Santander Holdings USA

ENTERPRISE MODEL RISK MANAGEMENT FRAMEWORK

- Working version –

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1. Introduction

1.1 Background

The identification, assessment, control, monitoring, and reporting of model risk, together with the clear articulation and communication of model risk appetite, provide the foundation for the Santander Holdings USA, Inc. ("SHUSA") Enterprise Risk Management ("ERM") model risk management ("MRM") program. Success in managing model risk as outlined in this framework is demonstrated by SHUSA establishing and maintaining an organizational culture that embraces by its actions prudent model risk management and integrates MRM processes within its day-to-day operations.

1.2 Scope

The Santander Holdings USA, Inc. Enterprise Model Risk Management Framework ("MRMF" or "Framework") applies to SHUSA and all U.S. Operating Entities of Banco Santander, S.A ("SHUSA OEs").

The MRMF describes the principles for the management, control, and oversight of model risk across SHUSA and SHUSA OEs, which are further detailed in the SHUSA Enterprise Model Risk Management Policy ("Policy"). Managers at all levels are expected to understand and embed within their organizations the prudent MRM principles described in this MRMF.

1.3 Purpose of the MRMF

The SHUSA Board of Directors ("SHUSA Board") has approved an overarching SHUSA Enterprise Risk Management Framework ("ERM Framework") that sets the principles of SHUSA's oversight of risks arising from its business activities and operations and governs its risk management activities. This MRMF must be read in conjunction with the ERM Framework as its purpose is it to develop the ERM program in relation to model risk, enabling the firm to achieve its strategic priorities, including its business plan, within its expressed model risk appetite.

SHUSA's Model Risk ERM Program is designed to achieve effective model risk management in a consistent fashion across the organization and is in compliance with all applicable rules, regulations and guidance. Moreover, it is designed to provide early recognition and effective management of model risk emerging from changes in SHUSA´s risk profile or from external or systemic sources and, for the Program to be refined as the risks and risk profile of SHUSA or SHUSA OEs change.

This MRMF is aligned to the Model Risk Framework approved by the Board of Directors of Banco Santander S.A., and is consistent with the principles of the supervisory guidance on model risk management (OCC 2011-12/SR 11-7). The MRMF is adopted by the SHUSA Board that establishes the principles that must be followed by all SHUSA OEs when managing and controlling model risk.

1.4 Document Ownership and Maintenance

As owner, the SHUSA Chief Risk Officer ("SHUSA CRO") is responsible for the development and maintenance of this MRMF. SHUSA's Chief Model Risk Officer ("CMRO") has primary responsibility for ensuring it is implemented and embedded on a day to day basis.

The MRMF is approved by the SHUSA Enterprise Risk Management Committee ("SHUSA ERMC") and noted at the SHUSA Executive Management Committee ("SHUSA EMC").

The MRMF must be reviewed at least annually and updated as necessary in the event of material changes to the model risk profile of SHUSA, be it directly or through a change in the model risk profile of SHUSA OEs, including regulatory changes. Material changes, relating to the way model risk needs to be managed and controlled, will be approved by the SHUSA ERMC. Non-material changes, such as changes to committee names or clarifications of the Framework's contents will be approved by the SHUSA CRO and noted at SHUSA ERMC and SHUSA RC.

2. Model Definition and Model Risk Definition

2.1 Model Definition

For the purpose of the Framework, a "model" is defined as a quantitative method, system, or approach that applies statistical, economic, financial, or mathematical theories, techniques, and assumptions to process input data into quantitative estimates. A model consists of three components:

- An information input component, which delivers assumptions and data to the model;
- A processing component, which transforms inputs into estimates; and
- A reporting component, which translates the estimates into useful business information.

The definition of a model also covers quantitative approaches whose inputs are partially or wholly qualitative or based on expert judgment, provided that the output is quantitative in nature.

Non-models, which are quantitative or qualitative methods that use deterministic rules to produce exact output values, are not covered under the scope of the Framework.

Models are simplified representations of real-world relationships among observed characteristics, values, and events. Simplification is inevitable but also intentional, to focus attention on particular aspects considered to be most important for a given model application.

Models may be internally developed, developed by a third party, developed by Banco Santander, S.A. or by other entities within SHUSA, or an off-the-shelf vendor system.

2.2 Model Risk Definition

For the purpose of the Framework, "model risk" is defined as the potential for adverse consequences from decisions based on incorrect, inadequate, or misused model outputs and reports. Model risk can lead to financial loss, poor business and strategic decision making, or damage to SHUSA's reputation. Model risk occurs primarily for two reasons:

- A model may have fundamental errors and may produce inaccurate or inadequate outputs when viewed against the design objective and intended business uses. Errors can occur at any point from design through implementation. In addition, shortcuts, simplifications, or approximations used to manage complicated problems could compromise the integrity and reliability of outputs from those calculations. Finally, the quality of model outputs depends on the quality of input data and assumptions used, and errors in inputs or incorrect assumptions can lead to inaccurate outputs
- A model may be used incorrectly or inappropriately. Even a fundamentally sound model producing accurate outputs consistent with the design objective of the model may exhibit high model risk if it is misapplied or misused

3. SHUSA MRM Principles

Model risk management and control should safeguard and take into consideration the principles set out in the ERM Framework. The following principles should be additionally applied.

3.1 Separation of Functions

The model development and model risk management functions shall be effectively separated. In the case of the model risk management function, mechanisms have to be in place in order to ensure its independent opinion.

3.2 Common Standards

Model development, monitoring, and management will be subject to common principles and standards as defined in the Policy and Model Risk Management Standards ("Standards"), without prejudice of complying with the regulatory requirements which may be laid down in each case.

3.3 Validation and Approval of Models

Models shall have the necessary independent validation reports and shall be properly authorized by the corresponding governance bodies before being implemented and used. The validation will be performed by using a methodology and assessment system that is common across SHUSA.

3.4 Adequate Usage of Models

Models will be used according to their characteristics and limited to the issues determined in the approval process, and also consistent with what is established in the risk appetite and in the risk policies which develop that appetite.

3.5 Monitoring and Control

The models should be regularly monitored and controlled in order to safeguard the adequate quality thereof and their use. Governance mechanisms will be in place to oversee that monitoring is proportionate, and to agree on the change or improvement actions which might be necessary. SHUSA senior management should be regularly informed about this monitoring and ratify or review the agreed actions.

3.6 Time Keeping

Control mechanisms should be put in place to guarantee compliance with the deadlines scheduled for all the stages of the model lifecycle and to guarantee the representativeness of the information and the assumptions used to develop the models.

3.7 Traceability of Development and Governance Processes

The documentation used to construct, validate, and monitor models should be kept up to date, guaranteeing that this process can be replicated and is traceable. In addition, all evidence which may be used to support and trace governance processes relating to models should be kept available.

3.8 Internal Capacity to Develop

It is important to reinforce internal capabilities, share best practices, and promote advanced risk management in developing models. For such purpose, the methodologies and technical development capabilities shall be available and will be shared with all the units that may require them.

4. SHUSA MRM Roles and Responsibilities

4.1 Three Lines of Defense model

Model risk management, in accordance with the ERM Framework, is structured into Three Lines of Defense which take the form in the field of MRM described below.

4.2 First Line of Defense

The First Line of Defense is composed of the departments, business lines, and activities that generate risk exposure. Within the scope of this Framework, it consists of the Model Owners and Model Developers.

Model Owner: A sufficiently senior person assigned primary First Line of Defense responsibilities for managing model risk for a model. Model Owners are responsible for:

- Maintaining an updated inventory of all the models used in their field of responsibility
- Identifying and proposing, in a first instance, the models which should be included in the perimeter of models subject to this Framework. They should also ensure that these models follow the guidelines established in this Framework
- Considering in the planning process the needs of models originating in the different activities
- Providing complete and sufficient information, and evaluating with the Model Developer whether it is sufficient and has the necessary quality from a methodological perspective
- For models which are not internally developed, verifying that they comply with the defined Standards and pass the necessary validation processes for the use for which they are intended before beginning to use them
- Accepting that the final model, whether it is developed in-house or by a third party, satisfactorily covers the objectives and needs, via the corresponding user's acceptance tests
- Ensuring that models are correctly implemented in the operational and management processes
- Using models in accordance with their features
- Monitoring the use of the model once it has been implemented, and monitoring its adequate operation

Model Developer: A sufficiently senior person assigned responsibility for leading the effort to develop a model. Model Developers are responsible for:

- Complying with a rigorous, structured and formal process that ensures that models are developed in accordance with the established Standards and the requirements established by the Model Owner
- Guaranteeing that the model constructed covers the Model Owner's needs and confirm that the Model Owner is aware of the model's implications and limitations, as well as the associated risks
- Monitoring the variables or aspects defined according to the type of model in question

- Documenting the development process

Both Model Owners and Model Developers shall verify, with the participation of other necessary functions:

- That the models development and implementation is viable
- That the model approval processes are complied with
- That the development documentation is available for the appropriate staff members
- That the inventory of models is kept up to date and all the models are monitored

4.3 Second Line of Defense

The Model Risk Management Group ("MRMG") is a specialized risk control and oversight team in charge of model risk management governance, control reporting, and validation.

The Second Line of Defense is responsible for:

- Establishing the general validation principles
- Validating Standards for constructing models
- Evaluating the methodology and data used in developing the model and challenging the model and its use, stating the model's implications and limitations, and the associated risks
- Providing a complete and consolidated overview of existing models and their evaluation and control
- Controlling the compliance of the processes outlined in this Framework, and their consistency with the defined policies
- Consolidating, contextualizing, and expressly evaluating the proposals of the models in the list of models subject to the Framework
- Verifying the completeness, adequacy, validity, and robustness of the model inventory

4.4 Third Line of Defense

The SHUSA Internal Audit Group ("IAG") should regularly assess that the Policy and Standards are adequate and are effectively implemented across SHUSA.

5. SHUSA MRM Organization

Model risk management requires a flexible and efficient structure of governance bodies that guarantees the participation of all the parties involved.

The governance model should identify its different component bodies, and the corresponding charters of the committees shall establish the process to grant authorities and powers to each one of them, including the qualitative and quantitative limits that define their field of action and decision. All committee charters must reflect the committees' MRM responsibilities.

5.1 SHUSA Risk Committee of the Board ("SHUSA RC")

SHUSA RC is ultimately responsible for the oversight of model risk at SHUSA and may delegate responsibility to SHUSA Enterprise Risk Management Committee ("SHUSA ERMC") and SHUSA Model Risk Management Committee ("SHUSA MRMC").

5.2 SHUSA ERMC

SHUSA ERMC is the committee responsible for supporting SHUSA RC by supervising model risk across SHUSA, escalating material issues, and approving or recommending certain foundational model risk management documents to the SHUSA Board.

5.3 SHUSA MRMC

SHUSA MRMC is the committee responsible for providing oversight across all MRM activities and for serving as a point of escalation for MRM issues between the First and Second Lines of Defense.

5.4 SHUSA Chief Model Risk Management Officer ("SHUSA CMRO")

The individual with ownership of the Policy and responsibility for overseeing MRMG and the implementation of the approach to model risk management.

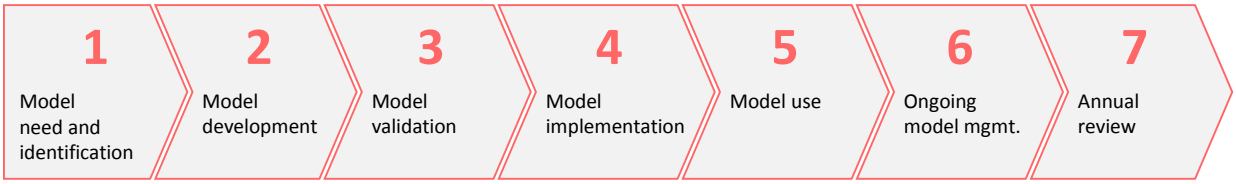
5.5 SHUSA MRMG

SHUSA MRMG is the SHUSA unit assigned responsibility for designing and implementing the approach to model risk management.

6. SHUSA MRM Key Processes

SHUSA defines the following key processes for the identification, management, and control of model risk throughout the model lifecycle. Figure 1 below shows SHUSA's model lifecycle, and the following subsections define each stage.

Figure 1: Model Lifecycle



6.1 Model Need and Identification

Model need and identification involves the identification of the need for a new model, for a new model use, or for a model change.

6.2 Model Development

Model development involves the design and build of a robust and stable model for a specific use, using a structured and industry-accepted approach, conceptually sound methodologies, mathematically correct coding, accurate and reliable data (internally sourced when possible), and extensive testing.

6.3 Model Validation

Model validation refers to the activities and processes that ensure a model is performing as intended, in line with its design objectives and business uses.

6.4 Model Implementation

Model implementation refers to encoding of a model into a production environment for use.

6.5 Model Use

Model Use involves the use of models for their validated and approved uses, with the required compensating controls, and for the approved time period.

6.6 Ongoing Model Management

Ongoing Model Management consists of performance and risk monitoring, change management, and model decommissioning and reactivation.

6.7 Annual Review

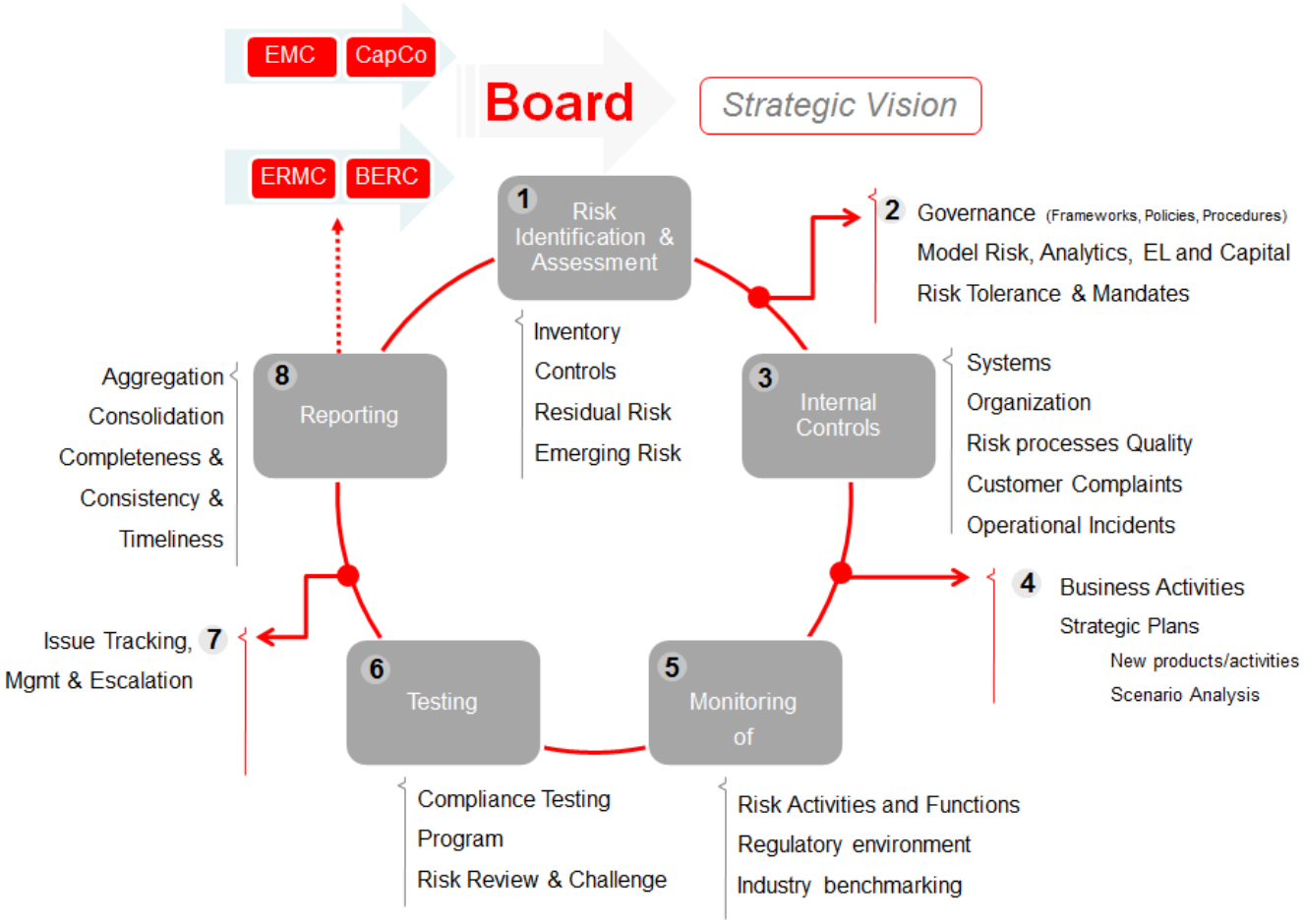
Annual review consists of the reevaluation of a model's Risk Tier (a categorization that is used to differentiate validation requirements based on model risk), and an assessment to determine the adequacy of past validation activities given potential changes in model risk where applicable.

7. Enterprise Risk Management Methodology

The ERM program is based upon building blocks that, taken as a whole, ensure that an integrated set of processes are defined and implemented throughout the risk cycle. Although not all building blocks will be relevant to specific risk types, all risk type frameworks and policies must ensure that the Risk Management methodology is embedded across the entire organization, and applied to each specific risk type as appropriate.

Figure 2 below illustrates the ERM program throughout its lifecycle. The integration of Model Risk Management into the program is reflected in the accompanying table.

Figure 2: ERM Program Lifecycle



1 Risk ID and Assessment
• Risk Identification:
  ○ Risk inventory – **Model Inventory**
  ○ Risk measurement
  ○ Risk quantification
  ○ Risk controls and mitigants – **Model Validation**
• Risk response – accept/ mitigate/ reject – **Model Approval**
• Risk Correlation
• Emerging Risks – **Ongoing Model Management**
	2 Governance
	• Governance of Risks (Risk Frameworks) – **MRMF**
	• Policies – **MRM Policy**
	• Procedures – **MRM Procedures**
	• New Product Approval – **Model Owners**
	• Cost management and effectiveness of controls
	• Organization, Staffing and Training – **MRM resources**
	Model Risk and Model Usage, Risk Analytics and Capital Calculation
	• Risk Model development and validation – **MRM Policy**
	• Risk Model User/ Owner governance and back testing – **MRM Policy**
	• Loss identification and forecasting
	• ICAAP / CCAR
	• Liquidity stress testing
	Risk Appetite & Mandates
	• Risk Appetite Limits & Metrics – **Model Risk Appetite Statement**
	• Risk Scoring, Risk Approvals & Mandates – **Model Validation**

3 Internal Control
• Quality assurance and Control – **Model Owner**
  ○ Systems
  ○ Organization
• Risk processes quality
• Customer complaints
• Operational incidents – **Ongoing Model Management**
	4 Business Activities
	• Business plans – **Model Development Documentation**
	• Commercial strategy
	• New Products – **Model Need and Identification**
	• Business plan scenario analysis

5 Monitoring • Regulatory, Policy and Business • Industry benchmarking • Risk Activities and functions – **Ongoing Model Management** • Risk Limits, KRIs, KPIs, Risk Appetite Statement – **MRM Reporting**	**6 Testing** • Compliance Testing Program • Risk Review & Challenge – **Model Validation and Annual Review**
7 Issue tracking and Escalation – MRM Policy	**8 Reporting** • Risk Monitoring / Loan Quality • Risk Reporting – **MRM Reporting** • Risk Aggregation / Consolidation • Completeness, consistency & timelines • Regulatory Reporting

8. Regulatory References

This MRMF incorporates guidance from the Federal Reserve, the Office of the Comptroller of the Currency, and other regulators as follows:

- Supervisory Guidance on Model Risk Management, Board of Governors of the Federal Reserve System (SR 2011-7)
- Office of the Comptroller of the Currency (Bulletin 2011-12), May 2011.

9. Document History and Version Control

9.1 Ownership and Authorship

Version	Date	Author	Owner	Change
1.0	Sept 2015	SHUSA Chief Model Risk Officer	CRO	Initial SHUSA MRM Framework

9.2 Sign-Off

Approving Body	Governance Committee Approval or Endorsement	Final Approval Date
SHUSA ERMC	SHUSA ERMC	9.23.2015