

Oracle Financial Services Market Risk Measurement and Management

User Guide

Release 8.0.5.0.0

Part Number: E88120-01

ORACLE®
Financial Services

**Oracle Financial Services Market Risk Measurement and Management User Guide:Release
8.0.5.0.0**

Oracle Financial Services Market Risk Measurement and Management User Guide, Release 8.0.5.0.0

E88120-01

Copyright © 2017, Oracle and/or its affiliates. All rights reserved.

Primary Author: Vineeta Mishra

Contributors: Hirak Patel and Vivek Choudhary

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark of The Open Group.

This software and related documentation are provided under a license agreement containing restrictions on use and disclosure and are protected by intellectual property laws. Except as expressly permitted in your license agreement or allowed by law, you may not use, copy, reproduce, translate, broadcast, modify, license, transmit, distribute, exhibit, perform, publish, or display any part, in any form, or by any means. Reverse engineering, disassembly, or decompilation of this software, unless required by law for interoperability, is prohibited.

The information contained herein is subject to change without notice and is not warranted to be error-free. If you find any errors, please report them to us in writing. If this is software or related documentation that is delivered to the U.S. Government or anyone licensing it on behalf of the U.S. Government, the following notice is applicable:

U.S. GOVERNMENT END USERS: Oracle programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, delivered to U.S. Government end users are "commercial computer software" pursuant to the applicable Federal Acquisition Regulation and agency-specific supplemental regulations. As such, use, duplication, disclosure, modification, and adaptation of the programs, including any operating system, integrated software, any programs installed on the hardware, and/or documentation, shall be subject to license terms and license restrictions applicable to the programs. No other rights are granted to the U.S. Government.

This software or hardware is developed for general use in a variety of information management applications. It is not developed or intended for use in any inherently dangerous applications, including applications that may create a risk of personal injury. If you use this software or hardware in dangerous applications, then you shall be responsible to take all appropriate fail-safe, backup, redundancy, and other measures to

ensure its safe use. Oracle Corporation and its affiliates disclaim any liability for any damages caused by use of this software or hardware in dangerous applications.

This software or hardware and documentation may provide access to or information on content, products, and services from third parties. Oracle Corporation and its affiliates are not responsible for and expressly disclaim all warranties of any kind with respect to third-party content, products, and services. Oracle Corporation and its affiliates will not be responsible for any loss, costs, or damages incurred due to your access to or use of third-party content, products, or services.

TABLE OF CONTENTS

ABOUT THE GUIDE	XI
SCOPE OF THE GUIDE	XI
DOCUMENTATION ACCESSIBILITY	XI
ACCESS TO ORACLE SUPPORT	XI
1 INTRODUCTION TO ORACLE FINANCIAL SERVICES MARKET RISK MEASUREMENT AND MANAGEMENT	16
1.1 Overview of OFS MRMM	16
1.2 Process Flow.....	17
1.3 Components of OFS Market Risk Measurement and Management.....	18
2 GETTING STARTED WITH OFS MRMM	20
2.1 Logging in to OFS MRMM Application	20
2.2 Managing OFS MRMM	22
2.3 Common User Interface Functionalities	24
2.3.1 Search	24
2.3.2 Sorting Objects	24
2.3.3 Deleting an Object.....	25
2.3.4 Changing the Layout.....	25
2.3.5 Exporting a Portfolio.....	25
3 OVERVIEW OF OFSAA INFRASTRUCTURE COMPONENTS	26
4 OFSAA RATE MANAGEMENT – CURRENCIES	27
4.1 Currencies.....	27
4.1.1 Search Container	27
4.1.2 Currencies Container	28
4.1.3 Currencies Summary Grid.....	28
4.1.4 Editing Currencies.....	29
4.1.5 Adding Currencies.....	29
4.1.6 Deleting Currencies.....	29
5 HOLIDAY CALENDAR	30
5.1 Overview of Holiday Calendars	30
5.1.1 Searching for a Holiday Calendar.....	30
5.1.2 Creating a Holiday Calendar	31

5.1.3	Executing Holiday Calendar	33
5.1.4	Holiday Exceptions.....	34
5.1.5	Excel Import/ Export.....	35
6	APPLICATION PREFERENCES	36
6.1	Overview	36
6.2	Understanding Application Preferences.....	36
6.3	Dimension and Hierarchy Configuration.....	37
6.3.1	Configuring Dimensions	37
6.3.2	Configuring Hierarchies.....	38
6.4	Default Configurations.....	39
6.4.1	Currency	39
6.4.2	Currency Pair	41
6.4.3	Model and Method	43
6.4.4	Model Parameters.....	44
6.4.5	Instrument Type Classification	46
6.4.6	Liquidity Horizon	47
7	BUSINESS CONFIGURATIONS.....	50
7.1	Overview	50
7.2	Understanding Business Configuration Settings	50
7.3	Portfolio Definition	51
7.3.1	Defining a Portfolio.....	51
7.3.2	Viewing a Portfolio	55
7.3.3	Editing a Portfolio.....	55
7.3.4	Copying a Portfolio.....	55
7.4	Modellable and Non-Modellable Risk Factor.....	56
7.4.1	Defining Modellable and Non-Modellable Risk Factors.....	56
8	INSTRUMENT VALUATION	65
8.1	Overview	65
8.2	Creating and Executing a Business Definition	65
8.2.1	Defining a Business Approach	65
8.2.2	Defining a New Business Definition.....	67
8.2.3	Procedure for Creating a Business Definition in Instrument Valuation	72
9	MARKET RISK – HISTORICAL SIMULATION	75
9.1	Overview	75

9.2	Creating and Executing a Business Definition	75
9.2.1	Defining a Business Approach	75
9.2.2	Defining a New Business Definition	76
9.2.3	Procedure for Creating a Business Definition in Market Risk Historical Simulation	85
10	MODEL VALIDATION.....	88
10.1	Overview	88
10.2	Creating and Executing a Business Definition	88
10.2.1	Defining a Business Approach	88
10.2.2	Defining a New Business Definition.....	89
10.2.3	Risk Theoretical and Hypothetical Definition.....	90
10.2.4	Model Parameters.....	91
10.2.5	Model Acceptance Criteria	92
10.2.6	Exception Probability and Multiplier	93
10.2.7	Zone Classification.....	95
10.2.8	Procedure for Creating a Business Definition in Model Validation.....	95
10.3	Model Performance Outputs	98
11	ANNEXURE A: DETAILS OF MARKET DATA	101
12	ANNEXURE B: APPROVAL WORKFLOW.....	107
12.1	Overview	107
12.2	Understanding Approval Work Flow.....	107
13	ANNEXURE C: LIST OF INSTRUMENTS.....	110
14	ANNEXURE D: LIST OF MODELS AND METHODS.....	112
15	ANNEXURE E: MR REPORTS.....	118

TABLE OF FIGURES

Figure 1 MRMM Process Flow.....	17
Figure 2 OFSAAI Login Window	20
Figure 3 OFSAAI Landing Page	21
Figure 4 MRMM Landing Page	22
Figure 5 MRMM Home Screen	23
Figure 6 MRMM Business Processes.....	24
Figure 7 MRMM Common Screen Elements	24
Figure 8 Rate Management - Currencies Summary Screen.....	27
Figure 9 Holiday Calendar Summary Screen	31
Figure 10 Holiday Calendar-Excel Import/Export for Adding Calendar Definitions	33
Figure 11 Holiday Calendar – Excel Import/Export for Adding Calendar Exceptions.....	35
Figure 12 Application Preferences	36
Figure 13 Dimension Configuration	37
Figure 14 Hierarchy Configuration	38
Figure 15 Default Configurations - Currency	40
Figure 16 Default Configurations – Currency Pair	42
Figure 17 Default Configurations – Model and Method	43
Figure 18 Default Configurations – Model Parameters.....	45
Figure 19 Default Configurations – Instrument Type Classification.....	46
Figure 20 Default Liquidity Horizon Values as Specified in BCBS d352	48
Figure 21 Default Configurations - Liquidity Horizon	49
Figure 22 Business Configurations	50
Figure 23 Business Configurations – Portfolio Definition Summary Screen.....	52
Figure 24 Business Configurations – Portfolio Definition Based on Instruments	53
Figure 25 Business Configurations – Portfolio Definition Based on Hierarchy.....	54
Figure 26 Portfolio Definition – Copying a Portfolio	56
Figure 27 Modellable and Non-Modellable Risk Factor Identification Summary Screen	57
Figure 28 Modellable and Non-Modellable Risk Factor Identification- Setting Rules.....	61
Figure 29 Modellable and Non-Modellable Risk Factor Identification- Adding Attributes.....	62
Figure 30 Modellable and Non-Modellable Risk Factor Identification – Adding Dimensions to Attributes	63
Figure 31 Instrument Valuation Summary Screen	66
Figure 32 Instrument Valuation – New Business Approach	66
Figure 33 Instrument Valuation – Business Definition Screen.....	68

Figure 34 Instrument Valuation – Execution Summary	69
Figure 35 Instrument Valuation – Pricing policy Download	69
Figure 36 Instrument Valuation – Defining a Pricing Policy	70
Figure 37 Instrument Valuation- Defining a Pricing Policy.....	71
Figure 38 Instrument Valuation - Scenario	71
Figure 39 Instrument Valuation – Adding the Baseline Scenario	72
Figure 40 Market Risk – Historical Simulation Summary Screen	76
Figure 41 Market Risk Historical Simulation – Business Definition Screen.....	76
Figure 42 Historical Simulation – Execution Summary.....	77
Figure 43 Risk Factor Reduced Set Identification - Download	77
Figure 44 Risk Factor Reduced Set Identification - Define	78
Figure 45 Defining Risk Factor Reduced Set.....	78
Figure 46 Stress Period Identification	79
Figure 47 VaR Model Parameters	80
Figure 48 Analyze By	82
Figure 49 Output Metrics.....	82
Figure 50 Market Risk Historical Simulation – New Business Definition	85
Figure 51 Model Validation Summary Screen	88
Figure 52 Model Validation – Business Definition Screen	89
Figure 53 Model Validation – Execution Summary.....	90
Figure 54 Risk Theoretical and Hypothetical Definition	90
Figure 55 Model Parameters.....	91
Figure 56 Model Acceptance Criteria.....	92
Figure 57 Exception Probability and Multiplier.....	93
Figure 58 Adding Exception Probability and Multiplier	94
Figure 59 Zone Classification	95
Figure 60 Business Definition – Model Validation	96
Figure 61 Approval Workflow	107

TABLE OF TABLES

Table 1 OFSAAI Landing Page.....	22
Table 2 Fields and their Descriptions in Dimension Configuration	38
Table 3 Fields and their Descriptions in Hierarchy Configuration.....	39
Table 4 Fields and their Descriptions in Currency Window	41
Table 5 Fields and their Descriptions in Currency Pair Window.....	42
Table 6 Fields and their Descriptions in Model and Method Window	44
Table 7 Fields and their Descriptions in Model Parameters Window	45
Table 8 Fields and their Descriptions in Instrument Type Classification Window	47
Table 9 Fields and their Descriptions in Portfolio Definition Window	53
Table 10 Fields and their Descriptions in New Business Approach Window	67
Table 11 Fields and their Descriptions in Instrument Valuation-Business Definition Window.....	73
Table 12 Fields and their Descriptions in Historical Simulation-Business Definition Window	86
Table 13 Fields and their Descriptions in Model Validation-Business Definition Window	97
Table 14 Expected Logical Quote Structure for Market Data	106
Table 15 Logical Quote Structure for Fixing Data.....	106
Table 16 List of Instruments.....	111
Table 17 List of Models and Methods	117

DOCUMENT CONTROL

Version Number	Revision Date	Changes Done
1.0	Created November 2017	Captured updates for 8.0.5.0.0 release

This document provides a comprehensive knowledge about the user interface and functionalities in Oracle Financial Services Market Risk Measurement and Management, Release 8.0.5.0.0. The latest copy of this guide can be accessed from [OHC Documentation Library](#).

ABOUT THE GUIDE

This section provides a brief description of the scope, the audience, the references, the organization of the user guide and conventions incorporated into the user guide. The topics in this section are organized as follows:

- [Scope of the guide](#)
- [Intended Audience](#)
- [Documentation Accessibility](#)
- [Access to Oracle Support](#)
- [Related Information Sources](#)

SCOPE OF THE GUIDE

The Oracle Financial Services Market Risk Measurement and Management User Guide Release 8.0.5.0.0 contains all the essential information for the user to make full use of application. It includes description of the system functions and capabilities and details the step-by-step process for system access and use.

INTENDED AUDIENCE

Welcome to release 8.0.5.0.0 of the Oracle Financial Services Market Risk Measurement and Management Analytics User Guide. This manual is intended for the following audience:

- Trading Desk Manager: This user monitors the performance of the investment and trading portfolios of a trading desk using varied tools.
- Business Analysts: This user reviews the functional requirements and information sources, like reports.
- Manager - Finance and Manager – Risk: This user analyzes and evaluates output metrics which will help them restructuring there portfolio in accordance to business needs.
- Administrator: This user manages system access, data load process and setup data.

DOCUMENTATION ACCESSIBILITY

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc>.

ACCESS TO ORACLE SUPPORT

Oracle Financial Services Market Risk Measurement and Management User Guide

Release 8.0.5.0.0

Oracle customers have access to electronic support through My Oracle Support. For information, visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info> or visit <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

RELATED INFORMATION SOURCES

You can access the below documents online from the documentation Library for [OFS MRMM 8.0.5](#):

- Oracle Financial Services Market Risk Measurement and Management Analytics User Guide Release 8.0.5.0.0
- Oracle Financial Services Market Risk Measurement and Management Installation Guide Release 8.0.5.0.0

You can access the OFS AAI documentation online from the documentation library for [OFS AAI 8.x](#):

- OFS Advanced Analytical Applications Infrastructure (OFS AAI) Application Pack Installation and Configuration Guide
- OFS Analytical Applications Infrastructure User Guide

The additional documents are:

- [OFS Analytical Applications Infrastructure Security Guide](#)
- [OFSAAI FAQ Document](#)
- [OFS Analytical Applications 8.0.5.0.0 Technology Matrix](#)

HOW THIS GUIDE IS ORGANIZED

This guide includes the following chapters:

- [Introduction to Oracle Financial Services Market Risk Measurement and Management](#)
- [Getting Started with OFS MRMM](#)
- [Overview of OFSAA Infrastructure Components](#)
- [OFSAA Rate Management – Currency](#)
- [Holiday Calendar](#)
- [Application Preferences](#)
- [Business Configurations](#)
- [Instrument Valuation](#)
- [Market Risk – Historical Simulation](#)
- [Model Validation](#)
- [Annexure A: Details of Market Data](#)
- [Annexure B: Approval Workflow](#)

- [Annexure C: List of Instruments Types](#)
- [Annexure D: List of Models and Methods](#)
- [Annexure E: List of MR Reports](#)

ABBREVIATIONS

Abbreviation	Description
CAS	Cross Asset Server
CVA	Credit Valuation Adjustment
DM	Data Model
DRC	Default Risk Charge
DVA	Debit Valuation Adjustment
EE	Expected Exposure
ENE	Expected Negative Exposure
EOD	End of Day
EPE	Expected Positive Exposure
ES	Expected Shortfall
FRTB	Fundamental Review of Trading Book
FVA	Funding Valuation Adjustment
IMA	Internal Models Approach
IMCC	Internally Modelled Capital Charge
MRF	Modellable Risk Factor
MRMM	Market Risk Measurement and Management
NMRF	Non-Modellable Risk Factor
OFSA	Oracle Financial Services Analytical Applications
OFSAI	Oracle Financial Services Analytical Applications Infrastructure
P&L	Profit and Loss
PFE	Positive Future Exposure
RF	Risk Factor
SES	Stressed Capital Add-on
VaR	Value at Risk

1 Introduction to Oracle Financial Services Market Risk Measurement and Management

This chapter provides an introduction to Oracle Financial Services Market Risk Measurement and Management (OFS MRMM) application. This chapter includes:

- [Overview of OFS MRMM](#)
- [Process Flow](#)
- [Components of OFS MRMM](#)

1.1 Overview of OFS MRMM

Market Risk is the risk of losses in on-balance sheet and off-balance sheet positions arising from changes to factors such as interest rates, currency exchange rates, equity prices, inflation, and so on. Banks and financial institutions must manage market risk from both regulatory and non-regulatory perspectives. From a regulatory perspective, market risk stems from all the positions included in the banks trading book and from commodity, foreign exchange risk positions in the whole balance sheet.

OFS MRMM enables banks to accurately measure, evaluate, monitor and manage Market Risk (MR). Additionally, it enables banks to proactively comply with the regulatory requirements of capital calculation as per the Internal Models Approach (IMA). This solution combines OFSAA's deep expertise with analytics of Numerix ([Numerix Cross Asset Server](#)) to ensure that all the critical elements of a market risk program from pricing, valuations, risk assessment, monitoring and management, stress testing to data governance, data storage, and final regulatory submissions are fully addressed.

OFS MRMM enables banks and financial institutions to comply with the latest market risk capital regulations such as Fundamental Review of Trading Book (FRTB). MRMM uses Numerix Cross Asset Server 4.1.0 and includes the models and methods to price instruments and derive historical Value-at-Risk (VaR).

OFS MRMM includes these three integrated components:

- Instrument Valuation
- Market Risk - Historical Simulation
- Model Validation

1.2 Process Flow

The process flow of OFS MRMM solution is as follows.

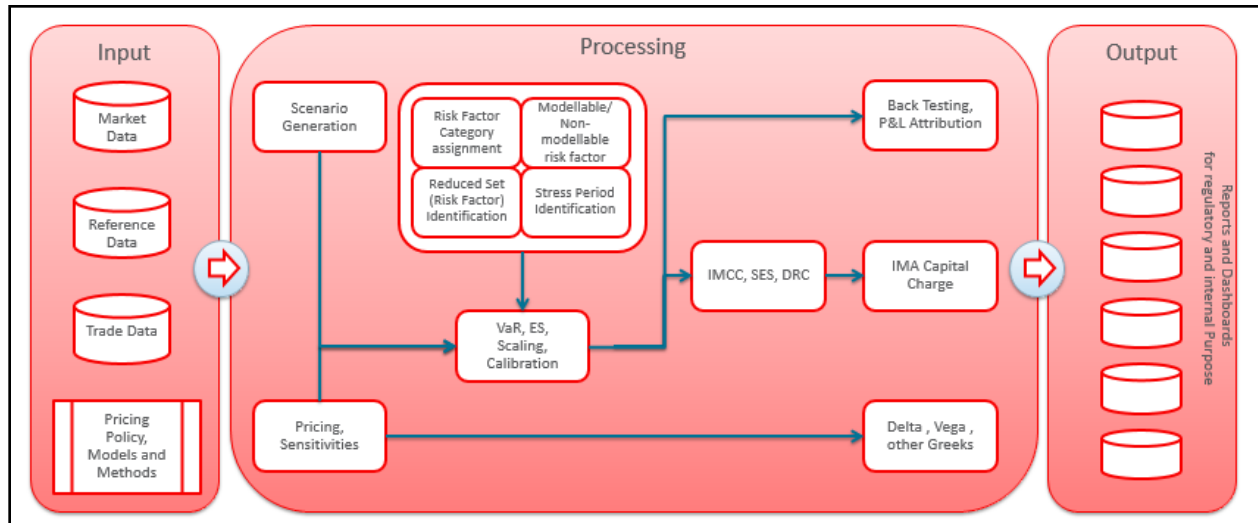


Figure 1 MRMM Process Flow

The process flow is explained below.

1. Input Data Requirement: The following types of data are expected as input to the solution:

- **Trade Data:** This is data of on and off balance sheet positions, settled and unsettled trades/deals belonging to trading book that you want to price and calculate risk measures. For example: data of bonds in which investment has been made, or swap transactions entered with counterparty.
- **Reference Data:** These are dimensions and attributes that describe the trade data. These are used to define business rules and view reports. For example: Product, Legal Entity, Currency, Netting Agreement, and Credit Support Annex.
- **Market Data:** These are price quotes, yield curves, volatility surface and other forms for financial market data which are supplied by designated agencies such as Bloomberg, Reuters and various exchanges or market makers. For example: Interest Rate Curve, Equity prices, Foreign Exchange spot and forward rates and so on.

2. User Configurations (Processing): To process the above data and achieve desired results such as price of a trade or capital requirement for trading book there are some minimum system configurations that you are expected to perform as below.

- **Application preferences**
 - **Dimension and Hierarchy configuration:** In this section you need to select the dimension that must be available for further configurations in MRMM and select the hierarchy for each selected dimension. The hierarchy must be pre-defined in Dimension Management.

See Dimension Management section in OFS Advanced Analytics Infrastructure User Guide on [OHC Documentation Library](#) for details.

- **Default Settings:** This is used to define default values used by various components of MRMM. It includes:
 - Currency
 - Currency Pair
 - Model and Method
 - Model Parameters
 - Instrument Type Classification
 - Liquidity Horizon
- **Business Configuration:** This section is used to define a portfolio and configure rules for identification of modellable and non-modellable risk factors. It includes:
 - Portfolio Definition
 - Modellable and Non-Modellable Risk Factor Identification
- **Business Processes:** This section is used to perform valuation of instruments and positions in a trading book, measure the risk of your portfolio or trading desk using historical simulation and validate the models. It includes:
 - Instrument Valuation
 - Market Risk – Historical Simulation
 - Model Validation
- **Output:** MRMM solution has predefined reports to view and analyse data and results. The reports are presented in multiple dashboards which users are expected to modify as per their specific requirement.

1.3 Components of OFS Market Risk Measurement and Management

This section provides an overview of the functionalities available in various components of MRMM application:

- **Instrument Valuation**

This component delivers the following functionalities:

- Pricing of each trade in a portfolio or part of a trading desk
- Calculation of Greeks for instruments
- Computation of Sensitivities (such as Delta, Vega) as per the regulatory requirements for the FRTB standardized approach

See [Instrument Valuation](#) for details.

- **Market Risk – Historical Simulation**

This component delivers the following functionalities:

- Risk Factor Reduced Set Identification
- Stress Period Identification as per the regulatory requirements for the FRTB IMA
- Historical VaR and Expected Shortfall (ES) from non-regulatory perspective
- Stress calibrated Expected Shortfall as per the regulatory requirements for the FRTB IMA
- Stressed Capital Add-on and Internal Modeled Capital Charge (IMCC) as per regulatory requirements under FRTB IMA

See [Market Risk – Historical Simulation](#) for details.

- **Model Validation**

This component delivers the following functionalities:

- VaR model backtesting
- Actual, Hypothetical and Risk-Theoretical Profit and Loss (P&L) calculation
- Backtesting and P&L Attribution as per requirements under FRTB IMA
- R-Y-G Zone Classification as per requirements under FRTB IMA

See [Model Validation](#) for details.

2 Getting Started with OFS MRMM

This chapter details how to get started with the OFS MRMM application, and explains the common features that are found across the components in the user interface. It describes the organization of the user interface and provides step-by-step instructions for navigating through the application. To avoid repetition, the common functionalities used in different modules of OFS MRMM application are explained under the Common Functionalities section. For example, common user interface functionalities in Portfolio Definition.

This chapter includes:

- [Logging in to OFS MRMM Application](#)
- [Managing OFS MRMM](#)
- [Common User Interface Functionalities](#)

2.1 Logging in to OFS MRMM Application

Access the OFS MRMM application using the login credentials (User ID and Password) provided and select the preferred language to navigate. The built-in security system ensures that you are only permitted to access the window and actions based on the authorization.

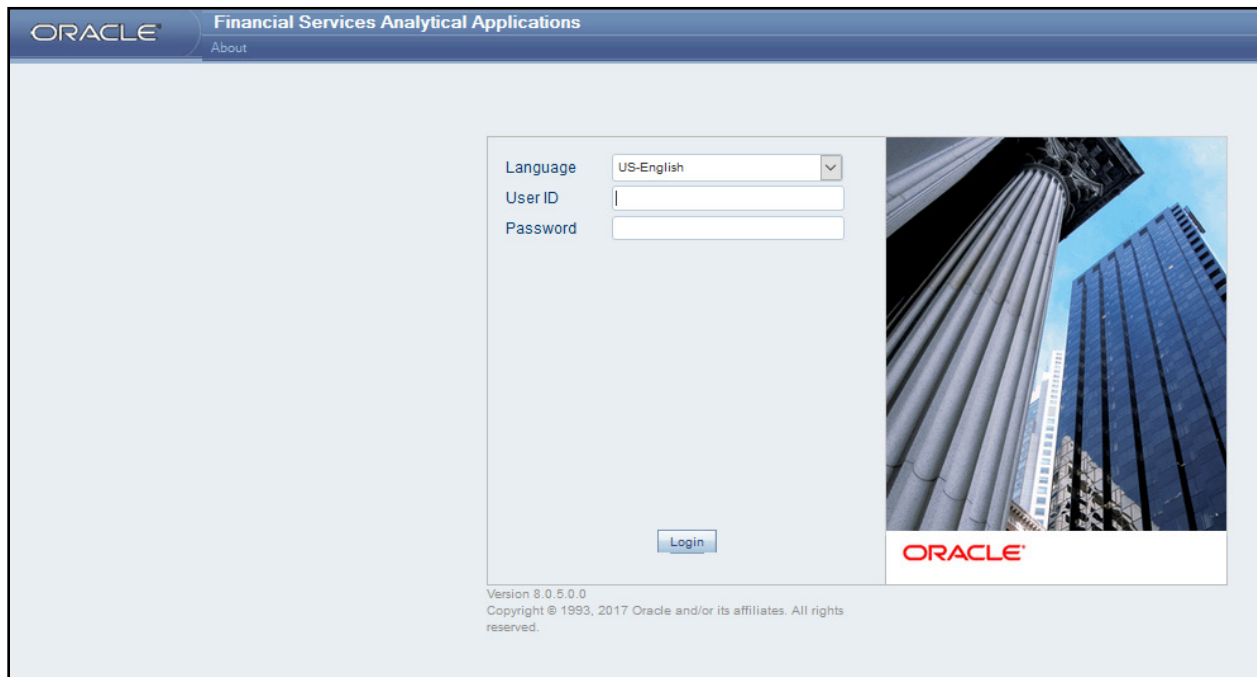


Figure 2 OFSAAI Login Window

Oracle Financial Services Market Risk Measurement and Management User Guide

Release 8.0.5.0.0

After logging in to OFSAAI, the below landing page window is displayed.

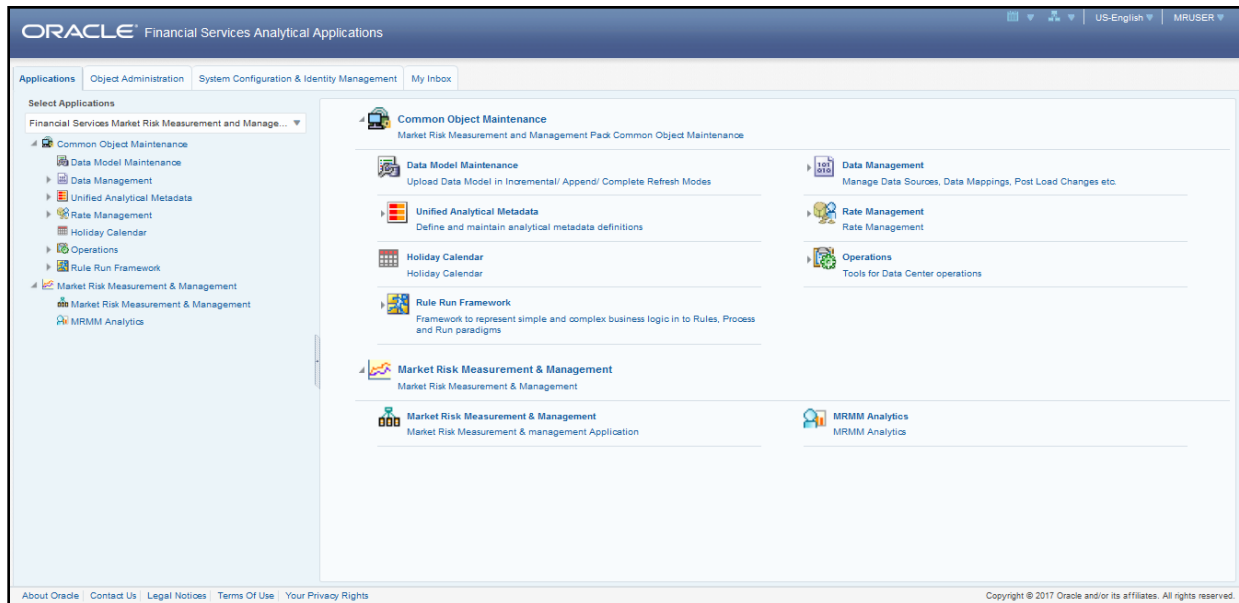





Figure 3 OFSAAI Landing Page

Tag	Description
MRUSER (username)	Click this drop-down to select the following options: Preferences, About, Change Password or to logout of OFSAAI.
	Click this drop-down to select the desired language.
	Click this icon to view the connection details.
	Click this icon to view the last login date.
Select Applications	Click this drop-down to view and select the application.
Object Administration	Object Administration is an integral part of the infrastructure and facilitates system administrators to define the security framework with the capacity to restrict access to the data and metadata in the warehouse, based on a flexible, fine-grained access control mechanism. For more information see OFS Analytical Applications Infrastructure User Guide on OHC Documentation Library .
System Configuration and Identity Management	System Configuration and Identity Management module is an integral part of Infrastructure administration process. It facilitates the System Administrators to provide security and operational framework required for Infrastructure. For more information see

Tag	Description
	OFS Analytical Applications Infrastructure User Guide on OHC Documentation Library .

Table 1 OFSAAI Landing Page

Select **Market Risk Measurement and Management** in the Left Hand Side (LHS) pane. The Market Risk Measurement and Management landing page is displayed.

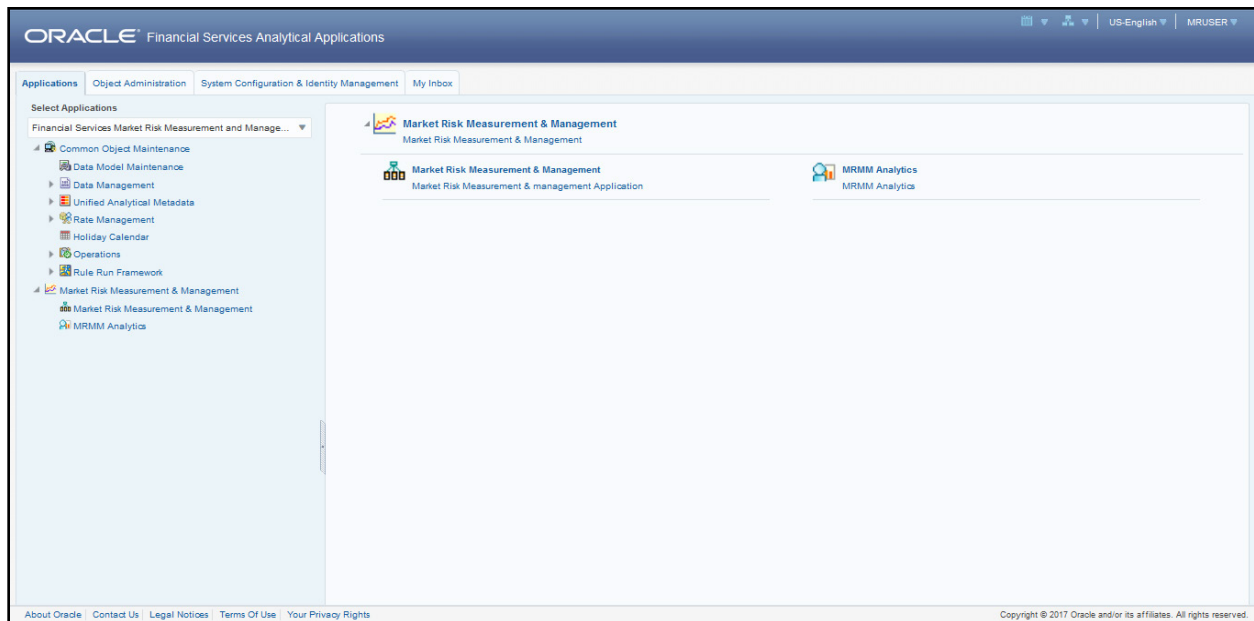


Figure 4 MRMM Landing Page

2.2 Managing OFS MRMM

This section describes how to manage the OFS MRMM application for users across all modules of the application. Some of the functionalities can be specific to the rights owned by the user.

In the MRMM landing page, click the **Market Risk Measurement and Management Application** link to view the home screen. Click the drop-down on the top Right Hand Side (RHS) corner to select the options such as Preferences, About, Change Password or to Logout.

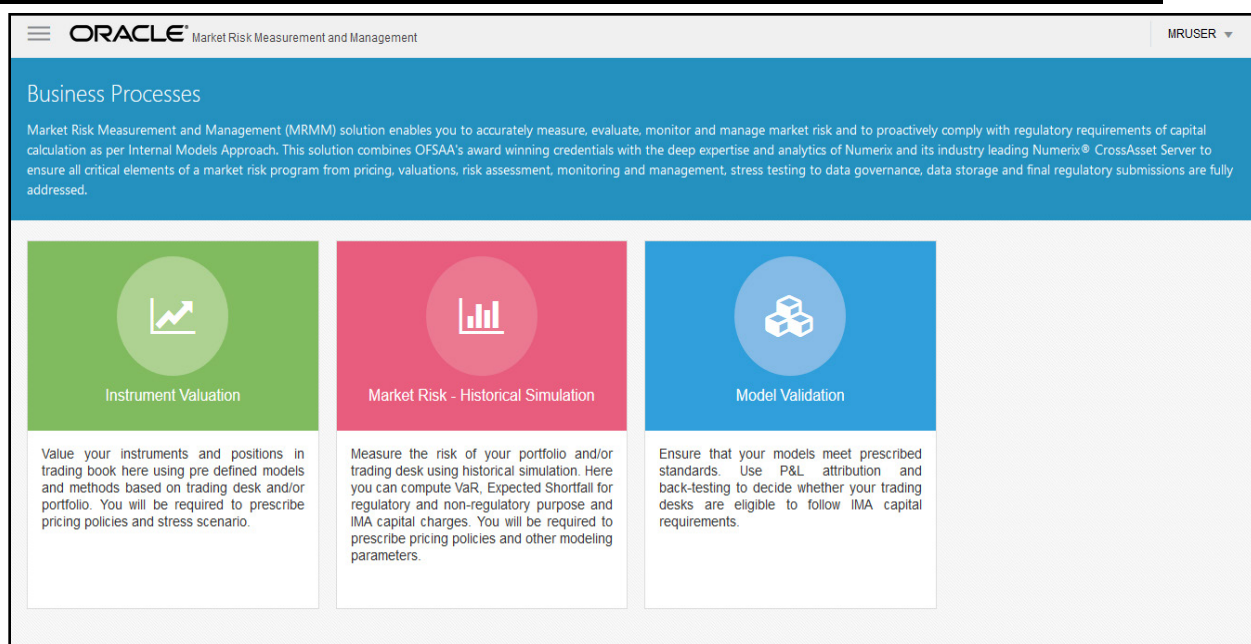


Figure 5 MRMM Home Screen

NOTE: For ease of navigation, click the Application Navigation  icon.

When you click the Application Navigation icon on the Left Hand Side (LHS) top corner, you can view the below options:

- **Business Processes**

The Home screen is referred to as **Business Processes** window. The screen displays the three business processes or components. See [Instrument Valuation](#), [Market Risk-Historical Simulation](#) and [Model Validation](#) for details.

- **Business Configurations**

In the **Business Configuration** screen you can define a portfolio and configure rules to identify modellable and non-modellable risk factors. See [Business Configurations](#) for details.

- **Application Preferences**

In the **Application Preferences** screen you can decide the manner in which you want the system to function. The components in this screen such as Dimensions and Hierarchy Configuration and Default Settings are used to set preferences which will be used by the system during valuation, VaR and other calculations. See [Application Preferences](#) for details.



Figure 6 MRMM Business Processes

2.3 Common User Interface Functionalities

This section details the common functionalities available across all modules of OFS MRMM such as creating, deleting, sorting, and searching a MRMM object. The following sections explains how this is done, taking the example of Portfolio Definition screen.

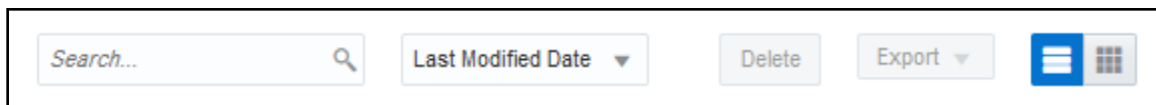


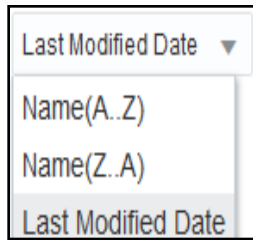
Figure 7 MRMM Common Screen Elements

2.3.1 Search

The Search option in the user interface helps you to find the required information. You can enter the nearest matching keywords to search, and filter the results by entering information on the additional fields. Search values are not case sensitive.

2.3.2 Sorting Objects

This option allows you to sort the portfolios based on Last Modified Date (default option), or Name (in ascending or descending alphabetical order).



2.3.3 Deleting an Object


To delete an existing Portfolio:

1. Select a portfolio and click **Delete**. Alternatively, you can select multiple Portfolios by using Shift + click/ Ctrl + click and click Delete on the top right hand corner. A confirmation dialogue appears.
2. Click **Yes**. The Portfolio details are deleted.

NOTE: Definition can be deleted only if it is not used in any MR object.

2.3.4 Changing the Layout

The application supports Grid View and List View layouts. You can change the layout by clicking

the  icon at the right hand corner of the screen.

2.3.5 Exporting a Portfolio

You can export the listed records to a Microsoft Excel spreadsheet and PDF from the Summary page. If any search criteria is applied, the values exported are restricted only to the search result.

To export the records, follow these steps:

1. Navigate to the Summary page.
2. Click **Export**, and select the required option from the drop down menu. The application supports two types of export options. They are Excel and PDF.
3. Specify the location for saving the exported file. You can view the file offline from the folder.

3 Overview of OFSAA Infrastructure Components

OFS MRMM uses the following components and frameworks of OFSAA Infrastructure. You can access these components under Common Object Maintenance in the OFSAAI landing page. See OFS Analytical Applications Infrastructure User Guide in [OHC Documentation Library](#) for features and details.

- **Data Model Maintenance:** OFS MRMM uses the Data Model Maintenance module of OFSAA. You can upload the data model using this component.
 - **Data Management:** Data Management tools such as Data Sources, Data Mapping, Data File Mapping, and Post Load Changes.
 - **Data quality Framework:** Data Quality Rules and Data Quality Groups in the OFSAA Data Quality Framework.
 - **Data Entry Forms and Queries:** OFS MRMM uses Excel Upload (Atomic), Forms Designer, Forms Authorization, Data Entry from the Data Entry Forms and Queries module of OFSAA. MRMM uses.
- **Unified Analytical Metadata:** OFS MRMM uses Dimension Management (Member, Attribute, Hierarchy Management) from the Unified Analytical Metadata module of OFSAA.
- **Operations:** OFS MRMM uses Batch Maintenance, Batch Execution, Batch Monitor, Batch Cancellation, Batch Scheduler, View Log from Operations module of OFSAA.
- **Process Modeling Framework:** OFS MRMM uses the Process Modeling Framework module of OFSAA.
- **Run Rule Framework:** Process Modeling Framework internally uses Process and Run from the OFSAA Run Rule Framework.

4 OFSAA Rate Management – Currencies

4.1 Currencies

Financial institutions commonly transact business in more than one currency. Transacting business in multiple currencies demands functional capabilities for multi-currency accounting and currency rate management.

OFSAA Rate Management's Currency module supports the definitions and maintenance of currencies. Currency definitions are fundamental to the definition of both interest rate yield curves and currency exchange rates. A key attribute of every yield curve is the currency with which it is associated; and currency exchange rates can only be established between defined currencies. OFSAA Rate Management provides a comprehensive list of ISO-defined currencies; you may also define and add your own user-defined currencies.

Upon initially navigating to **Common Object Maintenance > Rate Management > Currencies**, a summary screen displays a comprehensive list of more than 170 seeded ISO currency codes.

Code	Currency Name	Reference Interest Rate Code	Reporting Currency	Status
			No	Inactive
ALL	Albanian Lek		Yes	Active
AMD	Armenia Dram		No	Active
AUD	Australian Dollar	IRC21 Test	No	Active
AWE	hello		Yes	Active
EUR	Euro (European EMU)	1. ING Yield Curve	Yes	Active
GBP	Pound Sterling	GBP Libor	Yes	Active
RUR	Russian Ruble		Yes	Active
USD	US Dollar	1 YR Treasury Index	Yes	Active

Figure 8 Rate Management - Currencies Summary Screen

4.1.1 Search Container

A Search container is provided in which you may search for currencies by Name, by Currency (by ISO currency code), by status or by reporting currency.

4.1.1.1 Search Control

Enter your desired search criteria and click on the Search control.

4.1.1.2 Reset Control

Clicking on the Reset control removes search constraint you may have specified and refreshes the screen.

4.1.2 Currencies Container

The Currencies container presents a grid containing all of the currencies that meet your search criteria. The Currencies summary grid offers several controls that allow you to perform different functions when a currency is selected.

To select a currency, click on a check box in the first column of the grid. More than one currency can be selected at a time but this will cause some of the controls to become disabled. Clicking on a check-box a second time de-selects the currency.

You may select or deselect all of the currencies in the summary grid by clicking on the check box in the upper left hand corner of the summary grid directly to the left of the Code column header.

4.1.2.1 Add

Clicking on the Add control begins the process of adding a new currency. The Add control is disabled if any rows in the grid have been selected.

4.1.2.2 Edit

Selecting a single row out of the grid enables the Edit control. Clicking on the Edit control allows you to modify an existing currency. The Edit control is only enabled when a single currency has been selected.

NOTE: You can control the number of rows to display on screen by selecting the "Pagination Options" icon from the action bar.

4.1.2.3 Delete

Selecting one or more rows out of the grid enables the Delete control. Clicking on the Delete control deletes the currency or currencies you have selected.

4.1.3 Currencies Summary Grid

The following columns categorize each currency shown in the summary grid:

- **Code:** For seeded currencies, these are ISO Currency Codes. For user-defined currencies, these may be any pure character string (no numbers) up to a length of 3 characters.
- **Currency Name:** For seeded currencies, these are ISO Currency Codes. For user-defined currencies, these may be any string up to a length of 40 characters.

- **Reference Interest Rate Code:** Reference Interest Rate Code is the Interest Rate Code with which a currency is associated for forecasting purposes. You may define multiple yield curves each of which has the same Reference Currency, but a currency may only have one Reference Interest Rate Code.
- **Reporting Currency:** A reporting currency is an active currency to which balances in other currencies may be consolidated in order to facilitate reporting. Balances in reporting currencies may be, in turn, consolidated to the functional currency. For example, an American multinational bank might consolidate its holdings in Asian currencies to the Japanese yen (reporting currency) and its balances in European currencies to the Euro (reporting currency) after which it might consolidate these reporting currencies to the U.S. dollar (functional currency).
- **Status:** The status of any currency may be either Active or Inactive. You must “activate” a currency before you can configure default configurations for it in application preference. See [Default Configurations](#) for details.

4.1.4 Editing Currencies

To edit a currency, select a currency and then click on the Edit control. You may not modify any currency Code value. You may, however, modify Currency Name, the Reference Interest Rate Code, the Reporting Currency value (limited to Yes or No), or the currency's Status (limited to Active or Inactive).

Once you have completed your edits, click **Save**.

4.1.5 Adding Currencies

The first row in the Currencies container is an empty row that is ready for you to edit as a new currency. You may select this empty row, click on the Edit control, and generate a new currency. You may also generate a new currency by clicking on the Add control. This will generate another empty row at the top of the Currencies container that is ready for you to edit.

4.1.6 Deleting Currencies

Click on one or more currencies and then select the Delete control.

5 Holiday Calendar

This chapter discusses the procedure for creating a Holiday Calendar and generating a list of weekend and holiday dates. These dates are used during valuation of instruments.

This chapter includes:

- [Overview of Holiday Calendars](#)
- [Searching for a Holiday Calendar](#)
- [Creating a Holiday Calendar](#)
- [Executing Holiday Calendar](#)
- [Holiday Exceptions](#)
- [Excel Import/ Export](#)

5.1 Overview of Holiday Calendars

A Holiday is a day designated as having special significance for which individuals, a government, or some religious groups have deemed that observance is warranted and thus no business is carried on this day. The Holiday Calendar code can range from 1 to 99999.

The procedure for working with and managing a Holiday Calendar is similar to that of other OFSAA business rules. It includes the following steps:

- Searching for a Holiday Calendar.
- Viewing and Updating a Holiday Calendar.
- Copying a Holiday Calendar.
- Deleting a Holiday Calendar.
- Check Dependencies in the Holiday Calendar definitions.
- Refresh the Holiday Calendar summary page.

5.1.1 Searching for a Holiday Calendar

Search for a Holiday Calendar to perform any of the following tasks:

- View
- Edit
- Copy
- Delete
- Check Dependencies
- Refresh

Name	Created By	Creation Date	Last Modified By	Last Modification Date	Status
Bug 16751123	CHANNAMMA	9/4/2014 17:34:44	CHANNAMMA	9/4/2014 17:49:25	Processed
copyadStsdgrfhgighkjhkjkkjkkj	ALMHM80USER	8/18/2014 10:42:24	ALMHM80USER	8/18/2014 10:42:57	Defined
HM_Holiday_Calender1	ALMHM80USER	8/18/2014 18:42:41	ALMHM80USER	8/18/2014 18:42:41	Defined
Holiday	ALMHM80USER	8/18/2014 10:39:18	JILNA	8/20/2014 10:31:36	Defined
Holi	ALMHM80USER	8/18/2014 10:38:58	ALMHM80USER	8/18/2014 10:40:32	Defined

Figure 9 Holiday Calendar Summary Screen

5.1.1.1 Prerequisites

Predefined Holiday Calendar

5.1.1.2 Procedure

1. Navigate to the Holiday Calendar summary page. This page is the gateway to all Holiday Calendars and related functionality. You can navigate to other pages relating to Holiday Calendar from this page.
2. Enter the Search criteria.
 - Enter the name of the Holiday Calendar.
 - Click the Search icon.

Only holiday calendars that match the search criteria are displayed.

NOTE: You can control the number of rows to display on screen by selecting the "Pagination Options" icon from the action bar.

5.1.2 Creating a Holiday Calendar

You create holiday calendars to capture holidays for a given date range for any organization. It is possible to create and use multiple holiday calendars.

5.1.2.1 Procedure

1. Navigate to the Holiday Calendar summary page.
2. Click Add Holiday Calendar.
3. The Holiday Calendar details page is displayed.
4. Enter a code value for the new holiday calendar.

Note:

The code, is a numeric identifier for the holiday calendar. The code value must be a number between 1 and 99999. The code value you assign to the new holiday calendar must be unique.

5. Enter the name and a brief description for the holiday calendar.

Note:

The name you assign to the holiday calendar must be unique. Name can hold a maximum of 30 characters.

6. In the Holiday Properties grid, select not more than two weekend days. Then choose the Holiday Period. The Holiday Period can be defined for a range of up to 40 years less than the current date and 40 years greater than the current date, totally spanning a maximum of 80 years.

In the Holiday Details grid, define the Holiday details for the any period within the holiday range defined in step 6. There are two types of holidays that can be defined: Fixed and Moving.

A fixed holiday is one which is deemed as a holiday for every year in the holiday period, for that particular day.

Example

25th December – Christmas, is a fixed holiday.

Note:

To define a fixed holiday, input the holiday date for the first occurrence in the date range. For example, if your Date Range runs from 01-JAN-2000 to 31-DEC-2050, you should input the fixed holiday, Christmas, as 25-DEC-2000. The holiday calendar procedure will populate all subsequent 25-DEC entries in the holiday list table (FSI_HOLIDAY_LIST). A HOLIDAY_TYPE code = 0 is a Fixed type holiday, code = 1 is a Moving type holiday, and code = 2 is a weekend.

The holiday calendar procedure will also ensure that holiday and weekend entries are not duplicated. For example, if weekends are defined as Saturday/Sunday and Christmas falls on a weekend day, there will be only one entry in the FSI_HOLIDAY_LIST table. The PREVIOUS_WORKINGDAY and NEXT_WORKINGDAY fields designate the valid prior and following working days, respectively.

7. A moving holiday is one which is deemed as a holiday only for that particular date and year, and not for every year in the holiday period. All occurrences of a moving holiday must be input manually.

Once the holiday calendar definition is saved, its status in the summary page is marked as defined.

8. A holiday calendar created can also be deleted. Select one or more rows of holiday calendar definitions and click the Delete control.

5.1.2.2 Excel Import / Export

Excel import/export functionality is used for adding/editing holiday calendar definitions.

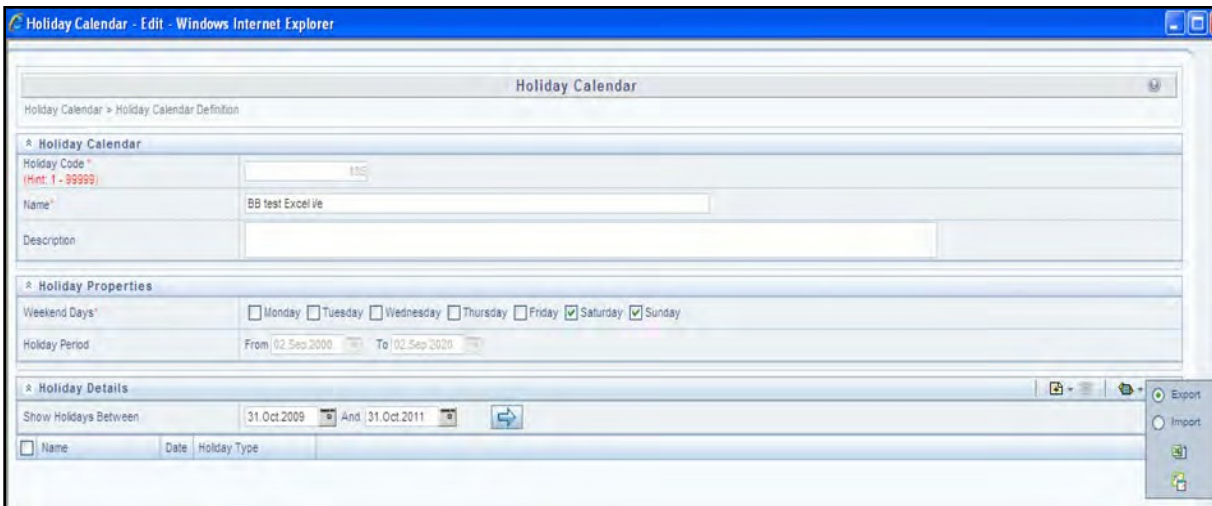


Figure 10 Holiday Calendar-Excel Import/Export for Adding Calendar Definitions

5.1.3 Executing Holiday Calendar

You execute a holiday calendar definition to generate calendar dates listing the various types of holidays for a given holiday period.

5.1.3.1 Prerequisites

Predefined Rules

5.1.3.2 Procedure

1. Navigate to the Holiday Calendar summary page.
2. Search for a rule.
3. Select a Holiday Calendar and Click the Generate Calendar Dates icon to execute the selected holiday calendar. Holiday list for holiday ID #1 generated successfully message appears (where #1 is the holiday calendar code). The holiday list can be confirmed by querying the FSI_HOLIDAY_LIST table.
4. The status of a holiday calendar where holiday dates have been generated displays as “processed” in the status column in the summary page.

Note:

In case you do not want to Generate Calendar dates immediately, you can select that particular holiday calendar anytime later from the summary page with its status defined, and then click the Generate Calendar Dates icon to execute the selected holiday calendar.

5. The generated holiday list is no longer valid if
 - There is a change in the definition of the holiday calendar.
 - There is any update or modification to the Holiday Exceptions defined for that holiday calendar.

In such a case, the user will get a message “This holiday calendar has been modified, Please generate the holiday list again” and the holiday calendar state will be changed to “Defined” until the holiday list is regenerated with new definition.

5.1.4 Holiday Exceptions

1. You can specify exceptions to holidays. As a prerequisite, a holiday calendar should have been properly defined and the status of the holiday calendar in the summary page should be processed. Generating the holiday list will populate the holidays (weekends, fixed and moving) along with the working days. Then the Show Exceptions button is enabled in the detail page. Any changes in the holiday definition will disable the “Show Exceptions” button. The user must generate the holiday list again to define or view the exceptions.
2. Click **Show Exceptions** in the Holiday Exceptions grid. The Holiday Exceptions window opens.
3. The search block in the Exceptions page has 6 fields: From (Year), To (year), Fixed Holidays, Moving Holidays, Holiday Date and All Exceptions.
 - From and To - Denotes the range of years which is a subset out of the holiday list generated, for which exceptions are required to be defined.
 - Fixed Holidays – You can filter the list of holidays by the type of Fixed Holidays.
 - Moving Holidays – You can filter the list of holidays by the type of Moving Holidays.
 - Holiday Date – For a particular known holiday date, exceptions can be defined.
 - All Exceptions - This checkbox when selected lists all the exceptions, if already defined, for the holidays within the From, To Date range.

The search result gives the list of all holidays based on the selection of the above search criteria fields.

4. In the Holiday Exceptions block, there are two types of exceptions that can be defined: Not a holiday and Shift to.

Any holiday can be marked as not a holiday, in which case that day is removed from the Holiday List. If the drop-down list in the exception type is selected as “Not a Holiday”, then the “shift to” date picker field is disabled.

Spring earlier considered as a holiday in the holiday calendar can be marked as Not a Holiday in the Exceptions Window. Further the user can write his comments or remarks in the Notes Text Box next to the Exception Type drop-down list.

Any holiday can be shifted to another day, in which case the earlier declared holiday is removed from the Holiday List, while the shifted to day is included as a holiday.

5.1.5 Excel Import/ Export

Excel import/export functionality is used for adding/editing holiday exceptions.

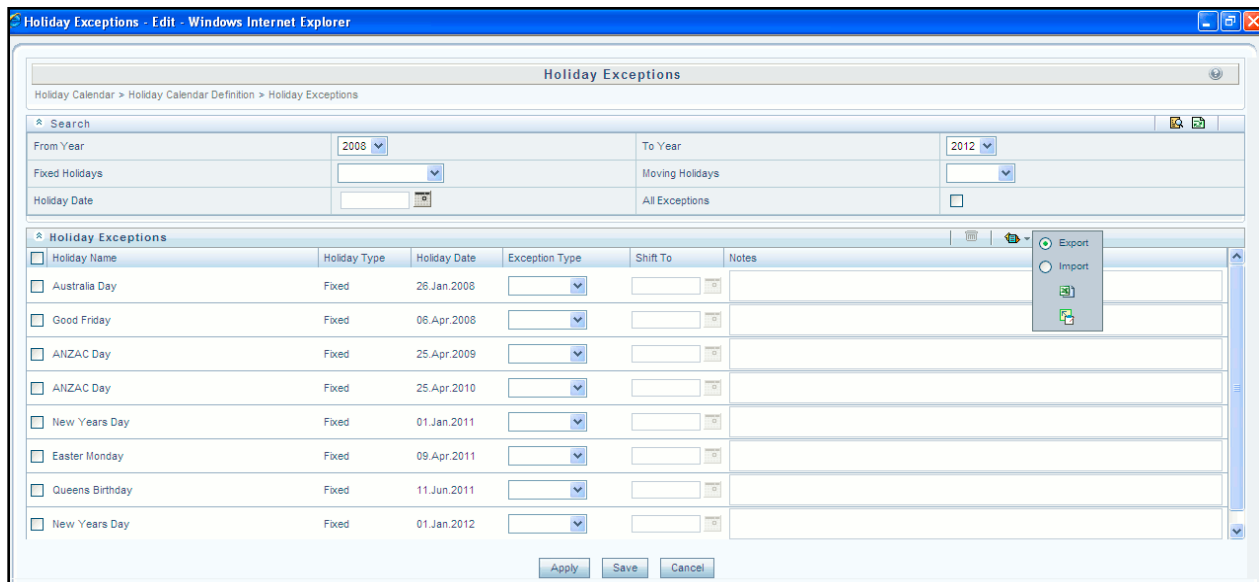


Figure 11 Holiday Calendar – Excel Import/Export for Adding Calendar Exceptions

6 Application Preferences


This chapter describes the application preferences in OFS MRMM and includes the following topics.

- [Overview](#)
- [Understanding Application Preferences](#)
- [Dimension and Hierarchy Configuration](#)
- [Default Configurations](#)

6.1 Overview

The Application Preferences section allows to set your preferences for the OFS MRMM application, which will be used for computing valuation, VaR and other calculations. The MRMM functional administrator can set the application preferences. Once set they are applicable at a global level and are applied to all users. Some of the preferences gets overwritten by parameters defined at other places such as data and business processes.

6.2 Understanding Application Preferences

In Oracle Financial Services Analytical Applications Infrastructure under Select Applications, select Market Risk Measurement and Management. Click  icon in the MRMM home screen to navigate to the Application Preferences window.

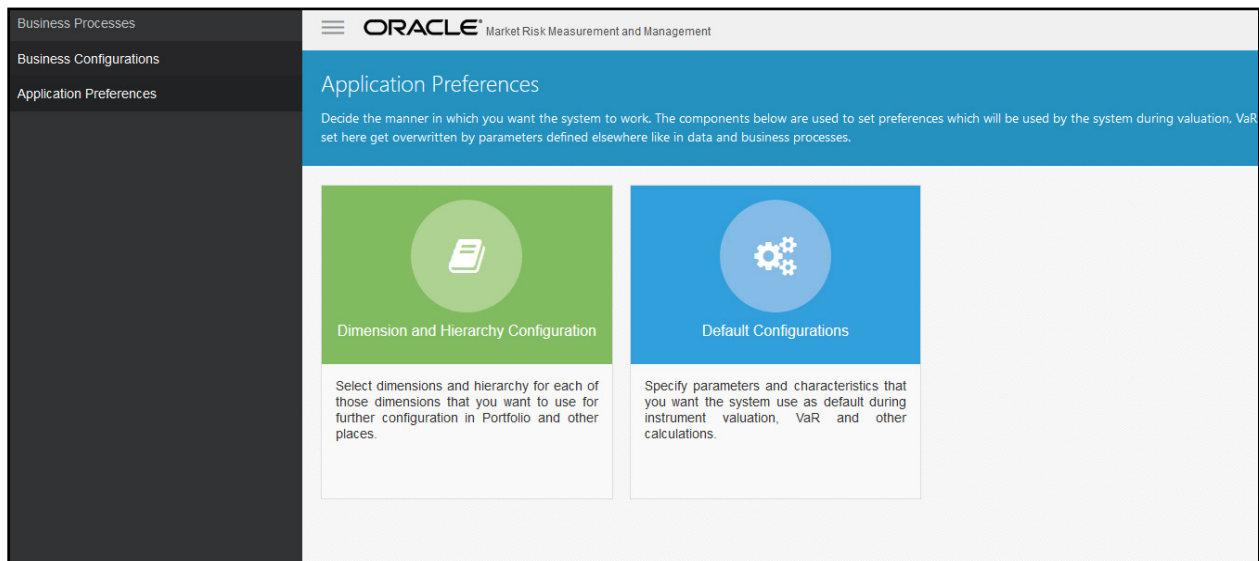


Figure 12 Application Preferences

The Application Preferences section includes:

- Dimension and Hierarchy Configuration
- Default Configurations

6.3 Dimension and Hierarchy Configuration

You can select dimensions from the available list to create a portfolio and decide the aggregation of results such as Value at Risk (VaR). For every selected dimension you must select a hierarchy which will be used to select members to define a trading book portfolio. The dimensions are pre-seeded with the application. You must create at least one hierarchy for all dimensions that you intend to use in Portfolio definition. Refer to OFS Analytical Applications Infrastructure user guide on [OHC Documentation Library](#) for steps to create hierarchy.

In this window you can perform the following actions:

- Dimension Configuration: This window enables you to select one or multiple dimensions from the available list of dimensions.
- Hierarchy Configuration: This window enables you to update one hierarchy each for the selected dimensions.

6.3.1 Configuring Dimensions

This section details the process of configuring dimensions.

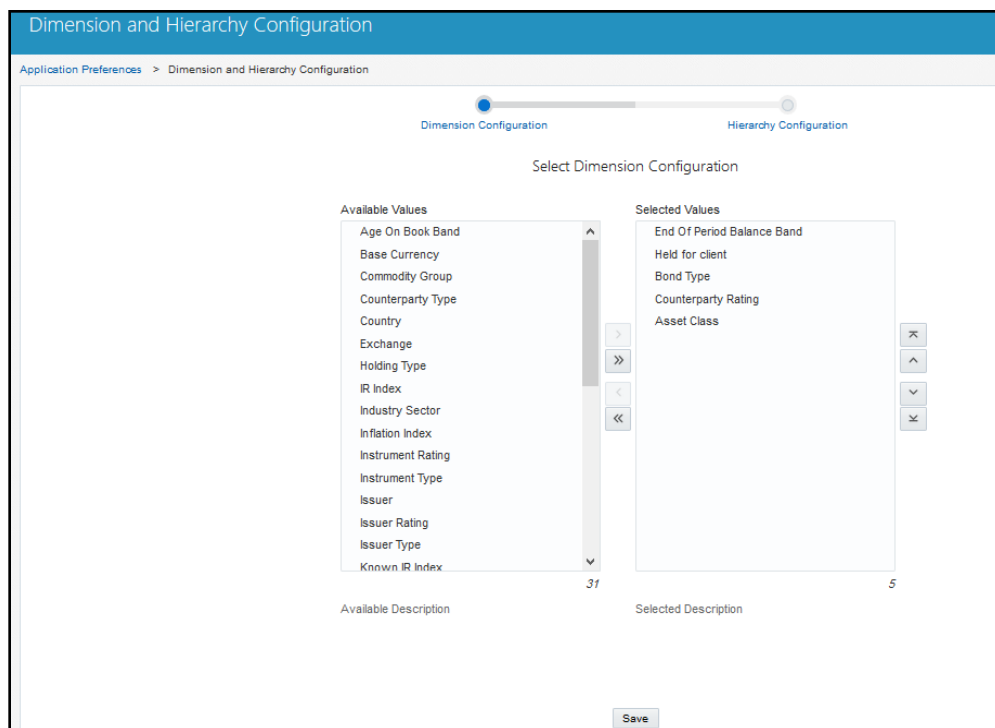







Figure 13 Dimension Configuration

The following table describes the fields in the Dimensions Configuration window:

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Available Dimensions	Displays the list of available dimensions.
Selected Dimensions	Displays the list of selected dimensions.

Table 2 Fields and their Descriptions in Dimension Configuration

To select a dimension, follow the below steps:

1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select, **Market Risk Measurement and Management**
2. Click  button in the MRMM home screen to navigate to the Application Preferences window.
3. Click **Dimension and Hierarchy Configuration**.
4. To add the dimensions, select the dimension from the **Available Values** and add them to the list of **Selected Values** by using  button. To select multiple values use Ctrl or Shift key. To select all the Available Values, use  button. To remove any selected value from the list use  button. To remove all the selected values use  button.
5. Click **Save** to update the selected dimensions list. The selected dimensions are now populated in the Hierarchy Configuration window.

6.3.2 Configuring Hierarchies

This section details the process of configuring hierarchies.

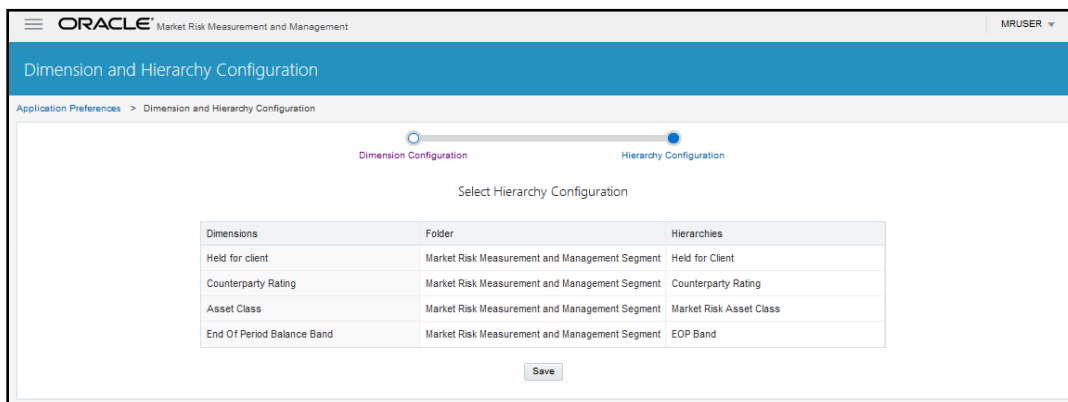


Figure 14 Hierarchy Configuration

The following table describes the fields in the Hierarchy Configuration window

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Dimensions	Displays name of dimension selected in Dimension Configuration
Folder	Select the folder from the drop-down box where the hierarchy has been defined
Hierarchy	Select the Hierarchy

Table 3 Fields and their Descriptions in Hierarchy Configuration

To select a hierarchy, follow the below steps:

1. In the Hierarchy Configuration window, update the Folder and Hierarchies field.
2. Click Save. The configured hierarchies will be used to define portfolios.

6.4 Default Configurations

In this section you can specify the default parameters and characteristics to be used by the application during valuation, VaR and other calculations. If the application fails to obtain values from trade, instrument or other specific configurations, then it uses these default values. You can configure the below settings in this window:

- [Currency](#)
- [Currency Pair](#)
- [Model and Method](#)
- [Model Parameters](#)
- [Instrument Type Classification](#)
- [Liquidity Horizon](#)

6.4.1 Currency

In this window you can define the default values at the granularity of currency. If you do not define the values at the instrument granularity, then the default values are used for processing. For each active currency you can specify the following characteristics:

- **Rank:** Rank represents the contribution of currency in global foreign exchange market turnover. Higher the turnover, higher the rank of currency. For example: USD is the most traded currency in world and is given rank 1.

- **Interest Rate Index:** It is the standard interest rate index or yield curve and corresponding term point which is used for pricing of a trading book instrument. For example: LIBOR for USD, MIBOR for INR
- **Interest Rate Tenor:** It represents the term point of the interest rate index mentioned above. It is expressed as tenor and unit of the term period. For example: 3 months term point is expressed as 3M.
- **Discount curve:** It is the default interest rate index or yield curve which is used to discount cash flows during pricing of a trading book instrument. For example: USD-LIBOR-3M
- **Holiday Calendar:** It indicates the default calendar which will be used to price any instrument denominated in selected currency.
- **Allowed Yield Curves:** For a specific currency, all the possible interest rate index or yield curves that the application can use is stored here.

Default Configurations

Application Preferences > Default Configurations

Currency Currency Pair Model and Method Model Parameters Instrument Type Classification Liquidity Horizon

Currency Name Currency Code Search Reset Update

Page 1 of 2 (1-10 of 14 items) < 1 2 > X

Currency Name	Currency Code	Rank	Interest Rate Index	Interest Rate Tenor	Discount Curve	Holiday Calendar	Allowed Yield Curve
Andorran Peseta	ADP						
Australian Dollar	AUD	4	BBSW	6M	IR_AUD-BBSW-6M	SYDNEY	AUD-BBSW-6M AUD-BBSW-3M
Barbados Dollar	BBD						
Canadian Dollar	CAD	6	CDOR	3M	IR_CAD-CORRA-ON	TORONTO	CAD-CORRA-ON CAD-CDOR-6m CAD-CDOR-3m
Costa Rican Colon	CRC						
Euro (European EMU)	EUR	2	EURIBOR	6M	IR_EUR-EONIA-ON	TARGET	EUR-EONIA-ON EUR-EURIBOR-1m EUR-EURIBOR-3m EUR-EURIBOR-6m EUR-EURIBOR-9m EUR-EI
Indian Rupee	INR	26	MIFOR	6M	IR_INR-MIFOR-6M		INR-MIFOR-6m
Jordanian Dinar	JOD			6M			
Pound Sterling	GBP	3	LIBOR	6M	IR_GBP-SONIA-ON	LONDON	GBP-SONIA-ON GBP-LIBOR-1M GBP-LIBOR-6m GBP-LIBOR-3M
Romanian Leu	ROL						

Page 1 of 2 (1-10 of 14 items) < 1 2 > X

Figure 15 Default Configurations - Currency


The following table describes the fields in the Currency window:

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Currency Name	This field displays the list of all currencies which are available in currency dimensions
Currency Code	This field displays the code of the selected currency.

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Rank	Rank represents the contribution of currency in global foreign exchange market turnover. Higher the turnover, higher the rank of currency.
Interest Rate Index	Provide the default index rate associated with currency such as LIBOR, Euribor and so on.
Interest Rate Tenor	Select the default tenor for the given Interest Rate Index such as 3M, 6M and so on.
Discount Curve	Select the default discounting curve associated with the currency.
Holiday Calendar	Specify the default Holiday Calendar to be used for corresponding currency.
Allowed Yield Curve	This is the list of all interest rate curves which are allowed to be used by the application.

Table 4 Fields and their Descriptions in Currency Window

Follow the below procedure for defining the Currency:

1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select **Market Risk Measurement and Management**.
2. Click  in the MRMM home screen to navigate to the Application Preferences window.
3. Click **Default Configurations > Currency**.
4. Select the Currency row that needs to be updated, and enter the details for **Rank**, **Interest Rate Index**, **Interest Rate Tenor**, **Discount Curve**, **Holiday Calendar**, and **Allowed Yield Curve**.
5. **Note:** Use 'F2' key, or click on any other row to come out of the edit mode in a table, before updating or navigating to a different tab.
6. Click **Update**.

6.4.2 Currency Pair

The Currency Pair window enables you to provide default values at the granularity of currency pair. If you do not define the values at the instrument granularity, then the default seeded values are used for processing.

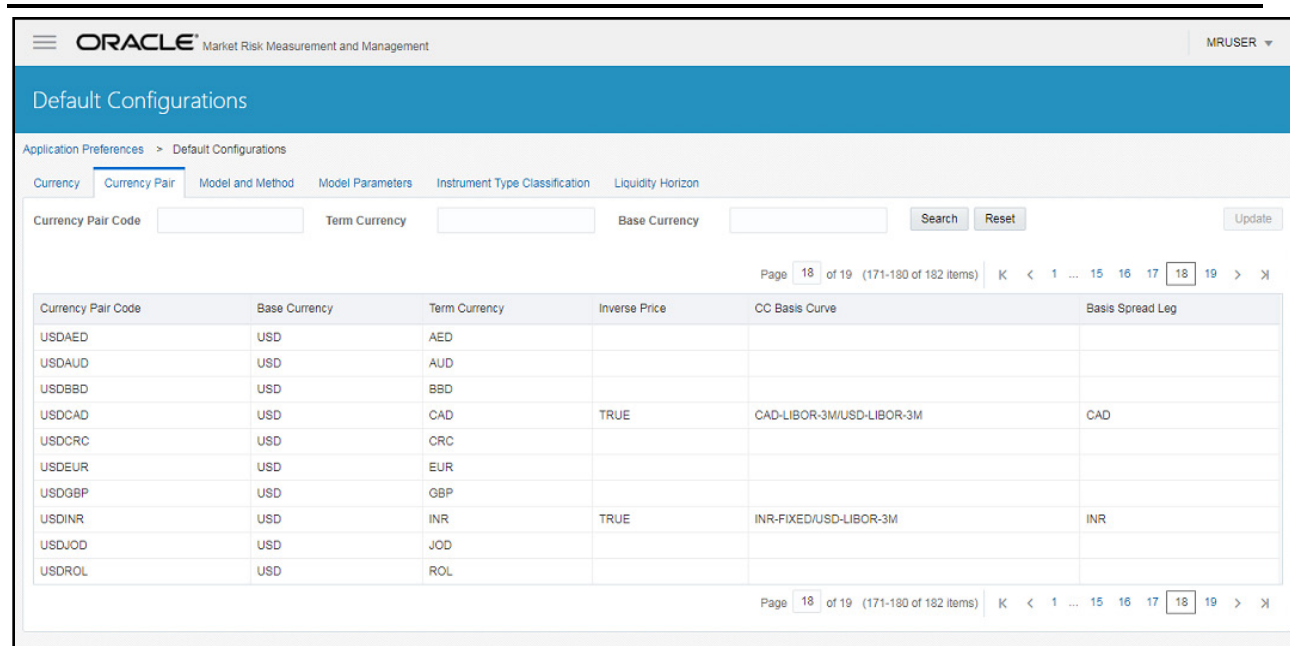



Figure 16 Default Configurations – Currency Pair

The following table describes the fields in the Currency Pair window:

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Currency Pair Code	A currency pair is the quotation and pricing structure of the currencies traded in the market.
Base Currency	The first listed currency in currency pair is called the base currency.
Term Currency	The second listed currency in currency pair is called the term currency.
Inverse Price	This is an indicator field with values as TRUE or FALSE. TRUE allows the usage of inverse price of currency pair with preference to direct price, FALSE will use only direct price.
CC Basis Curve	Select the default currency basis curve to be used for corresponding currency pair.
Basis Spread Leg	Specify the currency (from currency pair) which should be used as basis spread leg.

Table 5 Fields and their Descriptions in Currency Pair Window

To define the Currency Pair, follow the below steps:

1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select **Market Risk Measurement and Management**
2. Click  in the MRMM home screen to navigate to the Application Preferences window.
3. Click **Default Configurations > Currency Pair**.
4. Select the Currency Pair Code row that needs to be updated and enter the details for **Inverse Price**, **CC Basis Curve**, and **Basis Spread Leg**.

Note:

Use 'F2' key, or click on any other row to come out of the edit mode in a table, before updating or navigating to a different tab

5. Click **Update**.

6.4.3 Model and Method

For an instrument type you can select model and method that will be used to price instruments. Values defined in this screen are used if model and method are not provided as input with data, or if you have not provided value in the pricing policy business definitions of Instrument Valuation or VaR components. Default model and methods are specified at the granularity of instrument type.

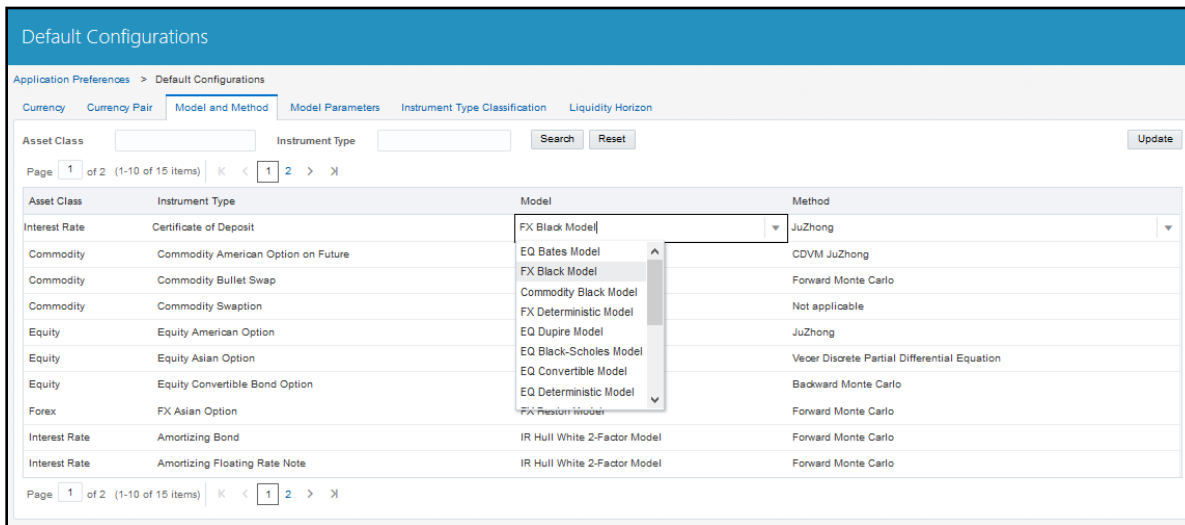



Figure 17 Default Configurations – Model and Method

The following table describes the fields in the Model and Method window:

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Asset Class	Displays the asset class (Interest Rate, Equity, Commodity and so on.) of instrument type for which model and method needs to be defined.
Instrument Type	Displays the instrument types.
Model	Select the model to be used for given instrument type from the drop-down list.
Method	Select the method to be used for selected model from the drop-down list.

Table 6 Fields and their Descriptions in Model and Method Window

To define the default model and methods, follow the below steps:

1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select **Market Risk Measurement and Management**
2. Click  in the MRMM home screen to navigate to the Application Preferences window.
3. Click **Default Configurations > Model and Method**.
4. Select the instrument type row to be updated.
5. Select the **Model** and the **Method** from the drop-down box.

Note:

Use 'F2' key, or click on any other row to come out of the edit mode in a table, before updating or navigating to a different tab

6. Click **Update**. Each instrument type is mapped to one of the asset class and its value is displayed.

NOTE: Model and Methods to be selected for a specific instrument type is limited to the models that are applicable to the corresponding asset class. See [Annexure D: List of Models and Methods](#) for details.

6.4.4 Model Parameters

You can define parameters for models which are used for pricing and calibration. Default model parameters are specified for each model used in MRMM application.

The model table displays the asset class and its corresponding model(s). Each model has a specific list of inputs that are required. Input for each model is integrated with the instrument parameters. For example, currency is integrated with market data used such as volatility parameter for some of the instrument types.

You can define the default value for such parameters in this window. Values of the model's parameter will be used in scenario when data for same is missing while pricing the instrument with corresponding model.

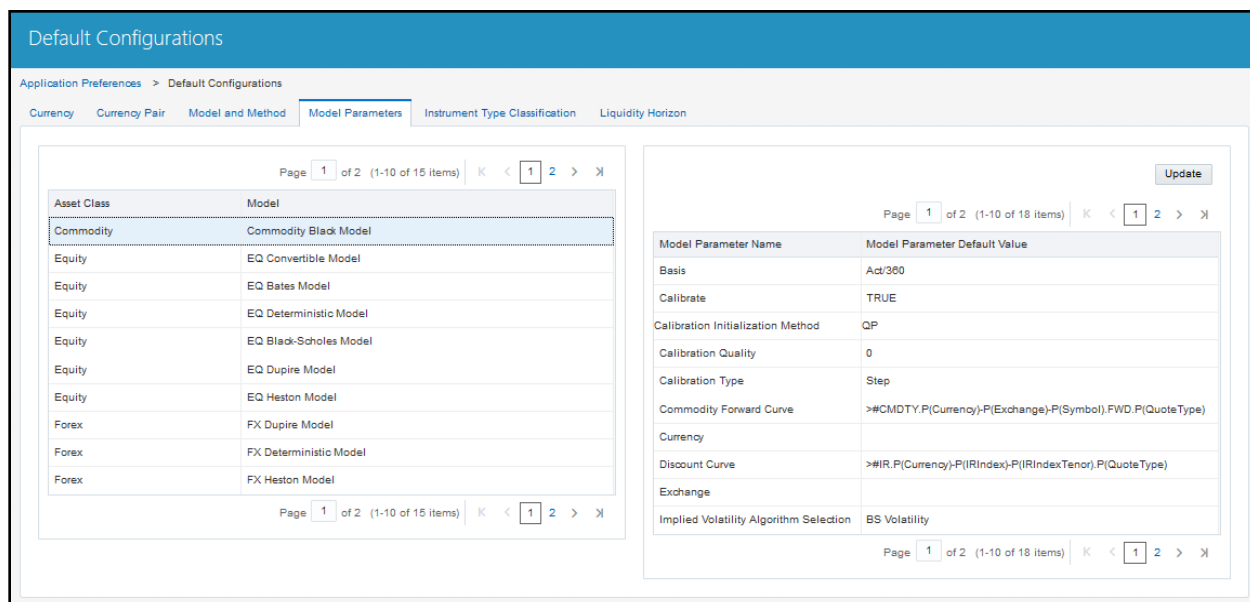



Figure 18 Default Configurations – Model Parameters

The following table describes the fields in the Model Parameters window:

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Asset Class	Displays the type of asset for which model and method needs to be defined.
Model	Displays the Model name.
Model Parameter Name	Displays the Model parameters associated with the selected Model.
Model Parameter Default Value	Provide the Model Parameters Value.

Table 7 Fields and their Descriptions in Model Parameters Window

To define the default Model Parameter value, follow the below steps:

1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select **Market Risk Measurement and Management**
2. Click  in the MRMM home screen to navigate to the Application Preferences window.
3. Click **Default Configurations > Model Parameters**.
4. Select the model for which model parameter values needs to be updated. When you select a model, then all the parameters associated with model will be displayed in the model parameter table on the Right Hand Side (RHS) of the window. Enter the default model parameter value against each model parameter. In this table you can either provide any default value, or leave it blank.
5. Click **Update**. The updated values are displayed.

6.4.5 Instrument Type Classification

The configuration and processing in OFS Market Risk Measurement and Management is primarily based on instrument type. The list of instrument types and their names generally differ for each financial institution. The table in **Instrument Type Classification** window allows you to map the instrument type as per the financial institution and the standard instrument type names used in MRMM application.

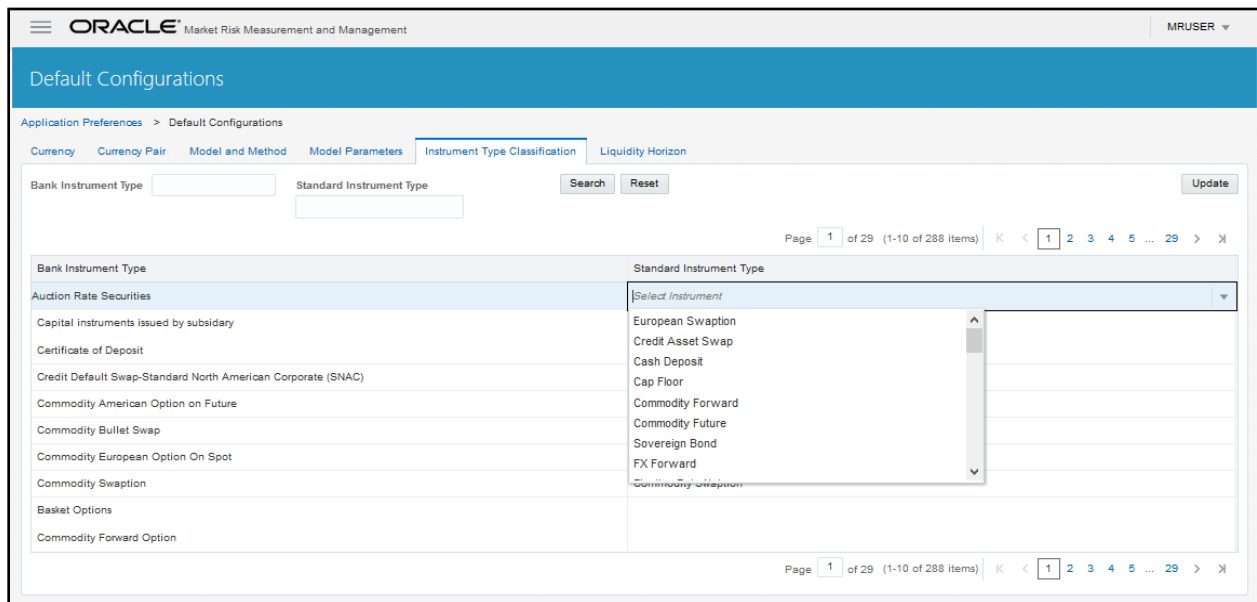



Figure 19 Default Configurations – Instrument Type Classification

The following table describes the fields in the Instrument Type Classification window:

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Bank Instrument Type	It is the Instrument type name as specified in instrument type dimensions.
Standard Instrument Type	It is the Instrument Type name as used by MRMM application. Select the Standard Instrument Type from the drop-down box.

Table 8 Fields and their Descriptions in Instrument Type Classification Window

To select the standard instrument type for a specific bank instrument, follow the below steps:

1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select **Market Risk Measurement and Management**
2. Click  in the MRMM home screen to navigate to the Application Preferences window.
3. Click **Default Configurations > Instrument Type Classification**.
4. Click any **Bank Instrument Type**. Select the **Standard Instrument Type** from the drop-down list on the RHS column.

Note:

Use 'F2' key, or click on any other row to come out of the edit mode in a table, before updating or navigating to a different tab.

5. Click **Update**. The mapping is saved.

6.4.6 Liquidity Horizon

OFS MRMM application incorporates the risk of market liquidity by varying the liquidity horizons during the calculation of regulatory Expected Shortfall. This enables to mitigate the risk of a sudden and severe impairment of market liquidity across asset markets. Liquidity horizon for each risk factor category is specified through the MRMM User Interface (UI) either at global level, or individually for each trading desk and portfolio. The default values applied by the application are as per Basel regulation (Reference BCBS d352).


Liquidity Horizon screen provides a mapping between the Risk Factor category and the values associated with each category. The table below lists the default liquidity horizon values as per Basel regulation (Reference: BCBS Document d352).

Risk factor category	<i>n</i>	Risk factor category	<i>n</i>
Interest rate: specified currencies - EUR, USD, GBP, AUD, JPY, SEK, CAD and domestic currency of a bank	10	Equity price (small cap): volatility	60
Interest rate: – unspecified currencies	20	Equity: other types	60
Interest rate: volatility	60	FX rate: specified currency pairs ³⁷	10
Interest rate: other types	60	FX rate: currency pairs	20
Credit spread: sovereign (IG)	20	FX: volatility	40
Credit spread: sovereign (HY)	40	FX: other types	40
Credit spread: corporate (IG)	40	Energy and carbon emissions trading price	20
Credit spread: corporate (HY)	60	Precious metals and non-ferrous metals price	20
Credit spread: volatility	120	Other commodities price	60
Credit spread: other types	120	Energy and carbon emissions trading price: volatility	60
		Precious metals and non-ferrous metals price: volatility	60
Equity price (large cap)	10	Other commodities price: volatility	120
Equity price (small cap)	20	Commodity: other types	120
Equity price (large cap): volatility	20		

Figure 20 Default Liquidity Horizon Values as Specified in BCBS d352

Liquidity horizon can be defined for each portfolio and trading desk individually.

To assign the risk factor value to each Risk Factor category, follow the below steps:

1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select **Market Risk Measurement and Management**
2. Click  in the MRMM home screen to navigate to the Application Preferences window.
3. Click **Default Configurations > Liquidity Horizon**.

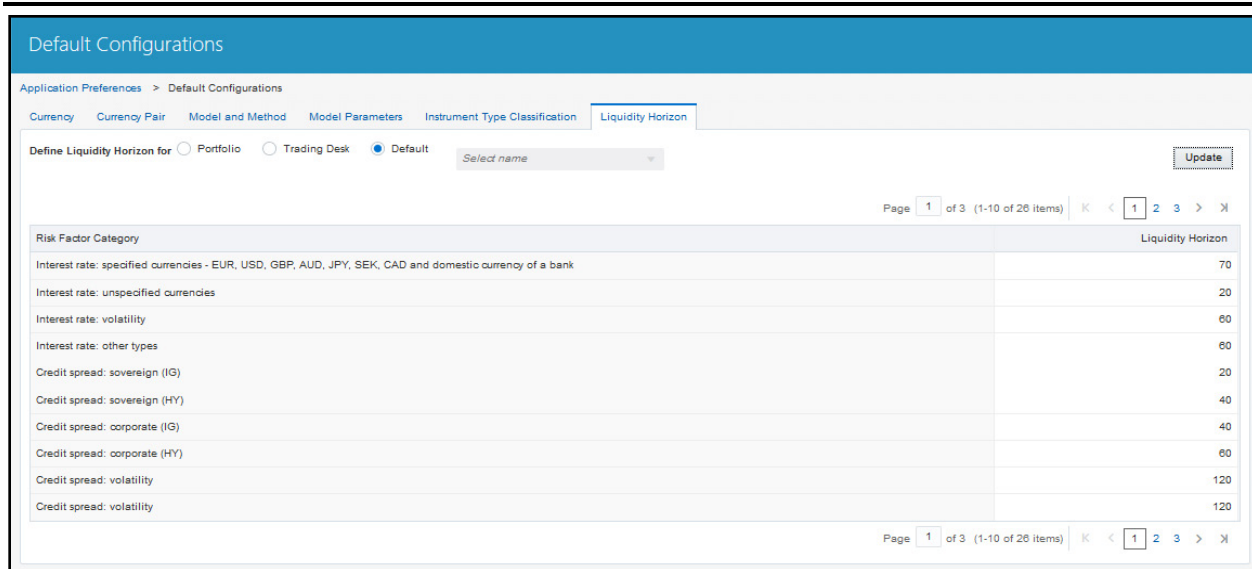


Figure 21 Default Configurations - Liquidity Horizon

4. In the field **Define Liquidity Horizon For**, select **Portfolio**, **Trading Desk** or **Default**. If you select default the pre-seeded values are considered for calculation of stress calibrated Expected Shortfall. You can update pre-seeded default values. If you select Portfolio or Trading Desk the list of Portfolio/ Trading Desk is displayed and liquidity horizon can be specified for each of them separately
5. Select the Portfolio or Trading Desk for which the Risk Factor values needs to be assigned.
6. Select any **Risk Factor Category**, and update the Liquidity Horizon or risk factor value.

Note:

Use 'F2' key, or click on any other row to come out of the edit mode in a table, before updating or navigating to a different tab.

7. Click **Update**. If the Risk Factor values are not defined for any Liquidity Horizon, or are partially defined, then the application considers default values for those items.

7 Business Configurations

This Chapter describes the Business Configurations module in OFS MRMM.


This chapter includes:

- [Overview](#)
- [Understanding Business Settings](#)
- [Portfolio Definition](#)
- [Modellable and Non-modellable Risk Factor Classification](#)

7.1 Overview

The Business Configurations section enables you to define a portfolio and configure rules to identify modellable and non-modellable risk factors.

7.2 Understanding Business Configuration Settings

In Oracle Financial Services Analytical Applications Infrastructure under Select Applications, select Market Risk Measurement and Management. Click  icon in the MRMM home screen to navigate to the Business Configurations window.

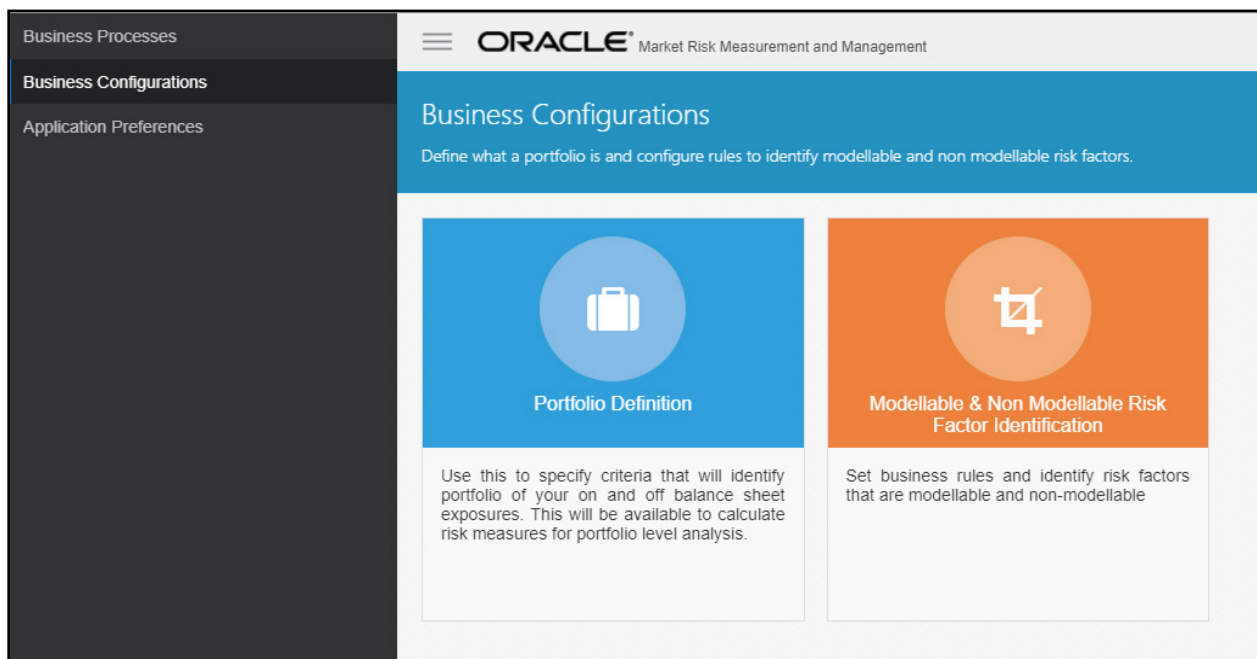


Figure 22 Business Configurations

The Business Configurations window includes the following sections:

- Portfolio Definition

- Modellable and Non-modellable Risk Factor

7.3 Portfolio Definition

This section discusses the procedure for defining and maintaining a Portfolio.


Portfolio is a group of financial instruments bundled together. It gives business user a flexibility to analyze a group of instruments together, which results in better business decisions.

In all the three modules of OFS Market Risk Measurement and Management, portfolio is the base for any evaluation to be performed. For example in Market Risk- Historical Simulation all the analysis that are performed are at granularity of portfolio or Trading Desk. Therefore, portfolio becomes a prerequisite for all Market Risk Measurement and Management modules if analysis is to be performed based on portfolio. Portfolio definition functionality provides a flexibility to create portfolio based on business hierarchy, or by selecting individual instruments. Business hierarchy provides a flexibility to cut across any supported hierarchy and create a desired portfolio for further analysis. Alternatively, MRMM also provides the option to select individual instruments and create a portfolio. The options provide a wider view for analysis using various dimensions.

You can define a portfolio to specify the criteria for portfolio identification of on and off balance sheet exposures. This will be available to calculate risk measures for portfolio level analysis. Portfolio defined in this section will be used in analysis of instrument valuations and portfolio valuations.

7.3.1 Defining a Portfolio

This section details the procedure for configuring a Portfolio. To define a Portfolio, follow the below steps:

1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select Market Risk Measurement and Management
2. Click  in the MRMM home screen to navigate to the Business Configuration window.
3. Click **Portfolio Definition**. The Portfolio Definition Summary Screen is displayed. You can view all the Portfolios, and perform operations such as searching, sorting, changing the layout and deleting the portfolios in this window. For details see section [Common User Interface Functionalities](#).

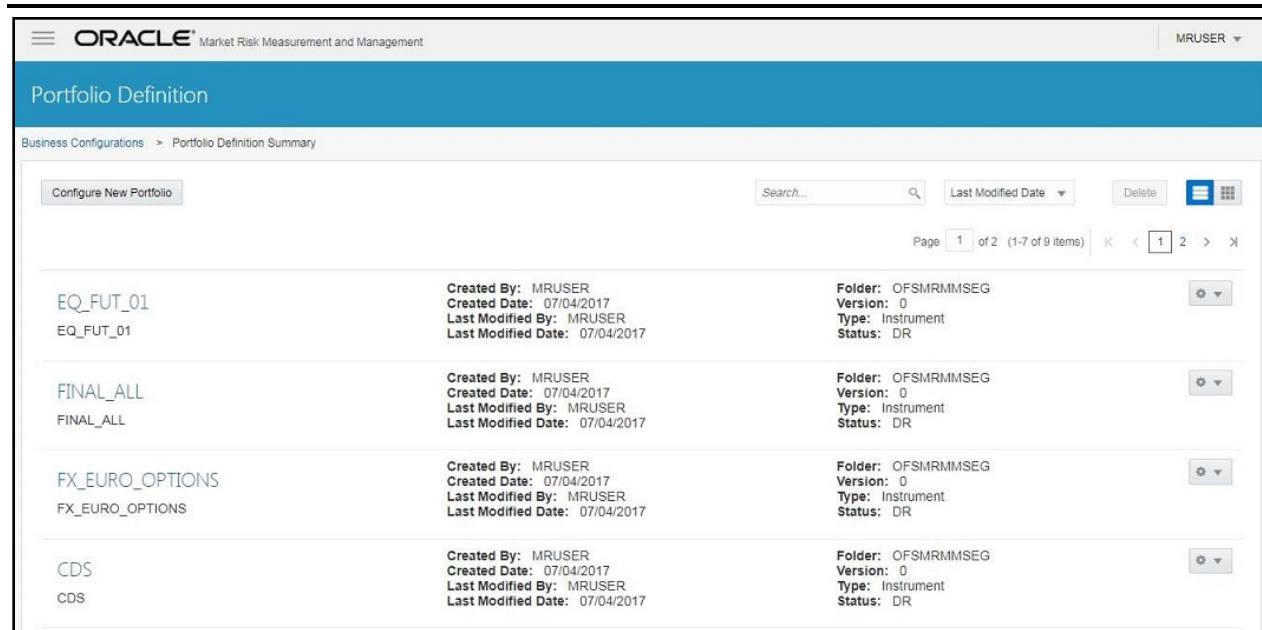


Figure 23 Business Configurations – Portfolio Definition Summary Screen

4. In the Portfolio Summary screen, click **Configure New Portfolio**. The **Create New** screen is displayed.

The following table describes the fields in the Portfolio Definition window:

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Name*	Enter the portfolio name.
Description	Enter a short description for the portfolio
Folder*	Select the Folder in which you want to save the definition.
Access Type	Specify the access type for the Business Definition created for selected trading desk/portfolio Specify whether the definition is Read Only/ Read Write
Version*	Displays the workflow version.
Portfolio Type	This option determines whether the Portfolio is defined based on Instruments or Hierarchy. Select the desired radio button to create portfolio based on Instruments or Hierarchy

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Filters	If you have selected Instrument option. You will be provided with two filters such as, Currency and Instrument type to filter the instrument records.

Table 9 Fields and their Descriptions in Portfolio Definition Window

1. Enter the Portfolio **Name** and **Description**.
2. Select the **Folder** from the drop down.
3. Specify the **Access Type**.
4. In the **Portfolio Type** field, select whether the portfolio should be based on **Hierarchy** or **Instruments**. For example, if you select **Instruments**, then the list of Instruments is displayed. The list displays all the available marketable instruments.
 - a. To create the Portfolio based on instruments, follow the below steps:
 - i. Select the **Instrument** radio button in **Portfolio Type**.
 - ii. Select the instruments to be added in the portfolio by toggling the switch in the **Include** column. The application allows multiple selections for this section.





The screenshot shows the 'Portfolio Definition' window with the following details:

- Name:** portfolio
- Description:** portfolio
- Folder:** OFSMRMMSEG
- Access Type:** Read (selected)
- Version:** 0
- Portfolio Type:** Instruments (selected)
- Filters:** Currency, Instrument Type
- Instrument List:**

Instrument Code	Instrument Type	Entity Code	Counterparty Name	Currency Code	Start Date	Maturity Date	Include
A_CMDTYFWD_001	CMDTYFWD						<input type="checkbox"/>
A_CMDTYFWD_002	CMDTYFWD						<input type="checkbox"/>
A_EGFUTURE_001	EGFUTURE					15/05/2020	<input type="checkbox"/>
A_EGFUTURE_002	EGFUTURE					17/05/2020	<input type="checkbox"/>
CMDTYSPT_001	CMDTY_SPOT			USD			<input type="checkbox"/>
CMDTYSPT_002	CMDTY_SPOT			EUR			<input type="checkbox"/>
CMDTYSPT_003	CMDTY_SPOT			NOK			<input type="checkbox"/>
CMDTYSPT_004	CMDTY_SPOT			INR			<input type="checkbox"/>
CMDTYSPT_005	CMDTY_SPOT			EUR			<input type="checkbox"/>
CMDTYSPT_006	CMDTY_SPOT			CNY			<input type="checkbox"/>

Figure 24 Business Configurations – Portfolio Definition Based on Instruments

- b. To create the Portfolio based on hierarchy, follow the below steps:

- i. Select the **Hierarchy** radio button in **Portfolio Type**.
- ii. Select the hierarchy from the Available Values and add them to the list of Selected values by using  button. To select multiple values use Ctrl or Shift key. To select all the Available Values, use  button. To remove any selected value from the list use  button. To remove all the selected values use  button.
- iii. In the **Select Currencies for Current Portfolio** field, select the desired currency.

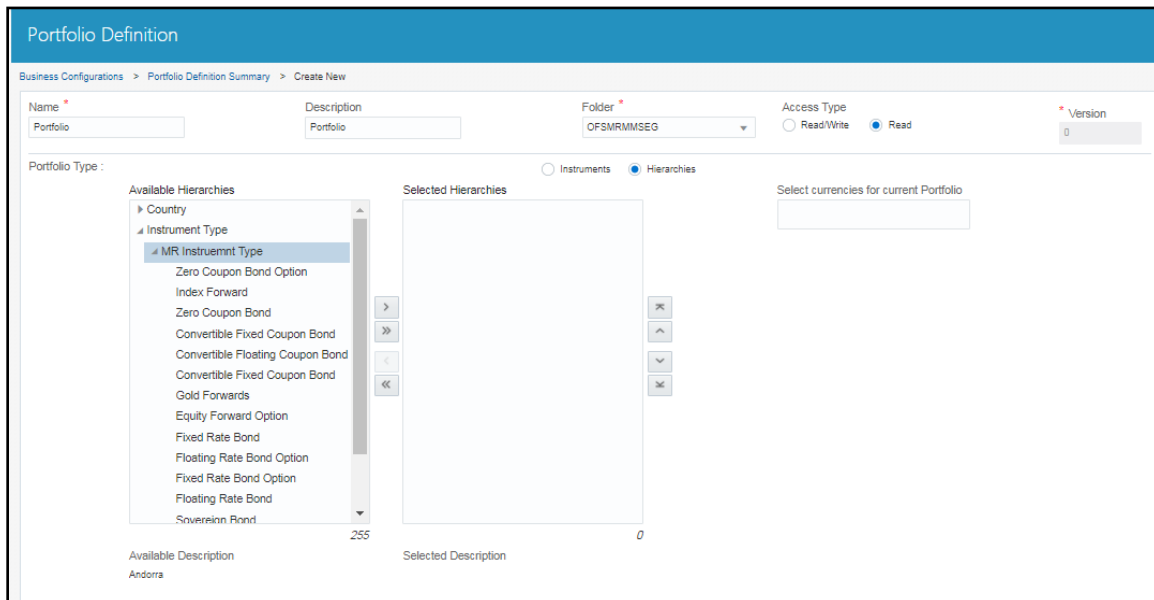

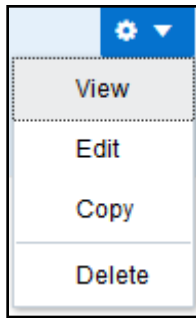



Figure 25 Business Configurations – Portfolio Definition Based on Hierarchy

5. Click **Save**. Portfolio ID saved successfully message is displayed. You can now view the Portfolio in the Summary screen. The Portfolios created in this module are further used for computation in the MRMM Instrument Valuation module.
6. Click **OK**. You can view the Portfolio in the Portfolio Summary screen.
7. To submit the Portfolio for approval, select the portfolio ID from the summary screen and click the Edit icon . Click **Submit**. The portfolio is submitted for approval.

To perform actions such as editing an existing portfolio, creating a copy and so on, click the actions drop-down menu adjacent to each portfolio name.



7.3.2 Viewing a Portfolio

You can view a Portfolio at any given point from the Portfolio Summary page. To view an existing Portfolio, select View in the actions drop down list  adjacent to the Portfolio name. The Portfolio Definition window displays the details of the selected Portfolio. You cannot edit any details in View mode.

7.3.3 Editing a Portfolio

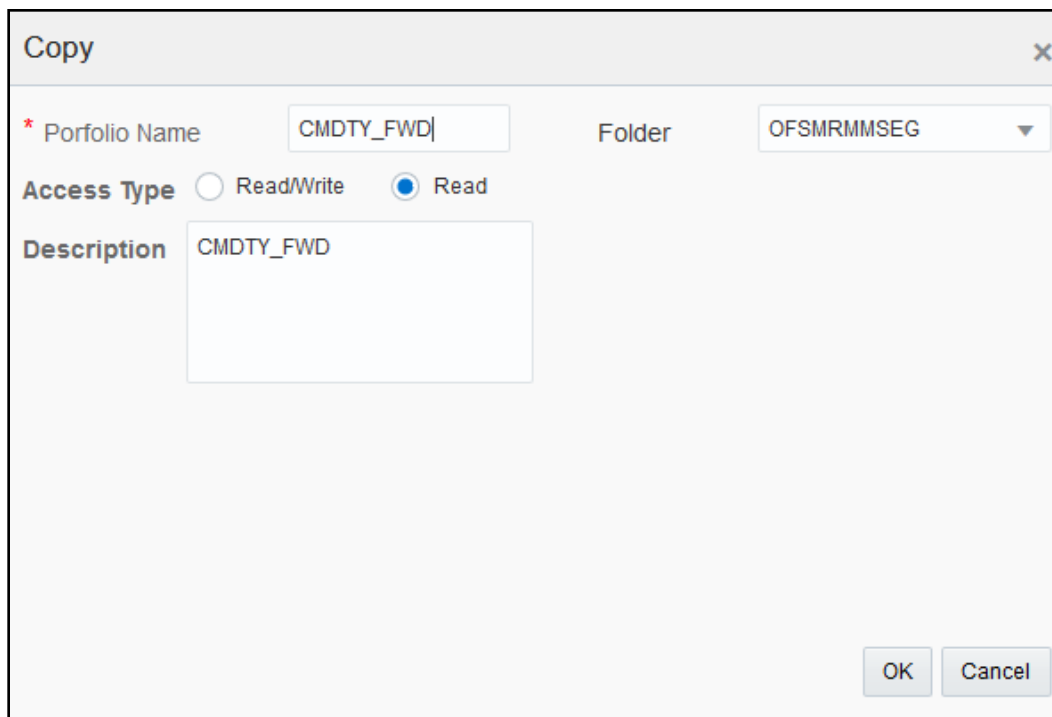
You can edit a portfolio at any given point from the Portfolio Summary page. To edit an existing portfolio:

1. Select **Edit** in the actions drop down list adjacent to the portfolio name. The Portfolio Definition window displays the details of the selected portfolio for editing.
2. Edit the required fields.
3. Click **Save**. The updated information can be viewed in the Portfolio Summary page.

7.3.4 Copying a Portfolio

You can copy a Portfolio at any given point from the Portfolio Summary page. To copy an existing portfolio, follow the below steps:

1. Select **Copy** in the actions drop-down list adjacent to the Portfolio name.
2. Assign a new **Portfolio Name**, and edit the **Description**.



The screenshot shows a 'Copy' dialog box with the following fields and values:

- Portfolio Name:** CMDTY_FWD
- Folder:** OFSMRMMSEG
- Access Type:** Read (selected)
- Description:** CMDTY_FWD

Buttons: OK, Cancel

Figure 26 Portfolio Definition – Copying a Portfolio

3. Click **OK**. The copy is created and can be viewed in the Portfolio Summary screen.

7.4 Modellable and Non-Modellable Risk Factor

A risk factor is referred as modellable, when the price of risk factor is real and is continuously available. All the risk factors should be classified into modellable and non modellable. Expected Shortfall (ES) and Value at Risk (VaR) computation is done only for modellable risk factor. In this screen you can set the business rules and identify risk factors as modellable or non-modellable.

7.4.1 Defining Modellable and Non-Modellable Risk Factors

This section details the procedure for classifying a risk factor into modellable or non- modellable. The classification of a risk factor as modellable or non-modellable is performed using this screen.

The screen has the below two sections:

- Modellable and Non-modellable Executions

This section displays the list of executions and their status. You can select the previous execution from the Select Execution Date drop-down box, and check the status as Success or Failed.

- Modellable and Non-modellable Risk Factors

This screen has two sections. The LHS displays the list of filters where you can select the nodes of given filter. Click Apply to apply the filters to the risk factors, or Reset to remove all the filters. The filtered set of risk factors can be viewed in the screen.

The screenshot shows the 'Modellable & Non Modellable Risk Factor Identification Summary' screen. At the top, it displays 'ORACLE Market Risk Measurement and Management' and the user 'MRUSER'. Below the title bar, there are navigation links for 'Business Configurations' and 'Modellable & Non Modellable Summary'. The main area contains a table of risk factors with columns for Name, ICAT, TBOALP, CQ, TPV, NMICS, RP, CA, and Modellable. A left-hand pane lists various filters such as Risk Factor Type, Asset Class, Market Data Type, etc. The table shows 10 rows of risk factors with their respective status in each column and a toggle for 'Modellable'.

Name	ICAT	TBOALP	CQ	TPV	NMICS	RP	CA	Modellable
CMDTY.USD-COMEX-HG.FWD-29-JAN-2016.MID	✓	✗	✗	✓	✓	✓	✓	<input checked="" type="checkbox"/>
CMDTY.USD-COMEX-IBM.FWD-29-JAN-2016.MID	✓	✗	✗	✓	✓	✓	✓	<input checked="" type="checkbox"/>
CR.AUD-VIA_SNRFOR_MM.CDS-5Y.SPREAD.MID	✗	✗	✗	✗	✗	✗	✗	<input type="checkbox"/>
CR.AUD-VIA_SNRFOR_MM.CDS.RECOVERY	✗	✗	✗	✗	✗	✗	✗	<input type="checkbox"/>
CR.GBP-HSBC_SNRFOR_MM.CDS-5Y.SPREAD.MID	✗	✗	✗	✗	✗	✗	✗	<input type="checkbox"/>
CR.GBP-HSBC_SNRFOR_MM.CDS.RECOVERY	✗	✗	✗	✗	✗	✗	✗	<input checked="" type="checkbox"/>
CR.JPY-JWN_SNRFOR_XR.CDS-5Y.SPREAD.MID	✗	✗	✗	✗	✗	✗	✗	<input type="checkbox"/>
CR.JPY-JWN_SNRFOR_XR.CDS.RECOVERY	✗	✗	✗	✗	✗	✗	✗	<input type="checkbox"/>
CR.USD-AXP_SNRFOR_XR.CDS-5Y.SPREAD.MID	✗	✗	✗	✗	✗	✗	✗	<input type="checkbox"/>
CR.USD-AXP_SNRFOR_XR.CDS.RECOVERY	✗	✗	✗	✗	✗	✗	✗	<input type="checkbox"/>

Figure 27 Modellable and Non-Modellable Risk Factor Identification Summary Screen

Following is the list of applicable filters:

- Risk Factor Type
- Term Currency
- Inflation Index Name
- Market Capitalization Category
- Commodity Group
- Bond Type
- Market Data Source
- Asset Class
- Market Data Type
- Currency
- Base Currency

The table on the RHS displays information about all the risk factors with following columns:

- Name of the Risk Factor

- Institution Conducted a Transaction (ICAT)
- Price form Transaction Between Other Arms-Length Parties (TBOALP)
- Committed Quote (CQ)
- Price Obtained from Third Party Vendor (TPV)
- Non- Modelling Idiosyncratic credit spread (NMICS)
- Real Price (RP)
- Continuously Available (CA)
- Modelling

You need to set rules for the risk factors before proceeding for identification of the modelling risk factors. After configuration of rules, modelling/non-modelling classification is performed as explained in the below example. Assume that following is the list of risk factors.

Market Data String	Asset Class	Market Data Type	Market Data Source	IR Index	Currency	Exchange Name
IR.EUR-EONIA.CASH-ON.MID	IR	CASH	Blue	EONIA	EUR	
IR.USD-USTREASURY-USGOVT.BILL-0-01-apr-2016.01-dec-2016.Price.MID	IR	SOV_BILL	Blue		USD	
FX.AUDUSD-SPOT.MID	FX	FX_SPOT	FX Source			
EQ.GBP-LN-CRH.SPOT.MID	EQ	EQ_SPOT	EQ Source		GBP	LN
CMDTY.USD-NYMEX-HO.SPOT.MID	CMDTY	CMDTY_SPOT	Commodity Source		USD	NYMEX
IR.ZAR-JIBAR-3m.FRA-4M-7M.MID	IR	FRA	IR Source	JIBAR	ZAR	
IR.USD-LIBOR-3m.SWAP-6Y.MID	IR	SWAP	Blue	LIBOR	USD	

The rules created are as below.

Rule for Institution Conducted a Transaction

Rule Name	Asset Class	Currency
Rule 1	IR	EUR,USD

Rule Name	Market Data Source	Currency
Rule 2	Commodity Source	USD

Rule for Price from Transaction Between other Arms-Length Parties

Rule Name	Asset Class	Market Data Type
Rule 1	IR, CMDTY	CASH, SOV_BILL, CMDTY_SPOT

Rule for Committed Quote

Rule Name	Market Data Type
Rule 1	FRA, SWAP

Rule for Price Obtained from Third Party Vendor

Rule Name	Market Data Source
Rule 1	FX Source

For each risk factor the flag is updated based on the rule as shown in the below table.

Market Data String	ICAT	TBOALP	CQ	TPV
IR.EUR-EONIA.CASH-ON.MID	Y	Y	N	N
IR.USD-USTREASURY-USGOVT.BILL-0-01-apr-2016.01-dec-2016.Price.MID	Y	Y	N	N
FX.AUDUSD-SPOT.MID	N	N	N	Y
EQ.GBP-LN-CRH.SPOT.MID	N	N	N	N
CMDTY.USD-NYMEX-HO.SPOT.MID	Y	Y	N	N
IR.ZAR-JIBAR-3m.FRA-4M-7M.MID	N	N	Y	N
IR.USD-LIBOR-3m.SWAP-6Y.MID	Y	N	Y	N

The RP value is computed as Yes for each risk factor if the following condition is met:

(Institution conducted a transaction= "Yes" AND (Price form transaction between other arms-length parties= "Yes" OR Committed quote = "Yes") OR Price Obtained from Third Party Vendor = "YES")

Based on the condition in the above table the application identifies whether the price is Real Price (RP), as shown below.

Market Data String	Real Price
IR.EUR-EONIA.CASH-ON.MID	Y
IR.USD-USTREASURY-USGOVT.BILL-0-01-apr-2016.01-dec-2016.Price.MID	Y
FX.AUDUSD-SPOT.MID	Y
EQ.GBP-LN-CRH.SPOT.MID	N
CMDTY.USD-NYMEX-HO.SPOT.MID	Y
IR.ZAR-JIBAR-3m.FRA-4M-7M.MID	N
IR.USD-LIBOR-3m.SWAP-6Y.MID	Y

The Continuously Available value is flagged as Yes/No based on the below calculation:

If the following conditions are met for the historical data of risk factor for a specified period, then the risk factor will be identified as Continuously Available, else it is marked as not Continuously Available:

- At least 24 data points should be available for continues availability period of 1 year. If there is a continuous availability period of 2 years, then at least 48 (24 * 2) data points should be available.
- Maximum period between two consecutive data points should not be more than 1 month.


For the current example, assume that all risk factors are Continuously Available.

Market Data String	Continuously Available
IR.EUR-EONIA.CASH-ON.MID	Y
IR.USD-USTREASURY-USGOVT.BILL-0-01-apr-2016.01-dec-2016.Price.MID	Y
FX.AUDUSD-SPOT.MID	Y
EQ.GBP-LN-CRH.SPOT.MID	Y
CMDTY.USD-NYMEX-HO.SPOT.MID	Y
IR.ZAR-JIBAR-3m.FRA-4M-7M.MID	Y
IR.USD-LIBOR-3m.SWAP-6Y.MID	Y

The flag for Modellable is computed with values as Yes/No. Risk Factor will be identified as Modellable if “Real Price” is Yes and “Continuously Available” is Yes. The modellable and non-modellable flag is updated based on the logic, as shown below.

Market Data String	Modellable
IR.EUR-EONIA.CASH-ON.MID	Y
IR.USD-USTREASURY-USGOVT.BILL-0-01-apr-2016.01-dec-2016.Price.MID	Y
FX.AUDUSD-SPOT.MID	Y
EQ.GBP-LN-CRH.SPOT.MID	N
CMDTY.USD-NYMEX-HO.SPOT.MID	Y
IR.ZAR-JIBAR-3m.FRA-4M-7M.MID	N
IR.USD-LIBOR-3m.SWAP-6Y.MID	Y

To set rules for each risk factor follow the below steps:

1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select **Market Risk Measurement and Management**.
2. Click  in the MRMM home screen to navigate to the **Business Configuration** window.
3. Select **Modellable and Non-modellable Risk Factor Identification**. The Modellable and Non-modellable Summary page is displayed.
4. Click **Set Rules**. The Risk Factor Rules screen is displayed. The screen displays the five flags Institution Conducted a Transaction, Transaction between Other Arm Length Parties, Committed Quote, Third Party Vendor and Idiosyncratic Credit Spread. The calculation of the risk factors Real Price (RP) and Continuously Available (CA) is dependent on these five flags. You can add multiple rules to each flag.

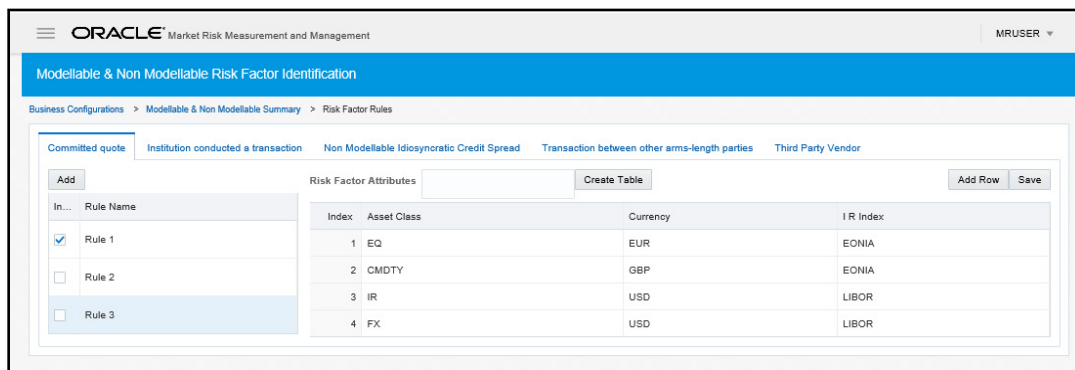


Figure 28 Modellable and Non-Modellable Risk Factor Identification- Setting Rules

5. Navigate to any of the five flags and click **Add**. A new rule is created.
6. Select the attributes for each rule which is created. For example, when you click Add in the Committed Quote column, a new Rule is created. When you click on the rule name, the **Risk Factor Attributes** field becomes available. For every rule, you need to add one or multiple risk factor attributes.

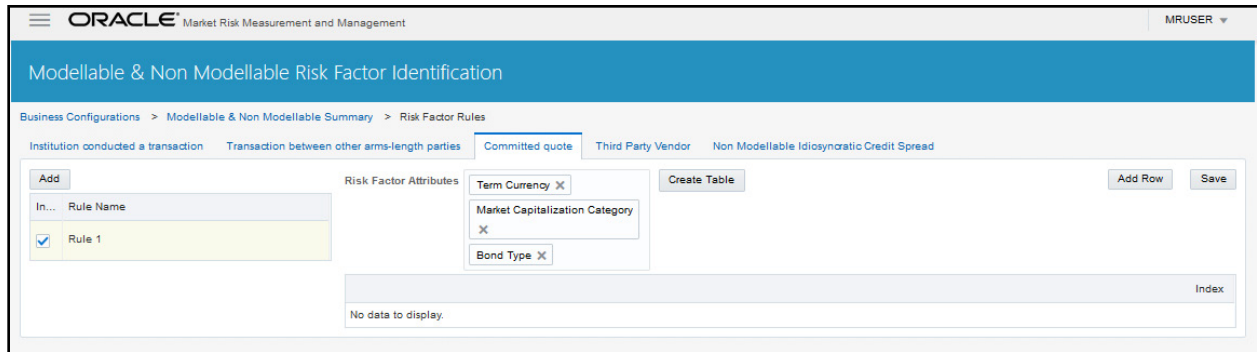


Figure 29 Modellable and Non-Modellable Risk Factor Identification- Adding Attributes

7. After selecting attributes, click **Create Table**. The selected attributes are displayed as column headers in the table.
8. Click **Add Row** to create a new row, and click on each cell. The pre-seeded dimensions for the attributes are displayed. Select the required dimensions and add in the table.

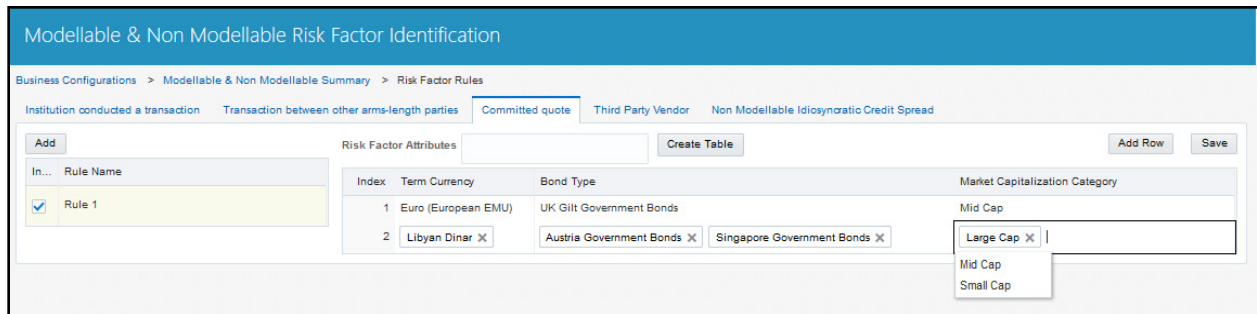
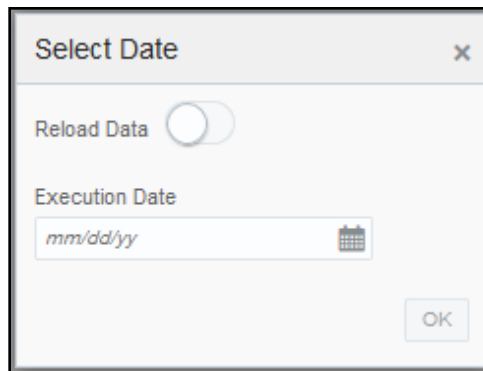


Figure 30 Modellable and Non-Modellable Risk Factor Identification – Adding Dimensions to Attributes

Note:

Use 'F2' key, or click on any other row to come out of the edit mode in a table, before updating or navigating to a different tab.

9. Click **Save**. The rules are saved. Additionally, you can also change the sequence of the rules to be executed by dragging the rules. Sequence of the rule in table will be sequence of execution of rule. You will have to select the check box for each rule if you wish to apply the rule for identifying the corresponding attribute. If you do not select the check box, the application will not execute the rule. Similarly set rules for all the required flags.
10. Click **Execute** in the summary screen. **Select Date** message box appears. To reload risk factor data of the last execution of given date, select **Reload Data**. In this case, the application will not derive the risk factor data required for instruments it will take last identified risk factor data. Else provide the Execution Date and click **OK**.



The rules created for Institution Conducted a Transaction (ICAT), Price form Transaction Between Other Arms-Length Parties (TBOALP), Committed Quote (CQ), Price Obtained from Third Party Vendor (TPV) and Non-Modellable Idiosyncratic credit spread (NMICS) will be executed in the sequence displayed in the respective interface. Rules will update the target column based on mapping selected in source column.

The RP value is computed as Yes for each risk factor if following condition is met:

The Continuously Available value is flagged as Yes/No

The flag for Modellable is computed with values as Yes/No. Risk Factor will be identified as Modellable if “Real Price” is Yes and “Continuously Available” is Yes. Corresponding risk factor should be marked as Modellable (Yes) else mark risk factor as non Modellable (No).

11. The RHS of the summary screen has filters that can be applied to filter the risk output data based on the risk factors. You can manually modify the system computed values for modellable and non-modellable for each risk factor.
12. Click **Save** to save the modifications made to the modellable status of risk factor. The resulting data is further used in the output metrics computed in historical simulation.

8 Instrument Valuation

OFS MRMM Instrument Valuation module enables you to create and analyze different perspectives of viewing the valuation of instruments. This chapter includes:

- [Overview](#)
- [Creating and Executing a Business Definition](#)

8.1 Overview

This module primarily aims to deliver the instrument granularity computations and metrics using NUMERIX. It computes the price of instruments in the portfolio, and addresses the needs of both regulatory reporting and internal risk management. You can perform valuation of instruments and positions in trading book here using pre-defined models and methods based on trading desk and/or portfolio. This module provides the below computations:

- Present value of instrument
- Cashflow of instrument
- Greeks and sensitivity associated with instrument
- Yield Risk report of instrument

8.2 Creating and Executing a Business Definition

This section elaborates the process of creating a business approach, and executing a business definition. A business definition allows you to set business specific parameters required for analysis. You need to define a business approach before creating a business definition.

8.2.1 Defining a Business Approach

A new business approach enables you to analyze each module from a trading desk or portfolio perspective. Follow the below procedure for defining a new business approach:

1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select **Market Risk Measurement and Management**
2. Select **Business Processes > Instrument Valuation**. The Instrument Valuation Summary screen is displayed. The screen displays the list of business approaches based on Trading Desk or Portfolio.

Oracle Financial Services Market Risk Measurement and Management User Guide
Release 8.0.5.0.0

Name	Created By	Created Date	Last Modified By	Last Modified Date	Folder
EQ_FUT_01 EQ_FUT_01	MRUSER	2017-07-04 22:58:08.0	MRUSER	2017-07-04 22:58:08.0	OFSMRMMSEG
FINAL_ALL FINAL_ALL	MRUSER	2017-07-04 22:06:34.0	MRUSER	2017-07-04 22:06:34.0	OFSMRMMSEG
FX_EURO_OPTIONS FX_EURO_OPTIONS	MRUSER	2017-07-04 22:05:45.0	MRUSER	2017-07-04 22:05:45.0	OFSMRMMSEG
CDS CDS	MRUSER	2017-07-04 22:05:06.0	MRUSER	2017-07-04 22:05:06.0	OFSMRMMSEG
EQ_FUTURE EQ_FUTURE	MRUSER	2017-07-04 15:05:50.0	MRUSER	2017-07-04 22:04:26.0	OFSMRMMSEG

Figure 31 Instrument Valuation Summary Screen

3. Click **New**. The **New Business Approach** window is displayed.

New Business Approach

Portfolio Trading Desk

Name: Portfolio_1

Description: portfolio

Access Type: Read/Write Read

Folder: OFSMRMMSEG

OK Cancel

Figure 32 Instrument Valuation – New Business Approach

The following table describes the fields in the New Business Approach window:

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Name	Displays the list of Trading Desk/Portfolio that you have access. Select the Trading Desk/Portfolio from the drop-down list.
Description	Displays the description for the Trading Desk/Portfolio.
Access Type	Specify the access type.
Folder	Select the folder from the drop down list.

Table 10 Fields and their Descriptions in New Business Approach Window

4. Select **Trading Desk** or **Portfolio** using the radio button.
5. In the **Name** drop-down box select the Trading Desk/Portfolio that needs to be analyzed. The list displays items that you have access to only.
6. The description field is auto populated based on the selected Portfolio/Trading desk. This is an uneditable field.
7. Select the **Access Type**, and **Folder**.
8. Click **OK**. The business approach is created.

After a business approach is created, it is listed in the Instrument Valuation Summary page. You can select any Trading Desk/Portfolio and proceed for creation of Business Definition.

8.2.2 Defining a New Business Definition

In the Instrument Valuation Summary screen, click on any business approach to navigate to the business definition screen for a specific Portfolio or Trading Desk.

Oracle Financial Services Market Risk Measurement and Management User Guide

Release 8.0.5.0.0

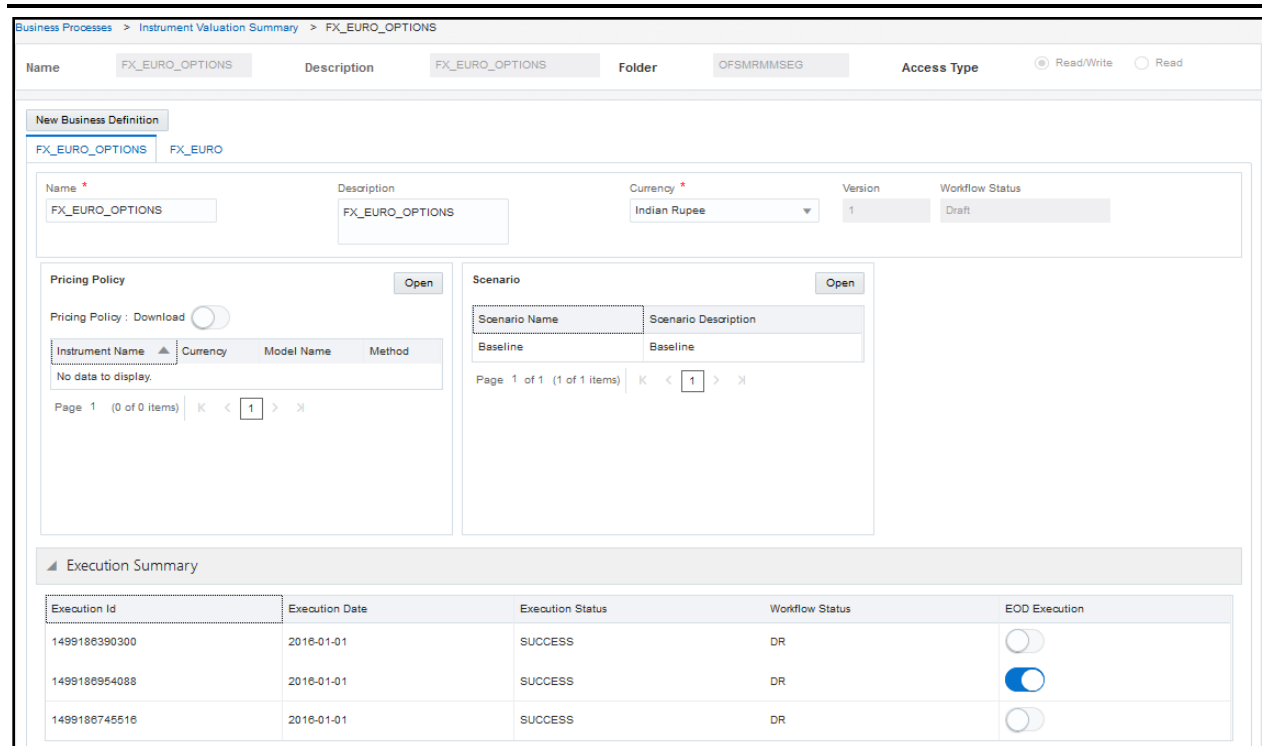


Figure 33 Instrument Valuation – Business Definition Screen

The screen includes the below two sections.

- **Trading desk/Portfolio information:** This section displays the trading desk/portfolio information such as Name, Description, Folder and Access Type. These fields are uneditable.
- **Business Definition:** You can define one or multiple business definitions in this section. The created definitions are displayed as tabs. Click on each tab to view details about the business definition. You can perform the below actions in this section:
 - **Edit a Business Definition:** Only business definitions in draft stage can be edited. Click a Business Definition in draft stage to edit.
 - **View the Execution Summary:** You can view the execution details of the business definitions here, such as Execution ID, Execution Date, Execution Status, Workflow Status, and End Of Day (EOD) Execution. You can select any one execution for a given date as EOD execution. All the reports use EOD run for reporting purpose. If an EOD run has not been selected, then by the system considers the last successful execution is as EOD run.

Execution Summary				
Execution Id	Execution Date	Execution Status	Workflow Status	EOD Execution
1499186390300	2016-01-01	SUCCESS	DR	<input type="checkbox"/>
1499186954088	2016-01-01	SUCCESS	DR	<input checked="" type="checkbox"/>
1499186745516	2016-01-01	SUCCESS	DR	<input type="checkbox"/>

Page 1 of 1 (1-3 of 3 items) | < 1 >

Figure 34 Instrument Valuation – Execution Summary

8.2.2.1 Pricing Policy

In this pane, you can select the pricing policy to be used for instrument pricing. Pricing Policy enables you to select models and methods to be used for pricing the instrument. You can either download, or define the pricing policy

- **Download:** If you select the Download option, then with all the corresponding instrument data, you will need to provide the models and methods to be used for pricing.

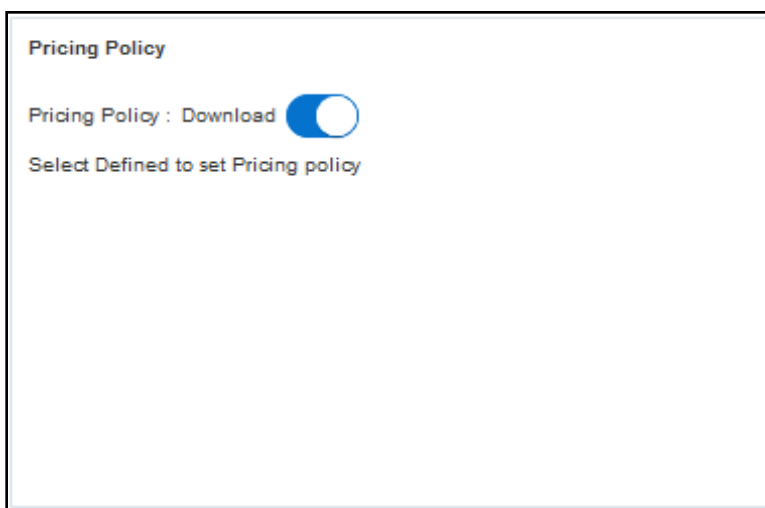


Figure 35 Instrument Valuation – Pricing policy Download

NOTE: In case for some instrument data the download values have not been provided, then default models will be used for pricing. The default models are defined in the [Business Configuration](#) section.

- **Define:** The Define option allows you to select the models and methods at the granularity level of Instrument Type and Currency. The pricing policy of an instrument can be defined based on the instruments considered for valuation. You can select the models and methods for the corresponding Instrument type and Currency.

Pricing Policy Open

Pricing Policy : Download

Instrument Name	Currency	Model Name	Method
Generic Swap	Iraqi Dinar	IR Deterministic Model	Forward A
FX Asian Option	Indian Rupee	FX Heston Model	Backward

Page 1 of 1 (1-2 of 2 items) | K < 1 > X

Figure 36 Instrument Valuation – Defining a Pricing Policy

To define a pricing policy, follow the below steps:

1. In the **Pricing Policy** pane, toggle off the Download button.
2. Click **Open**.
3. Click **Add** to create a new row in the table.
4. Click on each cell and select inputs for the below fields from the drop-down list.
 - **Instrument Type:** Select the instrument type for which you need to provide model and method.
 - **Currency:** Select the currency for which you need to specify model and method.
 - **Model Name:** Select the model from the drop down list. Specific list of models are eligible for specific instrument type. See [Annexure D](#) for the list of models and methods.
 - **Method:** Select the method from the drop down list. Specific list of methods are eligible for specific instrument type. See [Annexure D](#) for the list of models and methods.

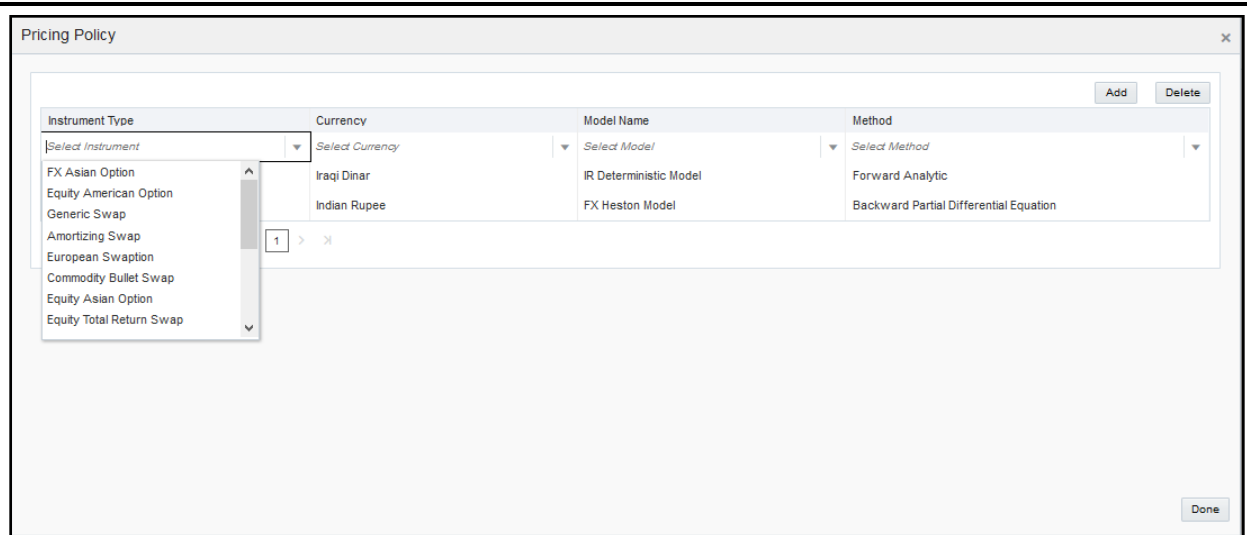


Figure 37 Instrument Valuation- Defining a Pricing Policy

5. Click **Done** to save the entries.

NOTE: In case for some instrument type and currency models and methods are not defined then default models will be used for pricing. The default models are defined in the [Business Configuration](#) section.

8.2.2.2 Scenario

In this pane, you can select only the Baseline scenario for execution. The Baseline scenario is displayed by default and cannot be deleted.



Figure 38 Instrument Valuation - Scenario

To add the baseline scenario, follow the below steps:

1. In the Scenario pane, click **Open**.

2. Select the baseline scenario from the drop-down list and click **Add**.

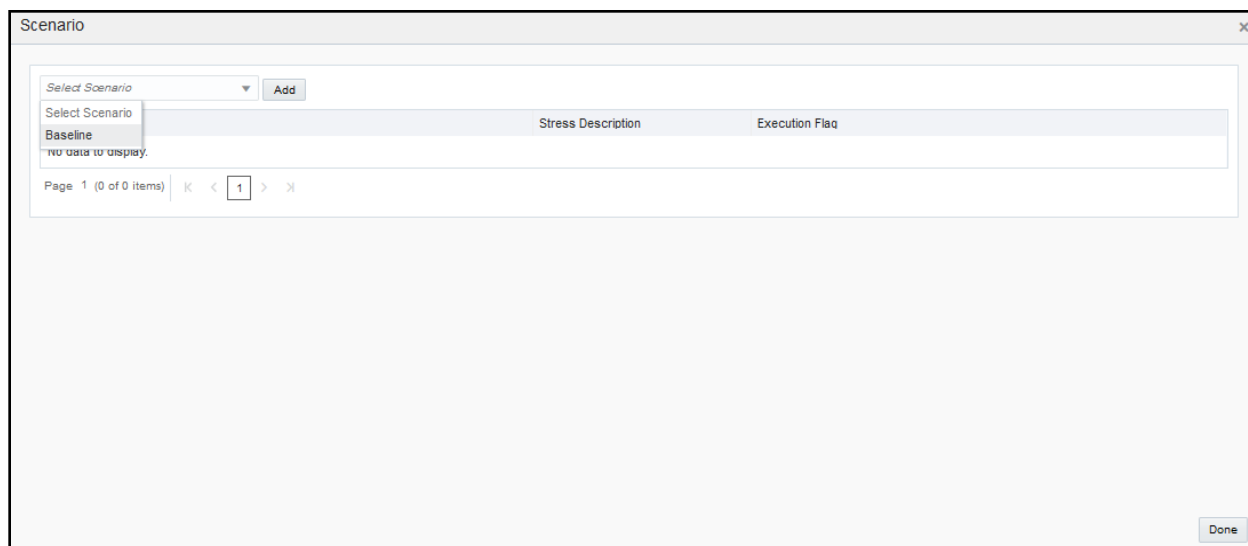


Figure 39 Instrument Valuation – Adding the Baseline Scenario

3. Click **Done**.

8.2.3 Procedure for Creating a Business Definition in Instrument Valuation

The defined executions are listed in the OFS MRMM Instrument Valuation summary screen. Click either Portfolio or Trading Desk tabs to view the list. Each business definition is executed as a separate run. The following table describes the fields in the new business definition window:

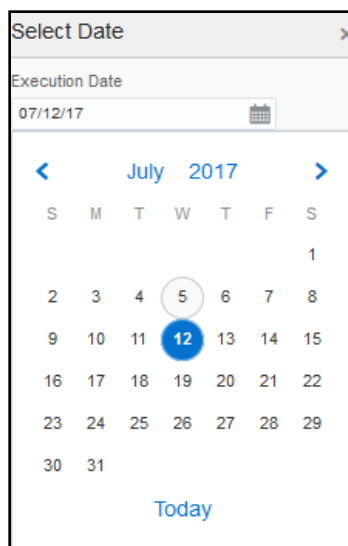
Fields	Description
Fields marked in red asterisk(*) are mandatory	
Name*	Enter the name of the business definition.
Description	Provide a description for the business definition.
Currency*	It is the currency in which all the output for given definition will be computed. Select the currency type from the drop-down list.
Version	Displays the workflow version of the business definition.
Workflow Status	Displays the workflow status of the business definition.
Pricing Policy	Select the models and methods to be used for instrument pricing.
Scenario	Select the scenario to be executed. The Baseline scenario is selected by default.

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Execution Summary	Displays the execution history of the business scenarios. Select the execution to be marked as EOD execution.

Table 11 Fields and their Descriptions in Instrument Valuation-Business Definition Window

Follow the below steps to create a new business definition in Instrument Valuation:

1. Click the business approach from the OFS MRMM Instrument Valuation summary screen, for which the business definition needs to be created.
2. Click **New Business Definition**. A new tab is created.
3. Click on the new tab, and provide details in the **Name**, **Description** fields.
4. In the **Currency** field, select the currency type from the drop-down list.
5. In the **Pricing Policy** pane, select Download or Define. You can Add or Delete a defined pricing policy. See [Pricing Policy](#) for details.
6. In the **Scenario** pane, select the baseline scenario. See [Scenario](#) for details.
7. Click **Save** and **Submit**.
8. Click **Execute** to trigger an adhoc run. A pop up message with a date-time editor is displayed. Specify the date on which the execution needs to be performed and click **OK**. The execution is triggered.



9. After executing the Business Definition, select any one execution for a given date as EOD execution.

9 Market Risk – Historical Simulation

The Market Risk Historical Simulation module enables you to compute portfolio level metrics using historical simulation. This chapter includes:

- [Overview](#)
- [Creating and Executing a Business Definition](#)

9.1 Overview

This module primarily aims to measure the risk of your portfolio and/or trading desk, and deliver the portfolio granularity metrics using NUMERIX and historical simulation. MRMM Historical Simulation enables you to compute VaR, Expected Shortfall for regulatory and non-regulatory purpose and IMA capital charges, and addresses the needs of both regulatory reporting and internal risk management.

The module provides the following computation:

- ES and VaR
- Stress calibrated ES
- Internally modelled capital charge
- Stressed capital add-on
- Aggregated Charge

9.2 Creating and Executing a Business Definition

This section elaborates the process of creating a business approach, and executing a business definition. A business definition allows you to set business specific parameters required for analysis. You need to define a business approach before creating a business definition.

9.2.1 Defining a Business Approach

Business approach enables you to analyze each module from a trading desk or portfolio perspective. You can define a new business approach and view the existing business approach from the Market Risk- Historical Simulation Summary screen.

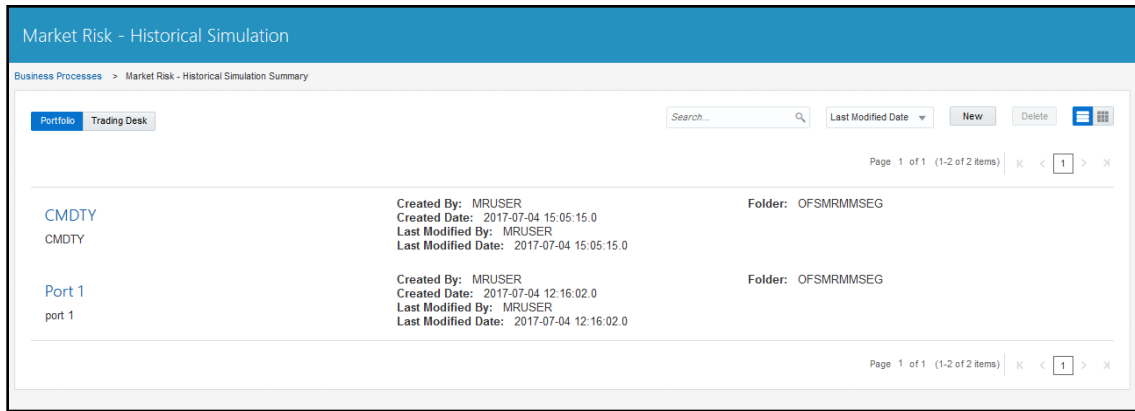


Figure 40 Market Risk – Historical Simulation Summary Screen

See [Instrument Valuation - Defining a Business Approach](#) for the detailed procedure.

9.2.2 Defining a New Business Definition

In the Market Risk – Historical Simulation Summary screen, click on any business approach to navigate to the business definition screen for the specific Portfolio or Trading Desk.

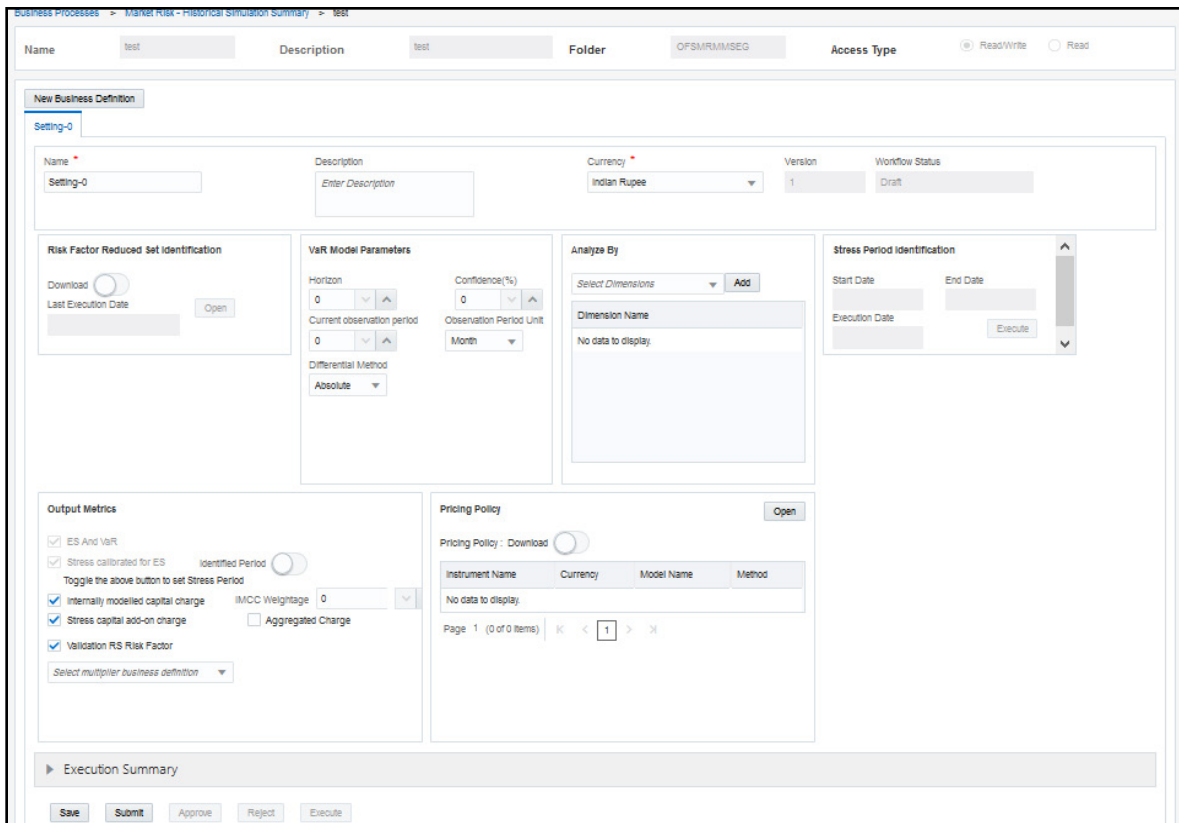


Figure 41 Market Risk Historical Simulation – Business Definition Screen

The screen includes the below two sections.

- **Trading Desk/Portfolio information:** It displays the trading desk/portfolio information. These fields are uneditable.
- **Business Definition:** You can define one or multiple business definitions in this section. The created definitions are displayed as tabs. Click on each tab to view details about the business definition. You can perform the below actions in this section:
 - **Edit a Business Definition:** Only business definitions in draft stage can be edited. Click a Business Definition in draft stage to edit.
 - **View the Execution Summary:** You can view the execution details of the business definitions here, such as Execution ID, Execution Date, Execution Status, Workflow Status, and End Of Day (EOD) Execution. You can select any one execution for a given date as EOD execution. All the reports use EOD run for reporting purpose. If an EOD run has not been selected, then by the system considers the last successful execution is as EOD run.

Execution Summary				
Execution Id	Execution Date	Execution Status	Workflow Status	EOD Execution
1499186390300	2016-01-01	SUCCESS	DR	<input type="checkbox"/>
1499186954088	2016-01-01	SUCCESS	DR	<input checked="" type="checkbox"/>
1499186745516	2016-01-01	SUCCESS	DR	<input type="checkbox"/>

Page 1 of 1 (1-3 of 3 items) | < 1 >

Figure 42 Historical Simulation – Execution Summary

9.2.2.1 Risk Factor Reduced Set Identification

This section enables you to identify the reduced set of risk factors in such a way that it explains 75% of the variation of the full model. The last successful execution date of reduced set identification is displayed on the reduced set of risk factor pane. You can either define or download the reduced set.

Download: If you choose to download the reduced set, then the full set of risk factors will be considered for all the computations.

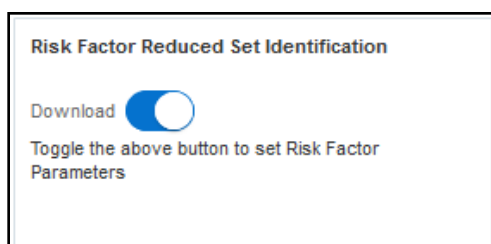


Figure 43 Risk Factor Reduced Set Identification - Download

Define: This option enables you to set the risk factor parameters. Follow the below steps to define the risk factors for reduced set identification:

1. Toggle off the download option in the **Risk Factor Reduced Set Identification** pane.

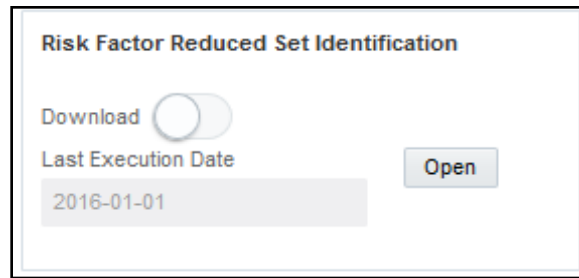


Figure 44 Risk Factor Reduced Set Identification - Define

2. Click **Open**, to view the zoom window.
3. Specify the date from the date-time editor.

Provide the number of historical days and select the unit as days, months or years from the drop-down list.

4. Click **Fetch**. The risk factor for all the instruments is fetched for the selected execution date. Fetch is background process which identifies the risk factors of the instrument for selected date. Once fetch is clicked you will have to click on refresh. If risk factors for given dates are already fetched then you can skip fetch and directly click on refresh button.
5. Click **Refresh**. Refresh will refresh the screen with already fetched risk factor for selected date.

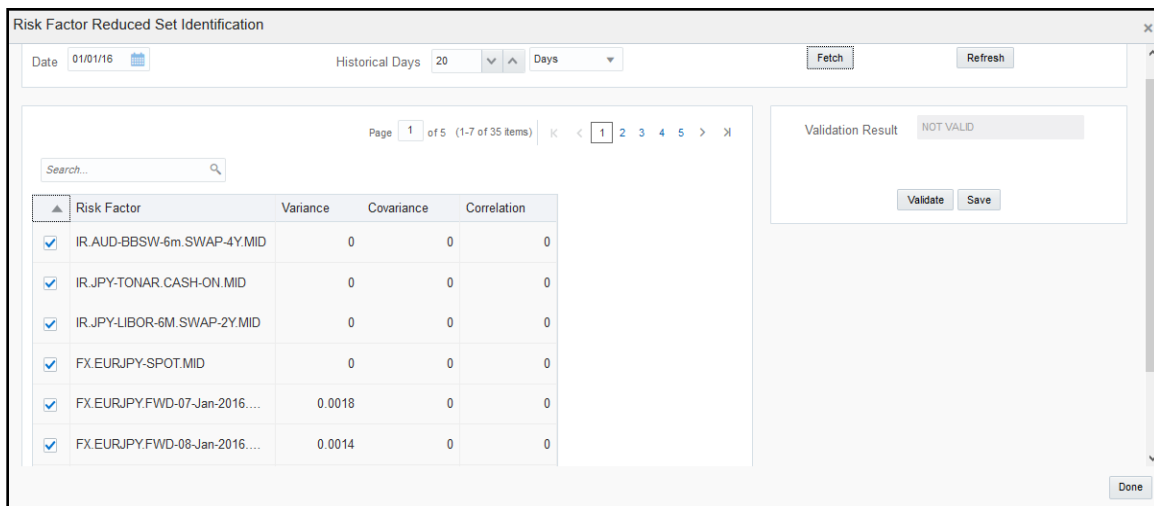


Figure 45 Defining Risk Factor Reduced Set

6. Select the check box for risk factors to be considered for reduced set.
7. Validate the reduced risk factor set after reduced set identification. OFS MRMM validates the reduced risk factor set using the below steps:

- a. The system fetches the Expected Shortfall for full set and current observation period [ES (F, C)] amount for historical period. System expects that ES for full set is already computed for all the dates in historical period.
- b. Computes the value for Expected Shortfall for reduced set and current observation period [ES(R, C)] for the specified historical period. To compute ES(R, C), the VaR Model Parameter and Pricing Policy specified in business definition is considered.
- c. For each date of historical period the percentage of ES(R,C) with respect to ES(F,C) is computed by using the below formula:

$$\text{Reduced set Percentage} = \frac{ES_{(R,C)}}{ES_{(F,C)}}$$

- d. Reduced Set Identified is Valid, if ES of the reduced set of risk factors is greater than equal to 75% of the fully specified ES model on average measured over the historical period as specified by user.

$$\text{Average of "Reduced set Percentage"} \geq 0.75$$

Where,

Average is computed over historical period specified by user

Note:

OFS MRMM skips the dates within historical period where ES full set is not available. Such dates are not considered for computing average.

8. Click **Save**.
9. Click **Done** to return to the business definition window.

9.2.2.2 Stress Period Identification

Stress period is identified as a 12-month period of stress since 2007 till execution date in which the portfolio experiences the largest loss. This section enables you to identify the stress period for a corresponding portfolio or trading desk.

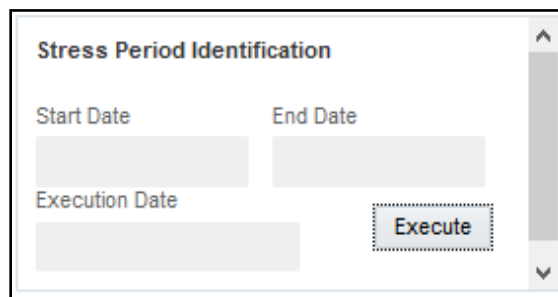


Figure 46 Stress Period Identification

This pane displays the below information:

- **Start Date:** Indicates start day of the stress period
- **End Date:** Indicates end date of the stress period

- **Execution Date:** Indicates the last execution date on which the stress period was identified

To trigger the Stress period identification process:

1. Click **Execute**.
2. Select the execution date from the date-time editor.
3. Click **OK**. The execution is triggered successfully.

9.2.2.3 VaR Model Parameters

In this section you need to define the below VaR model parameters. VaR model parameters allows you define and determine the behavior of VaR Model outputs.

The screenshot shows a dialog box titled "VaR Model Parameters". It contains the following fields and controls:

- Horizon:** A numeric input field with the value "4" and up/down arrow buttons.
- Confidence(%):** A numeric input field with the value "97.5" and up/down arrow buttons.
- Current observation period:** A numeric input field with the value "5" and up/down arrow buttons.
- Observation Period Unit:** A dropdown menu with "Day" selected.
- Differential Method:** A dropdown menu with "Relative" selected, and a sub-menu is open showing "Absolute" and "Relative" options.

Figure 47 VaR Model Parameters

- **Horizon:** It is the time horizon over which you can compute the VaR number output. Specify the horizon in terms of days.
- **Confidence:** Confidence is the percentage value that you need to define the VaR numbers. Specify the confidence value required for calculating the output.
- **Current Observation Period:** This is the current historical observation period to be considered for computation of VaR. The current historical period starts from execution date till the period specified in this column. Observation period is computed relative to execution date.
- **Observation Period Unit:** Specify the current observation period in terms of calendar days, months or years from the drop-down list.
- **Differential Method:** This is interpolation method used for interpolating missing values in historical data. This parameter indicates how to construct the simulated market from

execution date's market. You can select Absolute or Relative. The following formula explains the computation of scenario values under each method.

$$\begin{aligned} \text{Absolute difference} &= RF_t - RF_{t-1} \\ RF_{\text{Scenario Value}} &= RF_{\text{Execution date}} + \text{Absolute difference} \end{aligned}$$

$$\begin{aligned} \text{Relative difference} &= (RF_t / RF_{t-1}) - 1 \\ RF_{\text{Scenario Value}} &= RF_{\text{Execution date}} (1 + \text{Relative difference}) \end{aligned}$$

Where, RF is the risk factor, and t is the number of execution days.

9.2.2.4 Analyze By

In this pane you can select the dimensions for analyzing the VaR and ES numbers. Analyze By enables you to view VaR outputs at different granularity. For a selected dimension the application creates the tree structure of its nodes and provide the output. For Example, Instrument Type and Currency is selected in Analyze By in the same sequence. If a portfolio has two instrument types such as Zero Coupon Bond and Equity Forward, and has two currencies such as INR and USD. Then the application generates VaR numbers at following granularity.

- VaR at Group level
- VaR for Zero Coupon Bond with both currency
- VaR for Equity Forward with both currency
- VaR for Zero Coupon Bond and INR
- VaR for Zero Coupon Bond and USD
- VaR for Equity Forward and INR
- VaR for Equity Forward and USD

You can change the sequence of selected dimension by using drag and drop feature of the user interface.

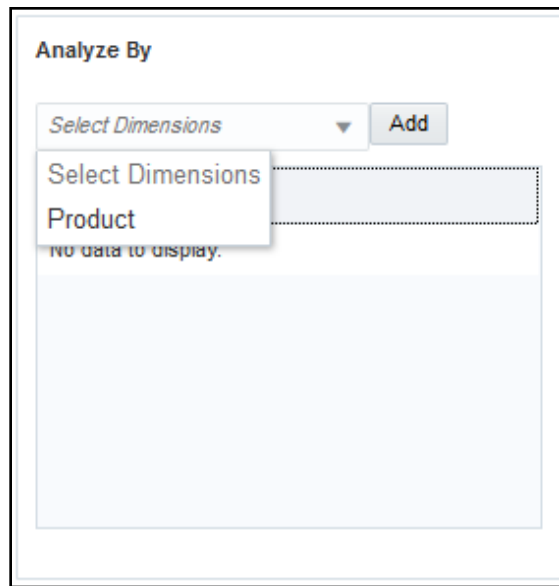


Figure 48 Analyze By

9.2.2.5 Output Metrics

This section allows you to select the list of desired outputs mentioned below.

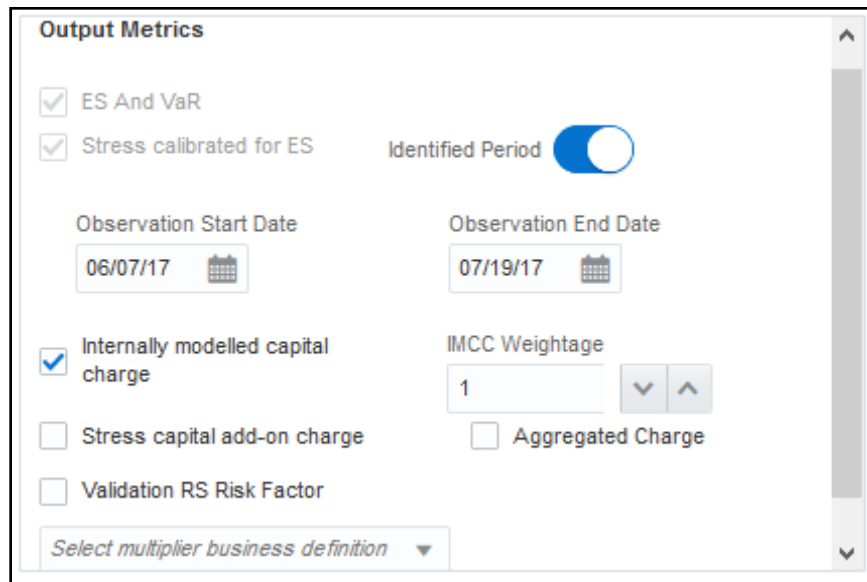


Figure 49 Output Metrics

The outputs are:

- **ES and VaR:** This option calculates the Expected Shortfall (ES) and Value at Risk (VaR) using the current observation period.

VaR is computed as maximum amount of potential loss that can occur for given confidence and time horizon.

ES is computed using the following equation:

$$ES = \sqrt{(ES_T(P))^2 + \sum_{j \geq 2} \left(ES_T(P, j) \sqrt{\frac{(LH_j - LH_{j-1})}{T}} \right)^2}$$

Where,

ES is the regulatory liquidity-adjusted expected shortfall;

T is the length of the base horizon;

$ES_T(P)$ is the expected shortfall at horizon T of a portfolio P;

$ES_T(P, j)$ is the expected shortfall at horizon T of a portfolio P with respect to shocks for subset of risk factors Q (j), with all other risk factors held constant;

Q(j) is the subset of risk factors whose liquidity horizon is at least as long as LH_j

LH_j is the liquidity horizon j as specified by you in Liquidity Horizon user interface

- **Stress Calibrated for ES:** This selection provides you the option to identify the stress period, or select the system identified stress period.
 - If you choose to define the observation period, toggle the Identified Period button and provide the Observation Start Date and Observation End Date.
 - If you select System Identified Period, then the stress period start and end date computed in the Stress Period Identification grid will be considered for computation.

Stress calibrated ES is computed using following equation

$$\text{Stress calibrated ES} = ES_{R,S} \frac{ES_{F,C}}{ES_{R,C}}$$

Where,

$ES_{R,S}$ is Expected short fall for reduced set of risk factor and stress observation period

$ES_{F,C}$ is Expected short fall for full set of risk factor and current observation period

$ES_{R,C}$ is Expected short fall for reduced set of risk factor and current observation period

- **Internally Modelled Capital Charge:** If you select this option, specify the Relative weight assigned to the firms internal model. This output is required to compute Internally Modelled Capital Charge (IMCC).

IMCC is computed using following equation:

$$IMCC = \rho (IMCC(C)) + (1 - \rho) \left(\sum_{i=1}^R IMCC(C_i) \right)$$

Where,

$IMCC(C)$ is Stress calibrated ES

$IMCC(C_i)$ is stress calibrated ES with respect to shocks for broad risk factors class i with all other risk factor held constant.

i is broad regulatory risk classes: interest rate risk, equity risk, foreign exchange risk, commodity risk and credit spread risk

ρ is the relative weight assigned to the firm's internal model

- **Stress Capital Add-on Charge:** Select this option to set computation of stress scenario capital charge (SES) with execution.

Stress capital add-on is computed using following equation

$$SES = \sqrt{\sum_{i=1}^L SES_{NM,i} + \sum_{j=1}^K SES_{NM,j}}$$

Where,

L is non-modellable idiosyncratic risk factor

K is non-modellable non idiosyncratic risk factor

$SES_{NM,X}$ is the stress scenario capital charge for non-modellable risk factor X , with respect to shock for X risk factor with all other risk factors held constant

- **Aggregated Charge:** Select this option to set computation of Aggregated Charge with execution. Computation of aggregated charge requires a multiplier. Multiplier is the number which is associated with number of exception arrived in Model Validation. Select the business definition defined in Model Validation module from the drop down box, to add a multiplier. If not selected system will take 1.5 as default value of multiplier.

Aggregated Charge is computed using following equation

$$Aggregated\ Charge = \max\{IMCC_{t-1} + SES_{t-1}; m_c \cdot IMCC_{avg} + SES_{avg}\}$$

Where,

IMCC and SES average is average taken over 60-days

m_c is multiplier derived from backtesting model. See [Exception Probability and Multiplier](#) for details.

- **Validation RS Risk Factor Flag:** Selecting this option enables you to check the validity of reduced set with execution. Validation logic is as specified in [Risk Factor Reduced Set Identification](#).

NOTE: If there is any dependency between two outputs, then the application auto selects the related output. For example, if you select Internally Modelled Capital Charge, then the application auto selects ES and VaR and Stress Calibrated for ES.

9.2.2.6 Pricing Policy

It allows you to select the pricing policy models and methods to be used for instrument pricing. You can either download, or define the pricing policy. See section [Pricing Policy](#) in Instrument Valuation chapter for details.

9.2.3 Procedure for Creating a Business Definition in Market Risk Historical Simulation

The defined executions are listed in the Market Risk Historical Simulation summary screen. Click either Portfolio or Trading Desk tabs to view the list. Each Business Definition is executed as a separate run. The new business definition screen is shown below:

Figure 50 Market Risk Historical Simulation – New Business Definition

The following table describes the fields in the business definition window:

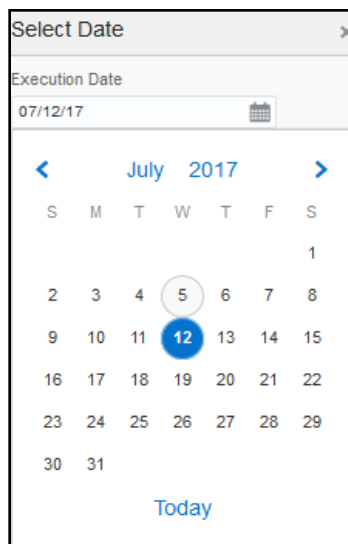
Fields	Description
Fields marked in red asterisk(*) are mandatory	
Name*	Enter the name of the business definition.
Description	Provide a description for the business definition.

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Currency*	It is the currency in which all the output for given definition will be computed. Select the currency type from the drop-down list.
Version	Displays the workflow version of the business definition.
Workflow Status	Displays the workflow status of the business definition.
Risk Factor Reduced	Displays the last successful execution date of risk factor identification.
Set Identification	Select whether you want to download or define the risk factor parameters.
Horizon	Specify the horizon in terms of days.
Confidence (%)	Specify the confidence level for computation.
Current Observation Period	Specify the current observation period for computation of VaR
Observation Period Unit	Specify the unit for current observation period in terms of days, months or year
Differential Method	Select the differential method from the drop-down list.
Analyze By	Select dimensions for analyzing the VaR and ES numbers from the drop-down list.
Stress Period Identification	Displays the start data and end date of the stress period. Specify the start and end date for stress period execution.
Output Metrics	Select the list of desired outputs.
Pricing Policy	Select the models and methods to be used for instrument pricing.
Execution Summary	Displays the execution history of the business scenarios. Select the execution to be marked as EOD execution.

Table 12 Fields and their Descriptions in Historical Simulation-Business Definition Window

Follow the below steps to create a new business definition in Market Risk-Historical Simulation:

1. Click the business approach from the Market Risk-Historical Simulation summary screen, for which the business definition needs to be created.
2. Click **New Business Definition**. A new tab is created.
3. Click on the new tab, and provide details in the **Name**, **Description** fields.
4. In the **Currency** field, select the currency type from the drop-down list.
5. Identify the reduced set of risk factors. See [Risk Factor Reduced Set Identification](#) for details.
6. Provide stress period start and end date and execute **Stress Factor Identification**. See [Stress period Identification](#) for details.
7. Provide details for the fields **Horizon**, **Confidence**, and **Current Observation Period** in **VaR Model Parameters** pane. See [VaR Model Parameters](#) for details.
8. Select the dimensions in the **Analyze By** pane. See [Analyze By](#) for details.
9. Select Download or Define in the **Pricing Policy** pane, and specify models and methods to be used for instrument pricing. See [Pricing Policy](#) for details.
10. Select the list of desired outputs in the **Output Metrics** pane. See [Output Metrics](#) for details.
11. Click **Save** and **Submit**.
12. Click **Execute** to trigger an adhoc run. A pop up message with a date-time editor is displayed. Specify the date on which the execution needs to be performed and click **OK**. The execution is triggered.



13. After executing the Business Definition, select any one execution for a given date as EOD execution.

10 Model Validation

This module enables you to ensure that your models meet prescribed standards. This chapter includes:

- [Overview](#)
- [Creating and Executing a Business Definition](#)

10.1 Overview

OFS Market Risk Model Validation Module enables you to validate historical VaR model. You can use Profit and Loss (P&L) attribution and back-testing to decide whether your trading desks are eligible to follow IMA capital requirements. The module provides the following computations:

- Actual, Hypothetical and Risk Theoretical Profit and Loss (P&L)
- Exception
- First Ratio
- Second Ratio

10.2 Creating and Executing a Business Definition

This section elaborates the process of creating a business approach, and executing a business definition. A business definition allows you to set business specific parameters required for analysis. You need to define a business approach before creating a business definition.

10.2.1 Defining a Business Approach

Business approach enables you to analyze each module from a trading desk or portfolio perspective. You can define a new business approach and view the existing business approach from the Model Validation Summary screen.



Figure 51 Model Validation Summary Screen

See [Instrument Valuation - Defining a Business Approach](#) for the detailed procedure.

10.2.2 Defining a New Business Definition

In the Model Validation Summary screen, click on any business approach to navigate to the business definition screen for that Portfolio/Trading Desk.

The screenshot displays the 'New Business Definition' screen in the Oracle Financial Services Market Risk Measurement and Management application. The interface is organized into several sections:

- Business definition:** A header section containing fields for Name (Business definition), Description (Definition 1), Currency (Indian Rupee), Version (1), and Workflow Status (Draft).
- Risk Theoretical and Hypothetical Definition:** Includes dropdown menus for Risk Theoretical and Hypothetical, both set to 'Select Business Definition'.
- Model Parameters:** Features input fields for Backtesting Period (3) and Backtesting Period Unit (Month), along with checkboxes for Actual P&L, Risk Theoretical P&L, and Hypothetical P&L.
- Model Acceptance Criteria:** Contains settings for Backtesting Requirements (Exception Limit: 0), P&L attribution Requirements (First Ratio Range: -2 to 1, Second Ratio Range: -2 to 3), and Breach Limit (1).
- Zone Classification:** Defines three zones with their respective start and end ranges: Green Zone (0 to 95), Yellow Zone (95.001 to 99.999), and Red Zone (99.99 to 100).
- Exception Probability and Multiplier:** A table with columns for No. of Exception, Probability of Occurrence %, and Multiplier. The table shows three rows with values 0, 1, and 2 for the number of exceptions, all with a probability of 1 and a multiplier of 0.
- Execution Summary:** A section at the bottom with a right-pointing arrow.

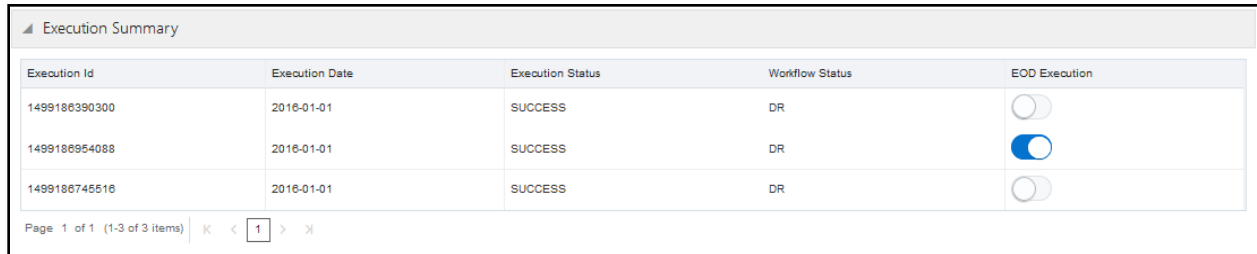
At the bottom of the screen, there are buttons for Save, Submit, Approve, Approve Retire, and Execute.

Figure 52 Model Validation – Business Definition Screen

The screen includes the below two sections.

- **Trading desk/Portfolio information:** It displays the trading desk/portfolio information. These fields are uneditable.
- **Business Definition:** You can define one or multiple business definitions in this section. The created definitions are displayed as tabs. Click on each tab to view details about the business definition. You can perform the below actions in this section:
 - **Edit a Business Definition:** Only business definitions in draft stage can be edited. Click a Business Definition in draft stage to edit.
 - **View the Execution Summary:** You can view the execution details of the business definitions here, such as Execution ID, Execution Date, Execution Status, Workflow Status, and End Of Day (EOD) Execution. You can select any one execution for a given date as EOD execution. All the reports use EOD run for reporting purpose. If an EOD run

has not been selected, then by the system considers the last successful execution is as EOD run.



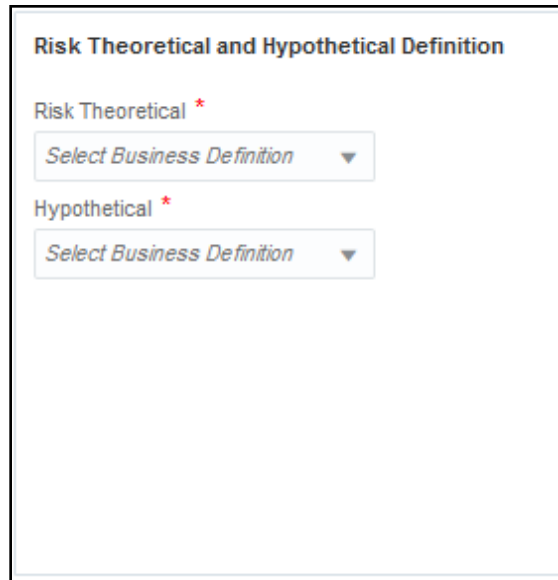
Execution Id	Execution Date	Execution Status	Workflow Status	EOD Execution
1499188390300	2016-01-01	SUCCESS	DR	<input type="checkbox"/>
1499186954088	2016-01-01	SUCCESS	DR	<input checked="" type="checkbox"/>
1499186745516	2016-01-01	SUCCESS	DR	<input type="checkbox"/>

Page 1 of 1 (1-3 of 3 items) | < 1 >

Figure 53 Model Validation – Execution Summary

10.2.3 Risk Theoretical and Hypothetical Definition

Select the business definition created in the module Market Risk – Historical Simulation, to be considered for Risk Theoretical and Hypothetical from the drop-down list.



Risk Theoretical and Hypothetical Definition

Risk Theoretical *

Select Business Definition ▼

Hypothetical *

Select Business Definition ▼

Figure 54 Risk Theoretical and Hypothetical Definition

- **Risk Theoretical**

This is the P&L calculated by the risk factors generated from the pricing models of the trading desk. Risk Theoretical P&L is similar to Hypothetical P&L and is computed using business definitions selected for Risk Theoretical.

- **Hypothetical**

Actual and Hypothetical P&L are computed using business definitions selected for Hypothetical.

- Actual P&L is difference in portfolio value as off time t and time t-1, where t is any specified historical date. Additionally, Actual P&L incorporates the change in instrument data for calculating P&L.
- Hypothetical P&L for time t is difference in portfolio value computed with market data as off time t and instrument data as off time t, and, portfolio value computed with market data as off time t+1 and Instrument data as off time t. For the calculation of Hypothetical P&L it is assumed that composition of the portfolio has not changed across the time.

NOTE: If you do not intend to use the output of Historical Simulation, then follow the below process to upload portfolio values to be considered for model validation:

Populate data from the Fact table (FCT_MR_PORTFOLIO_VALUE) and execute the batch <<INFODOM>>_MRMM_MDL_VALDN_INPUT_POP to populate the FSI_MR_PORTFOLIO_VALUE table for Model Validation Service. Use the below T2Ts for data population:

- T2T_MR_PORTFOLIO_VALUE_FCT_POP – For populating data from Portfolio Risk to FCT population table
- T2T_MR_PORTFOLIO_VAL_FSI_POP – FCT – for populating data from FCT population table of Portfolio Risk to FSI of Model Validation

See the OFS MRMM Download specification document available in [OHC Documentation Library](#) for the column details in FCT_MR_PORTFOLIO_VALUE table.

10.2.4 Model Parameters

Define the parameters for model validation in this section.

The screenshot shows a window titled "Model Parameters". It contains the following elements:

- "Backtesting * Period" with a numeric input field containing "5" and up/down arrow buttons.
- "Backtesting * Period Unit" with a dropdown menu showing "Month".
- Three checked checkboxes:
 - Actual P&L
 - Risk Theoretical P&L
 - Hypothetical P&L

Figure 55 Model Parameters

Provide the below details in this pane:

- **Backtesting Period:** It is the period over which model is to be validated and is relative to the execution date. Specify the backtesting period
- **Backtesting Unit:** It is the units in terms of which backtesting period is specified, such as Month Day or Year. The period entered should be in accordance to calendar days/months/year.
- **Specify the P&L for which exception should be computed.** You can select multiple P&L for exception computation. All the observations in backtesting period where loss is greater than the VaR are considered as exceptions. For a specific back testing period if on any of the day computed P&L (assuming all profit values as zero, and absolute value of Loss are considered for computation) is more VaR value for the given business definition then it has to marked as backtesting breached. If you select multiple P&L for computation, then the application considers maximum number of exceptions for validating the model.

10.2.5 Model Acceptance Criteria

If the value of the computed exception exceeds the specified exception limit, then the portfolio or trading desk fails the backtesting assessment. Exception is defined as the total number of backtesting breaches which occurs over a specific backtesting period.

The screenshot displays a configuration pane titled "Model Acceptance Criteria". It is divided into three main sections:

- Backtesting Requirements:** Contains a field for "Exception Limit" with a value of 0.
- P&L attribution Requirements:** Contains two fields for ratio ranges:
 - "First Ratio Range" with a range from -5 to 0.005.
 - "Second Ratio Range" with a range from -2 to 0.01.
- Breach Limit:** Contains a field with a value of 4.

Figure 56 Model Acceptance Criteria

You need to specify the below information in this grid for backtesting validation and P&L attribution validation:

- **Backtesting Requirements**
 - Exception Limit: Specify the number of exceptions allowed. If this limit is breached then the model assessment fails.
- **P&L Attribution Requirements**
 - First Ratio Range: First ratio is the mean of unexplained daily P&L (that is risk theoretical P&L minus hypothetical P&L) over the standard deviation of hypothetical daily P&L, for the specified backtesting period. Specify the acceptable range for first ratio of P&L attribution. If the first ratio computed is not in the specified range then model assessment fails.
 - Second Ratio Range: Second ratio is the ratio of variances of unexplained daily P&L and variance of hypothetical daily P&L, for the specified backtesting period. Specify the acceptable range for second ratio of P&L attribution. If second ratio computed is not in specified range then model assessment fails.
 - Breach Limit: If first ratio computed is not in user specified range or second ratio computed is not in user specified range then the model is considered as P&L breached. If total Number of Breaches in a specific backtesting period exceeds the specified total number of breach limit then the Portfolio / Trading Desk is considered as P&L assessment failed.

10.2.6 Exception Probability and Multiplier

This pane displays the probability of occurrence and Multiplier values.

No. of Exception	Probability of Occurrence %	Multiplier
0	1	1.7
1	1	21
2	1	11
3	1	13

Page 1 of 1 (1-4 of 4 items) | < 1 >

Figure 57 Exception Probability and Multiplier

To add multipliers follow the below steps:

1. Click **Open** in the **Exception Probability and Multiplier** pane.

No. of Exception	Probability of Occurrence	Type 1 % - Probability α	Type 2 % - Probability α	Multiplier
0	8.1	100	0	1.5
1	20.5	91.9	8.1	1.5
2	25.7	71.4	28.6	1.5
3	21.5	45.7	54.3	1.5
4	13.4	24.2	75.8	1.5
5	6.7	10.8	89.2	1.7
6	2.7	4.1	95.9	1.76
7	1	1.4	98.6	1.83
8	0.3	0.4	99.6	1.88
9	0.1	0.1	99.9	1.92
10	0	0	100	2

Figure 58 Adding Exception Probability and Multiplier

2. Click **Add**. A new row is created.
3. Provide values for the below columns:
 - Probability of occurrence (exact): Provide the exact probability of obtaining corresponding number of exceptions.
 - Multiplier: Provide the multiplier value/multiplication factor for the capital which is sufficient to return the model to a 99th percentile standard.

Values for the below columns are computed by the application:

- Number of Exception: This is auto populated number of exceptions starting with 0 and will keep on increasing as we add rows.
- Probability of rejecting model (Type 1): This is system computed column. Type 1 is the probability that using a given number of exceptions as the cut-off for rejecting a model will imply rejection of an accurate model. Column is reverse-cumulative of Probability of occurrence (Column 2) starting with 100%.
- Probability of accepting model (Type 2): This is system computed column. Type 2 is the probability that using a given number of exceptions as the cut-off for rejecting a model will imply acceptance of an inaccurate model Column is cumulative of Probability of occurrence (Column 2) starting from 0%.

4. Click **Done**.

NOTE: When you add a row, it will be added as last line, and when you delete a row, the last row will be deleted.

10.2.7 Zone Classification

Each model is classified into three zones Green, Yellow and Red which will be identified based on the Type 2 probability of occurrence.

The screenshot displays a 'Zone Classification' configuration window. It contains three sections, each with a title and a range of values:

- Green Zone (Start & End Range) % ***: Start value is 0, End value is 95.
- Yellow Zone (Start & End Range) % ***: Start value is 95.001, End value is 99.989.
- Red Zone (Start & End Range) % ***: Start value is 99.99, End value is 100.

Each value is displayed in a text box with up and down arrow buttons for adjustment.

Figure 59 Zone Classification

Specify the probability range for the below zones in terms of percentage:

- Green
- Yellow
- Red

10.2.8 Procedure for Creating a Business Definition in Model Validation

The defined executions are listed in the Model Validation summary screen. Click either Portfolio or Trading Desk tabs to view the list. Each business definition is executed as a separate run.

Oracle Financial Services Market Risk Measurement and Management User Guide
Release 8.0.5.0.0

The screenshot displays the 'New Business Definition' window for Model Validation. The window is titled 'Setting-0' and contains the following sections:

- Header:** Name (Setting-0), Description (Setting-0), Currency (Indian Rupee), Version (1), Workflow Status (Draft).
- Risk Theoretical and Hypothetical Definition:** Risk Theoretical (Select Business Definition), Hypothetical (Select Business Definition).
- Model Parameters:** Backtesting Period (5), Backtesting Period Unit (Month), Actual P&L, Risk Theoretical P&L, Hypothetical P&L.
- Model Acceptance Criteria:** Backtesting Requirements Exception Limit (4), P&L attribution Requirements First Ratio Range (-5 to 0.005), Second Ratio Range (-2 to 0.01), Breach Limit (4).
- Zone Classification:** Green Zone (Start & End Range) % (0 to 95), Yellow Zone (Start & End Range) % (95.001 to 99.999), Red Zone (Start & End Range) % (99.99 to 100).
- Exception Probability and Multiplier:**

No. of Exception	Probability of Occurrence %	Multiplier
0	1	1.7
1	1	21
2	1	11
3	1	13

Figure 60 Business Definition – Model Validation

The following table describes the fields in the model validation new business definition window:

Fields	Description
Fields marked in red asterisk(*) are mandatory	
Name*	Enter the name of the business definition.
Description	Provide a description for the business definition.
Currency*	It is the currency in which all the output for given definition will be computed. Select the currency type from the drop-down list.
Version	Displays the workflow version of the business definition.
Workflow Status	Displays the workflow status of the business definition.
Risk Theoretical*	Select the business definitions for Risk Theoretical from the drop-down list.
Hypothetical*	Select the business definitions for Hypothetical from the drop-down list.

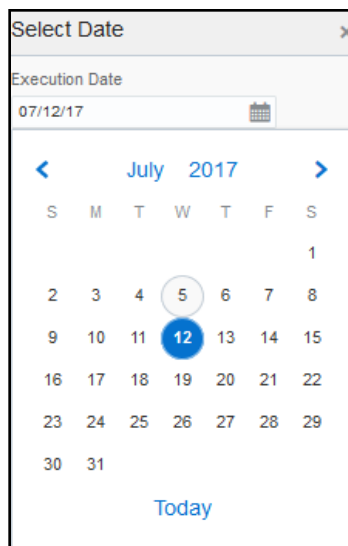
Fields	Description
Fields marked in red asterisk(*) are mandatory	
Backtesting Period*	Provide the backtesting period
Backtesting Period Unit*	Select the unit for backtesting period from the drop-down box
Backtesting Requirements Exception Limit*	Specify the number of exceptions allowed during backtesting for the model validation to pass.
P&L Attribution Requirements – First Ratio Range*	Specify the acceptable range for first ratio of P&L attribution.
P&L Attribution Requirements – Second Ratio Range*	Specify the acceptable range for second ratio of P&L attribution.
P&L Attribution Requirements – Breach Limit*	Specify the number of permissible breaches
Zone Classification Green Zone, Yellow Zone, Red Zone*	Specify the probability range for the three zones.
Exception Probability and Multiplier	Specify the probability of occurrence and multiplier values.
Execution Summary	Displays the execution history of the business scenarios. Select the execution to be marked as EOD execution.

Table 13 Fields and their Descriptions in Model Validation-Business Definition Window

Follow the below steps to create a new business definition in Model Validation:

1. Click the business approach from the MRMM Model Validation Summary screen, for which the business definition needs to be created.
2. Click **New Business Definition**. A new tab is created.
3. Click on the new tab, and provide details in the **Name**, **Description** fields.
4. In the **Currency** field, select the currency type from the drop-down list.

5. Select the business definitions for **Risk Theoretical** and **Hypothetical** from the drop-down list. See [Risk Theoretical and Hypothetical Definition](#) for details.
6. Specify the **Backtesting Period**, and select the P&L for which exceptions need to be computed, in the **Model Parameters** pane. See [Model Parameters](#) for details.
7. Provide details for **Backtesting Requirement**, and **P&L Attribution Requirements** fields displayed in the Model Acceptance Criteria pane. See [Model Acceptance Criteria](#) for details.
8. Provide the probability range for the Green, Yellow and Red zones in **Zone Classification** pane. See [Zone Classification](#) for details.
9. Add or remove rows based on the requirement in the Exception Probability and Multiplier section. See [Exception probability and Multiplier](#) for details.
10. Click **Save** and **Submit**.
11. Click **Execute** to trigger an adhoc run. A pop up message with a date-time editor is displayed. Specify the date on which the execution needs to be performed and click **OK**. The execution is triggered.



12. After executing the business definition, select any one execution for a given date as EOD execution.

10.3 Model Performance Outputs

Following are the additional outputs computed in Model Validation module:

1. P-value

P-value is probability of experiencing k or more exceptions within model where k is total number of observed exceptions. It is calculated for all P&Ls (Risk theoretical, Hypothetical and Actual P&L) using the following formula.

$$P - Value = \sum_{i=0}^k {}^n C_i * p^i * (1 - p)^{n-i}$$

where,

p-value = probability of experiencing k or more exceptions

n = Total number of backtesting days. This is the actual number of days that are used in backtesting. For example, if the backtesting period is 1 year but due to holidays total number of observation points is 252, then consider 252 days for computation in this formula)

p = (1- confidence level)

k = total number of exceptions

2. Loss Exception Deviation:

Loss Exception Deviation is the absolute average deviation of the loss exceptions from the ES. It is to be computed for all P&Ls (risk theoretical, Hypothetical and Actual P&L) It is calculated as follows:

$$\text{Loss Exception Deviation} = \frac{\sum_1^n ABS[(Loss - VaR) - ES]}{k}$$

Where,

Loss is corresponding P&L

VaR is corresponding VaR value

ES is corresponding ES value

K = total number of exceptions

n = is total number of backtesting days

3. Average Loss Duration

Average Loss Duration is the average time interval between successive loss exceptions. Suppose back testing was carried out for a portfolio for a period of 90 days. The below table details the loss exceptions observed during the back testing period. It is computed for all P&Ls (Risk Theoretical, Hypothetical and Actual P&L)

Loss Exception	Time of Loss Exceptions (in days)
L1	20
L2	50
L3	60

$$\text{Average Loss Duration} = (20 + 30 + 10) / 3 = 20 \text{ days}$$

4. Loss Duration Deviation

Loss Duration Deviation refers to the standard deviation of time interval between successive loss exceptions. It is computed for all P&Ls (Risk Theoretical, Hypothetical and Actual P&L). It is calculated as per the formula given below:

$$\text{Loss Duration Deviation} = \left(\frac{\text{Sum of Squared Deviations}}{\text{Number of Exceptions}} \right)^{1/2}$$

The Loss Duration Deviation is calculated for the illustration as follows:

Loss Exception	Time Interval Between Successive Loss Exceptions (in days)	Average Loss Duration	Deviation	Squared Deviation
L1	20	20	0	0
L2	30	20	-10	100
L3	10	20	10	100

$$\text{Loss Duration Deviation} = (200/3)^{1/2} = 8.16 \text{ days}$$

11 Annexure A: Details of Market Data

Market Data refers to the multiple types of data required from financial market to price interest rate, equity, foreign exchange and other types of products. The following types of market data are required by OFS MRMM application.

- **Rate:** These are daily input of FX spot, FX cash, and repo rates
- **Prices:** These are daily input of a number of spot prices, such as equity spot prices, bond spot prices, and for all exchange-traded futures and options contract types
- **Curves:** These include:
 - Yield curves represent the market data for the term structure of interest rates
 - Basic yield curve identified by currency and index
 - Cross currency basis curves, identified by a currency-index pair (currency-index/currency-index)
 - Cross currency swap curves, identified by a currency-index pair (currency-index/currency-index where first index is FIXED)
 - Single currency basis curves, identified by currency-index pair and an additional money market index
 - Dividend curves: These are methods to represent the dividends for the equity, and can be created using either dividend yields or discrete dividends that may be expressed either as yield or absolute amounts.
 - Constant value: Yield represented as specific percentage of equity's market price on a specific date
 - Dividend yield: Dividend expressed as percentage of equity's market price.
 - Absolute dividend: Absolute amount of dividend.
 - Repo and bond repo curves: Repo curves are used to model the cost of carrying a share associated with repurchase agreements
 - Fair strike curves: These are used when pricing EQ Variable Swap deals. A Fair Strike curve provides market quotes for variable swaps, in the form of a tabular list of dates and fair strike market quotes.
 - Volatility spread curves: These are used when pricing EQ Variable Swap deals. Volatility spread curves provide volatility basis term structures that comprises a collection of dates and associated strike adjustments
 - Credit curves: These are inputs such as Recovery Rate, Credit Spread, Survival Probabilities required by credit models for a specific counterparty.

- Real rate curves: These are nominal yield curve adjusted for inflation by a Consumer Price Index
- Commodity forward curves: These are built from the futures prices of the underlying commodity for several contract months
- Volatilities: These include:
 - Cap volatilities
 - Swaption volatilities: Swaption volatility cubes are used to aggregate a number of swaption surfaces and generate a full 3 dimensional surface for volatility over strikes
 - FX Volatilities: Matrix of FX volatilities are required for use with FX options.
 - Equity Volatilities: Equity volatility surfaces are presented as two matrices, one for call volatilities and one for put volatilities.
- Fixings: These are historical spot rates/value of the following categories:
 - Interest rate
 - FX spot
 - Inflation index

The market data is specified in a uniquely identifiable and logical form. These can be raw or derived data and can be shocked to created different Forecast Scenarios i.e. one or more shifts applied to selected market data. The above data will be sourced through stage tables. The logical quote structure in which market data is expected is given below. When data moves from stage table to processing, appropriate values are concatenated to form the required quote.

Asset Class	Market Data Type Code	Market Data Type	Market Data Description	Logical Quote structure	Type
IR	CASH	Cash	Cash Instrument	IR.Currency-IRIndex.CASH-InstrumentTenor.QuoteType	Curve
IR	BASIS_SWAP	Basis Swaps	Basis Swap	IR.[TargetUnderlying]/[KnownUnderlying].BASIS-Mat.QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor	Curve
IR	BASIS_SWAP_XCCY	Cross-currency Basis Swaps	Cross-currency basis swap	IR.[TargetUnderlying]/[KnownUnderlying].BASIS-Mat.QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor	Curve
IR	SWAP_XCCY	Cross-currency Fixed/Float Swaps	Cross-currency fixed-for-floating swap	IR.[UnderlyingFixed]/[UnderlyingFloating].SWAPMarketType-Mat.QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor; For [UnderlyingFixed], IRIndexTenor is FIXED	Curve

Oracle Financial Services Market Risk Measurement and Management User Guide

Release 8.0.5.0.0

Asset Class	Market Data Type Code	Market Data Type	Market Data Description	Logical Quote structure	Type
IR	SWAP_XCCY_ND	Cross-currency Fixed/Float Swaps-Offshore	Cross-currency fixed-for-floating swap – Offshore (Non deliverable) market	IR.[UnderlyingFixed]/[UnderlyingFloating].SWAPMarketType-Mat.QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor; For [UnderlyingFixed], IRIndexTenor is FIXED	Curve
IR	SWAP_XCCY_ONSHORE	Cross-currency Fixed/Float Swaps-Onshore	Cross-currency fixed-for-floating swap – Onshore market	IR.[UnderlyingFixed]/[UnderlyingFloating].SWAPMarketType-Mat.QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor; For [UnderlyingFixed], IRIndexTenor is FIXED	Curve
EQ	EQ_DIV	Equity Dividends	Equity Dividends	EQ.Currency-{Exchange}-Ticker.DIV.[Structure]	Curve
INFL	INFL_SEASONALITY	Seasonality	Seasonality	INFL.Currency-InflationIndex.SEASONALITY-Month	Curve
CR	CDS	Single-Name Credit Default Swaps	Single-name credit default swap (Spread and Recovery)	CR.Currency-ReferenceEntity_DebtType_RestructuringClause.CDS-Tenor.Indicator.QuoteType	Curve
CR	CR_IDX_SWAP	Credit Index Swaps	Credit index swap (Spread and Recovery)	CR.Currency-Index_Series_Version.CDIX-Tenor.Indicator.QuoteType	Curve
CR	SP	Survival Probabilities	Survival Probabilities	CR.Currency-ReferenceEntity_DebtType_RestructuringClause.SP-Maturity.QuoteType	Curve
IR	SOV_BOND	Sovereign Bonds	Sovereign bonds (Price and Yield)	IR.Currency-Type-Issuer.BOND-Coupon-IssueDate.Maturity.Indicator.QuoteType	Price
IR	SOV_BILL	Sovereign Bills	Sovereign Bills(Price and Yield)	IR.Currency-Type-Issuer.BILL-0-IssueDate.Maturity.Indicator.QuoteType	Price
IR	CORP_BOND	Corporate Bonds	Corporate Bonds (Price and Yield)	IR.Currency-Type-Issuer.BOND-Coupon-IssueDate.Maturity.Indicator.QuoteType	Price
EQ	EQ_SPOT	Equity Spot	Equity Spot	EQ.Currency-{Exchange}-Ticker.SPOT.QuoteType	Price
EQ	EQ_FUT	Equity Futures	Equity Futures	EQ.Currency-Exchange-ContCode.FUT-MatCode.QuoteType	Price

Oracle Financial Services Market Risk Measurement and Management User Guide

Release 8.0.5.0.0

Asset Class	Market Data Type Code	Market Data Type	Market Data Description	Logical Quote structure	Type
EQ	EQDIV_FUT	Equity Dividends from Equity Dividend Futures	Equity dividend key with the dividend curve stripped from equity dividend futures	EQ.Currency-Exchange-ContractCode.DIV.FUT-MaturityCode.QuoteType	Price
EQ	EQDIV_SWAP	Equity Dividends from Equity Dividend Swaps	Equity dividend key with the dividend curve stripped from equity dividend swaps	EQ.Currency-{Exchange}-Ticker.DIV.SWAP.Tenor.QuoteType	Price
INFL	INFL_BOND	Inflation-Linked Bonds	Inflation-Linked Bonds (Price and Yield)	INFL.Currency-Type-Issuer-InflationIndex.ILBOND-Coupon-IssueDate.Maturity.Indicator.QuoteType	Price
INFL	INFL_ZCIIS	Zero-Coupon Inflation-Indexed Swaps	Zero-Coupon Inflation-Indexed Swaps	INFL.Currency-InflationIndex.ZCIIS-Maturity.QuoteType	Price
INFL	INFL_ZCIIOP TION	Zero-Coupon Inflation-Indexed Options	Zero-Coupon Inflation-Indexed Options	INFL.Currency-InfationIndex.ZCIIOPTION-Flavour-Strike-Maturity.PRICE.QuoteType	Price
INFL	INFL_YOYOP TION	Year-on-Year Options	Year-on-Year Options	INFL.Currency-InflationIndex.YOYOPTION-Flavour-Strike-Maturity.PRICE.QuoteType	Price
CMDTY Y	CMDTY_FWD	Commodity Forward	Commodity Forward	CMDTY.Currency-Exchange-Symbol.FWD-Mat.QuoteType	Price
CMDTY Y	CMDTY_SPO T	Commodity Spot	Commodity Spot	CMDTY.Currency-Exchange-Symbol.SPOT.QuoteType	Price
IR	FRA	Forward rate agreement	Forward rate agreement	IR.Currency-IRIndex-IRIndexTenor.FRA-Period.QuoteType	Rate
IR	SWAP	Swaps	Swap	IR.Currency-IRIndex-IRIndexTenor.SWAP-Tenor.QuoteType	Rate
IR	ON_SWAP	Overnight Indexed Swaps	Overnight Indexed Swaps	IR.Currency-IRIndex-ON.SWAP-Tenor.QuoteType	Rate

Oracle Financial Services Market Risk Measurement and Management User Guide

Release 8.0.5.0.0

Asset Class	Market Data Type Code	Market Data Type	Market Data Description	Logical Quote structure	Type
FX	FX_SPOT	Forex Spot	Foreign exchange spot	FX.BaseCurrencyTermCurrency-SPOT.QuoteType	Rate
FX	FX_FWD	Forex Forward	Foreign exchange forward	FX.BaseCurrencyTermCurrency.FWD-Maturity.QuoteType	Rate
FX	FX_FWDND	Forex Forward Offshore	Foreign exchange forward	FX.BaseCurrencyTermCurrency.FWDND-Maturity.QuoteType	Rate
FX	FX_FWDONSHORE	Forex Forward Onshore	Foreign exchange forward	FX.BaseCurrencyTermCurrency.FWDONSHORE-Maturity.QuoteType	Rate
IR	SWPT_VOL	Swaptions	Represent a point on a swaption volatility surface	IR.[Underlying].[Instrument]::QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor.VOL and [Instrument] = SWPT.SwaptionStrike::OptionTenor::SwapTenor	Volatility
IR	SWPT_VOL_CUBE	Swaption Cubes	Represent a point on a swaption volatility cube	IR.[Underlying].SWPT.StrikeType::Strike::OptionTenor::SwapTenor::DataType.QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor.VOL	Volatility
IR	SWPT_VOL_CUBE_SHIFT	Swaption Cube Shifts	Specify a shift of the swaption volatility cube	IR.[Underlying].SWPT.StrikeType::Strike::OptionTenor::SwapTenor::SHIFT where [Underlying] = Currency-IRIndex-IRIndexTenor.VOL	Volatility
IR	CAP_VOL	Caps	Represent a point on a cap volatility surface	IR.[Underlying].[Instrument]::QuoteType where [Underlying] = Currency-IRIndex-IRIndexTenor.VOL and [Instrument] = CAP.CapTen::CapStrike	Volatility
EQ	EQ_SPOT_VOL	Equity Volatility	Represent a point on an equity volatility surface	EQ.Currency-{Exchange}-Ticker.SPOT.VOL.Maturity::Strike::StrikeType.QuoteType	Volatility
FX	FX_VOL	Forex Volatility	Represent a point on a FX volatility surface	FX.BaseCurrTermCurr.VOL::Tenor:[FXStrike]::QuoteType	Volatility
CMDTY	CMDTY_VOL	Commodity Volatility	Represent a point on a	CMDTY.Currency-Exchange-Symbol.VOL::Maturity::Strike::StrikeType.QuoteType	Volatility

Asset Class	Market Data Type Code	Market Data Type	Market Data Description	Logical Quote structure	Type
			commodity volatility surface		

Table 14 Expected Logical Quote Structure for Market Data

The logical quote structure in which fixings data is expected is given below. When data moves from stage table to processing, appropriate values are concatenated to form the required quote.

Asset Class	Logical Quote structure	Remarks
IR	Currency-Interest Rate Index-Tenor	Historical spot interest rate is required. Ex. USD-LIBOR-3M
FX	BaseCurrencyTermCurrency-SPOT	Historical spot exchange rate is required in the form "1 unit of base currency = n unit of term currency". Ex. AUDJPY-SPOT
INFL	Currency-Inflation Index	Historical value of inflation index is required. Ex. USD-CPI

Table 15 Logical Quote Structure for Fixing Data

12 Annexure B: Approval Workflow

12.1 Overview

OFS MRMM supports approval workflows based on user roles. A one-step maker-checker approval is supported for business assumption definition and Run definition to ensure that computations are carried out using the right input data.

A definition goes through multiple stages, each with a different status, before it can be used for computation. For instance, when a new business assumption is defined and saved, it will be in 'Draft' status. When the definition is edited and sent for authorization, the status of the definition changes to 'Pending Approval' and so on. Each stage requires action from the relevant user based on the role assigned to her. Similarly, a Run definition goes through the same stages of approval.

12.2 Understanding Approval Work Flow

The approval work flow and the logical change in each status is depicted as part of the process flow below:

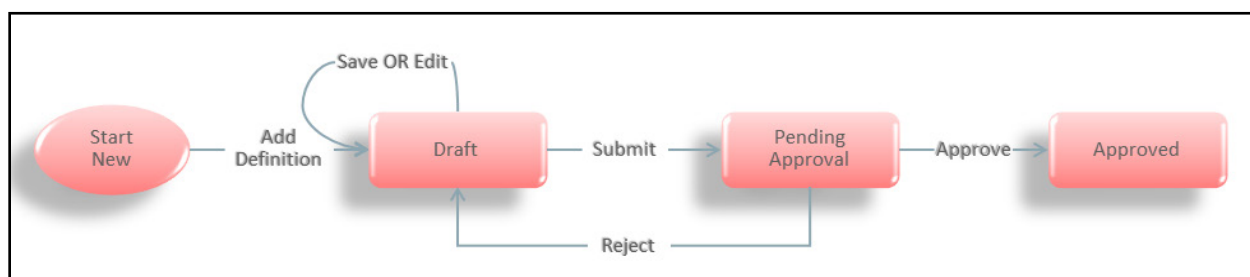


Figure 61 Approval Workflow

Each definition goes through multiple stages and has a status associated with it in each stage and the following table explains the status at each stage.

Status	Description
Draft	When a new definition is created and saved for the first time it is in 'Draft' status. While in draft status, the user is allowed to make any necessary edits without a change in the version number.
Pending Approval	When a definition is sent for approval but is not yet approved by the approver the status changes to 'Pending Approval'. This does not result in a change in the version number.
Draft	When a definition is rejected by the approver, it changes to 'Draft' status and is required to be updated or rectified. This result in a change in the version number. After the necessary updates have been made, it goes through the approval process again. You are allowed to delete a version in 'Draft' status.

Status	Description
Approved	When a definition has been approved its status changes to 'Approved'. This does not result in a change in the version number.

The steps which explain the approval work flow process and the tasks that a user can perform during each stage are as follows:

To create a new definition, click Add icon in the Business Assumptions Summary window. On creation of a new definition it is in 'Draft' status. The icons which are enabled while a definition is in Draft status are as follows: View, Edit, Copy, Delete, Send for Approval, and Approval Summary.

The actions which are permissible when a definition is in 'Draft' status are as follows:

- You can view the definition by clicking the View icon in the summary window. You cannot edit the values in View mode.
- You can edit the definition by clicking the Edit icon in the summary window and make the required changes. This does not result in a new version.
- You can copy the definition and save it with a new name by clicking the Copy icon in the summary window. The new definition will have the same attributes as the existing definition and will be created as version 0. This definition will be in 'Draft' status and the necessary edits can be made.
- You are allowed to delete any definition which is in 'Draft' status, by selecting the definition from the summary window and clicking the Delete icon.
- Once the definition is finalized, you can initiate the approval process by opening the definition in edit mode and clicking the Send for Approval icon in the definition window. This changes the status of the definition to 'Pending Approval'.
- You can view the approval workflow for the definition in the Approval Summary window, by clicking the Approval Summary icon. This window provides details of each change in the approval status.
- Once the definition is finalized, it is sent for approval and its status changes to 'Pending Approval'. The icons which are enabled in the 'Pending Approval' status are as follows: View, Copy, Approve, Reject, and Approval Summary.

The actions which are permissible when a definition is in 'Pending Approval' status are as follows:

- You can view the definition by clicking the View icon in the summary window. You cannot edit the values in View mode.
- You can copy the definition and save it with a new name by clicking the Copy icon in the summary window. The new definition will have the same attributes as the existing definition

and will be created as version 0. This definition will be in 'Draft' status and the necessary edits can be made.

- You can approve the definition, if you have the appropriate access rights, by clicking the Approve icon. You are allowed to add comments. The status changes to 'Approved' when you have completed the approval process.
- You can reject the definition, if you have the appropriate access rights, by clicking the Reject icon. You are allowed to add comments. Rejecting a definition changes the status back to 'Draft'.
- You can view the approval workflow for the definition in the Approval Summary window, by clicking the Approval Summary icon. This window provides details of each change in the approval status. This window provides details of each change in the approval status.

NOTE: The Approve or Reject buttons are present only for users who are mapped to the MR Approver role.

The actions which are permissible when a definition is in 'Approved' status are as follows:

- You can view the definition by clicking the View icon in the summary window. You cannot edit the values in View mode.
- You can edit the definition by clicking the Edit icon in the summary window and make the required changes. The definition is still in 'In Review' status.
- You can copy the definition and save it with a new name by clicking the Copy icon in the summary window. The new definition will have the same attributes as the existing definition and will be created as version 0. This definition will be in 'Draft' status and the necessary edits can be made.
- You can view the approval workflow for the definition in the Approval Summary window, by clicking the Approval Summary icon. This window provides details of each change in the approval status.
- Approved definition cannot be edited.

13 Annexure C: List of Instruments

OFS MRMM supports the following instruments:

Sl. No.	Name of the Instrument
1	Amortizing Bond
2	Basis Swap
3	Amortizing Floating Rate Note
4	Credit Asset Swap
5	Equity Future
6	Cross-Currency Basis Swap
7	Inflation Zero Coupon Swap
8	Cash Deposit
9	Certificado de Deposito Bancario
10	CapFloor
11	Commodity Forward
12	Commodity Future
13	Bond Price/Yield Calculator
14	FX Forward
15	Floating Rate Note
16	Forward rate Agreement
17	Treasury Bill
18	Vanilla IR Swap
19	Equity Variance Swap
20	Callable Bond
21	Commodity American Option on Future
22	Cross-Currency Fix Float Swap
23	Equity American Option
24	FX American Option
25	Amortizing Swap

Sl. No.	Name of the Instrument
26	Commodity European Option On Spot
27	Equity Asian Option
28	FX Asian Option
29	European Swaption
30	Generic Swap
31	Inflation Linked Bond
32	FX European Option
33	Equity European Option
34	FX Variance Swap
35	Equity Convertible Bond Option
36	Equity Total Return Swap
37	Commodity Swaption
38	Commodity Bullet Option
39	Credit Default Swap - Standard North American Corporate (SNAC)

Table 16 List of Instruments

14 Annexure D: List of Models and methods

OFS MRMM supports the following models and methods:

Instrument Type	Model	Method
Commodity American Option on Future	Commodity Black Model	Backward Monte Carlo
Commodity American Option on Future	Commodity Black Model	Forward Monte Carlo
Commodity American Option on Future	Commodity Black Model	JuZhong
Commodity American Option on Future	Commodity Black Model	CDVM JuZhong
Commodity Bullet Swap	Commodity Black Model	Forward Monte Carlo
Equity Convertible Bond Option	EQ Convertible Model	Backward Partial Differential Equation
Equity Convertible Bond Option	EQ Convertible Model	Backward Monte Carlo
Equity American Option	EQ Black-Scholes Model	Backward Partial Differential Equation
Equity American Option	EQ Black-Scholes Model	CDVM JuZhong
Equity American Option	EQ Black-Scholes Model	JuZhong
Equity Asian Option	EQ Deterministic Model	Vecer Discrete Partial Differential Equation
Equity Total Return Swap	EQ Deterministic Model	Not applicable
Equity Total Return Swap	EQ Black-Scholes Model	Backward Analytic
Equity Total Return Swap	EQ Black-Scholes Model	Backward Finite Difference
Equity Total Return Swap	EQ Black-Scholes Model	Backward Lattice
Equity Total Return Swap	EQ Black-Scholes Model	Backward Partial Differential Equation
Equity Total Return Swap	EQ Black-Scholes Model	Backward Tree
Equity Total Return Swap	EQ Black-Scholes Model	Forward Analytic
Equity Total Return Swap	EQ Black-Scholes Model	Forward Monte Carlo
Equity Total Return Swap	EQ Bates Model	Backward Finite Difference
Equity Total Return Swap	EQ Bates Model	Backward Monte Carlo
Equity Total Return Swap	EQ Bates Model	Forward Monte Carlo
Equity Total Return Swap	EQ Dupire Model	Backward Analytic
Equity Total Return Swap	EQ Dupire Model	Backward Finite Difference
Equity Total Return Swap	EQ Dupire Model	Backward Monte Carlo

Oracle Financial Services Market Risk Measurement and Management User Guide

Release 8.0.5.0.0

Instrument Type	Model	Method
Equity Total Return Swap	EQ Dupire Model	Backward Partial Differential Equation
Equity Total Return Swap	EQ Dupire Model	Backward Tree
Equity Total Return Swap	EQ Dupire Model	Forward Analytic
Equity Total Return Swap	EQ Dupire Model	Forward Monte Carlo
Equity Total Return Swap	EQ Heston Model	Backward Analytic
Equity Total Return Swap	EQ Heston Model	Backward Finite Difference
Equity Total Return Swap	EQ Heston Model	Backward Monte Carlo
Equity Total Return Swap	EQ Heston Model	Backward Partial Differential Equation
Equity Total Return Swap	EQ Heston Model	Forward Analytic
Equity Total Return Swap	EQ Heston Model	Forward Monte Carlo
FX Asian Option	FX Dupire Model	Backward Analytic
FX Asian Option	FX Dupire Model	Backward Finite Difference
FX Asian Option	FX Dupire Model	Backward Monte Carlo
FX Asian Option	FX Dupire Model	Backward Partial Differential Equation
FX Asian Option	FX Dupire Model	Backward Tree
FX Asian Option	FX Dupire Model	Forward Analytic
FX Asian Option	FX Dupire Model	Forward Monte Carlo
FX Asian Option	FX Black Model	Backward Analytic
FX Asian Option	FX Black Model	Backward Finite Difference
FX Asian Option	FX Black Model	Backward Lattice
FX Asian Option	FX Black Model	Backward Partial Differential Equation
FX Asian Option	FX Black Model	Backward Tree
FX Asian Option	FX Black Model	Forward Analytic
FX Asian Option	FX Black Model	Forward Monte Carlo
FX Asian Option	FX Deterministic Model	Not applicable
FX Asian Option	FX Heston Model	Backward Analytic
FX Asian Option	FX Heston Model	Backward Finite Difference
FX Asian Option	FX Heston Model	Backward Monte Carlo

Oracle Financial Services Market Risk Measurement and Management User Guide

Release 8.0.5.0.0

Instrument Type	Model	Method
FX Asian Option	FX Heston Model	Backward Partial Differential Equation
FX Asian Option	FX Heston Model	Forward Analytic
FX Asian Option	FX Heston Model	Forward Monte Carlo
Amortizing Bond	IR Deterministic Model	Backward Analytic
Amortizing Bond	IR Deterministic Model	Forward Analytic
Amortizing Bond	IR LIBOR Market Model	Backward Monte Carlo
Amortizing Bond	IR LIBOR Market Model	Forward Monte Carlo
Amortizing Bond	IR Hull White 1-Factor Model	Backward Lattice
Amortizing Bond	IR Hull White 1-Factor Model	Backward Monte Carlo
Amortizing Bond	IR Hull White 1-Factor Model	Backward Partial Differential Equation
Amortizing Bond	IR Hull White 1-Factor Model	Backward Tree
Amortizing Bond	IR Hull White 1-Factor Model	Forward Monte Carlo
Amortizing Bond	IR Hull White 2-Factor Model	Backward Lattice
Amortizing Bond	IR Hull White 2-Factor Model	Backward Monte Carlo
Amortizing Bond	IR Hull White 2-Factor Model	Backward Partial Differential Equation
Amortizing Bond	IR Hull White 2-Factor Model	Forward Monte Carlo
Amortizing Floating Rate Note	IR Deterministic Model	Backward Analytic
Amortizing Floating Rate Note	IR Deterministic Model	Forward Analytic
Amortizing Floating Rate Note	IR LIBOR Market Model	Backward Monte Carlo
Amortizing Floating Rate Note	IR LIBOR Market Model	Forward Monte Carlo
Amortizing Floating Rate Note	IR Hull White 1-Factor Model	Backward Lattice
Amortizing Floating Rate Note	IR Hull White 1-Factor Model	Backward Monte Carlo
Amortizing Floating Rate Note	IR Hull White 1-Factor Model	Backward Partial Differential Equation
Amortizing Floating Rate Note	IR Hull White 1-Factor Model	Backward Tree
Amortizing Floating Rate Note	IR Hull White 1-Factor Model	Forward Monte Carlo
Amortizing Floating Rate Note	IR Hull White 2-Factor Model	Backward Lattice
Amortizing Floating Rate Note	IR Hull White 2-Factor Model	Backward Monte Carlo
Amortizing Floating Rate Note	IR Hull White 2-Factor Model	Backward Partial Differential Equation

Oracle Financial Services Market Risk Measurement and Management User Guide

Release 8.0.5.0.0

Instrument Type	Model	Method
Amortizing Floating Rate Note	IR Hull White 2-Factor Model	Forward Monte Carlo
Amortizing Swap	IR Deterministic Model	Backward Analytic
Amortizing Swap	IR Deterministic Model	Forward Analytic
Amortizing Swap	IR LIBOR Market Model	Backward Monte Carlo
Amortizing Swap	IR LIBOR Market Model	Forward Monte Carlo
Amortizing Swap	IR Hull White 1-Factor Model	Backward Lattice
Amortizing Swap	IR Hull White 1-Factor Model	Backward Monte Carlo
Amortizing Swap	IR Hull White 1-Factor Model	Backward Partial Differential Equation
Amortizing Swap	IR Hull White 1-Factor Model	Backward Tree
Amortizing Swap	IR Hull White 1-Factor Model	Forward Monte Carlo
Amortizing Swap	IR Hull White 2-Factor Model	Backward Lattice
Amortizing Swap	IR Hull White 2-Factor Model	Backward Monte Carlo
Amortizing Swap	IR Hull White 2-Factor Model	Backward Partial Differential Equation
Amortizing Swap	IR Hull White 2-Factor Model	Forward Monte Carlo
Callable Bond	IR Deterministic Model	Backward Analytic
Callable Bond	IR Deterministic Model	Forward Analytic
Callable Bond	IR LIBOR Market Model	Backward Monte Carlo
Callable Bond	IR LIBOR Market Model	Forward Monte Carlo
Callable Bond	IR Hull White 1-Factor Model	Backward Lattice
Callable Bond	IR Hull White 1-Factor Model	Backward Monte Carlo
Callable Bond	IR Hull White 1-Factor Model	Backward Partial Differential Equation
Callable Bond	IR Hull White 1-Factor Model	Backward Tree
Callable Bond	IR Hull White 1-Factor Model	Forward Monte Carlo
Callable Bond	IR Hull White 2-Factor Model	Backward Lattice
Callable Bond	IR Hull White 2-Factor Model	Backward Monte Carlo
Callable Bond	IR Hull White 2-Factor Model	Backward Partial Differential Equation
Callable Bond	IR Hull White 2-Factor Model	Forward Monte Carlo
Certificate of Deposit	IR Deterministic Model	Backward Analytic

Oracle Financial Services Market Risk Measurement and Management User Guide

Release 8.0.5.0.0

Instrument Type	Model	Method
Certificate of Deposit	IR Deterministic Model	Forward Analytic
Certificate of Deposit	IR LIBOR Market Model	Backward Monte Carlo
Certificate of Deposit	IR LIBOR Market Model	Forward Monte Carlo
Certificate of Deposit	IR Hull White 1-Factor Model	Backward Lattice
Certificate of Deposit	IR Hull White 1-Factor Model	Backward Monte Carlo
Certificate of Deposit	IR Hull White 1-Factor Model	Backward Partial Differential Equation
Certificate of Deposit	IR Hull White 1-Factor Model	Backward Tree
Certificate of Deposit	IR Hull White 1-Factor Model	Forward Monte Carlo
Certificate of Deposit	IR Hull White 2-Factor Model	Backward Lattice
Certificate of Deposit	IR Hull White 2-Factor Model	Backward Monte Carlo
Certificate of Deposit	IR Hull White 2-Factor Model	Backward Partial Differential Equation
Certificate of Deposit	IR Hull White 2-Factor Model	Forward Monte Carlo
Commodity Swaption	Commodity Black Model	Not applicable
European Swaption	IR Hull White 2-Factor Model	Backward Lattice
European Swaption	IR Hull White 2-Factor Model	Backward Monte Carlo
European Swaption	IR Hull White 2-Factor Model	Backward Partial Differential Equation
European Swaption	IR Hull White 2-Factor Model	Forward Monte Carlo
European Swaption	IR Hull White 1-Factor Model	Backward Lattice
European Swaption	IR Hull White 1-Factor Model	Backward Monte Carlo
European Swaption	IR Hull White 1-Factor Model	Backward Partial Differential Equation
European Swaption	IR Hull White 1-Factor Model	Backward Tree
European Swaption	IR Hull White 1-Factor Model	Forward Monte Carlo
European Swaption	IR LIBOR Market Model	Backward Monte Carlo
European Swaption	IR LIBOR Market Model	Forward Monte Carlo
Generic Swap	IR Deterministic Model	Backward Analytic
Generic Swap	IR Deterministic Model	Forward Analytic
Generic Swap	IR LIBOR Market Model	Backward Monte Carlo
Generic Swap	IR LIBOR Market Model	Forward Monte Carlo

Oracle Financial Services Market Risk Measurement and Management User Guide**Release 8.0.5.0.0**

Instrument Type	Model	Method
Generic Swap	IR Hull White 1-Factor Model	Backward Lattice
Generic Swap	IR Hull White 1-Factor Model	Backward Monte Carlo
Generic Swap	IR Hull White 1-Factor Model	Backward Partial Differential Equation
Generic Swap	IR Hull White 1-Factor Model	Backward Tree
Generic Swap	IR Hull White 1-Factor Model	Forward Monte Carlo
Generic Swap	IR Hull White 2-Factor Model	Backward Lattice
Generic Swap	IR Hull White 2-Factor Model	Backward Monte Carlo
Generic Swap	IR Hull White 2-Factor Model	Backward Partial Differential Equation
Generic Swap	IR Hull White 2-Factor Model	Forward Monte Carlo

Table 17 List of Models and Methods

15 Annexure E: MR Reports

See the OFS Market Risk Measurement and Management Analytics User Guide Release 8.0.5.0.0 on [OHC Documentation Library](#) for details about reports.

Oracle Financial Services Market Risk Measurement and Management User Guide

Release 8.0.5.0.0



Oracle Financial Services Market Risk
Measurement and Management
User Guide

November 2017

Oracle Corporation
World Headquarters
500 Oracle Parkway
Redwood Shores, CA 94065
U.S.A.

Worldwide Inquiries:
Phone: +1.650.506.7000
Fax: +1.650.506.7200

oracle.com

Copyright © 2017, Oracle and/or its affiliates. All rights reserved. This document is provided for information purposes only and the contents hereof are subject to change without notice. This document is not warranted to be error-free, nor subject to any other warranties or conditions, whether expressed orally or implied in law, including implied warranties and conditions of merchantability or fitness for a particular purpose. We specifically disclaim any liability with respect to this document and no contractual obligations are formed either directly or indirectly by this document. This document may not be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without our prior written permission.

Oracle and Java are registered trademarks of Oracle and/or its affiliates. Other names may be trademarks of their respective owners.

Intel and Intel Xeon are trademarks or registered trademarks of Intel Corporation. All SPARC trademarks are used under license and are trademarks or registered trademarks of SPARC International, Inc. AMD, Opteron, the AMD logo, and the AMD Opteron logo are trademarks or registered trademarks of Advanced Micro Devices. UNIX is a registered trademark licensed through X/Open Company, Ltd. 0611