



Internal Auditors Society

Internal Audit Guidelines Market Risk Management

March 2012

The Audit Guidelines (the "guidelines") are intended to provide members of the Internal Auditors Society ("IAS"), an affiliate of the Securities Industry and Financial Markets Association ("SIFMA") with information for the purpose of developing or improving their approach towards auditing certain functions or products typically conducted by a registered broker-dealer. These guidelines do not represent a comprehensive list of all work steps or procedures that can be followed during the course of an audit and do not purport to be the official position or approach of any one group or organization, including IAS or any of its divisions or affiliates. Neither IAS, nor any of its divisions or affiliates, assumes any liability for errors or omissions resulting from the execution of any work steps within these guidelines or any other procedures derived from the reader's interpretation of such guidelines. In using these guidelines, member firms should consider the nature and context of their business and related risks to their organization and tailor the work steps accordingly. Internal auditors should always utilize professional judgment in determining appropriate work steps when executing an audit.



Internal Auditors Society

TABLE OF CONTENTS

I.	INTRODUCTION AND BACKGROUND	2
II.	AUDIT GUIDELINES	10
III.	GLOSSARY	37



Internal Auditors Society

I. Introduction and Background

I. INTRODUCTION AND BACKGROUND

A. Overview

Over time, financial institutions have improved the integration of systems to allow a more holistic view of their risks and have instituted better risk management practices. These have included improved internal and external reporting of various types and measures of risk, better decision-making structures, and greater involvement of boards of directors in setting the risk appetite of the firm and overseeing risk management policies. Also, the use of more rigorous risk modeling has made firms more sensitive to, and aware of their risk which is the first defense against systemic problems.

Financial Risk Management

Financial Risk Management is the process of evaluating and managing current and possible financial risk at a firm as a method of decreasing the firm's exposure to the risk by quantifying and taking acceptable risks. Financial risk managers must identify the risk, model different scenarios and outcomes, evaluate all possible remedies, and then implement the steps necessary to take acceptable risk. The forms of risk include:

- Market Risk
- Liquidity Risk
- Credit Risk
- Operational Risk

Market Risk

Market Risk is the potential financial loss resulting from changes in the fair value of assets and liabilities due to changing prices in the markets. It includes four standard market risk factors:

- Equity Risk or the risk that stock prices will change.
- Interest Rate Risk, or the risk that interest rates will change
- Currency Risk or the risk that foreign exchange (FX) rates will change.
- Commodity Risk or the risk that commodity prices (i.e. grains, metals, etc.) will change.

Two drivers of the market risk exposures are:

- Investment Position
- Market Volatility

Market risk can also be contrasted with Specific risk, which measures the risk of a decrease in one's investment due to a change in a specific industry or sector, as opposed to a market-wide move.

Best Practice Framework

The Best Practice Framework of Market Risk Management can be benchmarked in terms of:

- Policies
- Methodologies
- Infrastructure

SIFMA Internal Audit Guidelines for Market Risk Management

Policies

The Board of Directors should develop strategic objectives for the organization which are consistent with firm-wide objectives and disseminate them throughout the firm. The policies should be clear whether to aim at minimizing risk or aim at making a profit by aggressively taking risk. Business strategies should also avoid setting objectives that pursue short-term profit by disregarding long-term risk.

A firm must establish, document and maintain policies, controls and procedures to an auditable standard:

1. Concerning the operation of its VaR model approach; and
2. For monitoring and ensuring compliance with the policies, controls and procedures.

The Board of Directors should develop a policy regarding market risk management and disseminate it throughout the firm. This policy includes clear statements on the following:

- Roles and responsibilities of the director in charge and the Board of Directors or equivalent organization with regard to market risk management.
- Organizational framework such as establishing divisions concerning market risk management and the authority assigned.
- Establishment of market risk limits. Limits are established suited to each division and in aggregate for the firm for each risk category by examining the details of operations of the various divisions and taking into consideration the position of each division. Limits are reviewed and revised in a regular and timely manner. This includes risk limits, position limits, loss control limits.
- Identification, assessment, monitoring, control and mitigation of market risk management.

The Board of Directors should review and revise the policy in a regular and timely manner based on reports and findings on the status for market risk management.

Methodologies

Value-at-Risk (VaR) Model

Value-at-Risk is a technique which uses the statistical analysis of historical market trends or Monte Carlo simulations and volatilities to estimate the likelihood that a given portfolio's losses will exceed a certain amount. Value-at-Risk is frequently calculated for either one day or two week periods, and is generally given an X percent change that the portfolio will lose Y dollars. The firm's VaR model must have a proven track record of acceptable accuracy in measuring risk.

The VaR model must be fully integrated into the daily risk management process of the firm, and serve as the basis for reporting risk exposures to senior management. The VaR model must also be adequately documented. Adequate procedures must be in place to ensure that model changes are validated before introduction.

SIFMA Internal Audit Guidelines for Market Risk Management

VaR Back Testing

A firm must have processes in place to ensure that its VaR model has been adequately validated by suitably qualified parties independent of the development process to ensure that it is conceptually sound and adequately captures all material risks.

Back testing is the process of comparing forecasted losses via the VaR calculation with actual losses. It is intended to act as one of the mechanisms for the ongoing validation of a firm's VaR model and to provide incentives for firms to improve their VaR measures.

Stress Testing

Stress testing is designed to estimate how a portfolio will react to small or more drastic changing conditions in the markets and provides a more comprehensive picture of risk. A firm must frequently conduct a rigorous program of stress testing

A firm must periodically and actively identify scenarios that are relevant to its portfolio. Scenarios used must be appropriate to test the effect of adverse movements in market volatilities and correlations and the effect of any change in the assumptions underlying the VaR model. Scenarios involving low probability market events must nevertheless be plausible.

A firm must have procedures to assess and respond to the results produced from stress testing. In particular, stress testing results must be used to evaluate the firm's capacity to absorb such losses or identify steps to be taken to reduce risk. The results communicated routinely to senior management and periodically to the governing body.

The results of these tests must be reviewed by senior management and reflected in the policies and limits the firm sets.

Infrastructure

People (skills)

A firm must have a sufficient number of staff skilled in the use of sophisticated models in the trading, risk control, audit and back office areas.

Operations

A firm must have a risk control unit which is independent from business trading units and which reports directly to senior management.

A firm's governing body and senior management must be actively involved in the risk control process, and the daily reports produced by the risk control unit must be reviewed by a level of management with sufficient authority to enforce both reductions of positions taken by individual traders as well as in the firm's overall risk exposure.

SIFMA Internal Audit Guidelines for Market Risk Management

Accurate Data

It is the responsibility of a firm's own management to ensure accuracy and integrity of its VaR model. This responsibility includes obtaining appropriate independent validation of the VaR model.

Technology

A firm must have a conceptually sound risk management system that surrounds the use of its VaR model and meets qualitative standards.

In assessing whether the VaR model is implemented with integrity, consideration is given to the information technology systems used to run the VaR model and performing associated calculations. The assessment includes:

1. Feeder systems; risk aggregation systems; time series databases; the VaR model system; stress testing system; the back testing system including profit and loss cleaning systems; data quality, reconciliations and checks on completeness of capture;
2. System development, change control and documentation; security and audit trails; system availability and contingency procedures; network adequacy; and
3. Operational statistics relating to the VaR model production process, including statistics relating to timeliness, number of re-runs and reliability of data feeds.

Fraud

The main risk of fraud in Market Risk is that the true market risk exposure is disguised in order to avoid limits being breached and restrictions imposed on trading. As a result, it is important to ensure that the limit structure is approved independently and the completeness and accuracy of limit breaches reporting.

B. Audit Objectives

The main objectives of an audit of Market Risk Management are:

- To determine the adequacy and effectiveness of controls relating to Market Risk Management.
- To ascertain that all information needed to monitor market risk is accurate and complete.
- To review controls over compliance with requirements from key regulators, like the FED Market Risk Rule for Bank Holding Companies (SR09-1).

C. Audit Scope

The scope of the audit will include examination of the following activities and practices:

- Market Risk Organization
 - Org Structure
 - Governance
 - Policies and Procedures
 - Risk Management Systems

SIFMA Internal Audit Guidelines for Market Risk Management

- Market Risk Framework
 - Limit framework
 - Review and approval methodology
- Trade Capture
 - Data Completeness
 - Transaction Approvals
 - Model Usage/ Implementation
 - Valuations
- Market Risk Capture, Measurement and Monitoring
 - Risk Model usage/ implementation / change management
 - data completeness
 - VaR and Risk Sensitivities
 - Limit Monitoring
- Market Risk Reporting
 - Portfolio Analysis (exposures and stress)
 - Financial/ Regulatory Reporting
 - Key Risk Indicators (KRI)
- Market Risk Methodology
 - VaR Methodology
 - Scenario Analysis
 - Stress Testing
 - Back Testing
- Regulatory Requirements / Expectations

D. Business Risks

Failure to manage market risk can result in significant reputational and financial losses to the firm. In addition, failure to comply with regulations and applicable accounting procedures could cause a Firm to be fined or to suffer penalties.

Summary of Specific Business Risks

Organization Structure

- Failure to establish an organization structure that does not match the nature, scale, complexity and risk content of the business activities may result in omissions with regulatory, legal and financial consequences to the Firm.
- Failure to establish responsibilities and clear reporting lines and to provide required communications to upper management may increase the risk that inappropriate activities are not escalated or resolved properly.
 - Committees related to risk management are not appropriately addressing key issues, risks and decision making required.
 - Market risk management functions are not adequately segregated and independent of the risk taking function.
 - Front office risk management practices are inadequately challenged to escalate and resolve issues properly.

SIFMA Internal Audit Guidelines for Market Risk Management

- Market risk professions are not trained to keep up to date with industry trends and development

Policies

- Failure to establish strategic objective which reflect the Firm's risk appetite and are consistent with firm-wide objectives may generate significant losses for the Firm.
- Failure to establish, document and maintain policies, controls and procedures for all key market risk management functions may result in omissions with regulatory, legal and financial consequences to the Firm.
 - Management makes sub-optimal decisions regarding market risk as a result of information not being clear, detailed and timely.

Methodologies

- Use of untested and/or complex models may result in omissions with regulatory, legal and financial consequences to the Firm.
 - VaR methodologies used are not adequately controlled and do not meet regulatory expectations.
 - VaR numbers are not complete and accurate.
 - Governance procedures around the process for monitoring risks not included in VaR are not in place.
 - Stress testing is not rigorous due to the lack of appropriate scenarios.
 - Back-testing methodologies do not adequately evaluate models.
 - Back-testing procedures do not meet regulatory requirements.
- Significant risk factors associated with models are not identified by risk management and thus are not monitored with appropriate limits set.

Limit Framework

- Failure to establish and manage an appropriate risk limit structure which is periodically approved by the Board of Directors may result significant losses for the Firm.
 - Risk limits including wrong way risk are missing or not appropriately set.
 - Procedures for monitoring compliance with limits are inadequate.
 - Unresolved limit breaches are not resolved or not escalated to senior management.

Trade Data and Transactions

- Trading risks arise from the possibility that trading practices and supervisory standards are inadequate, omitted or fraudulent.
 - Data from trading books system to the risk system are not properly mapped.
 - New trading accounts and product/positions are not properly captured in the risk systems.
 - The data used within the VaR time series is not accurate, complete and updated on a timely basis.
 - Incomplete and /or inaccurate market risk is reported due to trades being approximately booked / dummy bookings made to aggregate risk or risk managed outside the firm infrastructure.

SIFMA Internal Audit Guidelines for Market Risk Management

- Inappropriate risk limit structure and Desk trade mandates may be in place due to evolving portfolio of products being traded by a Desk.
- Market risk is unaware of the potential impact on market risk exposures due to late trade bookings, cancels and amends.

Operations

- Failure to establish a risk control unit independent from business units which reports directly to senior management may result in significant losses for the Firm.
- Failure for the Firm's governing body and senior management to be actively involved in the risk control process may result in significant losses for the Firm.

Risk Management Systems

- Insufficient and/or unreliable systems fail to produce accurate and timely information resulting in significant financial loss for the Firm.
 - Automated information technology solutions have not been developed resulting in inconsistent, inaccurate and incomplete information.
 - Feeds into and out of risk data systems are incomplete resulting in missing data and sensitivities.
 - Management information system reports provided to senior management are inaccurate or incomplete.
- Inappropriate systems access or system changes may result in fraud.
- Market risk function is unable to continue to perform its required function during a crisis or disaster situation.



II. Audit Guidelines

SIFMA Internal Audit Guidelines for Market Risk Management

II. AUDIT GUIDELINES

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
A. Organization Structure		
Operations Structure Operational structure does not match the nature, scale, complexity and risk content of the business activities.	Up to date organizational charts are available showing a clear allocation of roles and responsibilities, management structure, reporting lines, supervision and accountability. Senior Management reviews and approves on an annual basis the overall appropriateness and efficiency of the organizational structure, including suitability of reporting lines, definition of roles and responsibilities and adequacy of oversight committees.	<ul style="list-style-type: none"> Obtain the organizational structure: <ul style="list-style-type: none"> Confirm with the business that it is up to date Assess the organization structure and determine if there are any gaps Obtain evidence that management reviews the roles, responsibilities and resourcing of market risk management at least annually (this may be documented in committee minutes (e.g., Risk Management Committee)).
Committee Structure Committees related to risk management are not appropriately addressing the key issues, risks and decision making required.	A committee charter is available for each key committee (e.g., Risk Management Committee, Risk Appetite Committee) which defines the role of the committee, responsibilities of each member, experience/knowledge of members, required member attendance, delegated authorities and other mandated requirements. <ul style="list-style-type: none"> The committee charter is reviewed and approved at least annually by the Board of Directors 	<ul style="list-style-type: none"> Obtain the committee charter describing each key committee (i.e. Risk Management Committee and the Risk Appetite Committee) and evidence Board of Director review and approval at least annually. Verify the charter outlines committee roles, responsibilities of each member, experience/knowledge of members, required members, delegated authorities and other mandated requirements. Verify that the attendance required appears reasonable. Obtain evidence Board of Director review and approval of committee members (e.g. knowledge/experience) at least annually.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
	<ul style="list-style-type: none"> - An evaluation of the committee members (e.g., experience/knowledge) is performed at least annually by the Board of Directors. 	<ul style="list-style-type: none"> • Obtain a sample of meeting minutes and confirm that there was appropriate attendance of meetings. Verify that meetings are being held as planned, and where there are major problems ad-hoc meetings are called.
<p>Segregation of Duties</p> <p>The market risk management function is not adequately segregated and independent of the risk taking functions within the organization.</p>	<p>The measurement and management risk functions are performed by the risk management team which is independent of the front office, product control or credit risk management teams.</p>	<ul style="list-style-type: none"> • Assess if adequate mandate is in place for all market risk management functions and assess if the ownership of key responsibilities are clearly defined. • Evaluate market risk management function interaction with and degree of reliance upon relevant support functions for providing data or other information. Based on the results of this evaluation, assess the adequacy of market risk management function independence in light of its mandate. • Within the market risk management function verify that adequate segregation exists between functions.
<p>Independence Challenge to Front Office</p> <p>Inadequate challenge/oversight of front office risk management practice may increase the risk that inappropriate activities are not escalated and resolved properly.</p>	<p>There are policies/processes in place to ensure significant issues related to front office risk management practice/tools are escalated to the appropriate control and risk management committee. This includes documentation of investigation, resolution of escalations; required management signed-off and associated timelines.</p>	<ul style="list-style-type: none"> • Obtain relevant policies and an understanding of relevant processes. Assess their adequacy and that it includes documented escalations (investigation and resolution) that are signed-off on by management. • Review a sample of escalations and verify that review actions were performed in the appropriate timeframe, by the appropriate risk management function to mitigate the risk in compliance with the escalation policy.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
<p>Training</p> <p>Market risk professionals within the organization do not attend adequate training or keep up to date with industry trends and developments.</p>	<p>Market risk management teams attend regular training sessions, peer group reviews and are members of appropriate industry groups in order to keep up to date with the latest methodologies and trends within market risk management. This training is planned, documented, and evaluated annually by risk management.</p> <p>Required training is monitored and approved by appropriate risk management.</p>	<ul style="list-style-type: none"> • Verify risk training is planned, documented, and evaluated annually by risk management. • Sample training records to verify that required training is monitored and approved by appropriate risk management. • Assess the level of training provided to market risk management to ensure that they keep up to date with latest developments, organization policies and new products.
<p>Adequacy of Resources</p> <p>Staffing levels within market risk management is inadequate to support its mandate.</p>	<p>Market risk management participates in the firm's annual planning and budgetary process to assess and adequately staff market risk management functions. This annual assessment is reviewed and approved by the Board of Directors and/or appropriate senior management.</p>	<ul style="list-style-type: none"> • Assess the adequacy of staffing within market risk management functions, to adequately support the business and to perform the functions required for market risk monitoring and measurement. The assessment should also take into consideration the adequacy of staffing in light of the degree of automated vs. manual processes. • Assess the professional adequacy of staff (e.g., GARP certified) within the market risk management functions. • Verify review and approval of the firm's annual planning and budgetary assessment by the Board of Directors and/or appropriate senior management. • Review the deployment of market risk functions, systems support and development to ensure that appropriate and adequate resources have been assigned to perform the function in the deployed locations.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
<p>Outsourcing and Off-Shoring Arrangements</p> <p>The establishment of outsourcing and off-shoring arrangements may create performance issues and control gaps.</p>	<p>Functions opting for outsourcing and off-shoring/deployment arrangements have performed a risk assessment (including an analysis of any legal and regulatory requirements) and appropriate risk mitigation plan prior to the deployment and/ or outsourcing of personnel.</p> <ul style="list-style-type: none"> - Functions have established control and performance standards as well as tools/ processes - Legal agreements and internal service level agreements and procedures documentation exists which define the range of outsourced and off-shored activities and determine the duties and responsibilities of the service. - Business Continuity Plans exist for the outsourced and/ or deployed function. - Vendor Management Policy is followed for outsourcing. 	<ul style="list-style-type: none"> • For the in-scope functions, determine whether outsourcing and/or offshoring arrangements exist and determine whether they are significant for the scope of the audit. For outsourcing and off-shoring arrangements identified as requiring review, perform the following: <ul style="list-style-type: none"> - Assess whether a formal risk assessment was carried out prior to deployment or outsourcing of the business process. - Obtain and review related contracts, service level agreements and procedures. Assess that the contract grants full auditing rights and includes adequate confidentiality clauses. - Evaluate whether control and performance requirements have been defined and Vendor Management Policy is followed. - Thoroughly review key risk indicators and management information to determine whether there are performance issues. - Ascertain through inquiry, review and testing as appropriate that regulatory requirements and restrictions are met. - Evaluate whether Business Continuity Plans and vendor contingency (in the case of outsourced relationships) have been considered and are adequately documented and tested.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
B. Governance / Policies and Procedures		
Business Strategy The business strategy does not reflect the institution's risk appetite	<p>The Board of Directors has clearly established strategic objectives which are appropriate from the perspective of market related risk management.</p> <ul style="list-style-type: none"> - The Board approves the overall risk appetite and strategy (and any other policies for integrated risk management) at least annually or more frequently during periods of market turmoil or major strategic changes. Meeting minutes showing discussion and approval are available and have been approved and distributed to those attending. - The risk strategy to the business is appropriately distributed and communicated to the organization. 	<ul style="list-style-type: none"> • Obtain evidence the overall strategic objectives and risk appetite is defined and approved by the Board of Directors at least annually. • Obtain evidence that the strategic objectives and risk appetite is disseminated and communicated appropriately throughout the organization.
Key Functions' Policies & Procedures Policies and procedures are out of date or do not take into account the business objectives and regulatory requirements	Policies and Procedures exists for all key market risk management functions, are well defined, and are prescribed, updated, reviewed and approved by senior management periodically, or when significant changes occur impacting the policy, to ensure consistency with current best practice, risk appetite, business strategy and regulatory environment.	<ul style="list-style-type: none"> • Obtain a complete listing of Policies and Procedures and verify that all areas of relevance have been documented. • Obtain evidence that Policies have been approved by management (i.e. committee meeting minutes) and Procedures approved by the head of the risk department. • Verify that Policies & Procedures reflect the approved strategy/risk appetite where applicable.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
	<p>Clear ownership of processes and controls are documented with the appropriate persons aware of it.</p>	<ul style="list-style-type: none"> • Verify that all policies and procedures consider the most up to date regulatory requirements. • Verify that any changes to Policies & Procedures are communicated in a timely manner to the business.
<p>Management Oversight of Committees</p> <p>Management make sub-optimal decisions as a result of information not being clear, detailed and timely</p>	<p>Committees perform and sign-off on reasonableness reviews validating the sources of information is complete and accurate.</p> <p>Senior management signs-off on detailed reviews on the information provided to key committees to ensure accurate and appropriate information is being provided.</p>	<p>For a sample of management meetings and reports:</p> <ul style="list-style-type: none"> • Obtain evidence of approved reasonableness reviews for completeness and accuracy of reporting. • Obtain evidence detail review of information provided is performed by senior management.
<p>Management Oversight of Reporting</p> <p>Risk reporting is not adequately monitored by management</p>	<p>Production schedules and associated procedures for (manual and system) reporting of risk information are monitored by management at least monthly to ensure the following:</p> <ul style="list-style-type: none"> - frequency of reporting - distribution to the correct level of senior management - timely receipt of report - preference for implementation and use of automated controls and reconciliation reports 	<ul style="list-style-type: none"> • Review procedures in place for the production of risk reporting. • Verify monthly monitoring by management of the risk reporting production schedule. • For a sample of reports, review the distribution of risk reports and verify that they have been reported to the correct level of senior management as well as the proper timeliness of production/receipt of these reports. • For a sample of report reconciliations, verify that reconciliations are performed independently, documented and approved by management.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
	Documented reconciliations of reports to the source system are independently performed and reviewed/approved by management.	<ul style="list-style-type: none"> For samples selected, verify the automation of controls and reconciliation reports where appropriate.
C. Risk Management Systems		
System Reliance Automated Information Technology (IT) solutions have not been developed, resulting in inconsistent, inaccurate and incomplete information.	There is a Risk IT Committee with documented and approved IT plans and policies to support the development/ implementation of automated IT solutions that provide consistency, accuracy and completeness of risk information.	<ul style="list-style-type: none"> Obtain evidence of IT planning meetings, documented and approved plans and policies that support the implementation and development of an automated risk IT solution.
Access to Systems, Source Code, Documents and Files Unauthorized access to applications, source code, databases, documents and files that support market risk management	Staff roles and responsibilities dictate their assigned user profile for access to applications, source code, databases, documents and files that support market risk management. There is an Exit Policy which includes immediate revoking of access to terminated employees. Access review is performed and documented by IT/risk management quarterly.	<ul style="list-style-type: none"> Obtain the access lists for applications, source code, databases, documents and files that support market risk management. Evaluate access levels related to access privileges of key personnel Verify access review performed quarterly by IT/risk management supervisors. Verify the review of access log to ensure information has not been tampered with. Verify access is revoked for terminated employees. Assess the resolution of exceptions identified.
Emergency Changes Emergency changes not properly approved and documented according to procedures.	Emergency changes are documented and approved per the organization's Policy & Procedures.	<ul style="list-style-type: none"> Obtain a sample of emergency/unplanned changes and verify that approvals were obtained in accordance with the organization's Policy & Procedures.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
Market Risk Feeds Feeds into and out of the risk data systems are incomplete.	Risk systems receive feeds from Front Office systems and send them to other capital calculation, risk overview and financial reporting systems. These feeds are documented on clear feed diagrams. Changes to feeds are approved and communicated to the appropriate market risk team.	<ul style="list-style-type: none"> Obtain the population of feeds from different sources and spreadsheets and understand how the staff ensures completeness and accuracy of the feeds Understand how new feeds or feed change requirements are communicated to the appropriate team. Document the role of staff in the setup of the feeds into the risk systems and the interaction with the different IT teams. Select a sample of feed changes and verify appropriate approval of both changes and/or accuracy.
Transmission of Risk Data Risk data is not transmitted to the risk data source, resulting in missing data and sensitivities	Transmission reports along with exception resolution are reviewed and approved by management to ensure that risk data flows accurately and completely into the risk systems.	<ul style="list-style-type: none"> For a sample of feeds to the risk system, verify that transmission reports are reviewed and approved by management and exceptions are resolved in a timely manner.
Quality of MIS Daily, monthly and quarterly MIS reports, provided to senior management are inaccurate, incomplete.	A standard reporting package from the risk systems is periodically reviewed by risk management to ensure completeness and accuracy and that user needs are being met.	<ul style="list-style-type: none"> Obtain evidence that the standard reporting package from the risk system is periodically reviewed by risk management for completeness and accuracy.
Back Out & Recovery Lack of documented back-out and recovery procedures for source code libraries.	Source code libraries are locked down and contain previous versions for fallback purposes.	<ul style="list-style-type: none"> Obtain evidence that source code libraries are locked down, prior versions of distributed code are retained in the source code libraries and that they are version labeled.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
<p>Business Continuity</p> <p>The market risk function is unable to continue to perform its required functions during a crisis/ disaster situation</p>	<p>The firm has developed and implemented an organization-wide Disaster Recovery (DR) / Business Continuity (BC) planning process and related procedures that include the market risk management functions.</p>	<ul style="list-style-type: none"> • Review the impact assessment figures for the various market risk processes and ensure that they adequately reflect the risk to the firm. • Through inquiry determine the status of the Business Recovery Plan and ensure that it is up to date and accurate. Ensure that an adequate change manager and alternate have been assigned who maintain the plan and keep up to date (on a 6 monthly basis or whenever there are changes). • Ensure that the following have been documented for market risk management functions and are up to date: <ul style="list-style-type: none"> - Seating allocations at Disaster Recovery site - Contact details of recovery team - Critical systems - Various disaster scenarios
D. VaR Methodology		
<p>VaR Methodology</p> <p>VaR methodologies used are not adequately controlled and do not meet regulatory expectations</p>	<p>Senior management signs-off on regular reviews of the VaR methodologies and associated policies and procedures in place and underlying risk models to ensure that they are current and based on market and organization's portfolio. This review includes monitoring of VaR and specific risk model compliance with regulatory requirements.</p>	<ul style="list-style-type: none"> • Identify and document the different types of VaR methodologies that are in use within the organization (e.g. regulatory VaR stressed VaR, responsive VaR etc.). • Verify senior management sign-off of a regular process to review methodologies including associated policies and procedures, and their underlying risk models to ensure that they are current and based on the market and organization's portfolio.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
<p>VaR Methodology Development</p> <p>Development of new VaR methodologies or for changing existing methodologies are not appropriately controlled</p>	<p>An independent risk committee identifies needs, approves development and monitors implementation of new and existing methodologies. This includes review and approval of written analysis before development.</p> <p>Senior management reviews and approves validation /testing before implementation.</p>	<ul style="list-style-type: none"> • For a sample of methodology changes, obtain evidence of review and approval of documentation provided to all relevant bodies. • Verify senior management review and approval of the validation/testing of the implementation of the VaR methodology and associated policies and procedures prior to implementation. • Review of independent model validation report. Verify issues/recommendations identified in the validation report are tracked and followed up. • Independent model validation should also include code review (not just methodology). • Scenario analysis should be tested extensively during development and post development.
<p>VaR Completeness and Accuracy</p> <p>VaR numbers are not complete and accurate</p>	<p>There is a controlled process to monitor assumptions as well as the accuracy of the VaR model including inputs from various other functions such as back testing, Risk based P&L and VaR accuracy reports. There is a formal governance forum reviewing and approving these assumptions and inputs.</p>	<ul style="list-style-type: none"> • Understand the various inputs used by management to monitor the accuracy of the VaR model and governance processes in place to monitor the VaR model (e.g. VaR governance committee etc.). Where issues arise with the accuracy of the VaR model ensure that these are appropriately escalated and actions are taken to remediate them. • Review the latest VaR back testing reports and ensure that the accuracy levels are within normal parameters. Ensure that VaR has remained within normal parameters for the period under review. Understand and assess reasons for any abnormal results. • Verify review and approval of assumptions and inputs by a formal governance forum.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
<p>Consolidated VaR Completeness and Accuracy</p> <p>Consolidated VaR numbers are not complete and accurate</p>	<p>Processes documentation and analysis are in place to ensure that consolidated VaR numbers are complete and accurate. Senior management reviews and approves analysis and consolidated VaR model output.</p>	<ul style="list-style-type: none"> • Review and document the process for consolidating the various business cluster VaR numbers into the following: <ul style="list-style-type: none"> - Group VaR - Country VaR - Legal Entity VaR - Divisional VaR • Review the controls including analysis (both within and outside the risk system) in place to ensure that: <ul style="list-style-type: none"> - Cluster level hierarchies are appropriate and correct - The correct clusters roll up into the correct legal entities, countries etc. - Cluster level VaR numbers have been completed and finalized before the consolidation process • VaR numbers are accurate and sensitivity based or full revaluation based. Verify senior management review and approval of analysis and VaR model output.
<p>Risks not included in VaR</p> <p>There are inadequate governance procedures around the process for monitoring risks not included in VaR</p>	<p>Annually, or as required, senior management reviews and approves the governance framework in place for monitoring the process regarding risks not included in VaR. This framework includes:</p> <ul style="list-style-type: none"> - Policies to meet regulatory expectation 	<ul style="list-style-type: none"> • Verify senior management review of the governance framework in place for monitoring risks not included in VaR. • Review the policy for risks not included in VaR and ensure that it is adequate and meets regulatory expectations • Review the process for identifying new risks which are not yet included in VaR and ensure that it is working in practice.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
	<ul style="list-style-type: none"> - Processes, documentation and reports are in place for identifying new risks which are not (yet) included in VaR. 	<ul style="list-style-type: none"> • Review the latest quarterly report over risks not included in VaR and ensure that it is complete and that all relevant fields have been completed. Test to ensure that the report contains all known risks not in VaR by discussion with cluster management, senior market risk management and review of the VaR governance forum minutes. • Verify thresholds are in place for risks being included in VaR.
E. Limit Framework & Monitoring		
<p>Limit Structure</p> <p>An appropriate limit structure is not in place.</p>	<p>There is a formal process for the definition and governance of risk limits for the firm. This defines specific limits for each different area including country limits, legal entity limits, business cluster limits. In addition, a broad range of limits are monitored including VaR, Scenarios, sensitivities and other risk measures.</p> <p>Roles and responsibilities for the management of limits are appropriately defined and associated policies are adequately documented.</p>	<ul style="list-style-type: none"> • Obtain the limit structure used by the firm (e.g. country, legal entity, business cluster limits, trader risk flags) • Review the policy to ensure that the limit management process is accurately documented and roles and responsibilities appropriately assigned for setting limits, changing limits and defining the limit structure. Verify that the limit structure reflects the current front office organization and that each limit has an appropriate front office and market risk manager assigned.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
<p>Limit Framework</p> <p>Limits are missing or not appropriately set.</p>	<p>A complete set of limits, both individual and in the aggregate, is in place aligned to the organization's risk appetite on a product by product basis for all material sensitivities covering all books. Limits are periodically re-evaluated. All limits are reviewed and approved periodically by the Board of Directors to ensure compliance with the organization's risk appetite including limits for sensitivities, VaR, Stress Testing, Concentration, etc..</p>	<ul style="list-style-type: none"> • Obtain a complete set of limits, both individual and in the aggregate, monitored by market risk management. • Verify limits are in line with risk appetite, periodically re-evaluated, and approved by the Board of Directors, considering: <ul style="list-style-type: none"> - Stress scenario results - Past events - Desk budgets - Business strategy - Risks not in VaR - Realized profit and loss - Board approved current limit structure
<p>Limit Monitoring Procedures</p> <p>Procedures for monitoring compliance with limits are inadequate.</p>	<p>A risk limit policy is in place documenting procedures regarding limit breaches and escalations.</p> <p>Risk management monitors risk limits on a daily basis and requires timely resolution of breaches.</p> <p>Resolution of limit breaches are reviewed and approved by senior management.</p>	<p>Limit Monitoring</p> <ul style="list-style-type: none"> • Review the process and procedures in place to ensure that limits are monitored daily. • Ensure that the limit monitoring and management procedures are performed in accordance with the firm's policy and that the policy is up to date. <p>Escalation of limit violations</p> <ul style="list-style-type: none"> • Review the policies and procedures in place to address limit breaches and escalations • Ensure that an appropriate level of senior management is responsible for approving limit escalations • Verify escalation to senior management for approval and resolution was performed on a timely basis

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
F. Trade Data		
Trading Books to Risk System Reconciliation Data from the Trading Books System to the Risk System are not properly mapped for risk aggregation and reporting.	Reconciliations between data mapped from the Trading Books System to the Risk System for risk aggregation and reporting are performed to ensure the mapping of trading accounts is consistent within the two systems. All reconciling items are escalated for resolution on a timely basis.	<ul style="list-style-type: none"> Obtain an understanding of any changes to the system reconciliation process as compared to prior years. Also, understand changes and additions to the fields/parameters being reconciled and ascertain that changes are in line with any field changes in the systems. Assess adequacy of reconciliation (e.g. any key fields not reconciled). For a sample of days, obtain and review the system reconciliations and evidence that all reconciling items are escalated and resolved on a timely basis.
New Trade Accounts and Product/Positions in Risk System New trading accounts and product/positions are not properly captured in the risk systems.	Management reviews and approves all new trading accounts and/or legal entities and approves the proper mapping for risk aggregation and reporting within the risk system.	<ul style="list-style-type: none"> For a sample of new trading accounts and legal entities, verify management review and approval of these accounts/entities and verify that they are properly mapped and included within the risk system on a timely basis.
Time Series Verification Updating The data used within the VaR time series is not accurate, complete and updated on a timely basis.	On a regular basis, data is 'recut' within the time series. Controls are in place to ensure 'recut' is complete, accurate and timely including: <ul style="list-style-type: none"> The time series verification process is adequately documented within risk policies and procedures. This includes the process for smoothing the time series (e.g. smoothing data, omitting extreme moves, extrapolating for missing data 	<ul style="list-style-type: none"> Review the process for monthly 'recutting' data including the process for smoothing the time series (e.g. smoothing data, omitting extreme moves, extrapolating for missing data points etc.). Verify that this process is adequately documented within risk policies and procedures. Obtain evidence of adequate supervisory review and approval around the monthly recut process Understand the time taken to perform the monthly recut and ensure that this meets regulatory expectations.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
	<p>points etc.) is adequately documented.</p> <ul style="list-style-type: none"> - Supervisory review and approval is in place surrounding the monthly recut process - The monthly recut process is performed timely to meet regulatory expectations 	
<p>Time Series Verification Proxy / Extreme Moves</p> <p>Inappropriate data series are used or not all data points are available in the data series.</p>	<p>Where an appropriate time series cannot be found, or does not have adequate data points to be used, documented policies and procedures are in place for selecting proxies or using extreme moves. This includes adequate reporting is in place to support the process</p>	<ul style="list-style-type: none"> • Verify policies and procedures are in place for selecting proxies or using extreme moves and are adequately documented and followed. • For a sample selected, verify reporting is in place to support this process as documented.
G. Trade Transaction Approvals		
<p>Daily Approvals</p> <p>Incomplete and / or inaccurate market risk is reported due to trades being approximately booked / dummy bookings made to aggregate risk or risk managed outside of firm infrastructure</p>	<p>Daily market risk reports require senior traders sign-off. All cancel/correct/dummy trades require supervisory approval. An end-of-day review of trades also requires supervisory approval.</p>	<p>For a sample of days selected:</p> <ul style="list-style-type: none"> • Verify senior trader sign-off of daily market risk reports. • Verify supervisory approval of all cancel/correct/dummy trades • Verify supervisory review of the end-of-day reports.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
<p>New Product Approval</p> <p>Inappropriate risk limit structures and Desk trade mandates may be in place due the evolving portfolio of products being traded by a Desk</p>	<p>Designated risk management groups are required to sign off on new products as part of the new product approval process</p>	<ul style="list-style-type: none"> • Obtain list of all new products approved in the last three months. For sample selected, verify: <ul style="list-style-type: none"> - Verify the designated management group includes all relevant parties, such as MRM, QRM, CRM, Product Control, Middle Office, Legal, Transaction Management, etc. - Any market risk restrictions placed on the new product including VaR limits are implemented by market risk management as detailed during new product process.
<p>Flat Risk Approval</p> <p>Trades are booked in trading books and certain banking books which do not feed down stream for risk reporting purposes, exposing the firm to unmonitored risk</p>	<p>Market risk periodically reviews and signs off on all trading books not feeding VaR calculation for market risk purposes to ensure the books are risk flat</p>	<ul style="list-style-type: none"> • Walkthrough the list of all trading books and certain banking books not feeding into VaR and understand the rationale as to why they are not feeding VaR. • For a sample selected, verify market risk management review the book quarterly to ensure books are risk flat. In addition, verify more frequent reviews by desk head/Product Control to ensure the positions in the accounts are valid.
<p>Manual Adjustment Approval</p> <p>Unauthorized manual adjustments are made on VaR exposures reported to Desk and Senior Management</p>	<p>Review and signoff of all manual adjustments by appropriate management with appropriate commentary describing the adjustment</p>	<ul style="list-style-type: none"> • For a sample of manual adjustments selected, verify management review sign-off with appropriate commentary description attached.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
H. Trade Model Usage / Implementation		
Risk Limit Monitoring Tools Risk limit monitoring tools do not capture individual trader/desk VaR correctly	Risk limit monitoring tools are in place to capture individual trader/desk VaR and to facilitate the comparison of exposures against limits, escalate excesses and record approvals. As such: <ul style="list-style-type: none"> - Data is directly fed from the risk management system to ensure accuracy. - Limits have assigned approvers. - The approver is only able to approve a limit excess for a maximum of 10 days before actions must be taken. - Limit metrics are reviewed by the appropriate function daily and as part of quarterly review. - Limit documentation provides a comprehensive audit trail. 	<ul style="list-style-type: none"> • For a sample of trades, <ul style="list-style-type: none"> ○ Verify that data, e.g. risk limits and VaR, agrees to the risk management system ○ Verify that all limits have approvers assigned and that approvers are appropriate and up to date. ○ Verify that for limits approved for more than 10 days, that action has been taken ○ Verify that limit metrics are reviewed daily and as part of a quarterly review ○ Verify the existence of a comprehensive audit trail
Trader Risk Limit Breach Limit breaches are not reported to the relevant trader/desk manager on a timely basis. Explanations and approvals for limit breaches are inadequate and/or are not provided on a timely basis.	Resolution of trader risk limit breaches are reported timely and approved by the appropriate committee or independent party.	<ul style="list-style-type: none"> • Review the process in place to monitor all limit breaches and follow up on any unauthorized exceptions • For a sample of limit breaches, based on discussions with market risk analysts, ascertain how they obtain their understanding for why limit breaches have arisen. Verify that the resolution is reported and approved by the appropriate committee or independent party.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
Unresolved Trader Risk Limit Breach Unresolved trader limit breaches are not escalated to senior management.	Unresolved trader limit breaches are escalated to senior management on a timely basis as defined in the escalation process documentation.	<ul style="list-style-type: none"> Obtain the escalation process documentation and review the process for escalating unresolved trader limit breaches. For a sample of unresolved limit breaches, verify timely escalation to management and implementation of resolution.
I. Trade Valuations		
Valuation Governance The firm does not have an adequate process to ensure that positions are valued completely and accurately.	The firm has formalized valuation governance processes and controls (e.g. independent price verification and valuation model approval, validation and usage controls) in place that ensure that positions are valued completely and accurately.	<ul style="list-style-type: none"> Verify the firm's valuation governance processes and related controls are in place for the activities/ positions that fall within the scope of the market risk management controls under review. Ensure that roles and responsibilities are clearly defined for the operation of valuation controls and that issues (e.g. related to independent price verification) are escalated for consideration in the context of market risk management/ verification. In addition to governance structure, verify valuation methodology is up to date, accurate and fully documented and that the valuation models have been subject to independent validation. Where required, for a sample of trade types, verify that positions are valued completely and accurately.
J. Risk Model Usage/Implementation/Change Management		
Data Quality Review Data quality issues are not adequately escalated and issues are not resolved timely.	A governance forum surrounding the market risk data quality metrics meets bi-weekly where key personnel from the risk team discusses the data quality issues highlighted in the market risk control report. Issues are escalated and tracked in the forum.	<ul style="list-style-type: none"> Ascertain there is sufficient representation on governance forum from business management. Obtain and review a sample of the meeting minutes of the market risk control report and ascertain: <ul style="list-style-type: none"> Issues in the market risk control reports have been sufficiently discussed

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
	<p>There is policy documentation to acknowledge and address data regulatory requirements.</p>	<ul style="list-style-type: none"> - Action items including those to address data regulatory requirements are tracked and monitored for timely resolution - Delays in past due items have been adequately justified - Trends such as unusual trends or deterioration in metrics (e.g. late feeds, regressions, un-run macros) have been discussed.
<p>Significant Risk Factors</p> <p>Significant risk factors associated with a model are not identified by risk management and thus are not monitored with appropriate limits set</p>	<p>The appropriate function performs model validation which involves a detailed review of the key risk factors associated with a model. These risk factors such as the following are documented and communicated to risk management for inclusion in limit setting and monitoring processes.</p> <ul style="list-style-type: none"> - Interest rates and their volatilities - Foreign exchange rates and their volatilities - Currency basis rates (between other currencies) - Interest rate – Foreign exchange correlations 	<ul style="list-style-type: none"> • Identify all products requiring quantitative models for risk management • Obtain all appropriate documentation to support the validation of the underlying model to each product selected • Assess if documentation clearly identifies key risk factors • Review t+1 risk reporting to ensure all risk factors identified are included for exposure monitoring • Determine whether risk managers are aware of any model limitations and opaque parameters identified

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
Market Risk Exposures Market risk is unaware of the potential impact on market risk exposures due to late trade bookings, cancels and amends.	Market risk reviews late trades, cancels and amends metrics, and considers the potential impact on market risk exposures. In addition management documents the decision on whether the impact of such trades is material or immaterial on VaR.	<ul style="list-style-type: none"> • Sample significant cancelled, amended and late trade adjustments. Inspect documentation of decision as to whether these have a significant impact on VaR. • Obtain support for material adjustments including documented explanations and assess appropriateness of conclusion made by market risk management
Economic Capital (EC) Development EC is not accurately calculated	<ul style="list-style-type: none"> - Economic Capital (EC) is accurately calculated: Processes and systems are in place for the calculation of EC - Calculations are reviewed and approved by Management to validate the accuracy and completeness of the manual procedures - Internal controls of systems are monitored and approved by management to validate the models and time series used for the development of the EC numbers 	<ul style="list-style-type: none"> • Understand the processes and systems required for the development of EC. Where strategic systems are not used understand manual controls in place and plans for migration to strategic systems. Review the soundness of EC model and make sure the methodology is in line with company's risk appetite and regulatory expectations. • Verify management's review and approval of manual controls. • Verify management monitoring and review of system controls.
Consolidated EC Consolidated EC numbers are not complete and accurate	Management reviews and approves reconciliations and reports that ensure the consolidated EC numbers are complete and accurate	<ul style="list-style-type: none"> • Review and document the process for consolidating EC numbers into the aggregate EC numbers • Review reconciliations and reports (both within and outside the risk system) in place to ensure the consolidated EC numbers are complete and accurate and rollup into the correct level of sensitivities.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
K. Financial and Regulatory Reporting		
Legal Entity Reporting Consolidated risk management reports are not produced with a legal entity focus to support regulations	There is reporting and governance in places to manage and monitor the business at a legal entity level including: <ul style="list-style-type: none"> - Governance process is in place to ensure that the business can be adequately managed at a legal entity level - Market risk reports are produced at the legal entity level 	<ul style="list-style-type: none"> • Obtain and understand governance in place to ensure that the business can be adequately managed at a legal entity level. • Verify market risk reports produced per governance in place. Choose a sample of reports and trace back to the source.
Consolidated Risk Based P&L Consolidated Risk Based P&L numbers are not complete and accurate	Process documentation is in place for consolidating the various business cluster Risk Based P&L numbers into their aggregate Risk Based P&L numbers Reconciliations are reviewed and approved by senior management ensuring that numbers are complete and accurate.	<ul style="list-style-type: none"> • Review the process documentation for consolidating the various business cluster Risk Based P&L numbers into their aggregate Risk Based P&L numbers for internal, legal entity and other reporting requirements • Select a sample and review for completeness and accuracy. • Verify that senior management reviews and approves reconciliations to ensure that numbers are complete and accurate.
L. Stress Testing & Scenario Analysis		
Stress Testing Scenarios Stress testing is not rigorous due to the lack of appropriate scenarios	Senior management is actively involved in selecting the scenarios. The stress testing group has established a methodology, analysis and reporting practice which are clearly documented and approved by Risk Management at least annually.	<ul style="list-style-type: none"> • Obtain the documentation of scenarios and stress factors and ensure that all scenarios have been fully documented. • Verify regular senior management review and approval of the scenarios document (i.e. Committee meeting minutes). • Obtain a walkthrough of the process of scenario setting / scenario selection, and obtain evidence (e.g. meeting minutes, emails, etc.) of input, challenge and review from senior management and subject matter experts.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
	<p>Directors are kept up-to-date with status of anything agreed with a regulatory agency relating to market risk stress testing.</p>	<ul style="list-style-type: none"> • Ensure regular review and updates to the scenarios to reflect market and economic conditions (through inquiry and inspection of the version control of the scenario document). • Review a sample of daily/weekly/monthly/quarterly scenarios for appropriateness (i.e. coverage of all risk factors, non-linear risk, correlation, skewness, cross-gamma, range of severities, forward-looking, joint and conditional modeling of market and credit risk).
<p>Stress Testing Oversight</p> <p>Management oversight of stress testing is ineffective due to the lack of appropriate reporting</p>	<p>Daily, weekly and monthly stress test results should be reported to the risk managers and Board, with adequate commentary and analysis explaining the movements.</p> <p>Risk managers and senior management provide review and challenge to the stress results and commentary.</p>	<ul style="list-style-type: none"> • For a sample of daily/weekly/monthly/quarterly/annual stress reports, ensure timely distribution of reports to appropriate parties. • For a sample of weekly/monthly/quarterly/annual stress reports, review and ensure appropriate level of commentary and analysis. • For a sample of monthly/quarterly/annual stress reports, ensure capital stress results are distributed in a timely manner to Finance for economic and regulatory capital purposes. • Verify review and challenge of stress results from senior management (e.g. committee presentations /reports /minutes of meeting/emails).
<p>Stress Limit Breach</p> <p>Actions taken as a result of stress tests is ineffective due to the lack of an appropriate limit framework</p>	<p>Stress limit breaches are escalated to the appropriate risk committees where mitigating actions is considered.</p> <p>Senior management uses the stress results in supporting their decisions in areas such as risk appetite, limit</p>	<ul style="list-style-type: none"> • Verify actions taken and key decisions made by senior management as a result of stress testing (e.g. minutes of meetings) is in conformance with regulatory guidance • Determine the extent to which stress testing output is used to support decisions in the following areas: <ul style="list-style-type: none"> - setting of the firm's risk appetite/tolerance;

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
	setting, capital planning and strategic decision-making.	<ul style="list-style-type: none"> - setting exposure limits; - capital and liquidity planning; - longer term business planning and strategic decision-making; - assessing the consistency of risk appetite, business strategy and capital planning; - risk mitigation strategies; and - Contingency planning.
M. Back Testing		
Back Testing Design Back Testing methodologies do not adequately evaluate models.	Senior management reviews and approves back testing methodologies at least annually and as change is required.	<ul style="list-style-type: none"> • Obtain documented methodologies for back testing and verify senior management's review and approval. • For a sample of back testing, verify that the approved methodology is followed.
Back Testing Policies & Procedures Back testing procedures do not meet regulatory requirements.	The organization has a standard back testing policy which is compliant with regulatory requirements. The policy is reviewed and approved by senior management annually and as required.	<ul style="list-style-type: none"> • Obtain the policy for back testing of VaR results and verify senior management review and approval. • Ensure that policy is accurately reflected in the back testing methodology document • Confirm that back testing methodology is in compliance with applicable regulatory requirements.
Back Testing Calculations VaR Back testing calculations are not performed in accordance with regulatory requirements	Senior management reviews and signs-off on a periodic compliance review to ensure that the VaR back testing calculations are performed in accordance with the different requirements by each regulator.	<ul style="list-style-type: none"> • Confirm that there is a process to monitor changes to regulatory requirements and update the procedures accordingly • Verify senior management's review and sign-off on periodic compliance review of VaR back testing calculations.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
<p>Back Testing Exceptions</p> <p>Exceptions identified have not been investigated.</p>	<p>Management investigates all back testing exceptions and provides commentary describing the cause of the exception. Commentary includes the impact due to P&L movements, trade and market movements and impact on risk/missing risk factors.</p>	<ul style="list-style-type: none"> • Understand the various reporting to communicate back testing exceptions to the appropriate forums monthly. • Verify that back testing exceptions are deemed to have occurred for any business day if the clean profit and loss figure for that business day shows a loss, which in absolute magnitude exceeds the one-day VaR measure for that business day. • Verify that both positive and negative back testing exceptions are identified. • Verify that all exceptions have been analyzed and have adequate commentary describing the cause of the exception. • Review back testing reports produced and ascertain the number of back testing exceptions (positive and negative) that have been identified at each level for the year. At the legal entity level, statistically there should be no more than a specified number of exceptions in the last 250 days. In the event that these figures have been exceeded understand the reasons for such differences and actions taken to address this issue. • Identify specific business clusters with a high number of back testing exceptions and understand the reasons for the high level of exceptions. Ensure that there are plans in place to address these issues including updating the VaR methodology for the business. Verify that decision making is documented in committee minutes.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
<p>Back Testing Reports</p> <p>Reporting of back testing results is not accurate, complete and / or timely.</p>	<p>Procedures to ensure that the reporting of back testing results are performed accurately and completely and on a timely basis to regulators are reviewed and approved at least annually by Risk Management. In addition, Risk Management reviews and approves internal daily back testing reports.</p>	<ul style="list-style-type: none"> • Verify the existence of back testing procedures and that they are reviewed and approved at least annually by risk management. • Understand and document the different regulators that require back testing reporting. For a sample of reports for different regulators ensure that: <ul style="list-style-type: none"> - They meet the back testing requirements for the relevant regulator in terms of content, definition of exceptions and frequency of reporting - Ensure that the reports have been produced and sent to the regulator on the timely basis • For a sample of daily back testing reports verify that they are reviewed and approved by management.
<p>Clean P&L</p> <p>Clean P&L nominals/books are not in line with regulatory requirements, and/or an appropriate change management process is not in place for excluded books</p>	<p>Items excluded (or cleaned) have been reviewed against any regulatory requirements for their appropriateness and any deviations have been explained and approved formally.</p> <p>Changes to the exclusions are requested and approved per the policy (e.g., approval by the controller if in line with allowable exclusions per the policy, or approval by the head of regional product control where it is not an 'allowable exclusion' per the policy).</p>	<ul style="list-style-type: none"> • Obtain policy detailing definition of allowable exclusions for nominal's/book's. Approval of policy should be demonstrated in the minutes of the relevant committee meeting. • Obtain the list of nominal's/books excluded and compare to the regulatory requirements. Where there are differences investigate whether these are 'allowable' per the policy and how it was approved (i.e. in the risk committee for the policy). • Select a sample of changes made after the process went live and ensure that they have been appropriately approved (i.e. email from Finance to IT) BEFORE they have been adjusted for in the system. • Review monitoring controls to validate the clean P&L calculation.

SIFMA Internal Audit Guidelines for Market Risk Management

Risks to be Managed	Types of Controls to Manage/Eliminate Risks	Potential Audit Work Steps
N. Regulatory Requirements/Expectations		
<p>Regulatory Requirements</p> <p>The Firm fails to comply with regulatory requirements (e.g., FINRA, FSA, SEC, local regulators).</p>	<p>A dedicated market risk regulatory team monitors all regulatory requirements and ensures that the firm's procedures comply with such requirements. This team also coordinates with market risk management for all regulatory meetings, and interactions. The dedicated market risk regulatory team ensures new and existing regulatory requirements are met by performing a documented analysis of regulatory requirements and that required changes are implemented to resolve identified gaps.</p>	<ul style="list-style-type: none"> • Through discussions with the regulatory team, obtain an understanding of all regulations in all jurisdictions that have specific requirements for market risk. • Understand whether there have been any recent regulatory examinations, significant letters from regulators that have been performed/received for market risk. Understand the outcomes, actions and conclusions from such interactions. Understand where there have been projects put in place to address any actions occurring. Document and review the status of such projects. • Verify documented analysis of the dedicated market risk regulatory team along with resolution of identified gaps.



Internal Auditors Society

III. Glossary

SIFMA Internal Audit Guidelines for Market Risk Management

III. GLOSSARY

The definitions in this section shall apply to the terms used in the guideline. Where terms are not defined in this section or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used.

Back Office (BO)	The operations area of a brokerage office, containing the book-keeping, margin, purchase and sales, cashiers, and dividend departments. The back office function generally supports trading thorough trade reconciliations, confirmations, settlement, and recordkeeping.
Back testing	Back testing is the process of comparing forecasted losses with actual losses. It is intended to act as one of the mechanisms for the ongoing validation of a firm's VaR model and to provide incentives for firms to improve their VaR measures.
BIS	The mission of the Bank for International Settlements (BIS) is to serve central banks in their pursuit of monetary and financial stability, to foster international cooperation in those areas and to act as a bank for central banks.
Breach	Violation of valid limits established, e.g. stress limit breach or flag breach.
Commodity Risk	Commodity Risk is the risk that commodity prices (i.e., grains, metals, etc.) will change.
Credit Risk	The risk of loss stemming from a borrower's failure to repay a loan or otherwise meet a contractual obligation.
Currency Risk	Currency Risk is the risk that foreign exchange (FX) rates will change.
DTC	The Depository Trust Company (DTC) is a depository for eligible securities that facilitates clearance between member organizations and banks without the necessity of receiving or delivering actual certificates. DTC is a subsidiary of DTCC.
DTCC	The Depository Trust & clearing Corporation (DTCC) is the holding company for the DTC and NSCC. For more than 35 years, the DTC's families of companies have helped automate, centralize, standardize and streamline processes that are critical to the safety and soundness of the capital market.
Equity Risk	Equity Risk is the risk that stock prices will change.
Enterprise Capital (EC)	The Enterprise Capital (EC) models measure the amount of capital required to absorb losses from extremely unlikely events over long time horizons. For example, typical EC models use confidence intervals of up to 99.97 percent (versus 95 to 99 percent for VaR models) and horizons of up to one year (versus one to 10 days for VaR models). EC calculations account not just for market risk, but also for credit and operational risks, and may make provision for liquidity, legal, and reputational risks
EuroCCP	European Central Counterparty Limited (EuroCCP) is the European subsidiary of DTCC that provides equities clearing services on a pan-European basis.

SIFMA Internal Audit Guidelines for Market Risk Management

Financial Risk	The probability that the actual return on a business or investment will be less than the expected return.
Financial Risk Management	The process of evaluating and managing current and possible financial risk at a firm as a method of decreasing the firm's exposure to the risk. Financial risk managers must identify the risk, evaluate all possible remedies, and then implement the steps necessary to alleviate the risk. The forms of risk include Market Risk, Liquidity Risk and Credit Risk.
FINMA	Swiss Financial Market and Supervisory Authority (FINMA) provides guidelines for financial market clients which strengthens confidence in the integrity and competitiveness of Switzerland's financial center.
Flag Tool	A mechanism that identifies and reports items such as exceptions or anomalies.
Foreign Currency (FX)	A currency other than the functional currency of the entity being referred to (e.g., the dollar could be a foreign currency for a foreign entity).
GARP	Global Association of Risk Professionals is a global leader in financial risk testing and certification programs, and education and training activities.
Governance	The overall management approach through which senior executives direct and control the entire organization, using a combination of management information and hierarchical management control structures. Governance activities ensure that critical management information reach the executive team is sufficiently complete, accurate and timely to enable appropriate management decision making, and provide control mechanisms to ensure that strategies, directions and instructions from management are carried out systematically and effectively.
GSD	The Government Securities Division (GSD) of the Fixed Income Clearing Corporation (FICC) provides Real-Time Trade Matching (RTTM), clearing, risk management, and netting for trades in US Government debt issues, including repurchase agreements or repos. Securities transactions processed by FICC's Government Securities Division include Treasury bills, bonds, notes, zero-coupon securities, government agency securities, and inflation-indexed securities.
Inflation Risk	The risk that the value of assets or income will decrease as inflation shrinks the purchasing power of a currency.
Interest Rate Risk	The risk that changes in the levels of interest rates will adversely impact the value of an investment or the profitability of a business.
KPI	Key Performance Indicators shed insight about risk events that have already effected the organization.
KRI	Key Risk Indicators monitor potential future shifts in risk conditions or new emerging risks so that management and boards are able to more proactively identify potential impacts on the organization's portfolio of risk.
Liquidity Risk	The risk stemming from the lack of marketability of an investment that cannot be bought or sold quickly enough to prevent or minimize a loss.

SIFMA Internal Audit Guidelines for Market Risk Management

Market Risk	The potential loss resulting from changes in the value of assets and liabilities due to declining prices in the financial market. It includes four standard market risk factors: Equity Risk, Interest Risk, Currency Risk, and Commodity Risk. Market risk is typically measured using a Value at Risk (VaR) methodology
Market Risk Limits	Market Risk Limits are established limits suited to each operation and each risk category by examining the details of operations of the various divisions and taking into consideration the position of each division. These limits include risk limits, position limits, loss control limits, etc.
NSCC	The National Securities Clearing Corporation is a subsidiary of the DTCC that provides trade processing, clearance, delivery, and settlement services to its members. It deals with brokers, dealers, and banks in the United States and Canada.
PRMIA	Professional Risk Managers' International Association (PRMIA) is a non-profit professional association. PRMIA's mission is to provide a free and open forum for the promotion of sound risk management standards and practices globally.
Risk	The likelihood of specified undesired event occurring within a specified period or in specified circumstances.
Risk Management	The set of processes through which management identifies, analyzes and, where necessary, responds appropriately to risks that might adversely affect realization of the organization's business objectives. Organizations routinely manage a wide range of risks (e.g. technological risks, commercial/financial risks, information security risks, legal risks and compliance risks).
Risk Profile	The relationship of how the overall value of a company changes as certain financial price variables change. A risk profile determines the sensitivity of a company to a change in interest rate, FX rates or commodity prices, typically measured by the company's equity value or stock price.
Scenario Testing	Scenarios Testing test the effect of adverse movements in market volatilities and correlations and the effect of any change in the assumptions underlying the VaR model.
Specific Risk	Specific Risk measures the risk of a decrease in one's investment due to a change in a specific industry or section, as opposed to a market-wide move.
Stress Testing	Stress testing estimates potential economic losses of a portfolio in abnormal markets and provides a more comprehensive picture of risk. A firm must periodically and actively identify all the worst case scenarios that are relevant to its portfolio. Stress testing results must be used to evaluate its capacity to absorb such losses or identify steps to be taken to reduce risk; and communicated routinely to senior management and periodically to the governing body.
Systematic Risk	The risk inherent to an entire market or market segment.
Time Series	A set of observations, results, or other data obtained over a period of time, usually at regular intervals: daily, monthly, quarterly.

SIFMA Internal Audit Guidelines for Market Risk Management

Unsystematic Risk	Company or industry specific risk that is inherent in each.
Value-at-Risk (VaR)	A technique which uses the statistical analysis of historical market trends or Monte Carlo simulations and volatilities to estimate the likelihood that a given portfolio's losses will exceed a certain amount. .

The Audit Guidelines (the "guidelines") are intended to provide members of the Internal Auditors Society ("IAS"), an affiliate of the Securities Industry and Financial Markets Association ("SIFMA") with information for the purpose of developing or improving their approach towards auditing certain functions or products typically conducted by a registered broker-dealer. These guidelines do not represent a comprehensive list of all work steps or procedures that can be followed during the course of an audit and do not purport to be the official position or approach of any one group or organization, including IAS or any of its divisions or affiliates. Neither IAS, nor any of its divisions or affiliates, assumes any liability for errors or omissions resulting from the execution of any work steps within these guidelines or any other procedures derived from the reader's interpretation of such guidelines. In using these guidelines, member firms should consider the nature and context of their business and related risks to their organization and tailor the work steps accordingly. Internal auditors should always utilize professional judgment in determining appropriate work steps when executing an audit.