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Central Bank of UAE raises the MRM game

MMS&G guiding decision-making of Emirati institutions

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After a pivotal change

The Central Bank of the United Arab Emirates (CBUAE) published a set of standards and guidance on model risk management (MRM) in December 2022, marking a pivotal moment in the regulatory landscape of the banking sector in the Middle East.

It establishes model risk as a material risk type and specifies enterprise-wide requirements for identifying, measuring, monitoring and controlling risk across all model types.

The CBUAE's Model Management Standards (MMS) presents mandatory MRM to be implemented by institutions in the UAE based on international standards while considering local circumstances. MMS provides MRM standards for all models as well as specific requirements for the application of the standards.

The CBUAE's Model Management Guidance (MMG) expands on technical aspects specific to certain model types. Briefly, MMS is general in nature and applies mandatorily to all models in an institution, whereas MMG deals with the technicalities of selected models in an in-depth manner.

This paper explores the key tenets of MMS and their implications for institutions, emphasising the need for a comprehensive approach to MRM that aligns with the CBUAE's requirements.

To whom will CBUAE MMS&G[1] apply?

MMS&G is applicable to all licensed institutions in the UAE. A parent company in the UAE must ensure its branches and subsidiaries follow MMS. Branches or subsidiaries of foreign institutions in the UAE must also adhere to MMS. If the parent company's regulator has stricter requirements, then those should be implemented. For any institution, MMS is applicable to all models that contribute to decision-making.

After MMS&G was published, institutions had to complete their self-assessment to identify shortcomings in their existing MRM framework and finalise a plan to achieve full compliance as per MMS&G requirements. On approval of the institution's uplift plan by the CBUAE, the regulator expects periodic reporting of the remediation status until compliance is achieved.

Key components of MMS

MMS and MMG share three key objectives:

- Ensure that models employed by UAE institutions meet high standards to adequately support decision-making and reduce model risk
- Improve the homogeneity of model management across institutions in the UAE
- Mitigate the risk of underestimation of provisions and capital at institutions in the UAE

The CBUAE sets out the core standards to be adopted by firms, each with several more detailed sub-sections, encompassing the entirety of the model lifecycle — from the initial stages of model development, implementation and validation through to ongoing model usage, performance monitoring and reporting of risks. The CBUAE believes the proposed standards will provide an effective overarching MRM framework, to which firms can be held accountable. The standards are applicable to a wide range of models used in guiding critical business decisions.

Model governance

MMS places significant emphasis on model governance, mandating institutions to establish model risk framework, policies and governance mechanisms. Institutions are expected to develop comprehensive frameworks specifying roles, responsibilities and governance mechanisms related to MRM.

[1] *MMS&G is a term widely used in the industry to refer to the MMS and MMG documents collectively.*

The Board is expected to be accountable for ensuring suitability of the framework and ensuring appropriate usage and management of models. Given the emphasis on model risk oversight, there is a need to design and implement enhanced risk appetite metrics for the Board's oversight.

For institutions, this necessitates augmenting the scope of the management and risk oversight committee reporting and governance mechanisms to adequately address model risk and develop a delegated authority structure. The establishment of a dedicated model risk oversight committee with representation from various functions can facilitate informed decision-making across all aspects of the model lifecycle.

Institutions need to ensure that the policy statements articulate desired measurable outcomes, facilitating easier evaluation of adherence and effectiveness, thus identifying and removing any redundancy.

The standards outline that the policies and guidance pertaining to data governance (e.g., data sourcing and collection, data quality review, and data storage) should be formally documented and reviewed/approved by the senior management/risk oversight committee to ensure coverage for all material data risk types in the enterprise.

CRISIL view

MMS requires institutions to fast-track the establishment of an overarching risk framework, policy and guidelines, in line with regulatory requirements, and outline the complete process flow for risk identification and quantification. As per the CBUAE mandate, institutions must define their model risk appetite statement, design/calibrate risk appetite thresholds and key performance indicators (KPIs), and ensure periodic monitoring through the model risk oversight committee. A risk-based approval authority matrix should be designed to reduce reliance on committees for approval.

Model risk must be incorporated in the institution's risk framework as a key risk and monitored by the Board through articulation of a formal model risk appetite statement, supported by quantitative metrics/KPIs. The model risk oversight committee should be accountable for ensuring that all materially impacting decisions are referred to and approved by the Board and senior management. Institutions must design and deliver targeted MRM training for the Board and senior management to bridge any knowledge gap and ensure effective review and challenge.

Additionally, the roles and responsibilities must be delineated between the development and validation teams, which not only necessitates the allocation of specific skill sets to each team but also will result in a cultural shift for many institutions to ensure the independence and objectivity of the functions.

Institutions need to invest resources to ensure the completeness of MRM documentation, streamline and optimise policies, and ensure consistency and standardisation in the enterprise MRM framework.

Given the recognition of model risk as a principal risk type, institutions are required to assess model risk as part of their Internal Capital Adequacy Assessment Process (ICAAP) and determine whether a Pillar II capital add-on is warranted.

MMS requires institutions to implement a robust model risk inventory platform that aligns with the institution's policies and processes, enabling real-time monitoring of the model landscape, integration of controls and development of risk reporting dashboards.

Data management framework (DMF)

The CBUAE mandates periodic testing of development data as an imperative to proactively identify, monitor, document and address any limitations or weaknesses present in the model due to data. The standards outline that the policies and guidance pertaining to data governance (e.g., data sourcing and collection, data quality review,

and data storage) should be formally documented and reviewed/approved by the senior management/risk oversight committee to ensure coverage for all material data risk types in the enterprise.

In terms of model data management, the principles outlined in MMS overlap with the Basel Committee on Banking Supervision's (BCBS) 239 guidelines. These principles extend the requirements to cover data used for modelling purposes. This underscores the importance of data quality frameworks in aiding model development and ensuring the accuracy and reliability of models.

CRISIL view

MMS formalises the need for model development data to be suitable, unbiased, consistent with the chosen methodology, and representative of the population to which the model will be applied.

Institutions are recommended to leverage/set up a separate data management function, with a dedicated set of data governance policies and standards, to establish a robust DMF. A data quality review and monitoring mechanism should be established to ensure that only accurate business-appropriate data is used to develop models to support the model lifecycle process.

Institutions can leverage their existing BCBS 239 compliance efforts to enhance data quality for model development, streamlining compliance efforts across regulatory requirements. Integrating MRM practices with existing BCBS 239 compliance programmes can create synergies and optimise resource allocation. Streamlining data governance practices across all models can augment data quality and model performance.

In view of the evolving risks in the industry, institutions should establish a suitable data storage policy, outlining the data storage requirements with appropriate access controls to reduce operational risks (cyber threats and data manipulation). A suitable IT infrastructure must be set up .to support the DMF.

Model development

MMS states that institutions should implement a robust model development process that includes defined standards for model design and implementation, model selection, and model performance measurement.

Institutions need to enhance model documentation and management information to monitor and report model limitations and assumptions to the model risk oversight committee. Institutions must establish a standardised guidance outlining the principles, criteria and objectives for creating and maintaining model documentation. Documentation must be thorough, current and facilitate comprehension of the model's operations, key assumptions and limitations. It should also enable a similarly skilled practitioner to reconstruct the model effectively and independently by leveraging the model’s development documentation.

CRISIL view

Institutions should design appropriate conditions for model identification/recognition. A robust risk-tiering mechanism covering firm-wide inventory is required for optimal allocation of resources and prudent risk management.

Institutions are required to enhance their model data quality testing procedures and ensure that data biases are identified and managed appropriately during model development.

Institutions should ensure that the model design and selection (statistical, deterministic, judgement driven, etc) should be supported with appropriate controls and chosen from a pool of challenger models (dependent on model tiering). Supervisory expectations around model development adjustments necessitate institutions to embed a robust mitigation mechanism for addressing model limitations and uncertainties.

Model implementation

MMS formalises the need for designing a model implementation stage for all models under development and deploying trained resources to ensure appropriate deployment. A comprehensive model implementation framework should be outlined by extensive documentation on implementation workflow and establish adequate controls to ensure accurate deployment of models, as suited for specific model families.

The CBUAE clarifies that production testing will be a key component of the model implementation workflow. This is critical to ensure that the model functions accurately in a pseudo-production (testing) environment setting, before making critical business decisions in the production environment.

Institutions must evaluate the adequacy of their system infrastructure and reduce dependency on end-user computing tools to accommodate the implementation of the expanding model landscape. It is imperative for institutions to consider i) evolution of model design and methodologies, ii) changing technology, and iii) volume of data to be processed by models.

CRISIL view

The standards on model implementation mandate that the institutions establish a model family-specific implementation process by outlining the implementation scope and plan. Roles and responsibilities of the different stakeholders involved in the model implementation workflow must be defined and documented to ensure streamlined execution.

User acceptance testing (UAT) must be performed as part of the implementation process. Institutions must ensure that the UAT test cases are designed to assess the full spectrum of model functionalities (technical and modelling perspective). A successful UAT is a necessary precursor to model deployment in the production environment.

Institutions need to establish a model family-specific implementation process by outlining the implementation scope and plan. Roles and responsibilities of the parties involved in the model implementation must be defined and documented. Institutions must ensure that comprehensive documentation is available to ensure that model users are adequately supported to use the model.

A robust IT system infrastructure is crucial to implement sophisticated complex models that consume and generate high volumes of data in production. During the implementation planning for a model, institutions should assess the phase requirements based on i) model sophistication, ii) data volume, and iii) infrastructure considerations (scalability and elasticity, computing power, and data storage and networks).

Institutions should plan for contingencies to address rollbacks if technical constraints impact model performance and stability. Detailed documentation should outline the model's requirements and the chosen infrastructure's capabilities to mitigate such scenarios.

Model usage

MMS establishes that the model usage documentation should clearly articulate the expected use of a model. It is critical that institutions establish or enhance existing documentation practices to ensure appropriate model usage, along with necessary access for the different groups of model users, is outlined appropriately.

MMS mandates that any manual model overrides (model input/output), incorporated by the business lines, must be meticulously documented, reviewed and approved either by the risk oversight committee or through a structured approval mechanism.

Annual review of model usage must be established to mitigate any materially adverse impact on financial reporting, provisions, risk decisions and business decisions.

CRISIL view

Institutions must establish a model usage policy encompassing i) usage approval by the model oversight committee, ii) appropriate usage control for different model users, and iii) adequate support for model overrides.

Model usage approval by the designated committee or individual should ensure validation suggestions (for identified gaps, redevelopment, etc.) are implemented appropriately to ensure the model is suitable for designated use. Robust controls and oversight mechanisms should be established through the model monitoring framework to prevent unauthorised model overrides to ensure appropriate model usage and accurate decision-making.

Model performance monitoring

MMS emphasises the importance of identifying and implementing effective mitigants to manage and control risks arising from the use of models. This means that institutions need to design risk mitigants that encompass various strategies, controls and practices, aimed at reducing model risk and enhancing the reliability of model outputs.

Designing a framework to periodically assess the development data, model structure, assumptions and model outcomes is imperative to proactively identify, monitor, document and address any limitations or weaknesses present in the model. The monitoring framework should establish an unambiguous reporting structure to ensure sufficient oversight at the senior management level with a limit framework for monitoring model risk.

Regarding post-model adjustments (PMAs), institutions need to develop a robust process for monitoring their use. All PMAs will be subject to independent review and calls for enhanced oversight by including PMA monitoring as part of the periodic model review.

CRISIL view

Model performance must be monitored through pre-determined thresholds as appropriate for different model types. Model(s) with sub-optimal performance should be tracked, escalated for additional oversight, and be subject to additional approvals prior to use. As per supervisory recommendations, institutions need to enhance model risk policies to restrict model use when significant deficiencies/errors are identified during the validation process or ongoing monitoring assessments.

Adjustments (model adjustments and expert judgements) should be understood, monitored and managed with an appropriate plan for remediation. Institutions need to identify model networks and develop a process for assessing network risk design-specific metrics for monitoring PMAs and expert judgements.

As model monitoring requires independent replication of model-specific key metrics, this necessitates the design of ‘live’ workflows to ensure model monitoring (including performance, assumptions and limitations, and PMAs) coverage for the expanding portfolio of models. Such a task presents potential for institutions to leverage industry experts for automating workflows and managing resources efficiently.

Independent model validation

MMS highlights the crucial role of independent model validation. Institutions should establish a validation function that offers continuous, independent and robust scrutiny of model development and utilisation. In addition to independent validations, the validation function is expected to review PMAs and monitor their use, ensuring adjustments are appropriate and do not introduce additional risk.

As mandated by the CBUAE, all models must be validated proportionate to their risk tier. Institutions may have to plan for a substantial increase in model validations and periodic revalidations in the near future to ensure

compliance with the CBUAE's MMS. This may require a quick ramp-up in validation expertise, resources and appropriate cost allocation.

Investment in validation expertise, including the use of external validation specialists for complex models, can strengthen the validation process. Additionally, fostering a culture of challenge within the validation function can lead to a more robust model evaluation. A comprehensive resource management process should be established to perform periodic reviews and ensure adequate availability of expert resources for a skilled independent validation function.

Institutions must establish an internal audit function to ensure the objectivity, independence and rigour of the validation functions.

CRISIL view

The CBUAE considers the model validation function as crucial in ensuring robust MRM. Institutions may need to upskill and augment resources across all dimensions of MRM. MMS establishes that institutions need to develop standardised validation and monitoring standards, along with a documentation template, for consistent and comprehensive assessment of the model.

The CBUAE requires all models to be subjected to independent validation, determined as per the model's risk profile. It becomes imperative for institutions to prioritise validation controls based on the specific model's risk profile. Institutions need to implement standardised and model category-specific control frameworks. Additionally, a formal reporting hierarchy and performance monitoring report approval process should be established to ensure any adverse monitoring outcome is identified and actioned upon, including all third-party vendor models.

Institutions should develop an overarching model validation standard, supplemented with model category-level validation standards, to ensure comprehensive validation effort for each model category, while maintaining consistent practices across models and model categories.

From an operational point of view, the availability of skilled resources for a robust validation function is critical for institutions. Institutions need to establish a comprehensive resource management process with periodic reviews to ensure adequate availability of expert resources, including industry experts, to ramp up their second line of defence.

MMS considers the internal audit function plays a critical role in ensuring a robust model validation function. Institutions may leverage industry experts to be part of internal audit and ensure sufficient control and transparent MRM.

Finally, the regulatory standards emphasise the need for robust processes for managing model risk, including incorporating model risk into risk appetite metrics and senior management oversight. This requires thorough and transparent processes for identifying, measuring and managing model risk. Institutions should develop clear escalation procedures for identified model risk issues and ensure effective communication with external auditors.

Model management guidance

As a supplement to MMS, the CBUAE also published MMG, which expands on technical aspects specific to certain model types, based on commonly accepted modelling practices used by practitioners and academics internationally.

MMG covers six model types and provides guidance on how to develop and validate these models. Models not covered in MMG are subject to principles of MMS. The provisions in the guidance are recommended, and any deviations from MMG must be justified and subject to review by the CBUAE.

Guidance on specific models in MMG	
1.	Ratings models
2.	PD models
3.	LGD models
4.	Macroeconomic models
5.	Interest rate in the banking book models
6.	Net present value models

In comparison to MMS, MMG is relatively prescriptive in outlining the specific model family examples. MMG allows institutions to deviate from the guidance if adequate supporting documentation is shared with the regulatory body.

Key challenges in implementation

Prior to the CBUAE's MMS&G, MRM at most UAE banks was still in its nascent stages. The CBUAE mandated institutions to overhaul and redesign their MRM framework to comply with the regulations post December 2022. As mandated by the CBUAE, institutions have already completed the gap analysis to identify shortcomings and have submitted an uplift plan to the CBUAE to remediate the gaps. As of mid-2024, the UAE banking industry is actively working towards full compliance with the CBUAE's standards and guidance. It is obvious that larger institutions and global systemically important banks have made progress, leveraging their extensive resources. Smaller banks (domestic systemically important banks) are leveraging industry experts to overcome challenges of resource limitation and complexities of implementation.

Indeed, the UAE banking industry is in a transitional phase as institutions adapt and comply with the MMS requirements. The key challenges include:

Model governance

Institutions should ensure that Board members and senior management designates have the necessary expertise in the MRM practice. Institutions must design training at the Board level and enterprise level to ensure all stakeholders are familiar with the changing regulatory landscape and importance of model risk as a material risk. Design, roll-out and monitoring of training will be a significant challenge for any institution.

Institutions need to ensure that the established governance structure is reviewed and refined to meet specific requirements of MMS. This will involve integrating MRM and making it more ingrained into the existing risk governance framework. Smaller institutions may need to establish or overhaul the existing governance frameworks, potentially creating new roles and committees focused on model risk oversight. A suitable model inventory system must be established by institutions to ensure efficiency in the operational workflow with real-time reporting dashboards and risk appetite metrics for senior management.

Completeness of policy and procedure documentation is a non-negotiable component in ensuring a robust MRM practice. CRISIL has expertise in streamlining, simplifying and globalising existing policies and processes, building on its decades of experience in helping global banks benchmark and simplify policies across risk types.

DMF

Existing data governance practices might require upgrades to ensure data used in models is accurate, complete and relevant. Collaboration between IT, data management and model development teams is crucial. Institutions need to adhere to robust development protocols (including establishing data quality framework, data documentation standards, data sourcing, and lineage standards) to ensure that the input data for models is aligned with supervisory standards and business objectives. Smaller institutions may need to seek support from industry data governance practitioners to establish a robust DMF.

Lack of data at a granular level may be a critical challenge in independent model development for many institutions. In absence of relevant data, institutions are leveraging vendor models for key business decisions. It is vital for institutions to validate and ensure reliable calibration of these models for local geographical factors. Additionally, banks must strategize to build up the necessary data pool, either internally or through third parties. In short, third-party vendor models and data sourcing need to be brought under the MRM framework to mitigate potential risks stemming from vendor-driven efforts.

Resource challenges

Institutions may need to invest in additional resources or upskill existing staff to meet the enhanced development and validation requirements under MMS. Smaller institutions may need to invest in systems and capabilities to establish or enhance procedures for development, validation and implementation. Institutions need to tactically partner with industry specialists to overcome any lack of experience and expertise in model development and validation.

Resource optimisation will be key, especially for the smaller institutions, to ensure the remediation timelines approved by the CBUAE are adhered to. A resource allocation framework needs to be developed, encompassing internal collaboration of all departments, clear delegation of tasks and responsibilities, and use of technology.

Model performance monitoring

Integrating MRM effectively into existing governance structures and ensuring clear communication of model risk to the Board can be challenging. Institutions need to enhance existing performance monitoring frameworks, to include robust controls, usage restrictions and contingency plans to manage model risks appropriately. For the smaller institutions, this may be a new area of engagement involving additional expertise and resources.

Conclusion

The CBUAE's MMS&G requirements reinforce the growing importance of effectively managing model risk, reflecting the broader trend towards greater transparency and accountability in MRM practices.

Partnering with CRISIL ensures seamless compliance with the CBUAE's requirements, mitigating regulatory scrutiny and potential shortcomings of non-compliance. CRISIL is well positioned to help institutions develop, augment and streamline their MRM framework and practice with tailor-made solutions, complying with local regulatory requirements — all this while incorporating global standards and best practices in MRM, thereby fostering long-term confidence in these institutions' decision-making capabilities.

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