data for calibration of risk parameters**. Institutions should analyse the comparability of the data used in terms of: i) scope of application; ii) definition of default; iii) distribution of the relevant risk characteristics; iv) the current and foreseeable economic or market conditions; and v) lending standards and recovery policies.

Detail
General estimation requirements

… and treatment of deficiencies, margin of conservatism and the use of human judgement, which may be necessary at any stage of the estimation process

General estimation requirements (2/2)

Human Judgement

- In order for institutions to complement their statistical models with human judgement, they should:
  - **Assess the modelling assumptions** and whether the selected risk drivers contribute to the risk assessment in line with their economic meaning.
  - Analyse the impact of the **human judgement** on the performance of the model.
  - Properly justify and **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.

Deficiencies and Margin of conservatism

- **Identification of deficiencies**. Institutions should identify all deficiencies related to the estimation of risk parameters that lead to a bias in the quantification or to an increased uncertainty that is not fully captured by the general estimation error, and classify each deficiency defined categories[1]
- **Appropriate adjustment**. Institutions should apply adequate methodologies to correct the identified deficiencies to the extent possible, monitor and document the methods used to apply appropriate adjustments.
- **Margin of conservatism (MoC)**. Institutions should add a margin of conservatism that is related to the expected range of estimation errors and should implement a framework for quantification, documentation and monitoring of estimations errors.
  - The final MoC on a risk parameter estimate should reflect the uncertainty of the estimation in **three categories**[2].
  - Institutions should **quantify MoC** for the identified deficiencies to the extent not covered by the general estimation error, at least for categories A and B at the level of the calibration segment, quantify the general estimation error (category C) and **add final MoC to the best estimate of the parameters**.
  - For each rating system, the **MoC applied should be documented** in the relevant model documentation and methodology manuals. The documentation should contain, among others, a complete list of potential and identified deficiencies, the potentially affected model components or risk parameters, methods for quantification, etc.

(1) 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.

(2) A – errors due to data and methodological deficiencies; B – relevant changes to underwriting standars, risk appetite, collection and recovery policies; C – general estimation errors.

Detail
PD estimation

General requirements for the PD estimation are provided, as well as, data requirements for the purpose of model development

PD estimation (1/6)

General requirements

- 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 for the purpose of assigning obligors to an obligor grade as part of the credit approval process;
  - For the purpose of assigning retail exposures to a grade or pool as part of the credit approval process, **each and every exposure** is rated with the model approved to be used on a given type of exposures, This models should **fit the single original obligor** within the applicable rating system, including exposures secured by unfunded credit protection.
- A PD model can contain **several different methods** for ranking the obligors or exposures as well as various calibration segments.

Model development

- This guidelines cover the data requirements, the risk drivers and rating criteria, the treatment of third parties, the rating philosophy and the homogeneity of the obligor grades or pools.

Data requirements

- For the purpose of model development, institutions should ensure that the RDS contains the values of **the risk drivers for appropriate points in time**, which, 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.

Detail
PD estimation

The GL provide the aspects that should be considered in the process of selecting risk drivers and rating criteria and how the ratings of third parties should be treated

PD estimation (2/6)

Risk drivers and rating criteria

- Institution should:
  - Consider a **broad set of information** in selecting risk drivers and rating criteria, including obligor characteristics (e.g. sector and geographic location for corporates), financial statements, trend and behavioral information.
  - Ensure that relevant **business experts** are consulted with respect to the business rationale and risk contribution of the considered risk drivers and rating criteria.
  - Ensure that the **decrease of reliability of information** over time for generally static information is appropriately reflected in the PD estimation. The model should estimate the proper level of risk with respect to all relevant, currently available and most up-to-date information. An appropriate MoC should be applied where a higher degree of uncertainty exists.
  - Ensure that the risk drivers and rating criteria are used **consistently** in model development and calibration.
  - Where there is a significant proportion of customers using **multiple facilities of the same type** within a considered retail rating system, analyse the level of risk of such customers compared with customers carrying only one facility of the relevant type.

Treatment of rating of third parties

- 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, in **different manners**: i) transferred to a relevant obligor; ii) an indication for an override of the assignment of the relevant obligor to a grade or pool; iii) an input to the PD model, reflecting contractual support of the related party for the obligor.
- To **incorporate internal or external rating of third parties into a PD model**, the institution should ensure: i) it fulfils all the requirements for relevant risk drivers; ii) no material biases are included; iii) there is no double counting of effect.
- 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.

Detail
PD estimation

Institutions should use some principles to choose an appropriate rating philosophy and should check the homogeneity of obligor or exposures grades or pools

PD estimation (3/6)

Rating philosophy

- Institution should choose an appropriate philosophy, considering:
  - 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 and of the risk parameter estimates that result from the method used.
  - Assess the adequacy of the resulting characteristics and dynamics of the rating assignment and risk parameter estimates that result from the method used.
  - The rating philosophy should also be taken into account for back testing purposes.
- The **appropriateness of the philosophy** should be analysed taking into account: i) the design of risk drivers; ii) the migration across grades or pools and iii) changes in the yearly default rates of each grade or pool.
- Where **different rating systems with different characteristics** are used, such as different philosophies or different levels of objectivity, accuracy, stability, or conservatism, institutions should ensure that the rating systems have an appropriate level of **consistency** and that any differences between them are well understood.

Homogeneity of obligor grades or pools

- 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.

Detail
PD estimation

The GL clarify which obligors should be taken into account in the numerator and denominator for the purpose of calculating a one-year default rate and which are the data requirements for the calculation of observed default rates

PD estimation (4/6)

PD Calibration

- The PD calibration provide information related with the calculation of default rates, such as the data requirements, the one-year default rates; long-run average default rate or the calibration.

Data requirements

- Institutions should ensure the **completeness of the quantitative and qualitative data** and other information in relation to the denominator and used for the calculation of the observed average default rate. In particular, they should ensure that the following **data is properly stored and available**:
  - Criteria for identifying the relevant type of exposures covered by the PD model under consideration.
  - Criteria for identifying the calibration segments.
  - The risk drivers used for risk differentiation.
  - All identification numbers of obligors and exposures relevant for default rate calculation.
- **Exclusion** of observations from the one-year default rate calculation should be undertaken only if obligors are wrongly included in the data set of defaults or if obligors are wrongly assigned to the considered rating model.

One- year default rates

- For calculating the **one-year default rate**, both of the following should apply: i) the **denominator** should consist of the **number of non-defaulted** obligors with any credit obligation[1] observed at the beginning of the one-year observation period; ii) the **numerator** should include all obligors considered in the denominator with at least **one default event** during the one-year observation period.
- 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.**
- Institutions should calculate the one-year default rates also for **the subset of obligors** that did not have a rating at the start of the relevant observation period but were in the range of application of the model under consideration, even if these obligors were assigned to a rating grade or pool in a conservative manner for the purpose of calculation of capital requirements (‘missing ratings’).

(1) Any on balance sheet item, including any amount of principal, interest and fees, or any off-balance sheet items, including guarantees issued by the institution as a guarantor.

Detail

PD estimation

The observed average of one-year default rates should be calculated based on a documented analysis, while the long-run average default rate should be calculated according to the historical observation period

PD estimation (5/6)

Observed average default rate

- The **observed average of one-year default rates** 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.
- 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** that should include:
  - 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;
  - an analysis of possible bias due to the specific calculation dates chosen;
  - for institutions using overlapping one-year time windows, an analysis of potentially significant bias due to implicit over-weighting of the overlapping time period;
  - an analysis of potentially significant bias due to seasonal effect related to the chosen calculation dates.

Long-run average default rate

- For the purpose of determining the historical observation period, 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.
- For **assessing the representativeness** of the historical observation period institutions should asses: i) the variability of all observed one-year default rates; the existence, lack or prevalence of one-year defaults rates relating to bad years; and iii) significant changes in the economic, legal or business environment.
- If the one-year default rates are not representative of the likely range of variability, then institutions should estimate the long-run average default rate by estimating an **appropriate adjustment** to the average of observed one-year default rates.
- If the **long-run average default rate is below the average of all observed one-year default rates** due to any adjustment made institutions should compare their adjusted long-run average default rates with the higher of the observed average of the one-year default rates of the most recent 5 years or the observed average of all available one-year default rates.

Detail
PD estimation

Since calibration is the part of the estimation process that leads to appropriate risk quantification, a sound and well-defined process has to be in place

PD estimation (6/6)

Calibration

- Institutions should have **sound and well-defined processes** in place to ensure a sound calibration to the long-run average default rate by including in their calibration process **quantitative calibration tests** by rating grade or pool**; quantitative calibration tests** on calibration segment level and supplementary qualitative analyses (including expert judgement).
- Institutions should **store and describe** in the documentation of the PD model the calibration sample associated with each calibration segment.
- 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.
- For the purpose of determining the PD estimates, the calibration should consider either:
  - 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.
  - 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.
- Institutions should **asses the potential effect** of the chosen calibration method on the behaviour of the PD estimates over the time.
- Where institutions derive PD estimates from realised losses and appropriate estimates of LGDs they should use a reference data set (RDS) including **realised losses on all defaults** identified in the observation period.
- 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**, justify and document the use and scope of the calibration segments.

Detail
LGD estimation

The estimation of LGD parameter is understood in a broad sense, encompassing all data, methods and processes leading to the estimates, including preparation of the necessary datasets,…

LGD estimation (1/9)

General requirements

- The general requirements for the LGD estimation include the LGD estimation methodologies, data requirements and recoveries from collaterals.

LGD estimation methodologies

- Institutions that have permission to use own estimates of LGD 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. 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.
  - **Treat each defaulted facility as a distinct** default observation[1].
  - 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[2].
  - Estimate their own LGDs based on their **own loss and recovery experience** that is reflected in historical data on defaulted exposures.
- Institutions may supplement their own historical data on defaulted exposures with **external data**. Institutions should not derive their LGD estimates only from market prices of financial instruments, but they may use this information to supplement their own historical data.
- Where in the case of **retail exposures** and **purchased corporate receivables** institutions derive LGD estimates from realised losses and appropriate estimates of PDs, they should ensure that:
  - The process for estimating total losses meet the overall requirements for estimation of the CRR, the outcome is consistent with the concept of LGD and with the concept of economic loss defined in these GL.
  - The process for estimating PD meets the specific and overall requirements to PD estimation of the CRR.

(1) Unless more than one independent defaults were recognised on a single facility that do not meet the conditions provided in these GL.

(2) 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.

Detail

LGD estimation

…model development for the purpose of risk differentiation, and calibration that aims to arriving at risk parameters reflecting the long-run averages and additional calibration step to take into account downturn conditions

LGD estimation (2/9)

Data requirements

- Institutions should **use a RDS covering** all of the following items: i) all defaults identified during the historical observation period; ii) all necessary data for calculating realised LGDs; iii) relevant factors that can be used to group the defaulted exposures in meaningful ways and relevant drivers of loss.
- The RDS should include **information on the results of the recovery processes**, including recoveries and costs, related to each individual defaulted exposure. 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 about the obligors and transactions that could be used as risk drivers. In this regard, the EBA GL specify the information that the RDS should include.
- Institutions should demonstrate that they **collect and store** in their databases all information required to calculate direct and indirect costs.

Recoveries from collaterals

- Institutions should **recognise the recoveries as stemming from collaterals** in all of the following situations: i) the collateral is sold by the obligor and the obtained price has been used to cover the defaulted exposure; ii) the collateral is repossessed or sold by the institution, the parent undertaking or any of its subsidiaries; iii) the collateral is sold in a public auction of the property; iv) the credit obligation is sold and the price for the obligation included the existing collateral; v) the leasing object is sold by the institution (in the case of leasing; and vi) any other method of realising the collateral possible of the legal framework.
- Institutions should consider the value by which the credit obligation of the obligor has been diminished as a result of the repossession of the collateral, and which the repossessed collateral was recorded as an asset on the balance sheet of the institution. As this value does not always reflect accurately the market value of the asset, an **appropriate haircut** should be applied and estimated with the assumption that the institution intends to sell the repossessed asset as soon as it is reasonably possible.

Detail
LGD estimation

Moreover, the GL provide detailed guidance on LGD estimation concerning risk drivers and, regarding the treatment of collaterals, specifying the eligibility…

LGD estimation (3/9)

Model development

- The model development of the LGD estimation includes the risk drivers, the eligibility and inclusion of collaterals and the homogeneity of facilities grades or pools.

Risk drivers

- Identify and analyse **potential risk drivers** that are relevant to its specific circumstances and characteristics of the type of exposures covered by the rating system, in particular: transaction-related, obligor-related, institution-related and external factors and characteristics.
- Analyse the risk drivers not only at the moment of default but also **at least within a year before default** and use a **reference date for a risk driver that is representative of the realisations** of the risk driver within a year before default, and take into account its **volatility** over time.

Eligibility of collaterals

- 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.
  - Clearly define in **their internal policies the main and other types of collaterals** used for the type of exposures covered by the rating system.
  - Ensure that the **policies regarding the management** of these types of collateral comply with the requirement set in the CRR (in relation to internal requirements for collateral management, legal certainty and risk management).
  - **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.
  - 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.

Detail
LGD estimation

… and the conditions for including collaterals in LGD estimations.
These GL also include the assessment of the homogeneity of facilities grades or pools

LGD estimation (4/9)

Inclusion of collaterals

- 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.
- To include the effect of collateral in the LGD institutions should meet several principles which include:
  - Avoiding 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.
  - 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;
    - recognise and include in this estimation direct costs related to the collection on each of these specific types of collaterals separately as well;
    - 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
  - Where the same collateral covers several exposures, institutions should specify an adequate allocation methodology.
  - Estimates 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, but also potential decreases in collateral value from the point of LGD estimation to the eventual recovery, as well as dependence between the risk of the obligor and the risk of the diminishing value of the collateral and as the cost of liquidating the collateral.

Homogeneity of facilities grades or pools

- 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.

Detail
LGD estimation

Moreover, the GL specify the concepts of economic loss and realised LGD including the definition,…

LGD estimation (5/9)

LGD calibration

- The LGD includes the specification of the concepts of economic loss and realised LGD and the long-run average LGD.

Economic loss and realised LGD

- **Definition**.
  - Institutions should **calculate realised LGDs for each exposure as a ratio of the economic loss** to the outstanding amount of the credit obligation at the moment of default. In this regard, they should calculate the economic loss realised on an instrument (i.e. defaulted facility) as a difference between:
    - The **outstanding amount** of the credit obligation at the **moment of default**.
    - Any **recoveries realised after the moment of default** discounted to the moment of default.
  - 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 obligation at the moment of default, the amount of the exposure that was forgiven or written off should be added to the outstanding obligation at the moment of default included in the **denominator of the realised LGD**.
  - 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. This artificial cash flow **should be discounted** to the moment of default in the same manner as all observed cash flows.

Detail
LGD estimation

… the treatment of fees, interest and additional drawings after default, discounting rates,…

LGD estimation (6/9)

Economic loss and realised LGD (cont.)

- **Treatment of fees and interest capitalised**.
  - **Before default**. Institutions should take into account in the calculation of realised LGD any fees for delays in payments or interest that have been capitalised in the institution's income statement before the moment of default by including them in the amount outstanding and economic loss at the moment of default[1].
  - **After default**. Any fees or interest 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.
- **Additional drawings**.
  - Institutions 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 institutions may reflect future drawings either in their conversion factors or in their LGD estimates.
  - 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.
- **Discounting rate**.
  - For **calculating the economic loss**, institutions should discount all recoveries and costs[2], using an annual discounting rate composed of a primary interbank offered rate applicable at the moment of default increased by [5%-points] add-on. For this purpose the primary interbank offered rate should be considered the 3 months EURIBOR or a comparable interest rate in a currency of the exposure.

(1) 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.
(2) Including capitalised late fees and interest and additional drawings after the moment of default.

Detail
LGD estimation

…as well as the treatment of direct and indirect costs

LGD estimation (7/9)

Economic loss and realised LGD (cont.)

- **Direct and indirect cost**.
  - For calculating 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 condition is met:
    - These costs are clearly included in the **outstanding amount** of the credit obligation at the moment of default.
    - These costs are associated with the **previous default** of the same obligor that is not considered as a multiple default.
  - **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.
  - **Indirect costs** should include all costs stemming from the running of the institution's recovery processes, overall costs of outsourced collection services nor included as direct cost, and all other costs related to the collection on defaulted exposures (including institution's overheads related to the recovery processes if material) that cannot be directly attributed to collection on a specific exposure.

Detail
LGD estimation

These long-run average LGD includes the calculation and the treatment of incomplete recovery process…

LGD estimation (8/9)

Long-run average LGD

- **Historical observation period** should be as broad as possible and should include: i) a **minimum length** of 5 years[1]; ii) a sufficient number of **closed recovery processes**; iii) **consecutive periods**, including the most recent periods before the moment of LGD estimation; iv) the full period for which the institution is able to replicate the currently applicable definition of default; and v) **all available internal data** considered relevant.
- **Calculation of long-run average LGD**.
  - An **arithmetic average of realised LGDs** over an historical observation period **weighted by number of defaults**, separately for each facility grade or pool, and at portfolio level, using all defaults observed in the historical period.
  - **Where institutions do not give equal importance to all historical data** for retail exposures they should demonstrate in a documented manner that the use of higher weights to more recent data is **justified**.
- **Treatment of incomplete recovery processes**. Institutions should:
  - Ensure that the **relevant information from incomplete recovery processes** is considered in a **conservative manner**. The LGD estimation should be based on **the long-run average LGD**.
  - Calculate the **observed average LGD for each facility grade or pool and at the level of 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, without including any expected future recovery. The observed average LGD should be weighted by the number of defaults included in the calculation.
  - Clearly specify in their internal policies **the moment of closing** the recovery processes. All closed recovery processes should be treated as such for the purpose of the calculation of the observed average LGD.
  - Define the **maximum period of the recovery process** for a given type of exposures.

(1) For exposures to corporates, institutions, central governments and central banks, the historical observation period increases by 1 year each year after implementation of own LGD estimates until a minimum of 7 years is reached for at least one data source.

Detail
LGD estimation

…and also the treatment of cases with no loss or positive outcome and calibration

LGD estimation (9/9)

Long-run average LGD (cont.)

- **Treatment of incomplete recovery processes**. For the purpose of this calculation institutions should:
  - Recognise without undue delay as closed recovery processes all **exposures in default** which fall into at least one of the following categories: i) exposures for which the institution does not expect to take any further recovery actions; ii) 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; iii) exposures fully repaid or written-off; and iv) exposures that have been reclassified to non-defaulted status.
  - Obtain the long-run average LGD by **adjusting the observed average LGD** taking into account the information related to processes that were not closed 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, estimating future cost and recoveries (under certain conditions)
- **Treatment of cases with no loss or positive outcome**. The **realised LGD on** these observations should **equal 0** for the purpose of calculation of observed average LGD and estimation of long-run average LGD.
- **Calibration to the long-run average LGD**.
  - Institutions should choose a **calibration method** appropriate for their LGD estimation methodology.
  - Where institutions observe extremely high values of realised LGDs much above 100%, they should identify **relevant risk drivers** to differentiate these observations and adequately reflect these specific characteristics in the assignment to grades or pool.
  - Institutions **should not exclude any defaults observed** in the historical observation period that fall within the scope of application of the LGD model.
  - In the analysis of the representativeness of data institutions should take into account not only the **current characteristics** of the portfolio but also, 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.

Detail

Estimation of risk parameters for defaulted exposures

The GL include also requirements regarding the estimates of EL_{BE} and LGD in-default to each defaulted exposure. Nonetheless, the GL on the estimation of these parameters are largely based on the requirements for the estimation of LGD for non-defaulted exposures

Estimation of risk parameters for defaulted exposures (1/4)

General requirements

- The general requirements specific to EL_{BE} and LGD in-default estimation contain the estimation methodologies, reference dates and data requirements.

Estimation methodologies

- Institutions that have obtained permission to **use own estimates of LGD**, should assign an **EL_{BE} estimate and a LGD in-default estimate** to each defaulted exposure within the range of application of the rating system subject to such permission.
- In this regard, 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 incorporated in the rating system.
  - Use the **same estimation methods** used for estimating LGD on non-defaulted exposures.
  - Consider all relevant **post-default information** in a timely manner.
  - Assess and duly justify situations where there are **systematic deviations** of the LGD in-default estimates shortly after the date of default compared to the LGD immediately before the default.
  - Perform **back-testing** and **benchmarking** of their EL_{BE} and LGD in-default estimates.

Reference dates

- Institutions should set the **reference dates** that can be used for grouping defaulted exposures in accordance with the recovery patterns observed. In this regard, they should **use information only on closed recovery processes** taking into account cost and recoveries only if observed up to the date of estimation.
- The **same defaulted exposure in the RDS should be used in all relevant reference dates** considered in the model.
- Furthermore, 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.

Detail

Estimation of risk parameters for defaulted exposures

In addition to the general requirements, which include specific data requirements, the GL give advice on the information on the time in-default and recoveries that should be taken into account for model development

Estimation of risk parameters for defaulted exposures (2/4)

Data requirements

- Institutions should use the **same RDS** as for the **LGD estimation for non-defaulted exposures**, complemented by any relevant information observed during the recovery process and at each reference date, and in particular at least the following **additional information**:
  - All relevant factors that can be used to group defaulted exposures and all relevant drivers of loss[1].
  - The amount outstanding at each reference date.
  - The values of any collateral associated with the defaulted credit obligations and their dates of valuation after the date of default.

Model development

- For the purposes of taking into account the **information on the time in-default and recoveries** realised so far institutions may take into account this information **either directly as risk drivers or indirectly**, for instance by **setting the reference date for estimation**.
- For the purpose of EL_{BE} and LGD in-default estimation, institutions should analyse the **potential risk drivers**, 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.

(1) Including those that may become relevant after the date of default and at each reference date.

Detail

Estimation of risk parameters for defaulted exposures

Moreover, the GL specify the calculation of realised LGD and long-run average LGD for defaulted exposures, specific requirements for EL_{BE} estimation…

Estimation of risk parameters for defaulted exposures (3/4)

Calibration of EL_{BE} and LGD in-default

- Institutions, should estimate LGD and long-run average LGD for the calibration of EL_{BE} and LGD in default taking into account specific requirements.

Realised LGD and long-run average LGD

- For the purposes of EL_{BE} and LGD in default, institutions should calculate:
  - The **realised LGDs for defaulted exposures**, in accordance with the estimation for non-defaulted exposures, with the only **difference** that this should be done **with regards to the reference date**, rather than the date of default[1].
  - Apply specific treatments for partial write-offs.
  - The **long-run average LGD of the realised LGDs for defaulted exposures**, following the requirements set out for LGD estimation 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.

Specific requirements for EL_{BE}

- **Current economic circumstances**.
  - Institutions should consider current economic factors, including **macroeconomic and credit factors**.
  - The EL_{BE} should be estimated on the basis of the long-run average LGD and no further adjustments to reflect current economic conditions should be performed where any of the following conditions is met:
    - the model includes directly at least one macroeconomic factor as a risk driver;
    - at least one material risk driver is sensitive to economic conditions;
    - the realised LGD for defaulted exposures is not sensitive to the economic factors relevant for the type of exposures under consideration.
  - Where none of these conditions is met, institutions should **adjust the long-run average LGD** for defaulted exposures to reflect current economic conditions and should **document separately** the long-run average LGD for defaulted assets and the adjustment to current economic circumstances.

(1) Institutions should include all fees and interest capitalised before the reference date and discount all subsequent cash flows and drawings to the reference date.

Detail

Estimation of risk parameters for defaulted exposures

…and specific requirements for LGD in-default estimation

Estimation of risk parameters for defaulted exposures (4/4)

Specific requirements for EL_{BE} (Cont.)

- **Relation of EL_{BE} to specific credit risk adjustments**
  - Where the model used for **credit risk adjustments** satisfies or can be adjusted to satisfy the requirements for own-LGD estimates institutions may use specific credit risk adjustments as EL_{BE} estimates.
  - 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 ELBE estimates and that the specific credit risk adjustments reflect or are adjusted to the requirements on the calculation of economic loss.
  - For the purposes of justifying situations where the specific credit risk adjustments exceed the EL_{BE} estimates institutions should ensure consistency of the ELBE estimates with the economic loss components as well as with the definition of default and analyse any differences in that regard from the definitions and methods used for the purpose of determining specific credit risk adjustments.

Specific requirements LGD in-default

- For the purpose of considering the **possible adverse change in economic conditions** during the expected length of the recovery processes the LGD should reflect at least **downturn conditions**[1].
- However, the LGD in-default should be increased, if necessary, in order 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.
- For **ensuring that LGD in-default is higher than the EL_{BE}**, or is equal to in limited cases for individual exposures, institutions should analyse and correct the LGD in-default in those situations where the EL_{BE} is obtained using specific credit risk adjustments and is above the LGD in-default obtained through direct estimation.
- Institutions should document the break-down into EL_{BE} and the add-on, and for the latter, the downturn conditions , the MoC, and any component for potential additional unexpected losses.

(1) Institutions should document separately the long-run average LGD for defaulted assets, and the adjustment to current economic circumstances.

Detail
Other aspects

Institution should identify deficiencies in the implementation of the PD and LGD, apply correct levels of conservatism and human judgement, and document and monitor its application

Application of risk parameters (1/2)

Conservatism

- Institutions should apply **additional conservatism** to the outcomes of the rating assignments where any deficiencies are identified or the process of risk parameters to obligors or facilities in the current portfolio. They should do so by establishing a framework consisting in the following phases:
  - **Identification of deficiencies of implementation of the model in the IT system or application of risk parameters**. Institutions should have a robust process for identifying these deficiencies and should consider at least the following triggers for additional conservatism[1]: i) missing data in the current portfolio; ii) missing updates of financial statements; iii) outdated ratings in the application portfolio; and iv) missing ratings.
  - **Specification of the form of conservatism and quantification of the appropriate level of conservatism**. Institutions should consider the overall impact of the identified deficiencies and the resulting conservatism on the soundness of assignments to grades or pools.
  - **Monitoring of the deficiencies and correcting them**. Institutions should regularly monitor the implementation and application deficiencies and the levels of additional conservatism applied in relation to them. In this regard, they should develop a plan to rectify the deficiencies within a reasonable timeframe.
  - **Documentation**. Institutions should specify adequate manuals and procedure for applying additional conservatism and should document the process applied in addressing implementation and application deficiencies.

Human judgement

- Institutions may use **human judgement** in the application of the model in the following cases: i) application of the qualitative variables used within the model, ii) via overrides of the inputs of the rating assignment process; and iii) via overrides of the model outputs of the rating assignment process.
- They should specify **clear criteria** for the use of qualitative model inputs.
- Institutions should specify the **policies** and **criteria** for the use of overrides in the rating assignment process.
- Institutions should **document** the scale and rationale of each override.
- They should **regularly monitor** the level and justifications for overrides of inputs and outputs of the rating assignment process, specifying the maximum acceptable rate of overrides for each model.
- Furthermore, they should analyse the **performance of exposures** in relation to which an override of input or output has been performed and regularly assess the model's performance before and after the overrides.

(1) The occurrence of any of these triggers should result in the adding of additional conservatism to the risk parameter for the purpose of the calculation of RWAs.

Detail
Other aspects

The deviation between regulatory and internal parameters has to be duly justified. In addition, the GL provides some guidance on the estimation of the IRB shortfall

Application of risk parameters (1/2)

Internal ratings and default and loss estimates

- 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[1], unless all of the following conditions are met:
  - The deviation is justified and appropriate for the specific area of use;
  - The deviation does not lead to a change in rank ordering in the assignment of obligors or facilities to grade and pools within a calibration segment other than within each grade or pool;
  - The deviation is due to the use of parameters for internal purposes without consideration of the MoC, without regulatory floors, without downturn adjustments in the case of LGD estimates or is due to the use of a different calibration method, which may entail specifying different calibration segments.
- 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.

IRB shortfall or excess

- Where the calculation for the difference between credit risk adjustments and the expected loss amounts for the overall non-defaulted IRB portfolio results in an **excess**, institutions may use this excess to cover for any IRB shortfall from the overall defaulted portfolio.
- Where calculation results in an excess of credit risk adjustments for both the defaulted and the non-defaulted portfolio, the sum of those two excesses should be considered and **added to Tier 2** (up to a limit of 0.06% of RWAs).
- Institutions should not include **partial write-offs** in the calculation of general and specific credit risk adjustments. However, the calculation of the expected loss amount should be based on the exposure value **gross of value adjustments but net of write-offs**.

(1) It may also be considered adequate to group continuous risk parameter estimates into homogeneous ranks for internal purposes.

Detail
Other aspects

Institutions should have a framework for the purpose of performing annual reviews of estimates of risk parameters

Review of estimates

Review of estimates

- Institutions should specify **internal policies** for changes of models and estimates of risk parameters used within a rating system, which should provide that changes in the models should be made as a result of at least: i) regular review of estimates; ii) independent validation; iii) changes in the legal environment; iv) internal audit review and v) competent authority review.
- In case **material deficiencies** are identified, institutions should take appropriate actions depending on the severity of the deficiency and apply a MoC.
- For the purpose of performing **annual reviews of estimates**, institutions should have a framework which includes at least the following elements:
  - A **minimum scope and frequency of analyses**, including predefined metrics to test data representativeness, model performance and predictions.
    - A representativeness analysis of potential differences between the reference dataset used to estimate the risk parameter and the current portfolio to which the estimates are applied, including the analysis of any changes in the portfolio or structural breaks.
    - Analysis of the performance of the model and its stability over time, identifying potential deterioration of the model performance across portfolios.
    - Analysis of the predictive power of the model (e.g. backtesting, out of time analysis, etc.).
  - **Predefined standards**, including predefined thresholds and significance levels for the relevant metrics.
  - **Predefined actions** to be taken in case of adverse results of the review, depending on the severity of the deficiency.
- Institutions should specify several **conditions** under which the analyses should be performed more frequently than annually, such as major changes in the risk profile, credit policies or relevant IT systems.
- They should also define a **regular cycle for full review of the rating systems**, taking into consideration their materiality, and covering all aspects of model development and quantification of risk parameters.
- For the regular review, institutions should use **consistent policies for data adjustments** and **exclusions** and ensure that any difference between the relevant datasets is justified and does not distort the results.

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Next steps

These GL apply from 1 January 2021

Next steps

- These guidelines apply from **1 January 2021**.
- Institutions should agree with their competent authorities the final deadline for submitting the application for such prior permission
- Institutions should engage with their competent authorities at an early stage in order to determine an adequate implementation plan, including the timeline for the supervisory assessment and approval of material model changes, where necessary.