

Compendium of technical standards IM model validation

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Executive summary

The over-the-counter (OTC) derivatives market highlighted the significant amount of leveraged, unmanaged risk undertaken by several financial institutions during the Global Financial Crisis in ~2008. They did so without maintaining or posting adequate margin between counterparties.

In March 2015, the Basel Committee on Banking Supervision (BCBS) and the International Organization of Securities Commissions (IOSCO) published the final policy framework that established the minimum standards for margin requirements for non-centrally cleared derivatives.

The BCBS and IOSCO had both agreed on the terms and implementation timeline of the framework, which was launched in September 2016 as Unclear Margin Rules (UMR). Since then, UMR has been implemented in a phased manner by the eligible financial institutions.

Further to this, the European Banking Authority (EBA) has been mandated to develop regulatory technical standards (RTS) to specify the supervisory procedures that would ensure initial and ongoing validation of the risk-management procedures covering exchange of margins for the financial institutions in European region.

The EBA released a draft of the RTS for validating Initial margin(IM) models on July 3, 2023. The draft RTS delineates the steps and methodology for IM model validation (IMMV).

In the design of IMMV, the EBA aims to harmonise the supervisory review of the IM model and has, thus, factored in the following:

- The variety of counterparties involved. On the one hand, there are banks with substantial exposure to OTC derivatives and a mature model approval process. On the other hand, there are numerous small market participants with low OTC exposure and a less rigorous model approval process. This leads to distinct validation approaches for each type of counterparty
- Validation of IM models when a common model is adopted as the industry benchmark (e.g., ISDA SIMM), and how the competent authorities can avoid duplication of efforts
- Transition to this regulatory standard given the IM model is extensively used by members without supervisory approval in some cases

Introduction

The EBA's RTS note on IMMV complements the European supervisory authorities' RTS on uncleared OTC derivatives.

The RTS on uncleared OTC derivatives establishes that counterparties, within the scope of the European Market Infrastructure Regulation (EMIR), must exchange IM when they enter an OTC derivative transaction not cleared by a central counterparty, and to do so, they are allowed to use an IM model. The RTS on IMMV establishes the framework for supervisory procedures on initial and ongoing validation of IM models.

Considering all the perspectives, the EBA focused on the following two aspects when drafting the IMMV RTS:

1. Covering counterparties of all sizes within the IMMV guidelines. This is because, there are banks with substantial exposure to OTC derivatives and a mature model approval process. On the other hand, there are numerous small market participants with low OTC exposure and a less rigorous model approval process. This leads to distinct validation approaches for each type of counterparty
2. A significant number of counterparties will opt for IMMV at the same time to follow the guidelines. This will increase the operational burden on both supervisors and counterparties

The EBA has addressed these issues pragmatically, based on quantitative assessment.

Institutions with significant OTC exposure will be subject to the standard validation approach, while those with low exposure will follow the simplified validation approach.

The EBA demarcated the institutions based on a primary criterion: the aggregate average notional amount (AANA), which needs to be calculated annually by all counterparties, covering March, April and May of the preceding year.

Counterparties with AANA greater than, or equal to, €750 billion must follow the standard validation approach. The remaining counterparties, along with non-credit institutions, will adopt the simplified validation approach, with an option to transition to standard validation if they so desire.

The validation process has a nearly identical structure for both the approaches, with substantial simplifications for simplified approach.

At least 37 counterparties surpass the €750 billion threshold for AANA (*details in appendix*). Primarily comprising banks, these counterparties would fall under the scope of standard validation. The remaining counterparts will follow simplified validation unless they opt for standard validation.

Many firms utilise the International Swaps and Derivatives Association (ISDA) standard IM model (SIMM).

As a result, when the RTS comes into effect, it is anticipated that the same model will be adopted by numerous firms simultaneously. To tackle this and the large number of counterparties opting for IMMV:

- The competent authorities have been expressly allowed to leverage the results and findings from previous validations in their assessment
- Simplifications are envisaged for counterparties as well, as they have been allowed to provide/ refer to some general documentation, at least for the model design, in their internal validation process
- A transitional solution for counterparties already using an IM model should be implemented. The use of any existing IM models should be allowed to continue for a limited period, while ample time is provided for the competent authorities to complete the initial stage of the validation process. After the initial validation, the application of the IM model will be contingent upon the outcome of the ongoing validation process. There will be phased validation process for smaller counterparties, to allow more time for preparation, under simplified process

Standard validation process

The model validation begins with the submission of application for the initial validation along with necessary documents. Once the model receives its initial approval, any subsequent changes to the model will initiate revalidation if the change in IM exceeds 5% with conditions and 10% without conditions.

The RTS allows banks to employ an industry benchmark model such as ISDA SIMM for the standard validation process.

The outsourced IM model can utilise general documentation prepared by the model provider for internal validation and as a part of the documentation to be submitted to the competent authorities.

To assess the fitness of the IM model for initial approval, static back-testing has been mandated to identify deficiencies in the model, in particular instances of “overshooting” (i.e., the change in the value of a netting set exceeds IM).

Dynamic back-testing has also been prescribed in response to ongoing monitoring of the model’s performance. It should be conducted within a dynamic one-year rolling time window, taking into account changing netting sets.

Simplified validation process

The model validation begins with an application for supervisory validation (initial or ongoing) to the competent authorities, along with the necessary documentation.

Only a change in IM exceeding 10% with conditions and 20% without conditions will trigger revalidation.

The simplified validation process requires only dynamic back-testing.

The competent authorities will also have the option to allow the immediate use of the model upon receiving a request for validation from counterparties within the scope of the simplified supervisory procedures.

The advantages of the simplified validation process over the standard validation process are as follows:

- More time for the approval application
- Less communication to competent authorities
- Higher threshold to define model changes
- Simpler back-testing requirements
- Less granular governance requirements

Firms employing the standard approach have a notable impact on the market and necessitate tighter requirements.

Background and rationale for RTS

The current regulations in EU establish that CPs under EMIR must exchange IM when they enter into uncleared OTC derivative contract. Contrary to Basel, this does not impose supervisory approvals for IM models and EU supervisors had legal empowerment to only forbid the use of a IM model in case of non-compliance with regulations. Additionally, there was a preference of supervisory approval at firm level, even if the same model is used across different counterparties. This paved the way for EBA to develop RTS to ensure initial and ongoing validation of risk management procedures. The RTS considers guidance of EMIR and WGMR (Basel Working Group on Margin Requirement), which mention that:

- Competent authorities should validate the risk-management procedures to avoid inconsistencies across the Union in the application
- IM model should not be used without explicit approval and it cannot be presumed that approval by one supervisor for one institution will imply approval for a wider set of jurisdictions/institutions

Existence of an already approved IM model

As part of UMR, many firms are already posting margin and have a model in place to calculate margin. The RTS addresses the existence of industry standard models, the transition phase from an already approved model to the RTS, and the changes to the model.

Availability of industry standard models

ISDA SIMM is an industry benchmark model. It is a sensitivity-based analytical parametric value-at-risk (VaR) IM model¹ based on a set of risk factors from the six risk classes.

The model is implemented and provided by several entities (46 entities² as per Licensed ISDA SIMM Vendor Contact List, as of June 23, 2022) such as Acadia's IM Exposure Manager (IMEM) and Bloomberg's MARS Collateral Management tool.

The RTS acknowledges the existence of industry standard models but does not favour a particular model, refraining from relaxing the requirements given that implementation will differ from firm to firm. It tackles the industry standard models by focusing on the following:

- Outsourcing requirements and use of validation results
- Features of back-testing
- Internal validation of general provisions

Business continuity

To continue using the IM model, firms should submit their applications to the competent authorities.

- Firms subject to the standard validation approach should apply within 1 year from the date of enforcement of this regulation

¹ <https://www.isda.org/a/cgDDE/simm-for-non-cleared-20131210.pdf>

² <https://www.isda.org/2016/09/15/isda-simm-licensed-vendors/>

- Firms subject to the simplified validation approach and with a month-end AANA of non-centrally cleared OTC derivatives, computed in accordance with Article 28 of Delegated Regulation (EU) 2016/2251, exceeding €50 billion should apply within 2 years from the date of enforcement of this regulation
- Firms subject to the simplified validation approach and with a month-end AANA of non-centrally cleared OTC derivatives, computed in accordance with Article 28 of Delegated Regulation (EU) 2016/2251, below €50 billion should apply within 3 years from the date of enforcement of this regulation

Once the application is submitted, the competent authorities may object to the use of the model within 2 years from the submission.

If the competent authorities raise objections to the use of an IM model by a firm, the firm would be granted a cure period to address any deficiencies in its model application.

This is expected to be implemented on a case-by-case basis, depending on the competent authority's decision and the nature of the issue identified in the model.

Model changes


Separate thresholds have been defined for both the validation approaches to trigger a model change request.

The threshold for model change under the simplified approach (Change to the total IM - 10% with conditions and 20% without conditions) is double that under the standard approach (Change to total IM – 5% with conditions and 10% without conditions). Calibration changes were already excluded from material changes and should only be communicated in advance to the competent authorities.

Comparison of standard and simplified validation processes

Documentation

For the validation process, the EBA has emphasised the importance of well-articulated documentation that provides a clear understanding of the modelling approach, technical specifications, governance, and is also crucial for audit purposes. The following table covers documentation requirements for initial application of an IM model.

RTS requirements		Standard approach	Simplified approach
	Documentation requirements: These requirements are applicable in the case of initial use, material extension, or changes to the IM model. The quality of the documents must be robust enough to provide the reader with a clear understanding of model implementation, usage, etc.	✓	✓
	1. Description of the rationale and objective of the IM model or of change of the IM model;	✓	✓
	2. The implementation date of the IM model or of the extension/change	✓	✓
	3. Scope of application of the model or scope affected by model extension/change, with volume characteristics.	✓	✓
	4. Confirmation that the model or its extension/change have been approved in accordance with the counterparties' internal approval processes by the relevant competent bodies, and the date of that approval	✓	✓
	5. Quantitative impact of the change or extension on the model or sum of IMs	✓	✓

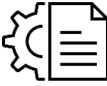

RTS requirements		Standard approach	Simplified approach
	6. Technical and process documents relating to the IM model or its material extension/change	✓	X
	7. Reports of the counterparties' independent review or validation	✓	✓
	8. Records of the counterparties' current and previous version number of IM models which have been validated	✓	X
	9. Appropriate proof of the delegation provided to the third party submitting the application on behalf of the counterparty, where applicable	✓	✓
	10. List of Validated counterparties which a CP relies upon for the implementation of its model, and of the competent authorities that granted validation of their initial margin models	X	X

Modelling and back-testing

Pricing and risk models encompass a wide array of categories and complexities.

It is crucial that the development team possesses sufficient skills and operates independently from the validation team.

Assumptions and limitations must be rigorously tested and documented. Back-testing serves as the litmus test for the model's performance quality, revealing its effectiveness.


RTS requirements		Standard approach	Simplified approach
	The model development unit must be competitive enough, and produce expected outcomes by feeding relevant inputs into the IM model	✓	✓
	Modelling assumptions , Ongoing monitoring is in place which includes dynamic back-testing, justifications for omitting risk factors from the IM model, usage of proxies, usage of Taylor series to capture non-linear risks, risks from illiquid positions, and impact of correlation changes among risk factors are the mandatory requirements to be captured in the documentation	✓	Not specifically defined
	<p>Static back-testing:</p> <ul style="list-style-type: none"> This should be run once every 3 months IM for netting sets should be compared with the changes in market value. When computing change in MV the model should apply same pricing methods, model parametrisations, market data and any other techniques used in the counterparty's end-of-day valuation process, or a close approximation of it; when Taylor series approximation is applied as pricing method approximation, the material first- and second order terms should be computed to reflect the change in the market value By comparing the IM with changes in market value, it can be inferred whether the IM is sufficient to cover losses on an MPoR horizon with a one-tailed 99 per cent confidence interval Based on the number of the overshooting (i.e., loss exceeding the initial margin), every netting set would be classified in accordance with a methodology inspired by Basel's traffic-light method 	✓	X

RTS requirements		Standard approach	Simplified approach
	<p>Dynamic back-testing: The “dynamic” nature of this back-testing means that the composition of the netting sets, where IM are computed, constantly changes, possibly daily. In contrast to the static back-testing, the daily output of the IM model will be rescaled to 1-business-day MPoR. This IM will be matched with the hypothetical (i.e., without considering the intraday activity) one-day change in the market value of the netting set of the day that the IM is meant to cover</p>	✓	✓

Shortfall

The EBA has introduced two approaches for testing shortfall assessment: margin average shortfall (MAS) and margin average relative shortfall (MARS).


These approaches are designed to complement the existing industry practices related to defining shortfall.

RTS requirements		Standard approach	Simplified approach
	<p>MAS is the simple average of the P&L values minus the IM amount floored at zero (i.e., margin shortfall amount) over the dates of the relevant lookback period, multiplied by 100. It is mandatory to know about the overshooting when performing static back-testing, including its cause and resolution, on a quarterly basis</p> <p>Note: Counterparties in the scope of the simplified supervisory procedures as shall report only those netting sets with a MAS that exceed the threshold of EUR 500,000</p>	✓	✓
	<p>MARS is to be reported for the selection of netting sets that need to be analysed. This is to compare the relative riskiness of netting sets of different sizes. MARS is obtained from MAS by dividing each summand by the IM amount, thus measuring the average percentage of margin shortfall. High MARS indicates that a netting set had high riskiness per unit of IM</p>	✓	✗

Outsourcing

Not all counterparties possess adequate resources to fulfil the regulatory requirements. This necessitates outsourcing to a third party.



Outsourcing is also a prudent approach in case AANA of the counterparties falls below €750 billion. That said, senior management supervision at every stage is crucial to safeguard process and validation.

RTS requirements		Standard approach	Simplified approach
	<p>Outsourcing of the IM model, encompassing end-to-end services including validation and audit, from a third party must be supervised by the counterparty’s senior management. It must also be involved in the decision-making process of critical functions</p>	✓	✓
	<p>The outsourced IM model must be audited by the counterparty’s relevant authorities</p>	✓	✓

Extensions and changes in the model


The materiality of extensions and changes in the IM model ratio is computed using the approach outlined in the following definition:




The ratio shall be equal to the highest value of a ratio observed over the period of 15 consecutive business days prior to the date of application for validation for the extension or change. That ratio shall be calculated as the ratio given by the absolute value of the difference of the IM computed using the IM model with and without the extensions or changes, divided by the value of the IM computed using the IM model without the extensions or changes, calculated as the sum of all netting sets in the scope of the IM model application.

RTS requirements		Standard approach	Simplified approach
	Materiality of extensions and changes in the IM model: Subdivision of extensions or changes into several incremental ones is not permissible. The below-mentioned materiality and conditions are not applicable in case of a change in IM due to calibration or a change in calibration methodology	✓	✓
	1. An additional location in another jurisdiction, including the extension of the desk position into another time zone, resulting in a change	>5%	>10%
	2. An additional asset class	>5%	>10%
	3. A change in the quantitative modelling technique	>5%	>10%
	4. Changes in terms of ratio	>10%	>20%
	Extensions or changes not considered material need to be notified to authorities prior to planned implementation date	✓	✓
	1. A change in the risk modelling technique needs to be notified before its planned implementation date	Atleast 2 months prior notification	Annual notification
	2. Changes in calibration or its methodology	One month prior notification	Annual notification
	3. Any other changes	Annual notification after implementation	Annual notification after implementation

Responsibilities of each function

The different units under model risk management should operate independently to uncover any hidden risks and nuances that may exist.

RTS requirements	Standard approach	Simplified approach
 <p>Senior management Involvement of the senior management in management of the model and understanding of model</p>	<ul style="list-style-type: none"> Active involvement Good understanding Awareness of assumptions and limitations Impact thereof on reliability of the output 	<ul style="list-style-type: none"> General Understanding Involvement in model management

RTS requirements		Standard approach	Simplified approach
	Model development unit	<ul style="list-style-type: none"> Responsible for originating, renewing, or trading exposures cannot alter the model implementation without appropriate control Involvement in decision making process w.r.t to new and change to IM models as well as IT infrastructure Adequate and proportionate to the size of CP and risk of CPs business Reports findings to senior management Responsible for quantitative output, producing reports on model output, controlling input data integrity and analysing the output 	<p>The model development unit should be appropriately governed by submitting relevant documents such as:</p> <ul style="list-style-type: none"> Description of organisational structure Documentation showing unit ensures the units responsible for originating, renewing, or trading exposures cannot alter the model implementation without appropriate control Latest and relevant reports of last year
	Audit	<p>Audit is independent, resources are appropriate, process to address recommendations from audit is adequate should be verified by ensuring:</p> <ul style="list-style-type: none"> Internal or external audit reviews all IM models on at least an annual basis and delivers conclusion to senior management The report should provide sufficient information on compliance of Delegated Regulation (EU) 2016/2251 and identify areas in annual work plan for detailed review of compliance Audit is independent, adequate, proportionate and performs its tasks effectively <p>Remediation of issues identified by audit are relevant, material, credible and appropriate.</p>	<p>Documents to show audit function is appropriate:</p> <ul style="list-style-type: none"> Description of organisational structure Audit is independent Latest and relevant reports of last year
	Internal validation	<ul style="list-style-type: none"> Conducted by adequate and qualified personnel, not involved in development Performance is monitored on continuous basis by conducting atleast annual internal validation Extensions/changes are validated Validation report is comprehensive and sound with findings reported and remediated timely Validation of general structure and implementation including assumptions and calibration process, back-testing and statistical tests Similar mandates apply if third party provides validation services 	<p>Documents to show internal validation meets requirements of internal governance:</p> <ul style="list-style-type: none"> Description of organisational structure Internal validation is independent Latest and relevant reports of last year

IT infrastructure

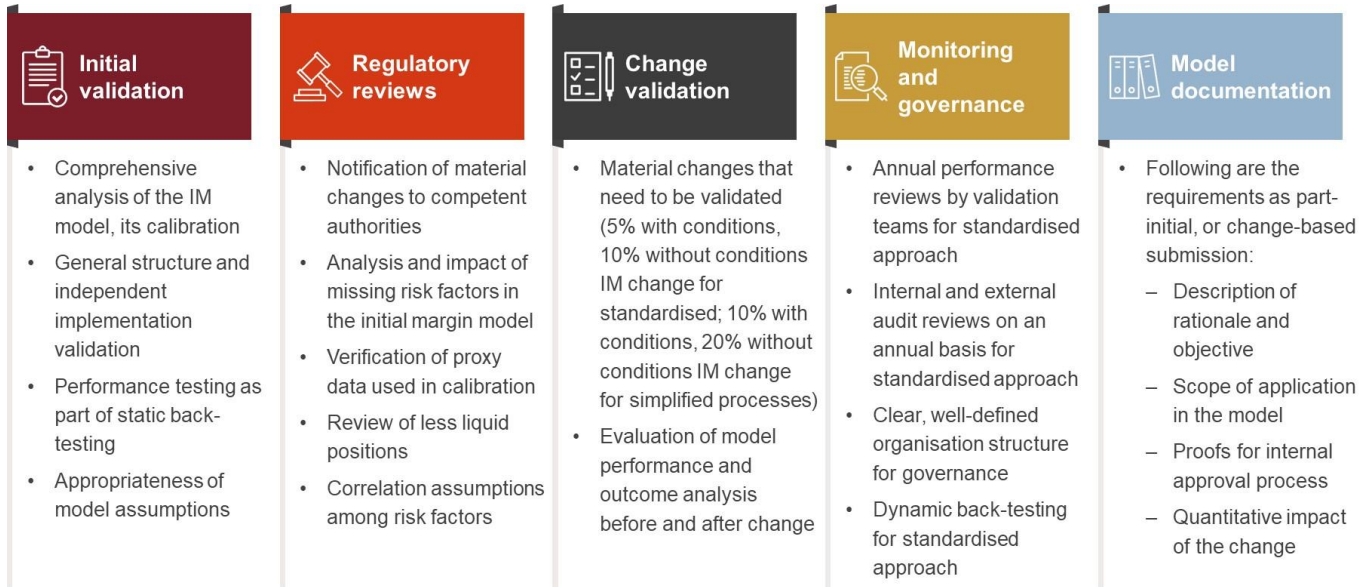
The importance of a resilient IT infrastructure cannot be overestimated. It forms the foundation of the risk margin requirement, enabling smooth functioning of counterparties.

RTS requirements		Standard approach	Simplified approach
	The IT infrastructure must be capable enough to provide accurate results in a timely manner	✓	✓
	There should be appropriate remediation capabilities in case of problems encountered	✓	X

Model validation framework

Though the technical guideline defines two validation approaches, with the simplified approach being lighter, the end-to-end validation process contains multiple technical aspects that require a rigorous validation framework.

Firms should cover these as a multi-layered approach.



Final thoughts

The draft RTS introduces novel aspects to the IMMV requirements, bringing in new facets that might be unfamiliar territory for certain counterparties and pose challenges for others. While numerous counterparties will eagerly embrace the guidelines, there will be multitude challenges that the counterparties will face in preparation of the requirements before submitting application for validation as well as for ongoing model risk management activities post approval. Even if the same IM model is used by multiple counterparties, there are several nuances to consider for its implementation within a specific firm. These may include, but not limited to:

- Technological sophistication, experience and understanding of model lifecycle procedures, governance, audit and IT processes
- Review of internal model risk management policies, streamlining roles and responsibilities of each functions especially smaller counterparties even though they fall under simplified approach.
- With respect to the model itself, it is important to consider the implementation of pricing methodology and the impact of its assumption, limitations and methodology on downstream IM models and subsequent overshooting
- Finally, the current market environment and market movements along with composition of the portfolio for deeper understanding of IM and its overshooting

To tackle the challenges, CPs will have to dedicate significant resources to ensure smooth transition for compliance of the regulation.

There is no denial that this is a massive undertaking for both supervisors and counterparties. But if channelled appropriately and efficiently, there is a great potential for reduction of significant risk at counterparty and systemic level.

How CRISIL can help

CRISIL with its strong domain expertise can help in advisory and delivery support across a large breadth of topics covered in this EBA technical standards. Some of these include:

- Preparation of requirements for Initial model validation under both standard and simplified approaches
- Developing and building analytics for the IM model
- Integration of IM model to the Risk infrastructure which includes various risk factor data, sensitivities calculation and transformation
- Model change validation and documentation. Development of validation plan, ongoing monitoring plan and documentation templates
- Provide guidance in developing model risk management policies, defining roles and responsibilities of each function.
- Ongoing monitoring of the IM model and periodic data submission to industry forums and regulatory bodies
- Regulatory remediation and interpretation of regulatory follow-ups, action items and discussions
- Compilation of materials for the full model approval pack
- Project Management support for the full model approval pack
- Operational Support/ BAU tasks (e.g., Running monitoring tasks daily, compiling back testing and exceptions reports, root cause analysis of divergence of IM numbers and more)

Appendix:

Details of counterparties and regions

Table 1: Number and size of counterparties subject to the RTS (as of September 30, 2021)

	Number of counterparties	Nominal AANA (€ billion)
Nominal AANA > €3 trillion	17	37,811.9
Nominal AANA > €2.25 trillion and <= €3 trillion	1	2,872.0
Nominal AANA > €1.5 trillion and <= €2.25 trillion	6	2,103.2
Nominal AANA > €750 billion and <= €1.5 trillion	13	7,273.8
Nominal AANA > €50 billion and <= €750 billion	80	7,862.0
Nominal AANA > €8 billion and <= €50 billion	245	2,870.4
Total	362	60,793.4

Source: EBA survey among NCAs on the impact of the RTS

Table 2: Number of counterparties by member state (as of September 30, 2021)

	Nominal AANA > €3 trillion	Nominal AANA > €2.25 trillion and <= €3 trillion	Nominal AANA > €1.5 trillion and <= €2.25 trillion	Nominal AANA > €750 billion and <= €1.5 trillion	Nominal AANA > €50 billion and <= €750 billion	Nominal AANA > €8 billion and <= €50 billion
Belgium					2	3
Finland	0	0	0	0	2	0
France	2				2	
Germany	8	0	2	2	40	85
Ireland	5	0	2	5	1	8
Italy	0	0	0	1	7	1
Luxembourg	0	0	0	0	4	71
Netherlands	2		2	3	17	58
Slovenia	0	0	0	0	0	3
Spain	0	0	0	2	3	11
Sweden	0	1	0	0	2	5

Source: EBA survey among NCAs on the impact of the RTS

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