

Guide to Internal Models (EGIM)

ECB's Guide updated version

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Why Management Solutions?



Abbreviations

ALM		IRB	Internal Ratings-Based
CCR	Counterparty Credit Risk	IT	Information Technology
CRR	Capital Requirements Regulation	LGD	Loss Given Default
DMP	Default Management Process	LRA	Long-Run Average
DoD	Definition of Default	MoC	Margin of Conservatism
DR	Default Rates	MPOR	Margin Period of Risk
ECB	European Central Bank	OTC	Over the Counter
EEPE	Effective Expected Positive Exposure	PD	Probability of Default
F-IRB	Foundation Internal Ratings-based	RNIEPE	Risks Not In Effective Expected Positive Exposure
IM	Internal Model	RWA	Risk-Weighted Asset
IMM	Internal Model Method	SFT	Securities Financing Transactions
		TRIM	Targeted Review of Internal Models

1 Executive summary

The new release of the **Guide to Internal Models**, published by the ECB in February 2024, clarifies how banks should include material climates and environmental risks in their models, and provides clarifications for banks wishing to revert to the standardised approach for calculating their RWA in line with the revised version

Background: about the Guide to internal models...



- **February 2017. First version** of the Guide to internal models (TRIM guide). With this guide the ECB aims to ensure consistent application of high supervisory standards for supervised institutions and promote a consistent understanding and application of rules related to the use of internal models.
- **November 2018.** Revised general topics chapter.
- **June 2019.** Revised risk-type specific chapters.
- **February 2024. Revised ECB guide to internal models** (general and risk specific chapters), without major changes from the draft version (June 1013).

What is new?



General aspects

- ⊕ General principles on climate change
- ⊕ Migration to less sophisticated approaches
- ⊕ Internal models in the context of consolidations

Credit risk

- ⊕ Definition of default
- ⊕ LGD, part. article 500 CRR
- ⊕ IT Implementation
-  PD
-  MoC

Market risk

-  Delimitation of the regulatory trading book
-  Ratings, probabilities of default and recovery rate key assumptions

Counterparty credit risk

- ⊕ Use test
- ⊕ Risks not in effective expected positive exposure

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General topics

Main new content

The ECB's revised Guide to Internal Models incorporates additional topics where further clarification of existing regulatory requirements appears to be necessary, such as climate change related risks integration into models, migration to less sophisticated approaches and internal models in the context of consolidation



General principles on Climate Change

- Institutions should **consider** the materiality of all **risks** in the **life-cycle** of their **internal models**, including **climate-related** and **environmental** risks.
- Where **risk drivers** related to this topic are found to be **relevant and material**, they should be **included in approved IM** for the calculation of own funds requirements.



Migration to less sophisticated approaches

- Institutions must document the **reasons for reverting to a less sophisticated approach** and establish objective criteria for **deciding which approach to use** in the calculation of **own funds requirements**. This involves considering operational capacity and cost, the availability of data and possibility to use another available IRB approach (F-IRB, Slotting...) and the impact of the reversion on capital requirements.
- Institutions must consistently apply the **defined criteria to assess** whether the **requirements** on the conditions to revert to the use of less sophisticated approaches are met across all classes or types of exposures with similar characteristics. In addition, they must provide convincing **evidence that the application does not seek to reduce own funds requirements**.
- Where the institution is considering multiple applications related to a **new IM strategy**, the ECB expects the submission of a single comprehensive and **consistent application** for all related rating systems to assist in a more efficient assessment and approval process.



Internal Models in the context of consolidations

- The general treatment of IM in the **case of consolidations** (mergers and acquisitions) **recognizes the possibility of compliance issues regarding the continued use of IM** in a business combination. **In such cases, existing IM** can be used provided that there is a clear model mapping and a plan to address the specific issues that may arise. Anyhow, a separated ECB decision is needed in each case.

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Credit Risk Definition of Default

A new section on the definition of default has been introduced, including the ECB's understanding of the relevant provisions to ensure a common and consistent approach to the application of the definition of default



Consistency of the application

- For a **banking group**, all information about the **different exposures** and the behaviour of the obligor across the banking group **must be consolidated**.
- This also applies in cases where the DoD is applied at the level of an individual credit facility for those subsets of indications of unlikeliness to pay that are related to the condition of the obligor rather than the status of a particular exposure.



Return to non-defaulted status

- For exposures subject to distressed restructurings the **minimum probation period is generally longer than for exposures not subject to distressed restructuring** (obligor when all conditions are met for all exposures; facility should monitor each one).
- Where **distressed restructuring applies to a defaulted exposure**, the probation period should last a minimum of one year.



Days past due criterion

- At the onset of the **91st consecutive day after the materiality threshold is exceeded for the first time**, the institution should activate the **default flag** for all affected exposures.
- Threshold: >100€ retail / >500€ non-retail; or >1% of all on-balance sheet exposure.

Adjustments to risk estimates in the case of changes of DoD

- Where a change has been made to the DoD, **institutions should demonstrate the model's risk differentiation** on a time series of realised default rates, **reflecting the new DoD**.
- **Where institutions determine that their models do not maintain good risk differentiation** capacities with respect to the new DoD, in addition to the recalibration, **institutions should perform a full redevelopment of their models**.



Unlikeliness to pay criterion

- Institutions should analyze the reasons for the sale of credit obligations and the reasons for any losses recognized thereby.
- The calculation of the **diminished financial obligation** should be performed for all distressed restructurings, even when the threshold is blatantly exceeded.
- When specifying in their internal policies and procedures other additional indications of unlikeliness to pay of an obligor, **institutions should define and document additional indications of unlikeliness to pay that are appropriate for the specific type of exposure**.



Consistency of external data

- Institutions that use external data that are not themselves consistent with the definition of default, must make **appropriate adjustments to achieve broad equivalence**.
- The use of external data for the purpose of risk quantification results in a higher level of estimation uncertainty. Therefore, **it would be in line with best practice for institutions to apply a category A MoC**.

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Credit Risk

Loss given default and IT implementation

The ECB provides further guidance related to the implementation of article 500 CRR on the treatment of massive disposals, in terms of the qualifying criteria and the possible adjustments in the estimation of the LGD

Realised LGD: Treatment of massive disposals (art. 500 of the CRR)

- **Article 500** of the **CRR** allows institutions to **adjust their LGD estimates** by partly or fully offsetting the effect of massive disposals of **defaulted exposures** on realised LGDs up to the **difference** between the **average estimated LGDs** for **comparable exposures** in default that have not been liquidated and the average realised LGDs including on the basis of the losses realised due to massive disposals, **subject to certain conditions**.
- Although the adjustment may only be carried out until 28th June 2022 (which means that it is not possible to request additional adjustments under this article if not requested before), **existing** adjustments may last for **as long as** the corresponding **exposures are included** in the institution's own **LGD estimates**. **Existing adjustments** may still be **subject to change** even after 28th June 2022 (the dates refer to the date of disposal of the asset).
- An institution must qualify for the use of art. 500 of the CRR by **meeting the conditions set out therein or be a subsidiary or parent of an institution which thus qualifies**. The consolidated change for a parent company should reflect the adjustments conducted by their qualifying subsidiaries.
- **The denominator of the 20% threshold must be understood as the outstanding amount of defaulted exposures** as of the date of the first disposal according to the plan submitted to the competent authority. The **threshold** should be evaluated at the **level of the institution** submitting the plan referred to in article 500 CRR.
- Regarding foreclosed assets, only the share of an exposure is permitted (not the sale of an asset).
- The **average estimated LGDs** for comparable exposures in default that **have not been finally liquidated can be calculated based on the institution's incomplete workout** treatment applied to the exposures as of the date before the date of their disposal.
- The **defaults subject to the massive disposal** adjustment should be treated as closed observations **determining the maximum period of the recovery** process with the date of the massive disposal as the closure date, unless institutions can prove this approach has a significant and unjustifiable biasing impact.

IT Implementation

- Institutions should **document and keep an updated register of all current and past versions of the elements of a rating system** including data flow, relevant sources and specifications (size, data of construction and data dictionaries)
- When applying for a **material model change**, the institution should **provide evidence that it is able to provide a new version of the relevant IT system** ready to be put into production once the change is approved.
- To ensure the integrity and **robustness of IT systems** and that, in terms of IT, the implementation of the models is successful and error-free, **institutions should have in place a consistent process for testing** the relevant IRB systems and applications upon first implementation and on an ongoing basis.

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Credit Risk

Probability of Default and MoC

The PD section has been revised, focusing on the calibration subsection where the aim is to explain that PD should reflect the LRA DR and provide further details on the ECB's supervisory expectations for additional calibration tests

Model development phase

- As institutions should take appropriate **measures against model overfitting**, the statistical process followed by the institution in **selecting its model(s) should include assessing the performance of the model(s)**.
- This testing should be done on a random sample (**out-of-sample**) and a sample with a different period time (**out-of-time**), unless there are no sufficient data available for the training sample.

Risk differentiation

- According to the requirement to ensure correct risk differentiation across grades, the ECB expects that a very **granular rating scale will only be used in cases where the institution is able to empirically confirm** the risk differentiation across grades.

Ratings on third parties

- In the context of "rating transfers" the concept of **"appropriate guarantee"** should not be understood as **credit risk mitigation** but as a **contractual agreement** between the institution's obligor and the third party, fully covering the obligor by providing the obligor with a **claim** against the third party that is **effective** (before the institution has to recognise a default event of the obligor) **and enforceable**.
- The third-party support considered under the approach of "as a **risk driver** of the PD model", can be applied for **contractual** or **organisational** relationships.

Calculation of 1Y Default Rate

- A **joint-obligor** should be considered as a **separate obligor** and the **default** on a joint credit obligation should be **counted separately** from the default of individual obligors. Consequently, a **specific rating / PD** should be **assigned** to the joint obligor and should be counted separately for the default rate and RWA calculation.
- To calculate the one-year default rate, each **obligor/facility should be counted as one** in the denominator and numerator of the one-year DR calculation, **even** where the **obligor cannot be observed for the entire one-year period**.

Calibration to the LRA DR

- Institutions must **document the rationale for the calibration approach** (LRA DR at grade level or calibration segment level) and prove that it is **appropriate** at both the **grade and calibration segment** level.
- In order to calculate the LRA DR, the ECB expects institutions to make all reasonable efforts to obtain **long series of default rates with data of sufficient quality**.
- If such long series are available covering the period representative of the likely range of variability of default rates, the **LRA DR should be computed as the observed average of one-year default rates in that period**.
- Institutions should justify the sample and calibration methodology, as well as perform additional tests to **corroborate that the final PDs reflect the LRA DR on each grade**. Additionally, entities are expected to **demonstrate that such deviations between the PD and the LRA DR at the grade level do not distort the RWA calculations**, and if so, analyze the differences.
- Institutions should **compare the average PD (before MoC) at calibration segment level with the one-year default rate and with the LRA DR** at calibration segment level.
- Where the appropriate consideration of overrides in the calibration process is not possible, institutions should **apply an appropriate adjustment (AA)** to the extent possible **and a corresponding MoC** to account for the uncertainty associated.

MoC*

- MoC in case of climate-related information**
 - When climate related information has been used in risk estimates, MoC should be considered to reflect problems of quality or lack of information
- MoC C at rating-grade level**
 - MoC C must reflect the uncertainty at the level of the final PD estimates (at the level of the grade or pool) and should not affect the rank ordering.
 - However, institutions should be able to ensure monotonicity in their final estimates.

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Market Risk

Scope of the internal model approach and methodology for IRC models focusing on default risk

The Market risk section has also been revised, including detailed information about the delimitation of the regulatory trading book, and the validation requirements of ratings, PD and recovery rate assumptions

Delimitation of the regulatory trading book

- In accordance with CRR, **position risk** on a traded debt instrument may be divided into two components:
 - **General risk of traded debt instruments**, which refers to the risk of a price change due to a change in the level of interest rates. The ECB considers that this is a reference to risk-free interest rates and does **not include counterparty credit spread risk**.
 - **Specific risk of debt instruments**, which refers to the risk of a price change due to factors related to its issuer or, in the case of a derivative, the issuer of the underlying instrument. The ECB considers that this definition of specific risk does **not include counterparty credit spread risk**. Consistent with this interpretation, the ECB considers that counterparty credit spread risk does not fall under the definition of either general or specific risk, cannot be included in the scope of the IMA and is not part of the actual or hypothetical profit and loss (P&L) for back-testing.
- Instruments in the regulatory trading book which are lent out or repo'ed out should be **included in the calculation of own funds requirements for market risk**, while instruments borrowed/obtained via securities lending or reverse repo should not be included in the calculation of own funds requirements for market risk. This is because the securities lending or repo transaction does not transfer the market risk of the security. Furthermore, the market risk of the securities lending or repo transaction should be captured.

Ratings, probabilities of default and recovery rate assumptions

- The IRC model must be based on data that are **objective, up to date and be closely integrated into the daily risk management process** of the institution and serve as the basis for reporting risk exposures to senior management. Therefore, institutions should demonstrate that the PD estimates are appropriate. Furthermore, where the estimates of PDs are not derived in combination with current market prices, institutions should analyse any observed **differences** between these estimates and estimates that are derived in combination with current market prices where the relevant corrections were performed to obtain real-world PDs.
- Any internal model used to calculate capital requirements for market risk must **capture accurately all material price risks**, be conceptually **sound and implemented with integrity** and give a **meaningful differentiation of risk**, and accurate and consistent estimates of incremental default and migration risk. Therefore, institutions should be able to show that the statistical methodology used to derive PDs is conceptually sound and that PDs are accurate and consistent across all rating grades. An analysis of the expected range of estimation errors should be performed, in order to assess the accuracy of the estimates, and the PD for a rating grade should not be set to zero solely on the basis that no defaults have been observed in the past for that rating grade.

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Counterparty Credit Risk

Margin period risk and cash flows

Regarding Counterparty Credit Risk section, further details for margin period of risk (MPOR) were introduced...

Principles for ECB Banking Supervision

- Where a **netting set contains one or more trades** involving either illiquid collateral or an OTC derivative that cannot be easily replaced, the correct application of CRR should imply that each institution should define and determine, based on its portfolio and market data history:
 - **Illiquid collateral**, which includes the collateral legs of SFTs;
 - **OTC derivatives** that cannot be easily replaced;
 - **Trades or securities** that are held as collateral, concentrated in a particular counterparty;
 - **Stressed market conditions**.
- This means that institutions should **implement processes** to reliably identify the securities or transactions concerned and the related netting sets, and to monitor them.
- Institution should consider, for each counterparty, **features and attributes** of transactions and collateral.
- For the purpose of **potential MPOR extensions**, the illiquid collateral and hard to-replace transactions need to be identified under normal market conditions and under stressed market conditions. In order to derive **conditions that characterise stressed market conditions**, the ECB sees benefit in establishing processes and methodologies that:
 - Analyse the **available market data history** on a regular basis in order to identify historical events leading to conditions where the market cannot be considered as continuously active.
 - Where relevant, consider **potential future situations** that could affect the **replaceability of transactions** and/or the **liquidity of collateral**, in order to anticipate potentially reduced market depth and/or liquidity under future extreme but plausible economic scenarios based on justified expert opinions.
- The ECB sees benefit in **defining and determining conditions** under which:
 - **No prices** for collateral or the relevant transactions can be obtained;
 - **Prices are unchanged** for a number of consecutive days in markets where prices normally change more frequently;
 - **Smaller but usually active markets** could be subject to market-specific stress events that affect the replaceability of transactions and/or the liquidity of collateral traded on these markets.
- The ECB sees benefit in developing **documented methodologies** on how to use the features and attributes; ii) how historical events of market stress or reduced liquidity are identified to the extent historical analysis is used; iii) how stressed market conditions can be anticipated, using expert opinions; and iv) how available data are taken into account.
- Finally, and independently from the issue of a potential MPOR extension, the ECB sees benefit in **monitoring on an ongoing basis**, from the overall institution's portfolio perspective:
 - **The size of hard-to-replace transactions and illiquid collateral**;
 - **The size of concentration in a single counterparty**.

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Counterparty Credit Risk

Use test and Risks not in effective expected positive exposure

... as well as two new sections regarding use test and risks not in effective expected positive exposure

Principles for ECB Banking Supervision

Use test

- Institution should apply the **envisaged model changes or extensions for internal risk management purposes** to acquire sufficient experience with the change or extension before it is fully implemented.
- The ECB has identified possible ways for an institution to make **appropriate upfront use of the model changes and extensions** and also to test Pillar 1 own funds requirements:
 - **Implementation in the live production environment** used to calculate limit utilization for internal risk management on a daily basis.
 - **Implementation in a non-live production environment**, where weekly test runs are recommended.
- The practices are recommended for model changes only in the **following cases**:
 - **changes in exposure levels**
 - **changes of data management/supply**
 - **significant IT system changes**
 - **changes in regular quantitative validation** that have a quantitative impact on how the institution assesses the integrity of the IMM

Risks not in effective expected positive exposure

Identification

- **RNIEPE** refers to a **distinct risk not accurately captured in or fully omitted** from the calculation of EEPE.
- RNIEPE can **emerge** as a result of specific circumstances, including:
 - **A single risk factor, a set of risk factors** or the dependency structure of a subset of risk factors that cannot be modelled precisely enough to allow for the modelling of the joint distribution under CRR.
 - **Processes in place** that do not allow the modelling of a margin arrangement to reflect correctly or conservatively enough all the relevant terms and specifications required by CRR.
 - **Cash flows** that would be paid to a defaulting counterparty in margined trading and that are not, or not fully, reflected in exposures underlying the EEPE owing to the DMP or owing to the legal requirements of the contract.
- It would be good practice for institutions to have **policies and controls** relating to RNIEPE.

Quantification

- Quantification of RNIEPE should be methodologically **similar to the respective exposure** quantification in the IMM, reflecting either an expected exposure averaged over one year or an increment to an EEPE, taking relevant stress calibrations into account where applicable.

Management

- To ensure that ongoing risk measurement is accurate according to CRR, the risk control unit should carry out **regular impact quantification and monitoring of all RNIEPE**.
- To assess the **adequacy of own funds**, institutions should quantify and monitor the RNIEPE and adjust their scope on a regular basis and update the RNIEPE at least quarterly.

6 | Why Management Solutions?

MS has extensive experience in risk and capital management, particularly in the processes of compliance with the associated regulation (CRR/CRD)

MS differential values in risk and capital management

- 1. Experience with supervisory bodies.** MS is a "highly rated external service provider" in internal capital models by different European and American Supervisors. In particular, it has 7 framework service agreements with the ECB related to internal models and is the highest rated provider in the capital area.
- 2. Regulatory modelling.** MS has extensive experience in modelling: (i) credit risk (IRB, IFRS 9 & CECL, stress testing, others), (ii) market risk, CCR and IRRBB (VaR, pensions, xVA); (iii) ALM and liquidity; (iv) residual value; and (v) economic capital, among others.
- 3. Independent validation.** MS collaborates with different institutions as an independent supervisor of internal models, verifying compliance with regulatory requirements (e.g. CRR, EBA, ECB Guidance on internal models...) to obtain approval from regulators (e.g. ECB, DNB, Bundesbank...).
- 4. Experience in the design and implementation of capital calculation engines.** MS has extensive experience in supporting institutions in the design and implementation of capital calculation and reporting solutions (including our proprietary MIR and SIRO tools), as well as in the execution of capital impact analysis exercises, optimisation...
- 5. Specialised team.** MS has a team of experts in the field of risk and capital management (modelling, regulation, impacts, information systems, reporting...), combining quantitative and technical expertise with strong regulatory knowledge.

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**Maximum
Commitment**

Francisco Pérez Calurano
Partner at Management Solutions
francisco.perez.calurano@msspain.com

Marta Hierro
Partner at Management Solutions
marta.hierro@msspain.com

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