Oracle Financial Services Market Risk

User Guide

Release 8.0.4.0.0

ORACLE[®] Financial Services





DOCUMENT CONTROL

Version Number	Revision Date	Changes Done	
Version 1.0	January 2017	Captured 8.0.4.0.0 Minor Release installation procedure and configuration details.	
Version 2.0	June 2018	Updated information on the functional aspects.	

This document provides a comprehensive knowledge about the user interface and functionalities in Oracle Financial Services Market Risk, Release 8.0.4.0.0. The latest copy of this guide can be accessed from <u>OHC Documentation Library</u>.

Oracle Financial Services Market Risk User Guide, Release 8.0.4.0.0

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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
- <u>Access to Oracle Support</u>
- <u>Related Information Sources</u>

SCOPE OF THE GUIDE

The Oracle Financial Services Market Risk User Guide Release 8.0.4.0.0 contains all the essential information for the user to understand and use the product effectively. 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 8.0.4.0.0 of the Oracle Financial Services Market Risk User Guide. This manual is intended for the following audience:

- Functional Engineering Group
- Product Management Group
- Project Manager Team
- Senior Management

DOCUMENTATION ACCESSIBILITY

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RELATED INFORMATION SOURCES

You can access the below documents online from the documentation Library for OFSTR 8.0.4:

- Oracle Financial Services Market Risk User Guide Release 8.0.4.0.0
- Oracle Financial Services Treasury Risk Installation Guide Release 8.0.4.0.0

You can access the OFS AAI documentation online from the documentation library for OFS AAAI 8.x:

- OFS Advanced Analytical Applications Infrastructure (OFS AAAI) 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 8.0.4.0.0 Technology Matrix

ABBREVIATIONS

Abbreviation	Description		
CVA	Credit Valuation Adjustment		
DM	Data Model		
DVA	Debit Valuation Adjustment		
EE	Expected Exposure		
ENE	Expected Negative Exposure		
FVA	Funding Valuation Adjustment		
OFSAAI	Oracle Financial Services Analytical Applications Infrastructure		
OFSMR	Oracle Financial Services Market Risk		
P&L	Profit and Loss		
RF	Risk Factor		
SES	Stressed Capital Add-on		
VaR	Value at Risk		

NOTE: Release **8.0.4.0.0** is the terminal release of OFS Market Risk and OFS Market Risk Analytics. See OFS Market Risk Measurement and Management User Guide on <u>OHC Documentation Library</u> for OFSAA offering around market risk and valuations.

1 Introduction to Oracle Financial Services Market Risk

Oracle Financial Services Market Risk estimates the market risk of a portfolio through the estimation of loss-distribution based risk measures, such as Value at Risk (VaR), Conditional Value at Risk (CVaR), Component VaR, Marginal VaR, Incremental VaR, and so on. It covers the estimation of risk arising out of movements of multiple risk factors such as interest rates, equity prices, commodity prices and exchange rates.

OFS MR is concerned with the estimation of market risk for the portfolios held by the bank. These portfolios may belong to the trading book or the banking book. The application enables a bank to estimate the market risk of a portfolio based on its underlying positions, through the estimation of risk measures such as Value-at-Risk, Conditional Value-at-Risk and so on. It also enables a bank to carry out Stress Testing and Back Testing procedures for validation.

The scope of OFS MR is not restricted to regulatory reporting. The application caters to the internal reporting needs of the bank, and supports the estimation of market risk of user-defined portfolios covering a wide range of instruments. Additionally, it renders use of Oracle Financial Services Modeling Framework for stress testing of market risk estimates.

The scope of Market Risk, Release 8.0.4.0.0, will be restricted to the testing following areas:

- Analytic Method
- Cash flows Estimation and mapping
- Back testing
- Constant Maturity Function
- Daily Pricing
- Historical Simulation
- Incremental VaR
- Mean Reversion Rate
- Monte Carlo Simulation
- Scenario VaR Calculation
- Stress Testing
- VaR Model Pricing
- Volatility Model

- Zero Coupon Yield Curve
- Performance Issues

2 Getting Started with OFS MR

This chapter details how to get started with the OFS MR application. It describes the organization of the user interface and provides step-by-step instructions for navigating through the application. It includes:

- Logging in to OFS MR Application
- Installing the Solution

2.1 Logging in to OFS MR Application

Access the OFS MR 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.

ORACLE	Financial Services Analytical Applications About
	Language User ID Password Logi CRECE
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Figure 1 OFSAAI Login Window

After logging in to OFSAAI, the below home screen is displayed.



Figure 2 OFSAAI Landing Page

Click Market Risk, the MR landing page is displayed.

Market Risk	
▶ 🎦 Reference Data Management	Portfolio Management
Reference Data Management	Portfolio Management
Incremental VaR	Manage MR Rules
Incremental VaR	Manage MR Rules
Enterprise Modeling Option	Metadata Browser
Enterprise Modeling Option	Browse metadata lineage



Тад	Description
MRUSER (username)	Click this drop-down to select the following options: Preferences, About, Change Password or to logout of OFSAAI.
iii ▼	Click the icon to view the last log in date.
A V	Click the icon to view the connection information
US-English 🔻	Click this drop-down to select the desired language.

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Тад	Description
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 <u>OHC Documentation Library</u> .
Sandbox	Sandbox is an integral part of the Infrastructure system. For more information refer OFS Analytical Applications Infrastructure User Guide on OHC.

Table 1 OFSAAI Landing Page

2.2 Installing the Solution

To install Oracle Financial Services Market Risk, refer the Oracle Financial Services Treasury Risk Application Pack Installation Guide, Release 8.0.4.0.0 on <u>OHC</u> <u>Documentation Library</u>.

2.2.1 Uploading the Model

Click Unified Metadata Manager on the left pane of the OFSAAI Infrastructure screen, to perform Model Upload. Click Import Model to open the Business Model Upload screen. Choose the type of Upload as New Upload. Enter the Erwin XML File Path and click Upload and the model will get uploaded.

2.2.2 Loading the Data

Data upload involves the loading of the below stage tables:

- stg_dim_bank_instrument_type
- stg_dim_commodity
- stg_dim_instrument_contract
- stg_dim_mr_asset
- stg_dim_stock_index
- stg_equity_corporate_actions
- stg_fct_bank_positions

- stg_fct_cds_spreads
- stg_interest_rate_parameters
- stg_mkt_instrument_contract
- stg_mr_risk_factor_statistics
- stg_commodity_future_curve
- stg_fct_equity_indices
- stg_fct_instrument_schedule
- stg_fct_funds_composition
- stg_fct_obligors_details
- stg_fct_portfolio_data
- stg_fct_yield_curve

NOTE: Run the Slowly Changing Dimensions (SCDs) to populate the required DIM and FCT tables.

3 Overview of OFSAA Infrastructure Components

OFS MR 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 <u>OHC</u> <u>Documentation Library</u> for features and details.

- Data Model Maintenance: OFS MR 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 MR uses Excel Upload (Atomic), Forms Designer, Forms Authorization, Data Entry from the Data Entry Forms and Queries module of OFSAA. MR uses.
- Unified Analytical Metadata: OFS MR uses Dimension Management (Member, Attribute, and Hierarchy Management) from the Unified Analytical Metadata module of OFSAA.
- Operations: OFS MR uses Batch Maintenance, Batch Execution, Batch Monitor, Batch Cancellation, Batch Scheduler, View Log from Operations module of OFSAA.
- **Run Rule Framework:** Process Modeling Framework internally uses Process and Run from the OFSAA Run Rule Framework.

Additionally, OFS MR uses the following functionalities of OFSAA Infrastructure. See OFS Analytical Applications Infrastructure User Guide in <u>OHC Documentation Library</u> for features and details.

- Sandbox
- Object Administration
- Managing MR Rules
- Enterprise Modelling Option
- Metadata Browser

4 Reference Data Management

This Chapter describes the Reference Date Management feature in OFS MR.

This chapter includes:

- Overview
- Equity Risk Factor Selection
- <u>Time Vertex Specification</u>
- ZCYC Estimation Method Selection
- Interest Rate Model Selection
- <u>Correlation Mapping</u>

4.1 Overview

Oracle Financial Services Market Risk, Release 8.0.4.0.0, estimates the market risk of a portfolio through the estimation of loss-distribution based risk measures such as VaR, CVaR, Component VaR, Marginal VaR, Incremental VaR, and so on. It covers estimation of risk arising out of movements of multiple risk factors such as interest rates, equity prices, commodity prices and exchange rates.





4.2 Equity Risk Factor Selection

The Equity Risk Factor Selection summary screen displays the list of equity risk factors that are already defined in a particular currency. The screen also provides a search option for finding, or filtering the risk factors, on the basis of currency selected from the currency browser. You can search, or select a particular currency by clicking $\overline{ \dots }$ in the currency browser, to filter the search.

After the selection is entered, all the equity risk factors denominated in that particular currency are displayed.

4.2.1 Defining an Equity Risk Factor

This section details the procedure for selecting Equity Risk Factor.

		Equity Dick Easter	Selection	
		Equity Kisk Factor	Selection	
Search and Filter				S 2
urrency	I			
Equity Risk Factor Li	ist		■ ■ @ ₽ % ? ₹	1 to 2 of 2 📢 💽 🕟
Equity Risk Factor Li	st Created By	Creation Date	Last Modified By	1 to 2 of 2 📢 💽 📡 Last Modified Date
Equity Risk Factor Li Currency USA dollar	Created By MRUSER	Creation Date 06/14/2018	E I I II I	1 to 2 of 2 📢 💽 💽 Last Modified Date 06/14/2018



	- microsoft internet Explorer			
Currency Selection				
Currency				
Benchmark Stock Index Ma	oping			
Benchmark Stock Index				
k				
🔏 Custom Equity Risk	Factor Selection			
an equity				
		Save	Close	
lear Info				
our mite	MRV25LISER	0	reation Date	24-Apr-2009
	INCLOSOEN	0		2.1.10 2000
Modified By			ast pindited Late	

Figure 6 Equity Risk Factor Selection Definition Screen

Fields	Description
Fields marked in red a	asterisk(*) are mandatory
Currency	Select a currency from the currency browser.
Benchmark Stock Index	The indices corresponding to the selected currency are displayed in the benchmark stock index browser. Selecta a single Benchmark Stock Index from the browser.
Custom Equity Risk Factor Selection	This field displays all the custom equities denominated in the selected currency in equity browser. You can perform multiple selections or deletions of custom equities.

The following table describes the fields in the Equity Risk Factor Selection window:

Table 2 Fields and their Descriptions in Equity Risk Factor Selection Window

To define a new Equity Risk Factor, follow the below steps:

- 1. In Oracle Financial Services Analytical Applications Infrastructure home screen, select **Market Risk**
- Navigate to Market Risk > Reference Data Management > Equity Risk Factor Selection summary screen.
- 3. Click Add 🔒.
- 4. Provide details for fields Currency and Benchmark Stock Index.

Benchmark stock index mapping and custom equities selection are editable in this screen. A defined Equity Risk Factor cannot be deleted.

- 5. Select the equities to be added in **Custom Equity Risk Factor Selection**.
- 6. Click **Close**. The defined Equity Risk Factor is saved, and displayed in the summary screen.

4.2.2 Viewing an Equity Risk Factor

To view an existing Equity Risk Factor, select an existing record by activating the select button \square , then click **View** \square in the right hand corner of the Equity Risk Factor summary screen. The selected Equity risk factor is displayed in view mode, and cannot be edited.

Currency Selection				
Currency	USD			
Benchmark Stock Index I	Mapping			
Benchmark Stock Index	New York Stock Exchange			
				_
😫 💑 Custom Equity Ri	sk Factor Selection			
List of Equity Risk Fa	ctors		1 to 4 of 4 🔣	
NASDAG - Apple NASDAQ - BE Aerospace Inc				
NASDAQ - Zoran Crop NYSE - AmericanIntrigroup				
		Close		
Jser Info				
	MRV25USER	Creation Date	05/05/2009	

Figure 7 Equity Risk Factor Selection View Screen

4.2.3 Editing an Equity Risk Factor



Figure 8 Equity Risk Factor Selection Edit Screen

To edit an Equity Risk Factor, follow the below steps:

- 1. In the Equity Risk Factor summary screen, select the entry to be edited.
- 2. Click **Edit** *I* present at the right hand corner of the Equity Risk Factor summary Screen. You can change the Benchmark Stock Index for that particular currency, and add or delete the Equity Risk Factors as required.
- 3. To add the Equity Risk Factors in the Edit screen, click Add 🖹.
- To delete the Equity Risk Factor, select the custom equity to be deleted, and click **Delete** .
- 5. Click Save.

4.3 Time Vertex Specification

This screen enables you to select the time vertex for all the risk factors. The available time vertices are:

Risk Metrics Time vertices

Custom Time vertices

4.3.1 Risk Metrics Time Vertices

The risk matrices time vertex screen is the default display screen for the time vertex specification. Risk matrices are the standard time vertices which cannot be edited. It specifies the time on eighteen standard time vertices following the specific time unit such as, days, months, and years.

	Time Vertex Specifica	ation	_
Time Vertex Specification			?
RiskMetrics Time Vertices	○ Custor	n Time Vertices	
Time Vertices			
Time Vertex	Maturity	Time Unit	
Time Vertex1	Spot		
Time Vertex2	1	Month	
Time Vertex3	3	Month	
Time Vertex4	6	Month	
Time Vertex5	12.16666666666666	Month	
Time Vertex6	15.16666666666666	Month	
Time Vertex7	18.16666666666668	Month	
Time Vertex8	24.333333333333332	Month	
Time Vertex9	27.333333333333332	Month	
Time Vertex10	36.5	Month	
Time Vertex11	4.0555555555555555	Year	
Time Vertex12	5.0694444444445	Year	
Time Vertex13	7.09722222222222	Year	
Time Vertex14	9.125	Year	
Time Vertex15	10.13888888888888	Year	
Time Vertex16	15.20833333333334	Year	
Time Vertex17	20.277777777778	Year	
	30 416666666666668	Year	

Figure 9 Time Vertex Specification – Risk Metrics Time Vertices

4.3.2 Custom Time vertices

You can change the standard time vertex to a customized time vertex. Enter the custom time vertices on the basis of maturity and time unit. Spot is the default first time vertex, and it cannot be edited. Specify the custom time vertices in the ascending order. In addition to the default sixteen rows provided for entering custom time vertex, you can add new rows to the custom time vertices screen and provide the additional input data.

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			· · · · · · · · · · · · · · · · · · ·
O RiskMetrics Time Vertices		Oustom Time Vertices	
Time Vertices			
Time vertices			
Time Vertex	Maturity	Time Unit	
Time Vertex 1	Spot		
Time Vertex2	2	Month(s)	~

Figure 10 Time Vertex Specification – Custom Time Vertices

4.4 Zero Coupon Yield Curve Estimation Method Selection

Zero Coupon Yield Curve (ZCYC) is selected for every interest rate asset class and currency combination. Ensure to specify the time vertex prior to ZCYC Estimation Method selection.

Market Risk > Reference Data Man	agement > ZCYC Estimat	ion Method Selection	1				
		ZCYC Estimatio	n Method Selection				
Search and Filter						R B	ň.
Currency			Interest Rate Asset Class			~	
ZCYC Estimation Method		~					
SZCYC Estimation Method			R B C 0 C	₹	1 to 25	of 52 📢 📢 🕨 📡	
ුසු Currency	Interest Rate Asset Class	ZCYC Estimation M	ethod Created By	Creation Date	Last Modified By	Last Modified Date	
GBP	Swap	External Data	MRUSER	06/15/2018	MRUSER	06/15/2018	
Euro	Rating - CC	External Data	MRUSER	06/15/2018	MRUSER	06/15/2018	
Euro	Rating - AA	External Data	MRUSER	06/15/2018	-	-	
Euro	Rating - AAA	External Data	MRUSER	06/15/2018	-		
Euro	Soverign Rating	External Data	MRUSER	06/15/2018	-	-	
EUR	Swap	External Data	MRUSER	06/15/2018	-	-	
Euro	Money Market	External Data	MRUSER	06/15/2018	-	-	
Euro	Rating - BBB	External Data	MRUSER	06/15/2018	-		
Euro	Rating - B	External Data	MRUSER	06/15/2018	-	-	
Euro	BMA Index	External Data	MRUSER	06/15/2018	-		
Euro	Rating - A	External Data	MRUSER	06/15/2018	-	-	
Euro	Rating - BB	External Data	MRUSER	06/15/2018	-		
Pound sterling	Money Market	External Data	MRUSER	06/15/2018	-	-	
Pound sterling	Rating - BB	External Data	MRUSER	06/15/2018	-	-	

Figure 11 ZCYC Estimation Method Selection Summary Screen

The summary screen enables you to search and filter the ZCYC estimation method selection on the basis of currency, Interest Rate Asset Class and ZCYC Estimation Method. Select one or multiple parameters from currency, Interest Rate Asset Class and ZCYC Estimation Method, and click **Search**.

4.4.1 Methods for ZCYC Estimation

OFS MR provides three methods for ZCYC Estimation.

- Spread over Sovereign Yield Curve
- Bootstrap Yield Curve
- External Data

🎄 Interest Rate Selection			
Currency		Interest Rate Asset Class	Rating - AAA
2CYC Estimation Method Selection			
O Spread over Sovereign Yield Curve	O Bootstrap Yield Curve	C External Data	



4.4.1.1 Spread Over Sovereign Yield Curve

If you select the Spread Over Sovereign method, you need to specify the type of spread to be applied to the Yield Curve. These spreads can be applied only to the standard time vertex. The available options are:

 Time Vertex Spread: Provide multiple spread values (in basis points) for each standard time vertex.

Spread Specification		
Time Vertex Spread		
Time Vertex	Maturity	Spread (in basis points)
Vertex1	Spot	
Vertex2	1 Month	
Vertex3	3 Month	
Vertex4	6 Month	
Vertex5	12 Month	
Vertex6	15 Month	
Vertex7	18 Month	

 Parallel Spread: Provide a single value for Spread (in basis points), which will be applied to all time standard vertices.

🎄 Spread Specification		
O Time Vertex Spread	Parallel Spread	
Spread (in basis points)	2	

4.4.1.2 Bootstrap Yield Curve

Sovereign and money market asset classes are always estimated using a bootstrapping procedure, or obtained as a download.

Define ZCYC Eztimation Method - Micro	osoft Internet Explorer				
Interest Rate Selection					
Currency Furn			Interest Rate Asset Class	Rating - CCC	~
- ZCYC Estimation Method S	election				
Stread over Sovereign Vield Cirve	Boststran Viel	d Ourve	O External ()ata	
	O Bootsa ap Hor	u curve	CEAGINGI	Jata	
	l	Save Close			
* User Info		Croatic- D-t-		11 May 2000	
Last Modified By	MIX 7 2000LIX	L act Marilla	, Data	11-may-2009	
and a mounded by		Last Houne	r Dato)

Figure 13 ZCYC Estimation Method Selection Bootstrap Yield Curve Screen

4.4.1.3 External Data

You can provide Zero Coupon Yield Curve as a download by selecting the External Data.

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ine ZCYC Eztima	tion Method - Microsoft Int	ernet Explorer			
🚠 Interest	Rate Selection				
Currency	Euro		Interest Rate Asset	Class Rating - CCC	~
🎄 ZCYC Est	timation Method Selection	n .			
O Spread over	r Sovereign Yield Curve	O Bootstrap Yield Curve	⊙ Ext	ernal Data	
		Save	Close		
			01030		
lser Info					
ted By	MRV25U	JSER	Creation Date	11-May-2009	
			Last Modified Date		

Figure 14 ZCYC Estimation Method Selection External Data Screen

4.4.2 Adding a ZCYC Estimation Method Selection

Follow the below steps, to add a ZCYC Estimation Method:

- 1. Navigate to Market Risk > Reference Data Management > ZCYC Estimation Method Selection
- 2. Click Add 🖻. The definition screen is divided into two sections:
 - Interest Rate Selection
 - ZCYC Method selection
- 3. In the Interest Rate Selection section, select the below:

 - Interest Rate Asset Class: The list displays all the interest rates defined in the selected currency. Select a single Interest Rate Asset Class from the drop down list. The Available Interest Rate Asset Classes are:
 - Rating AAA

- Rating AA
- Rating A
- Rating BBB
- Rating BB
- BMA Index
- Rating B
- Rating CCC
- Rating CC
- Rating C
- Rating D
- Government Agency
- Money Market
- Sovereign Rating
- Swap
- In the ZCYC Estimation Method Selection section, select a single method for ZCYC estimation, for the defined Currency – Interest Rate Asset Class combination. The available options are:
 - Spread Over Sovereign
 - Bootstrap Yield Curve
 - External Data
- 5. Click Save.

4.4.3 Viewing a ZCYC Estimation Method Selection

In order to View an existing ZCYC Estimation Method, select a record by activating the select button \checkmark , then click View \blacksquare present on the right hand corner of the ZCYC Estimation Method summary screen. The selected ZCYC Estimation Method is displayed in view mode, and it cannot be edited.

4.4.4 Editing a ZCYC Estimation Method Selection

Follow the below steps, to edit a ZCYC Estimation Method:

1. Select the defined estimation method that needs to be edited.

- 2. Click **Edit** ^I present at the right hand corner of the ZCYC Estimation Method Screen. In the Edit screen you can modify the ZCYC Estimation Method Selection only, the changes can only be done to the previously defined ZCYC Estimation Method. The Interest Rate Selection section cannot be edited.
- 3. Click Save.

, Interest Rate Sei	ection			
rrency Ye	n		Interest Rate Asset Class	Rating - AAA
Spread over Sovereign	Method Select	ion Bootstran Vield Curv	e OEvternal	Data
opreda ever devereigi		O bottarap neu curv		Duid
Spread Specifica	tion			
) Time Vertex Spread			O Parallel Spread	
Time Vertex	Maturity	Spread (in basis points)		
Vertex?	1 Month	100		
Vertex2	3 Month	125		
Vertex4	6 Month	100		
Vertex5	12 Month	140		
Vertex6	15 Month	160		
Vertex7	18 Month	150	=	
Vertex8	24 Month	170		
Vertex9	27 Month	180	=	
Vertex10	36 Month	180	=1	
Vertex11	4 Year	200		
		Sav	/e Close	

Figure 15 ZCYC Estimation Method Selection Edit Screen

4.5 Interest Rate Model Selection

This screen enables you to map an interest rate model for each currency-interest rate combination. If a Zero Coupon Yield Curve Estimation Method has not been specified for all the interest rate asset classes in a particular currency, then that currency will not appear for selection in the Currency Browser.

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		Interest Rate Model Sele	ection			
Search and Filter						R 5
urrency						
_						
List of Selected Interes	st Rate Models			Z 🗇 🖻 🏷 ?	₹	1 to 5 of 5 📢 🚺 🚺
List of Selected Interes	t Rate Models Created By	Creation Date	₽	🖉 ា 🗈 🗞 ?	₹	1 to 5 of 5 ແ 💽
List of Selected Interes	at Rate Models Created By MRUSER	Creation Date 06/15/2018	₽ ■ [ast Modified By	₹	1 to 5 of 5 🔌 🚺 🕨 Last Modified Date
List of Selected Interes Currency Pound sterling USA dollar	at Rate Models Created By MRUSER MRUSER	Creation Date 06/15/2018 06/15/2018		ast Modified By	₹	1 to 5 of 5 💽 🖬 💽
List of Selected Interes Currency Pound sterling USA dollar Japanese yen	t Rate Models Created By MRUSER MRUSER MRUSER	Creation Date 06/15/2018 06/15/2018 06/15/2018		ast Modified By	₹	1 to 5 of 5 📢 📢 💽 Last Modified Date
List of Selected Interes List of Selected Interes Currency Pound sterling USA dollar Japanese yen Euro	t Rate Models Created By MRUSER MRUSER MRUSER MRUSER	Creation Date 06/15/2018 06/15/2018 06/15/2018 06/15/2018		ast Modified By	₹	1 to 5 of 5 📢 💽 Last Modified Date



4.5.1 Adding an Interest Rate Model

Follow the below steps, to add a new Interest Rate Model:

- 1. Navigate to Market Risk > Reference Data Management > Interest Rate Model Selection.
- 2. Click Add 🖹. The New Interest Rate Model Selection screen is displayed.
- 3. In the **Currency** field, select a single currency from the currency browser. Multiple selections are not allowed. Once a particular currency selected, then all the interest rates asset class available in that currency will be displayed.
- 4. In the **Interest Rate Model Mapping** section, select one Interest Rate Model for each Interest Rate Asset Class, from the following:
 - Black Model
 - Hull White Model
 - Ho-lee Model
 - Ornstein Uhlenback Model

🟯 Currency Selection		
Currency Euro		
t		
🟯 Interest Rate Model Mapping		
Interest Rate Asset Class	Interest Rate Model	
Soverign Rating	~	
Rating - CC	~	
Money Market	~	
Rating - B	~	
Rating - AA	~	
Rating - BBB	~	
Rating - AAA	×	
BMA Index	~	
Rating - A	×	
Rating - BB	×	

Figure 17 Interest Rate Model Selection Add Screen

After a model is defined for a particular interest rate-currency combination, it can be edited, and a different model can be selected. You cannot save the selection unless an Interest Rate Model is mapped to every Interest Rate Asset Class, for the selected currency.

If spread over sovereign yield curve is specified for any Currency – Interest Rate Asset Class combination, then a separate Interest Rate Model is not allowed to be selected for that combination.

4.5.1.1 Viewing an Interest Rate Model Selection

In order to View, select an existing record by activating the select button V, then click **View** \blacksquare present on the right hand corner of the screen. The selected Interest Rate Model is displayed in view mode and it cannot be edited.

w Interest Rate Model - Micros	ft Internet Explorer	
💑 Currency Selection		
Currency	US Dollar	
🚋 interest Rate Model Ma	pping	
Interest Rate Asset Class	Interest Rate Model	
Sovereign Rating	Hull White	
Government Agency	Black Process	
	Cos	
	Care	
ser Info		
ser Info ed By	Core MRV25USER Creation Date	05/04/2009

Figure 18 Interest Rate Model Selection View Screen

4.5.1.2 Editing an Interest Rate Model

Follow the below steps, to edit an Interest Rate Model:

 Select a defined Interest Rate model that needs to be edited by clicking the select button

- Click Edit Present at the right hand corner of the Interest Rate Model Selection Screen. In the edit screen, you can only add or modify the already defined models for a particular Asset Class. Currency once defined cannot be edited.
- 3. Click Save.

🚋 Currency Selection			
Currency	US Dollar		
🎄 Interest Rate Model Mappin	ng		
Interest Rate Asset Class	Interest Rate Model		
Government Agency	Black Process	×	
Sovereign Rating	Hull White	~	
Rating - BBB		~	
Rating - AA		~	
Rating - C		×	
Swap		~	
Rating - B		×	
Rating - A		~	
Rating - AAA		*	
Money Market		~	
Rating - CCC		×	
Rating - D		*	
Rating - CC		~	
Rating - BB		~	
		Save	
er Info			

Figure 19 Interest Rate Model Selection Edit Screen

4.6 Correlation Mapping

Risk Factor Correlation mapping and FX Risk Factor Correlation Mapping are one time configuration user interface. In this screen you can setup the risk factors to be considered for computing correlation. Correlation matrix is used in VaR computation, therefore, ensure to select all the risk factors which are part of the portfolio.

4.6.1 Risk Factor Correlation Mapping

Risk Factor correlation mapping enables you to select the risk factors applicable to the portfolio based on asset and asset class combination.

Follow the below steps, to add a risk factor:

1. Click **Risk Factor Correlation Mapping**. The summary screen displays the list of selected risk factors.

2. Click Add icon to add the risk factor

plications Sandbox Object Administration	System	Configu	ration a	& Identity	Managerr	nent											
Select Applications		Market	Risk :	Refere	nce Data I	Manager	nent > Risk	Factor Co	relation Map	ping							
Financial Services Market Risk	*								Risk	Factor	Correla	tion Ma	pping				
Common Object Maintenance Data Model Maintenance Data Model Maintenance		Asse	Search t	and Filt	¢r.												B 5
El Judice Avalycel Metadat El Judice Avalycel Metadat El Judice Avalycel Metadata El Judice Avalycel Metadatatatatatatatatatatatatatatatatatat			Asset	Asset (set	Class Maj	pping						Asset Clas Corporate Soverign R Corporate	AA asing A	2 •			

Figure 20 Risk Factor Correlation Mapping – Add screen

3. Select Asset of risk factor.

		Risk Factor C	orrelation Mapping		
Select	6				
set	Indian Rupee	×			
Asset - Asset Class	Mapping			6	
Jet	Ass	et Class			
			Orment		
		Save	Cancel		

Figure 21 Risk Factor Correlation Mapping – Asset Class Selection

4. Click the Add icon to select all Asset Classes applicable for the selected asset.

Asset Class Corporate - A Corporate - AA Soverign Rating

Figure 22 Risk Factor Correlation Mapping – Asset Class Browser

5. Click **OK** to save the mapping

4.6.2 FX Risk Factor Correlation Mapping

FX Risk Factor correlation mapping enables you to select the risk factors applicable to Forex instruments based on currency. You can select the pair of currency applicable as risk factor for forex instruments in the portfolio.

Follow the below steps, to add a risk factor:

- 1. Click **FX Risk Factor Correlation Mapping**. The summary screen with list of selected risk factor is displayed.
- 2. Click the **Add** icon to add the risk factor.

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Sector Ocycet Advancestual System Configuration & Materiance Steed: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applications Image: Applicatio		Analytical Applications		
Image: Source Sourc	pelications Sandox Otject Administration Byut Select Applications Financial Services Market Risk ♥ ▲ Common Object Maintenance ∰ Data Mangement ▶ @ Data Mangement ▶ @ Data Anagement	em Configuration & Identify Management Merter Riss > Reference Data Management > FX Ris	r Factor Correlation Mapping FX Risk Factor Correlation Mapping	
	 I Go Operations I Mariana Rus. I Egatherance Data Management I Egatherance Data Management I Egatherance Data Management I Egatherance Data Management I Element Rate Model Selection I Rest Rate Model Rest Rate Rate Model Rest Rate Model Rest Rate Model Rest Rate Model Rest Rate Rate Rate Rate Rate Model Rest Rate Rate Rate Rate Rate Rate Rate Rat	📩 Conney 1	Contency 2 //3 Coller	

Figure 23 FX Risk Factor Correlation Mapping

3. Select **Currency 1**. It denotes the first currency in currency pairs of forex instruments.

		FX Risk Facto	r Correlation Mapping		
Select					
amency 1	Indian Rupee	~			î
Currency Mappings				8	
urrency 1	Curren	zy 2			
		Sav	Gancel		

Figure 24 FX Risk Factor Correlation Mapping – Currency Selection

 Click the Add icon, to select all the Currency 2 applicable for the selected Currency 1. Currency 2 denotes the second currency in currency pair of forex instruments.

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QQ		
Hierarchy Hierarchical		
Currency 2 Serbian dinar Russian Ruble Saudi Arabian Riyal Seychelles Rupees Sweedish Kroners Singapore Dollar Slovak Koruna Syrian Pound Tunisian Dinar Turkish Iira Taiwan dollar Ukrainian Hryvnia US Dollar CFA Franc Aquatorial CFA Franc West South African Rand	UIS Dollar UAE Dhiram Aussie Dollar Singapore Dollar Japanese Yen	~

Figure 25 FX Risk Factor Correlation Mapping-Currency 2 Browser

5. Click **OK**, to save the mapping
5 Portfolio Management

This chapter describes the Portfolio Management feature in OFS MR.

This chapter includes:

- Overview
- Defining a Portfolio
- Viewing a Portfolio
- Deleting a Portfolio

5.1 Overview

This screen enables you to define a portfolio on the basis of multiple dimensions. A portfolio is a combination of currency, MR asset class, Line of business, Trading Desk, Legal Reporting, Bank Instrument Type, Market Risk Instrument Type, Counterparty, Market Risk Asset and MR Bank Asset Class. A portfolio can be defined on one or multiple dimensions, along with one or multiple leaf nodes. Once a portfolio is defined it can be deleted but cannot be edited.

	Analytical Applications		VS-English V MRUSER V
Applications Sandbox Object Administration Select Applications Financial Services Market Risk	Market Risk > Portfolio Management	Portfolio Management	
Common Object Maintenance Data Model Maintenance Data Management El Unified Analytical Metadata	Search and Filter Portfolio Name State of Portfolios	■ ■ Ø = ■ ∞ ? =	1 to 2 of 2 📢 📢 👀 👀
Coperations Market Risk Erselerence Data Management	Image: Portfolio Name Portfolio Description Portfolio Test Testing Portfolios Global Portfolio Global Portfolio	User MRUSER MRUSER	Creation Date 06/14/2018 03/27/2018
of <mark>Portfolio Management</mark> da incremental VaR ▶ 07 Manage MR Rules	n		
 Contraction of the second secon	-		

Figure 26 Portfolio Management Summary Screen

5.2 Defining a Portfolio

Follow the below steps to define a new Portfolio:

- 1. Navigate to Market Risk > Portfolio Management
- 2. Click Add 🖻 in the Portfolio Management Summary Screen.
- 3. Enter the details in the below fields:
 - **Portfolio Name** Give an appropriate portfolio name.

- **Portfolio Description** Describe the portfolio in brief.
- 4. Add dimensions to the portfolio:

Click **Add** 🖻 in the Filter Specification section. Dimension Hierarchy Browser will open.

- Configure the dimensions as required. A portfolio is a combination of one or more following dimensions. A position can belong to multiple portfolios. You can define a portfolio as a combination of multiple level under each dimensions
 - MR Currency
 - MR Asset Class
 - MR Line of Business
 - Trading Desk
 - Legal Reporting
 - Instrument Type
 - Market Risk Instrument Types
 - Counterparty
 - Market Risk Asset
 - Asset Class

You can select one or multiple nodes under each dimension. A combination of different dimensions and different nodes make a unique portfolio. Once the dimensions are selected from the Dimension browser, depending upon the selection leaf nodes of each dimension needs to be selected. For example: from Bank Instrument Type Browser, you need to select one or more instruments which need to be included in a particular portfolio.

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Search			
Q			
🛞 Hierarchy			
lierarchical			
ailable Bank Instrument Type		Selected Bank Instrument Type	
- Bank Instrument Time	~	Discrete Asian Option on Commodity	~
- Commodity Forward Ontion		Cliquet/Ratchet Option on Commodity	
Commodity Forward Option		Commodity forward	
Commodity Futures Option	_		
Commodity Futures			
Continuous Asian Onting on Consumedity			
Discrete Asian Option on Commodity			
Discrete Asian Option on Commodity	•		
Commodity Backet Ontion			
Cliquet/Batchet Option on Commodity			
Digital Ontion on Commodity			
Eived Lookback Ontion on Commodity			
Eleating Lookback Option on Commodity			
Commodity Quanto Ontion			
Shout Ontions on Commodity			
Spot Commodity	~		~

Figure 27 Portfolio Management-Adding Dimensions

6. Click **OK** and **Save**.

5.3 Viewing a Portfolio

To view an existing Portfolio, select an existing record by activating the select button \checkmark and click View \blacksquare , on the RHS corner of the screen. The selected portfolio will be displayed in view mode and it cannot be edited.

iew Portfolio - Microsoft	Internet Explorer		
🚈 Portfolio Definition			
ortfolio Name	Non Exotic Simple Instruments Portfolio		
ortfolio Description	Non Exotic Simple Instruments Portfolio		
Filter Specification			
💑 Dimensions			
📠 Market Risk Instr	ument Types		1 to 5 of 21 📢 🚺 🚺
Commodity Futures Commodity forward Commodity Option Spot Commodity Equity Futures			
		Close	
User Info			

Figure 28 Portfolio Management-View Screen

5.4 Deleting a Portfolio

In order to delete a particular portfolio, select an existing record by activating the select button N, and click delete m, on the RHS corner of the screen. The selected portfolio is deleted, multiple deletion is not allowed under this screen.

6 Incremental VaR

This Chapter describes the Incremental VaR feature in OFS MR.

This chapter includes:

- Overview
- Defining Incremental VaR
- <u>Viewing Incremental VaR</u>
- Editing Incremental VaR

6.1 Overview

Incremental VaR is calculated for all portfolios which are previously defined under portfolio management screen and for which risk measures have been calculated. An incremental portfolio is defined based on the following parameters: reference portfolio, execution date, VaR model and instruments. Position specific details like number of units and position type are required for each instrument mapped to the portfolio.

	Analytical Applications						v US-Englis	n▼ MRUSER	•
Applications Sandbox Object Administration Select Applications	Market Risk > Incremental	VaR							
Financial Services Market Risk				ncremental VaR					~
Common Object Maintenance Data Model Maintenance Data Management Data Management Data Management	Search and Filter Incremental Portfolio Name Run Execution Date			Reference P Market Risk	ortfolio VaR Model Name			2 D V V	ĺ
Operations	S Incremental VaR Deta	ils			■⊞0₀?		1 to 25 of 45 🔣		
a 🖉 Market Risk	Name	Reference Portfolio	Run Execution Date	Market Risk VaR Mode Name	Created By	Creation Date	Last Modified By	Last Modified Date	
▶ 본순Reference Data Management en Portfolio Management 6월 <mark>Incremental VaR</mark> ▶ Ø Manage MR Rules	V20 V8 V/4 IV14 IncrementalVar_New1 incrementalVaR	PortFolioTest PortFolioTest PortFolioTest PortFolioTest PortFolioTest	02/11/2009 02/11/2009 02/11/2009 02/11/2009 02/11/2009	AnalyticalModel AnalyticalModel AnalyticalModel AnalyticalModel AnalyticalModel	MRUSER MRUSER MRUSER MRUSER MRUSER	08/28/2018 08/23/2018 08/23/2018 08/21/2018 08/14/2018	MRUSER MRUSER MRUSER MRUSER MRUSER	08/28/2018 08/23/2018 08/23/2018 08/21/2018 08/21/2018	
Characterise Modeling Option Metadata Browser	testincre testi11 test	PortFolioTest PortFolioTest PortFolioTest PortFolioTest	02/11/2009 02/11/2009 02/11/2009 02/11/2009	AnalyticalModel AnalyticalModel AnalyticalModel AnalyticalModel	MRUSER MRUSER MRUSER MRUSER	08/10/2018 08/10/2018 08/09/2018 08/07/2018	MRUSER MRUSER MRUSER MRUSER	08/16/2018 08/10/2018 08/10/2018 08/09/2018	

Figure 29 Incremental VaR Summary Screen

6.2 Adding an Incremental VaR

Incremental VaR Specification - Micros	soft Internet Explorer				
					_
Hierarchy Browser - Microsoft	Internet Expl 🖃 🗖 🔀				
* Search		Reference Portfolio			
		Market Risk VaR Model Name			
Instruments 1 to 50 of	2206 《 〈 〉 ▷				
Instruments					
Astruments MARASCEN INR MARASCEN INR MARASCEN INR SUBEXLID SUBEXLID INR SUBEXLID SUBEXL	INSTEGPV0SPV024 INSTEGPV0SPV01 INSTEGPV0SPV018 INSTEGPV0SPV020 INSTEGPV0SPV022 INSTEGPV0SPV022 INSTEGPV0SPV017 ▼	Swell			
S User Info					
User	MRV25USER	Creation Date	24-A	pr-2009	
Last Modified By		Last Modified Date			
A Done				SQ Local intranet	

Figure 30 Incremental VaR Add Screen

Follow the below steps, to add an Incremental VaR:

- 1. Navigate to Market Risk > Incremental VaR
- 2. Click Add 🖻 in the Incremental VaR Screen.
- 3. Enter the details in the below fields:
 - Incremental Portfolio Name: Give an appropriate incremental portfolio name.
 - Reference Portfolio: For a specific incremental portfolio, single existing portfolio can be selected along with multiple instruments mapped to it from the hierarchy browser.
 - **Run Execution Date**: Select an appropriate Run Execution date from the calendar browser which will be the fic mis date for you.
 - Market Risk VaR Model Name: Select single market risk VaR model name from the market risk VaR model hierarchy browser to which this particular Incremental VaR model will be mapped.
- 4. Add details in **Position Specifications** section, by following the below steps:
 - a. Click Add 🖹 on the RHS corner of the Position Specifications section in the Incremental VaR screen.

- b. Select the instruments from the hierarchy browser. Multiple instruments mapped to the portfolio can be selected but only one instrument can be selected at a time.
- c. Provide details for the fields **Units** and **Position Type**.
- 5. Click Save.

6.3 Viewing an Incremental VaR

To view an existing defined Incremental VaR Portfolio, select a record by activating the select button N, then click **View** \blacksquare on the RHS corner of the screen. The chosen Incremental VaR Portfolio is displayed and it cannot be edited.

remental VaR Specification	for View - Microsoft Internet Explo	orer		
Incremental VaR Details				
Incremental Portfolio Name	testttt	Reference Portfolio	Bank Portfol	lio
Run Execution Date	05/07/2008	Market Risk VaR Model Name	Analytic IUT	Duration_0
			-	
📲 Position Specificatio	n			
🔏 Instrument ID	Instrument Name	Instrument Type	Units	Position Type
INSTCMOPTSVAN13	CMOP 1700.2036 USD CALL NC	DEXRMSEEDJPR 6/2/2009 Commodity Option	2	Short
BSE:MADRASCEM	MADRASCEM INR	Spot Equity	23	Long
BSE:HP	HP INR	Spot Equity	43	Long
		Close		
ser Info		Close		
ser info	MRV2SUSER	Close		56/2009 15:34:17

Figure 31 Incremental VaR View Screen

6.4 Editing an Incremental VaR

Follow the below steps, to edit an Incremental VaR:

- Select a defined Incremental VaR portfolio that needs to be edited by clicking the select button ^I.
- 2. Click **Edit** At the right hand corner of the Incremental VaR summary screen.

- 3. You can change the execution date and check for incremental VaR. All the dimensions under position specification column can be edited or deleted for a given Incremental VaR portfolio. The reference portfolio and VaR model name once defined cannot be edited. You can modify the number of units and position type for a particular instrument mapped to the defined portfolio.
- 4. Click Save.

remental VaR Specification	for Edit - Microsoft Internet Explorer				
Incremental Val Details				1 c	-
Incremental Portfolio Name	testtt		Reference Portfolio	Bank Portfolio	
Run Execution Date	05/07/2008		Market Risk VaR Model Name	Analytic IUT D	uration_0
🚔 Position Specificati	on				±
🕺 Instrument ID	Instrument Name		Instrument Type	Units	Position Type
INSTCMOPTSVAN	13 CMOP 1700.2036 USD CALL NCDEXR	RMSEEDJPR 6/2/2	2009 Commodity Option	2	Short 🕑
BSE:MADRASCEM	MADRASCEM INR		Spot Equity	23	Short
BSE:HP	HP INR		Court Exercitor	43	Long
			-spoi Louisy	10	Long
			spok kupiky		Long
		Save			
ser Info		500			
ser info	MFV2SUSER	Save	Spor Liquity	5	B/2009 15.34:17

Figure 32 Incremental VaR Edit Screen

7 Process Description

Process Name	Rule Name	Description
Positions Data Population	POSITIONS DATA POPULATION	This module loads the positions data from stage table to FACT table if positions data is given as download
Market Data Population	MARKET DATA POPULATION	This module loads the market data from stage table to FACT table if market data is given as download
Commodity Future Curve Population	COMMODITY FUTURE CURVE POPULATION	This module loads the commodity future curve from stage table to FACT table if commodity future curve is given as download
Equity Corporate Actions Data Population	CORPORATE ACTIONS DATA POPULATION	This module loads the corporate action data from Stage table to FACT table
Instruments Obligors Data Population	OBLIGORS DATA POPULATION	This module loads the obligors details from stage table to FACT table
Instruments Schedule Data Population	INSTRUMENT SCHEDULE POPULATION	This module loads the Instruments Schedule from stage table to FACT table
MR VaR Data Preparation	Currency and Interest Rate Instruments Re- classification	This module does the Instrument Reclassification of instruments with risk factor type as Currency and Interest Rate
MR VaR Data Preparation	Commodity and Equity Instruments Re- classification	This module does the Instrument Reclassification of instruments with risk factor type as Commodity and Equity.
MR VaR Data Preparation	Currency Asset Re- Classification	This module does the reclassification of all the instrument with risk factor type as Currency
MR VaR Data Preparation	Commodity Asset Re- Classification	This set of modules does the Reclassification of Asset Class
MR VaR Data Preparation	Asset Re-classification for Quanto Options	This set of modules does the Reclassification of Asset Class
MR VaR Data Preparation	Sovereign Asset Class Re-Classification	This set of modules does the Reclassification of Asset Class

Following is the description of processes in Market Risk version 8.0.4.0.0:

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Process Name	Rule Name	Description
MR VaR Data Preparation	Asset Class Classification - Simple Derivatives on Sovereign	This set of modules does the Reclassification of Asset Class
MR VaR Data Preparation	Asset Class Classification Compound Derivatives on Sovereign	This set of modules does the Reclassification of Asset Class
MR VaR Data Preparation	Asset Class Reclassification	This set of modules does the Reclassification of Asset Class
MR VaR Data Preparation	Asset Class Reclassification based on Rating	This set of modules does the Reclassification of Asset Class
MR VaR Data Preparation	Asset Class Classification on Rating for Simple Derivatives	This set of modules does the Reclassification of Asset Class
MR VaR Data Preparation	Asset Class Classification on Rating for Compound Derivative	This set of modules does the Reclassification of Asset Class
MR VaR Data Preparation	Asset Class Reclassification for Equity	This set of modules does the Reclassification of Asset Class
MR VaR Data Preparation	Asset Class Reclassification for Simple Equity Derivatives	This set of modules does the Reclassification of Asset Class
MR VaR Data Preparation	Asset Class Reclassification for Compound Equity Derivatives	This set of modules does the Reclassification of Asset Class
MR VaR Data Preparation	Asset Class Reclassification for CDS	This set of modules does the Reclassification of Asset Class
MR VaR Data Preparation	Asset Class Reclassification for Convertible Bonds	This set of modules does the Reclassification of Asset Class

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Process Name	Rule Name	Description
MR VaR Data Preparation	POSITION DATA POPULATION	This module loads the Position Data of Instruments from stage table to FACT table.
MR VaR Data Preparation	MARKET INSTRUMENT	This module loads the Instrument Parameter from stage table to FACT table.
MR VaR Data Preparation	EQUITY INDEX DATA POPULATION	This module loads the Equity Index Data from stage Table to FACT Table.
MR VaR Data Preparation	PORTFOLIO DATA POPULATION	This module loads the Portfolio data like VaR Limit and Actual P&L from Stage Table to FACT Table.
MR VaR Data Preparation	YIELD CURVE POPULATION	This module loads the Yield Curve Data from stage table to FACT Table for all the Rating and Currency combinations for which you have selected the download option.
MR VaR Data Preparation	CDS SPREAD POPULATION	This module loads the CDS Spread data from stage Table to FACT Table.
MR VaR Data Preparation	Interpolate_CDS_Spread s	This module maps the given CDS spread to the standard time vertices as specified by you. If the standard time vertices are not in the downloaded CDS Spread then spread values are interpolated for the intermediate time vertices.
MR VaR Data Preparation	Pop_Correlation_AC	This module populates the Funds and Benchmark Codes as Asset Class, this module is purely for calculation purposes where correlation between Benchmark Codes, Funds and Risk Factors is required for Calculating of VaR and other Risk Measures.
MR VaR Data Preparation	RISK FACTOR STATISTICS POPULATION	This module loads the Variance, Co-variance, Mean and Correlation Data between all the Risk Factors from stage table to FACT table. This module will be useful if you want to give the Variance, Co-variance, Mean and Correlation data as download.

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Process Name	Rule Name	Description
MR VaR Data Preparation	RunningAccCalc	This module calculates the Running Accumulator for Asian Option and updates the value for the corresponding instrument.
MR VaR Data Preparation	ZCYCEstimation	This module calculates the Yield Curve for all the Rating and Currency combinations for which you have selected either Bootstrap method or choose to apply spread over Sovereign Yield Term Structure.
MR VaR Data Preparation	CMFEstimation	This module calculates the Commodity Future Curve using all the Commodity futures traded in the market.
Interest Rate Mean Reversion Estimation	IRMeanReversion	This module calculates the Mean Reversion Rate for Interest Rate instrument
Risk Factor Volatility Correlation Estimation	EWMA 0.94	This module first fetches the historical data of all the Risk Factors given by you and applies the corporate action if available to the equities. Once the corporate action has been applied then the module will check for the missing value and fill up the missing values using the method as selected by you. Thereafter, the module calculates the Variance, Co-variance, Mean, and Correlation for all the Risk Factors.
Pricing OTC Instruments	OTCPricing	This module uses the output of Risk Factor Volatility Correlation Estimation Module and calculates the price of all the OTC Instruments available with the bank. Along with the price calculation, module also calculates the Greeks for all the option instruments and Modified Duration for all the bonds.
Market Risk VaR Estimation	Analytic Model / Historical Model / Monte Carlo Model	This module calculates the Risk Measures like VaR, CVaR for the model as defined by you.
Market Risk VaR Estimation	Simulated_PL_Bucketing	This module buckets the P&L distribution as generated in Monte Carlo or Historical VaR

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Process Name	Rule Name	Description
		Estimation Methodology for plotting the curve of P&L distribution.
MR Incremental VaR Estimation	MRIncrementalVaR	This module calculates the Incremental VaR of the position defined by you added in the selected portfolio.

Table 3: Process Description

8 Examining Results

In order to examine results, you verify the corresponding tables. After execution is complete, verify the T2T logs and the Run-Rule logs, for execution status and errors, if any. The logs will also mention the name of the table in which the Output is populated. You have to access the particular table to view the results.

Additionally, you can view the final outputs in the reports section. This can be accessed by clicking Information Delivery on the left pane of the OFSAAI Infrastructure. Under that click Insight and then click Viewer to view all the reports.

9 Market Risk Models

This section explains the functional inputs required to create the below MR models:

- Exponentially Weighted Moving Average (EWMA) Model
- Generalized Autoregressive Conditional Heteroskedasticity (GARCH) Model
- Market Risk VaR Model.

For information on deployment of the models, see Oracle Financial Services Analytical Applications Infrastructure 8.0.4.0.0 User Guide on <u>OHC</u> Documentation Library.

9.1 Exponentially Weighted Moving Average model

OFS Market Risk estimates the Variance of, Covariance and correlations between the historical returns of risk factors using the Exponentially Weighted Moving Averages (EWMA) Method. The risk factors are correlated, and risk estimation models are factored in the calculations.

EWMA method allows for greater weight being given to recent observations. These risk factors are values of interest rates, exchange rates, equities and commodities at the relevant vertices. The number of observations to be used for the Variance-Covariance estimation is specified as part of the Market Risk VaR Model.

Volatilities and correlations of certain asset classes, such as commodities, may be heavily influenced by seasons. OFS Market Risk allows adjustments to calculations to factor in the effect of seasons. Seasonality adjustment requires specification of season start and end dates. When seasonality is specified, only those historical returns on risk factors for the observations that fall within the relevant season are used for computations.

For example, if the number of seasons specified is 3, then three dates should be provided that is, first date for start of season 1, second date for end of Season 1 and third date for end of season 2.

Where seasonality is specified the price observations are taken from seasons in which the valuation date falls.

9.1.1 Estimation of Variance - Covariance

This section details the calculations involved in the estimation of variance-covariance.

9.1.1.1 Calculation of Returns

The first step in estimation of variance-covariance is the calculation of returns for each risk factor. Returns are calculated over the historical time period in intervals corresponding to the VaR horizon.

For example, if the observation period is 250 days, and VaR horizon is 2 days, then a total of 124 non-overlapping returns are calculated. The return over a time interval is calculated using the following formula:

$$R_t = Ln(P_t) - Ln(P_{t-n})$$

Where,

 P_t = Price at time t

P_{t-n}= Price at time t-n.

9.1.1.2 Estimation of Variance and Volatility

Variance of each of the risk factor's returns over the VaR horizon is calculated using the following formula:

$$\sigma R_t = \frac{\sum_{t=1}^T (\lambda^{T-t} * R_t^2)}{\sum_{t=1}^T (\lambda^{T-t})}$$

Where,

 σR_t = Estimated volatility of risk factor R_tP_{t-n} = Price at time t-n.

Rt = Return on risk factors at time t

T=Number of historical observations

t = Day on which a particular historical observation has occurred

 λ^{T-t} = Decay factor which gives the relative weight (T-t) to each observation

Volatility is calculated using the following formula:

$$Volatility = \sqrt{\sigma R_t}$$

9.1.1.3 Estimation of Covariance

Covariance is a measure of the extent of joint movement in two variables, which in case of market risk are the risk factors. OFS Market Risk estimates the covariance between each pair of risk factors using the following formula:

$$Cov (R_{t1}, R_{t2}) = \frac{\sum_{t=1}^{T} (\lambda^{T-t} R_{t1} R_{t2})}{\sum_{t=1}^{T} \lambda^{T-t}}$$

Where,

Cov (R_{t1}, R_{t2}) = Covariance between risk factor returns R_{t1} and R_{t2}

 R_{ti} = Return at time t, on risk factor i

9.1.2 Estimation of Correlation

Correlation is a measure of the strength of the joint movement in two variables. In case of market risk these are the risk factors. OFS Market Risk estimates the correlation between each pair of risk factors using the following formula:

$$\rho(R_{t1}, R_{t2}) = \frac{\text{Cov}(R_{t1}, R_{t2})}{\sigma R_{t1} \sigma R_{t2}}$$

Where,

 $\rho(R_{t1}, R_{t2})$ = Correlation between risk factor returns R_{t1} and R_{t2}

 σR_t = Estimated volatility of risk factor R_t

Cov (R_{t1}, R_{t2}) = Covariance between risk factor returns R_{t1} and R_{t2}

9.1.2.1 Cross Correlations

Where cross correlations are not considered in a given run, the value of correlation across asset class is reset to 0. Intra asset class correlations are unchanged. For example, correlation between interest rates of different maturities and across currencies is considered, while correlation between interest rate asset classes and stock indices is reset to 0. Whether cross-correlations are to be considered or not, is specified as part of Market Risk VaR model definition.

9.1.3 Defining an EWMA Model

Follow the below steps to create an EWMA model.

- 1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select **Financial Services Market Risk**.
- To open the Model Creation screen, select the Sandbox tab > Modeling > Model Creation on the Left-Hand Side (LHS) menu.
- 3. Click Add button in the Model Creation screen.

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Figure 33 Model Creation Screen

- 4. Enter the Model Name and Model Description.
- 5. Select the Model Objective.
- 6. Select the technique as **EWMA Model**.

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Figure 34 Model Definition Screen

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Figure 35 Technique Selection Browser

- 7. There are two available options Volatility Correlation parameters and Seasonality Parameters.
 - a. Volatility Correlation Parameters:

Oracle Financial Services Market Risk estimates the Variance-Covariance Matrix based on the following parameters:

- i. Select the **Missing Observation Estimation Method**. OFS Market Risk supports the following methods for the estimation of missing observations in the historical data:
 - Linear Interpolation
 - Prior-day
 - Nearest-day
 - Omit-day

OFS Market Risk estimates the missing observations in the data before carrying out further calculations.

ii. Specify the Number of Observation Days. The number of observation days is specified for the purpose of selecting the historical risk factor values. For example, if the number of observation days is specified as 250, then the observations related to a trailing period of 250 business days from the date, for which the computations are made are considered.

iii. Specify the **Decay Factor**. It provides the weight for each observation under the EWMA method of Variance-Covariance estimation also called as "Lambda". It is specified as a number between zero and one (inclusive). Decay factor of 1 indicates that equal weight is given to all observations. A value closer to zero indicates that more weight is given to the recent observations

b. Seasonality Parameters

Seasonality plays an important role when the volatilities and correlations are greatly influenced by seasons, specifically in case of instruments linked to commodities. Seasonality Adjustments can be specified as Yes or No.

If you select **Yes**, then specify the following seasonality parameters:

- i. **Number of Seasons:** It should be specified as a numeric value. It divides the year into the specified number of seasons.
- ii. Season 1 Start Date: The start date of the first season is specified in terms of the month, and the day when the first season in a year begins. Therefore, a season need not follow the calendar year. The start dates for each subsequent season are determined based on the end date of the previous season.
- iii. Season End Date/s: The end date is specified for each of the seasons, except the last season. The end date of the last season is computed as the day prior to the season start date for the next year. When seasonality is specified, OFS Market Risk considers the season to which the date on which computations are run belongs, and accordingly picks up the historical values of risk factors which fall in that season.





9.2 Generalized Autoregressive Conditional Heteroskedasticity (GARCH) Method

The volatilities and correlations are estimated using both the EWMA methods as well as the Generalized Autoregressive Conditional Heteroskedasticity (GARCH) method. The volatility – correlation calculations take into account the seasonality parameters, cross correlations and the horizon specified.

9.2.1 Estimation of GARCH Parameters

OFS Market Risk utilizes the Linear Programming Problem function of NAG libraries for the estimation of the GARCH parameters. Alpha (α), Beta (β) and Omega (ϖ). α , β and ϖ are estimated by maximizing the following equation:

$$mlecoff = \sum_{m}^{t=1} \left[-Ln(Cov_t) - \left(\frac{X_{t-1}Y_{t-1}}{Cov_t} \right) \right]$$

Where,

m = number of observation days

Xt-1 = Returns of risk factor X on day t-1

Yt-1 = Returns of risk factor Y on day t-1

$$Cov_t = \omega + \alpha(X_{t-1}Y_{t-1}) + \beta CovXY_{t-1}$$

Where,

CovXY_{t-1} = Covariance between risk factor X and Y on day t-1 α , β and ω = GARCH Parameters

$$\omega = V_L \left(1 - \alpha - \beta\right)$$

$$V_L = Long \ term \ covariance = \frac{\sum_{m=1}^{t=1} (X_{t-1} - \mu_X)(Y_{t-1} - \mu_Y)}{m}$$

Where,

 μ_X = Mean of Risk factor X on time t-1 μ_Y = Mean of Risk factor Y on time t-1 With constraints, $\alpha, \beta, \varpi > 0$ $\alpha + \beta < 1$ The variance is predicted for each day using the guess values for α , β and ϖ . The maximum likelihood estimate for each day is computed using the formula given above. Values of α , β and ϖ are estimated using the LPP function of NAG libraries, in an iterative manner such that the overall MLE during the observation period is maximized.

Following are the steps for estimation of GARCH parameter:

- 1. Generate guess parameter of α , β and ϖ , such that α , β , $\varpi > 0$ and $\alpha+\beta < 1$
- 2. Calculate mlecoff for scenarios
- 3. Repeat step 1 and 2 for 3000 scenarios.
- Select the scenario where mlecoff is maximum and use the corresponding α, β and
 σ values to derive variance/covariance and correlation using equations explained in section below.

Alternatively, GARCH parameters can be provided as a download, and while defining the model you can select the option of not calibrating the GARCH parameters.

9.2.2 Estimation of Variance and Volatility

The formula for estimating variance using GARCH model is as follows:

$$VarX_t = \omega + \alpha(X_{t-1}X_{t-1}) + \beta VarX_{t-1}$$

Where,

VarXt = Variance of risk factor X on day t

VarX_{t-1} = Variance of risk factor X on day t-1

Xt-1 = Returns of risk factor X on day t-1

 α , β and ω = GARCH Parameters estimated in above step

On the first day when the GARCH model is applied, the predicted variance as on the previous day is not available. In this case, the first value of predicted variance is taken as the square of the returns. Thereafter, the GARCH model is applied to predict the variance. Volatility is calculated using the following formula:

$$\sigma X_t = \sqrt{VarX_t}$$

Where,

 σX_t = Volatility of Risk Factor X on day t

VarXt = Variance of risk factor X on day t

Covariance based on the GARCH model is estimated using the formula as follows:

$$Cov_t = \omega + \alpha(X_{t-1}Y_{t-1}) + \beta CovXY_{t-1}$$

Where,

Xt-1 = Returns of risk factor X on day t-1

Y_{t-1} = Returns of risk factor Y on day t-1

CovXY_{t-1} = Covariance between risk factor X and Y on day t-1

On the first day when the GARCH model is applied, the predicted covariance as on the previous day is not available. In this case, the first value of predicted covariance is taken as the square of the returns. Thereafter, the GARCH model is applied to predict the covariance.

9.2.3 Estimation of Correlation

Correlation is a measure of the strength of the joint movement in two variables. In case of market risk these are the risk factors. OFS Market Risk estimates the correlation between each pair of risk factors as per the formula given:

$$\rho XY_t = \frac{CovXY}{\sigma X_t \sigma Y_t}$$

Where,

 $\rho X Y_t$ = Correlation between risk factor X and Y on day t

 $CovXY_t$ = Covariance between risk factor X and Y on day t

 σX_t = Volatility of Risk Factor X on day t

 σY_t = Volatility of Risk Factor Y on day t

9.2.4 Cross Correlations

Where cross correlations are not considered in a given run, the value of correlation across asset class is reset as 0. Intra asset class correlations are unchanged. For example, correlation between interest rates of different maturities, and across currencies is considered while correlation between Interest Rate Asset Classes and Stock Indices is reset to 0. Whether cross-correlations are to be considered or not is specified as part of Market Risk VaR Model definition.

9.2.5 Defining a GARCH Model

Follow the below steps to create a GARCH model:

1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select **Financial Services Market Risk**.

- To open the Model Creation screen, Select the Sandbox tab > Modeling > Model Creation on the Left-Hand Side (LHS) menu.
- 3. Click Add button in the Model Creation screen.

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Figure 37 Model Creation Screen

- 4. Enter the Model Name and Model Description.
- 5. Select the model objective
- 6. Select the technique as **GARCH** Model.
- 7. There are two available options Volatility Correlation parameters and Seasonality Parameters.
 - a. Volatility Correlation Parameters:

Oracle Financial Services Market Risk estimates the Variance-Covariance Matrix based on the following parameters:

- i. Select **Yes** or **No**, for the field **Calibrate GARCH Model**: If you select Yes, then system will calibrate GARCH parameter alpha, beta and omega as per the method mentioned. Else system will pick the given GARCH parameter and proceed for computation.
- ii. Select the **Missing Observation Estimation Method**. Oracle Financial Services Market Risk supports the following methods for the estimation of missing observations in the historical data:
 - Linear Interpolation
 - Prior-day
 - Nearest-day

Omit-day

OFS Market Risk estimates the missing observations in the data before carrying out further calculations.

iii. Specify the **Number of Observation Days**. The number of observation days is specified for the purpose of selecting the historical risk factor values. For example if the number of observation days is specified as 250, then the observations relating to a trailing period of 250 business days from the date, for which the computations are made, are taken into consideration.

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Figure 38 Model Definition Screen

b. Seasonality Parameters

Seasonality plays an important role when the volatilities and correlations are greatly influenced by seasons, specifically in case of instruments linked to commodities. Seasonality Adjustments can be specified as Yes or No.

If you select **Yes**, then specify the following seasonality parameters:

- i. **Number of Seasons**: It should be specified as a numeric value. It divides the year into the specified number of seasons.
- ii. Season 1 Start Date: The start date of the first season is specified in terms of the month and the day when the first season in a year begins. Therefore, a season need not follow the calendar year. The start dates for each subsequent season are determined based on the end date of the previous season.
- iii. **Season End Date/s**: The end date is specified for each of the seasons, except the last season. The end date of the last season is computed as the day prior to the season start date for the next year. When seasonality is specified, OFS Market

Risk considers the season to which the date on which computations are run belongs and accordingly picks up the historical values of risk factors which fall in that season.

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Figure 39 Model Definition Screen

9.3 VaR Estimation

Value-at-Risk (VaR) is the worst expected portfolio loss under normal market conditions over a specific time interval at a given confidence level. This section details the types of VaR models available in OFS MR, for VaR estimation.

9.3.1 Risk Measure Estimation Parameters

This section details the methods that OFS MR supports, for estimating risk measures, and provides steps to define the parameters. Following are the supported methods:

- Analytic (Parametric / Variance Covariance Method) Method
- Historical Simulation Method
- Monte Carlo Simulation Method

9.3.1.1 Analytic (Parametric / Variance Covariance Method) Method

Calculation of VaR of a portfolio is a two-step process, which includes:

 Calculation of Undiversified VaR: This method is calculated by multiplying the volatility vector with the cash flows and summing them up. The output of this step is the undiversified VaR corresponding to each Asset – Asset Class
 Maturity vertex as well as the undiversified VaR of the portfolio.

The first step in estimating the portfolio VaR is to estimate the undiversified VaR of each of the positions. The undiversified VaR of each Asset – Asset

Class - Maturity vertex is arrived at by multiplying the cash flow matrix with the respective risk factor volatilities. The cash flow matrix is an n x 1 matrix, which has rows equal to the number of Asset - Asset Class - Maturity combination and 1 column holding cash flows.

$$VU = z\alpha \, \left(\frac{V}{\sqrt{360}}\right)$$

Where,

VU = Vector of Undiversified VaR for each position.

CF = nx1 Vector of Cash Flows

V = Annual Volatility Vector

 $z\alpha$ = Standard normal value z, corresponding to the confidence level α

The Undiversified VaR of the portfolio is the simple summation of the elements of the undiversified VaR vector.

 Calculation of Diversified VaR: This method is computed by multiplying the vector of undiversified VaR with the correlation matrix. The output of this step is the diversified portfolio VaR in the reporting currency.

OFS Market Risk estimates the VaR of a portfolio as function of Cash flow Vector and the Variance Covariance matrix. . Here, the VaR is calculated at the portfolio level.

$$VaRp = (CFT * Q * CF)^{1/2}$$

Where,

VaRp = Portfolio VaR

CF = Cashflow Matrix

CFT = Transpose of the vector of Cashflow Matrix

 $Q = VarianceCovariance Matrix * z\alpha 2$

 $z\alpha$ = Standard normal value z, corresponding to the confidence level α

Component VaR

Under the analytic method to risk measure estimation, component VaR is calculated as the contribution of each Asset – Asset Class – Maturity vertex to the Diversified Portfolio VaR as follows:

 Delta VaR of each Asset – Asset Class – Maturity vertex maturity is calculated as follows:

$$DelVaR = \frac{(CFT * Q)}{VaRP}$$

Where,

DelVaR = Delta VaR of each Asset,Asset Class and Maturity vertex CFT= Transpose of the Cash Flow Vector $z\alpha 2$ = Square of standard normal value,z,at a confidence level of α

VaRP = Diversified Portfolio VaR

 $Q = VarianceCovariance Matrix * z\alpha 2$

• Component VaR is calculated as follows:

Component VaR = Cash Flow * the respective DelVaR

9.3.1.2 Historical Simulation Method

Simulation of Risk Factor

Simulation is carried out by applying historical returns on the current value of risk factors based on the parameters specified in the Market Risk VaR Model.

The output of this process is the simulated values of all the risk factors in a given portfolio. The number of simulated values of each risk factor is equal to n-1 number of historical observations specified in the Market Risk VaR Model.

For historical simulation methods, returns on risk factors are calculated using the returns method. The returns observed historically, are applied to the current value of the risk factors to simulate the possible values of the risk factors. The returns are calculated over the historical time period in intervals corresponding to the VaR horizon.

Stock index is the risk factor for equity instruments. The returns are thus calculated on the historical values of stock index and stocks specified as custom equity risk factors. The equity prices are calculated from the stock index returns.

Simulation of Portfolio Value

Simulated portfolio value refers to the price of portfolio under each scenario.

The instrument value for all instruments as part of a portfolio is calculated under all simulated scenario. Simulated portfolio value in the reporting currency is derived as the sum of all the instrument prices under each scenario.

P&L Distribution

P&L Distribution is Profit or Loss of the portfolio under each scenario against the portfolio value as on the current day.

Portfolio VaR and CVaR

The VaR and CVaR values which are obtained from the P&L Distribution are based on the confidence level and horizon specified in the Market Risk VaR Model.

Based on the confidence level α , the 1-day α -VaR is the $(1 - \alpha)^{th}$ value in the arranged P&L values. The confidence level α must be entered in the OFS Market Risk application. The t-day α -VaR is estimated by multiplying the 1-day α -VaR by \sqrt{t} .

CVaR is calculated as the expected value of all simulated data points that exceed the VaR. It is the expected loss conditional on the occurrence of loss greater than VaR. The P&L distribution and is calculated as:

CVaR =	E(Y / Y > VaR)	 -
		_

Where,

Y = Value of simulated loss

Thus, it is the arithmetic average of all simulation points exceeding the VaR value.

Component VaR

Under the Simulation Methods of risk measure estimation, both Monte Carlo as well as Historical, Component VaR is calculated as the contribution of each position to the Portfolio VaR as detailed below.

- The scenario position values are estimated for n instruments in the portfolio for m scenarios of prices, and converted to the home currency.
- The variance of the scenario portfolio values is estimated as follows:

Variance = $1/m \Sigma j=1m (jPt+1 - \mu j)^2$

Where,

m = Number of scenario portfolio values

jPt+1 = Scenario portfolio value

 μj = Mean of the scenario portfolio values

 The covariance between the scenario position values of each instrument and the scenario portfolio values is estimated as follows:

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Covariance = $1/m \Sigma k=1m j=1m (xk - \mu k) (jPt+1 - \mu j)$

Where,

Xk = Scenario position values of instrument "i"

The covariance of each position with the scenario portfolio values is calculated.

Component VaR for each instrument is calculated as follows:

Component VaR = [(Covariance) / (Variance)] * Portfolio VaR

9.3.1.3 Monte Carlo Simulation Method

Simulation of Risk Factor

For the purpose of Monte Carlo Simulation, risk factors are simulated using stochastic processes such as:

- Geometric Brownian Motion for Equity and Commodities
- Garman-Kohlhagen process for Currency
- Hull-White process/ Black process/ Ornstein Uhlen Beck process/ Ho-Lee process
 for Interest Rate

The parameters of each of the stochastic process are available as a download.

Risk factor scenario under Monte Carlo simulation is derived using stochastic process for each risk factor, Correlation Matrix, and seed value to generate pseudo random number. Monte Carlo Simulation Method is a three step process detailed below.

Step 1

Pseudo random number is given as input for stochastic process to arrive at the simulated risk factor values.

Pseudo random number is generated using a seed value provided by user. You can provide seed value while defining the VaR model. If a seed value is not provided, then system generates random seed value.

Step 2

Generated pseudo random number is used to simulate the value of each risk factor using the stochastic process assigned to them. Additionally, to pseudo random number each stochastic process requires specific inputs such as mean and variance. Details of stochastic process for each risk factor are explained below.

Equity and Commodity Risk Factors

Custom equities and benchmark indices and commodities are modeled using the Geometric Brownian Motion. The output of this process is the simulated prices of all the equities in the portfolio. Geometric Brownian Motion generates a scenario for respective risk factors using Pseudo random number and three inputs, such as initial value, Mue (mean) and Sigma (Variance) of the risk factor.

Geometric Brownian Motion is governed by following equation:

 $dS(t,S) = \mu Sdt + \sigma SdW_t.$

The risk factor for equities is either the benchmark stock index to which it is mapped or the equity itself. Custom equity risk factors are modeled using a Geometric Brownian Motion. In case of equities mapped to the stock index, the index itself is modeled and the index returns are estimated. The price of a particular equity is estimated from the modeled returns on the respective stock index. OFS Market Risk estimates the equity prices using the Capital Asset Pricing Model as follows:

$$Et+1 = Et * exp (\beta im * Rm)$$

Where,

Et+1 = Equity Price at time t+1

Et = Equity Price at time t

 β im = Beta or the sensitivity of asset returns to stock index returns

Rm = Return on stock index

Currency Risk Factor

Currencies are modeled using Garman Kohlagen Process. The output of this process is the simulated prices of exchange rates. Garman Kohlagen Process generates scenarios for respective risk factors using four inputs, such as spot value between currencies, risk free term structure of the first currency, risk free term structure of the second currency and volatility term structure. Initial value provided to equation is the current spot value. Risk factor scenarios are created by propagating initial value and Garman Kohlagen Process equation preserves the volatility of generated scenarios.

Garman Kohlagen Process is governed by the following equation:

$$dS(t,S) = \left(r(t) - r_f(t) - \frac{\sigma(t,S)^2}{2}\right)dt + \sigma dW_t$$

Interest Rates Risk Factor

Interest rates are modeled using the interest rate model specified by the user (Hull White Process, Black Process, Ornstein Uhlen Beck Process or Ho-Lee Process). If Spread over Sovereign yield curve is specified for any interest rate, then that spread is applied to the simulated values of the sovereign yield curve to arrive at the simulated values for the given rating. Benchmark indices such as Libor are simulated using the interest rate model specified for the sovereign yield curve.

Hull White process generates scenarios for the respective risk factors using Pseudo random number and three inputs, such as yield term structure, mean reversion rate and Sigma (variance). To estimate the mean reversion rate and speed, each interest rate risk factor's change of rate are computed for the specified number of days. Change of rate is regressed with rate using linear regression. Speed of the mean reversion is -1* slope. Mean reversion rate and speed are calculated using NAG library's liner equation "nag_simple_linear_regression (g02cac)". Details description of NAG equation is available on http://www.nag.com/numeric/CL/nagdoc_cl23/html/G02/g02cac.html.

This process is repeated for all interest rate risk factors.

Hull White Process is governed by following equation:

$$dr_t = (\theta(t) - ar_t)dt + \sigma dW_t$$

Black Process generates scenario for respective risk factors using overnight rate and volatility term structure. Black Process is governed by following equation:

$$dS_t = \left(r(t) - q(t) - \frac{\sigma(t, S)^2}{2}\right)dt + \sigma dW_t$$

Ornstein Uhlen Beck Process generates scenario for respective risk factor using Pseudo Random number and Overnight rate and speed value as provided by user while defining VaR Model. Ornstein Uhlen Beck Process is governed by following equation:

$$dXt = \kappa(\theta - Xt)dt + \sigma dWt$$

Ho-Lee Process generates scenario for respective risk factor using mean reversion rate and Sigma (variance). Ho-Lee model is equivalent to Hull-White model with a meanreversion rate as zero.

Interest rate model specified are short-rate models and therefore model the (spot) overnight rate for all Interest Rate Asset Classes. For other maturity buckets, the interest rate is modeled using the correlation of the overnight rate with the maturity bucket rate. This is done by calculating the beta coefficient. An error value is also included in Beta function, error value is with respect to maximum deviation observed in target maturity bucket.

Error value in beta function is computed using iterative process. This error value is to address variance of spot with respect to target time vertex. In certain scenarios where spot rate is stable and target time vertex rate is volatile in nature, beta function's resultant scenario of target time vertex represents the variation as in spot rate and not target time vertex rate. Error value in beta function tends to incorporate the variation of target time vertex in the generated scenario. Maximum of 1000 iterations will be performed to compute the error value. Initial error value is set to 0.5. After each iteration the difference between maximum deviation in historical data is compared with the maximum deviation generated in simulation. Iteration where above mentioned difference is minimum will be stamped as the final scenario set for corresponding maturity time bucket.

$$\beta_{0,i} = \rho_{0,i} \ * \left(\frac{\sigma_i}{\sigma_0}\right) * \in$$

Where,

 $\begin{array}{l} \beta_{0,i} = \ Beta \ Coefficient \ for \ i^{th} \ maturity \ time \ bucket \\ \rho_{0,i} = \ Correlation \ between \ overnight \ rate \ and \ i^{th} \ maturity \ time \ bucket \\ \sigma_0 = \ Volatility \ of \ the \ overnight \ rate \\ \sigma_i = \ Volatility \ of \ i^{th} \ maturity \ time \ bucket \\ \in = \ Error \ value \end{array}$

The log change in the spot rate is multiplied by the Beta coefficient to arrive at the log change to the target maturity time bucket rate with respect to all scenarios.

$$Ln(r_{i,Xscenario}) - Ln(r_{i,spot}) = \beta_{0,i} \left[Ln(r_{0,Xscenario}) - Ln(r_{0,spot}) \right]$$

Where,

 $r_{i,Xscenario} = X^{th}$ scenario rate of i^{th} maturity time bucket $r_{i,spot} = Spot$ rate of i^{th} maturity time bucket $r_{0,Xscenario} = X^{th}$ scenario rate of overnight time bucket $r_{0,spot} = Spot$ rate of overnight time bucket

 $\beta_{0,i} = Beta Coefficient for ith maturity time bucket$

The simulated value of ith-day interest is calculated by solving for $r_{i,Xscenario}$ in the above equation.

While simulating interest rates, the resulting values may be negative. A floor of 0.001 is applied to all the simulated values. Any interest rate going below this value is taken as 0.001 for the purpose of calculations.

CDS Spreads

In case of Credit Defaults Swaps and Collateralized Debt Obligations, the risk factor to be simulated is the CDS spread. Only the spreads at the shortest maturity are modeled using the Geometric Brownian Motion process. The spreads of all other maturities are simulated in a manner similar to ;I simulation. The beta co-efficient is calculated based on the equation given above. The absolute change in the spread value at the shortest maturity is multiplied with the by the Beta coefficient to arrive at the value of the other maturities.

$$S1, i - S1, 0 = \beta 0.5, 1 (S 0.5, i - S0.5, 0)$$

Where,

S1, i = Scenario value of 1 - year spread rate S1,0 = Scenario value of 1 - year spread rate S0.5, i = Scenario value of 6 - month spread rate S0.5,0 = Scenario value of 6 - month spread rate B0.5, 1 = Beta Coefficient

> Under Historical Simulation, the absolute change in the value of spread rates is taken as the return which is applied to the current spread rate. The formula for calculating spread returns is as follows:

$$Rt = St - St - 1$$

Where,

Rt = Return on spread rates at time t St = Spread rate at time t

St - 1 = Spread rate at time t - 1

Step 3

Correlated Risk factor scenarios are then derived using correlation matrix and simulated risk factor generated in the above step.

Simulation of Portfolio Value

Simulated portfolio value is the price of the portfolio under each scenario.

The instrument value for all instrument as part of a given portfolio is calculated under all simulated scenario. The simulated portfolio value in the reporting currency is derived as sum of all instrument prices under each scenario.

P&L Distribution

The P&L distribution is Profit or Loss of the portfolio under each scenario against the portfolio value as on the current day.

Portfolio VaR and CVaR

The VaR and CVaR values obtained from the P&L Distribution are based on the confidence level and horizon specified in the Market Risk VaR Model.

Based on the confidence level α the 1-day α -VaR is the $(1 - \alpha)^{th}$ value in the arranged P&L values. The confidence level α must be entered in OFS Market Risk application. The t-day α -VaR is estimated by multiplying the 1-day α -VaR by \sqrt{t} .

CVaR is calculated as the Expected Value of all simulated data points that exceed the VaR. It is the expected loss conditional on the occurrence of loss greater than VaR. The P&L distribution is calculated as follows:

CVaR =	E(Y / Y > VaR)	
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Where,

Y : Value of Simulated Loss

Thus, it is the arithmetic average of all simulation points exceeding the VaR value.

Component VaR

Under the Simulation Methods to risk measure estimation, both Monte Carlo as well as Historical, Component VaR is calculated as the contribution of each position to the Portfolio VaR as follows:

- The scenario position values are estimated for "n" instruments in the portfolio for "m" scenarios of prices and converted to the home currency.
- The variance of the scenario portfolio values is estimated as follows:

Variance = $1/m \Sigma j = 1m (jPt+1 - \mu j)^2$

Where,

m = Number of scenario portfolio values

jPt+1 = Scenario portfolio value

 μ j = Mean of the scenario portfolio values

• The covariance between the scenario position values of each instrument and the scenario portfolio values is estimated as follows:

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Covariance = $1/m \Sigma k=1m j=1m (xk - \mu k) (jPt+1 - \mu j)$

Where,

xk = Scenario position values of instrument i

The covariance of each position with the scenario portfolio values is calculated.

Component VaR for each instrument is calculated as follows:

9.3.2 Back Test Parameter

Back testing refers to the procedure of verifying the accuracy of the VaR model by comparing the realized P&L value with the value predicted by the VaR model.

OFS Market Risk back tests VaR estimates using Hypothetical P&L. Hypothetical P&L is defined as the gain / loss from a position at some specific time (Example, end of local business day) resulting from changes in market over the next twenty four hours, assuming a static portfolio

Actual P&L is affected by internal risk management policy and practice. Here a dynamic portfolio is assumed. OFS Market Risk back tests VaR estimates using the following methods:

- Simple Back Test
- Kupiec Test

A simple back test involves counting the number of loss exceptions for a given time period. Kupiec Test counts the number of exceptions in any given sample and performs a Likelihood-Ratio-Test at a given confidence level. Back testing is done for the days.

Back Testing comprises of calculation of the following:

- Hypothetical P&L
- Profit/Loss Exceptions
- P-value
- Critical Value
- Loss Exception Deviation
- Average Loss Duration
- Loss Duration Deviation
9.3.2.1 Calculation of Hypothetical P&L

OFS Market Risk calculates the hypothetical P&L of the portfolio assuming that the portfolio composition remains unchanged over the VaR horizon. Portfolio value at time "t" is calculated based on the actual prices of the instruments as on time "t" and the position held in the instruments. Hypothetical portfolio value at time "t+1" is calculated based on the actual prices of the instruments as on time "t+1" and the position held in the instruments at time "t". Hypothetical P&L is calculated as the difference between the hypothetical portfolio value as of time "t+1" and the portfolio value as of time "t".

The formula for computing hypothetical portfolio value is as follows:

Where,

HPt+1 = Hypothetical Value of Portfolio at "t+1"

w t (i) = Number of units of instrument "i" in the portfolio at time "t"

pt+1(i) = Price of instrument "i" at time "t+1"

9.3.2.2 Calculation of Profit/Loss Exceptions

OFS Market Risk compares the actual as well as the hypothetical portfolio loss with the estimated VaR value for the back testing period specified by the user in order to find the number of exceptions. Loss exception is the number of times the actual loss exceeds the estimated VaR value for a given confidence level. OFS Market Risk also calculates the profit exceptions.

9.3.2.3 Calculation of P-value

P-value refers to the probability of the frequency of exceptions for a given level of confidence.

P-Value is calculated by passing the number of back testing points, number of Actual exceptions and the exception probability to the Binomial Distribution and then passing the probability calculated to Chi square distribution.

Where,

Number of back testing points is number of back testing days taken as input from user in VaR Model definition

Number of Actual exceptions is Profit/Loss Exceptions"

Exception probability is number of Actual Exceptions / number of back testing points

OFS Market Risk uses the following Binomial Distribution equation:

Let X denote a random variable having a Binomial distribution with parameters n and p ($n \ge 0$ and 0).

Then,

$$Prob\{X = k\} = {\binom{n}{k}} p^k (1-p)^{n-k}, for \ k = 0, 1, ..., n.$$

Where

n = number of back testing points

p = exception probability

k = number of Actual exceptions

OFS Market Risk uses the following Chi-Distribution equation:

The lower tail probability for the χ^2 distribution with v degrees of freedom, for calculating probability $P(X \le x : v)$ a transformation of a gamma distribution is employed, i.e., a χ^2 distribution with v degrees of freedom is equal to a gamma distribution with scale parameter 2 and shape parameter v/2.

Where,

$$P(X \le x : \nu) = \frac{1}{2^{\nu/2} \Gamma(\nu/2)} \int_{0.0}^{x} X^{(\nu/2)-1} e^{-X/2} \, dX, \, x \ge 0, \nu > 0$$

9.3.2.4 Estimation of Critical Value

Critical value is asymptotically Chi Square distributed with one degree of freedom. OFS Market Risk compares the P-value with the critical value at 5% and 1% significance level, on both the loss as well as profit tail of the P&L distribution, in order to check the validity of the Model.

Critical Value is calculated as two-step process.

First step is to calculate P-value by passing the number of back testing points, number of Actual exceptions and the probability as 1% (for Critical value at 1%) and 5% (for critical value at 5%) to the Binomial Distribution. Resultant output is further processed using Chi-Distribution to generate probability for the x2 distribution, to arrive at Critical Value.

9.3.2.5 Calculation of Loss Exception Deviation

Loss Exception Deviation is the absolute average deviation of the loss exceptions from the CVaR. It is calculated as follows:

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```
Loss Exception Deviation = \frac{\sum_{t=1}^{n} (L_t - CVaR_t)}{\sum_{t=1}^{n} (L_t - CVaR_t)}
```

Where,

n = Number of loss exceptions

Lt = Loss exceeding VaR at time "t"

CVaRt = Conditional VaR of the portfolio at time "t"

9.3.2.6 Calculation of Average Loss Duration

Average Loss Duration is the average time interval between successive loss exceptions.

9.3.2.7 Calculation of Loss Duration Deviation

Loss Duration Deviation refers to the standard deviation of time interval between successive loss exceptions. The standard deviation of time interval between successive loss exceptions is calculated.

It is calculated as per the formula given below:

Loss Duration Deviation =
$$\left(\frac{\sum_{t=1}^{n} (Average Deviaiton Loss - Deviaiton Loss)}{n}\right)^{1/2}$$

Where,
Average Deviation Loss = $\left(\frac{\sum_{t=1}^{n} (Deviaiton Loss)}{n}\right)$
n= Number of loss exceptions

9.3.3 Defining Risk Measure Estimation Parameters

Follow the below steps to define the Risk Measure Estimation Parameters:

- 1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select **Financial Services Market Risk**.
- To open the Model Creation screen, Select the Sandbox tab > Modeling > Model Creation on the Left-Hand Side (LHS) menu.
- 3. Follow steps 1 to 6, in section <u>Defining a Market Risk VaR Model</u>.
- 4. Specify the following Risk Measure Estimation Parameters:
- a. **General Parameter Specification:** The general risk measure parameters are generic in nature and are should be specified

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for each of the risk measure estimation method selected. These parameters include:

- i. **Reporting Currency**: Select the currency in which risk measures are to be reported, from a pop-up list of currencies.
- ii. **Horizon**: Specify the horizon in terms of days. It is the future point in time over which risk measures are estimated.
- iii. **Confidence Level**: Specify the confidence level as a percentage and up to 4 digits after decimal points.
- iv. **Yield Curve Interpolation Method**: Select the interpolation method required for interpolating the yield curve from the below:
 - Linear Interpolation Method
 - Log Linear Interpolation Method
 - Cubic Spline Interpolation Method
 - Log Cubic Interpolation Method

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Figure 40 Model Definition Screen

- **b.** Method Selection: OFS Market Risk supports the following methods for estimating risk measures:
 - i. **Analytic Method Parameters**: If you select the Analytic Method to risk measure estimation, specify the following parameters:

- **Cash Flow Type**: It determines whether the cash flows from instruments will be returned in terms of the future value or will

be discounted to obtain the present values. Select one of the following:

- Present Value
- Future Value
- Cross Correlation: It determines whether the inter-asset class correlation should be taken into account or not. If you select Yes, then the inter-asset class correlation is used as computed. If you select No, then the inter-asset class correlations are changed to zero. Cross correlation does not affect intra-asset class correlation. For example, for a given portfolio consisting of positions in US equities, US interest rate instruments and Indian equities, if cross correlations is specified as No then the correlation between Indian equities and US interest rates is changed to zero while the correlation between US equities and Indian equities remains unchanged. Cross Correlations as one of the following:
 - Yes
 - No
- Cash Flow Allocation: It is the method of splitting cash flows and allocating them to the standard vertices in a manner that preserves either the VaR or the duration of the original cash flow. VaR-preserving Allocation allocates cash flows in a manner that preserves the VaR and the present value of the original cash flow, while Duration-preserving Allocation preserves the present value and duration. Select any one of the following:
- VaR-preserving Allocation
- Duration-preserving Allocation

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Figure 41 Model Creation

- ii. **Monte Carlo Simulation Method Parameters:** If you select the Monte Carlo Simulation Method Parameters for risk measure estimation, specify the following parameters:
 - **Number of Iterations:** Specify the number of iterations for simulating risk factors and instrument prices as a numeric value.
 - Random Number Seed: It is the initial value required for generating a set of pseudo-random numbers. A given seed will always generate the random numbers in a particular sequence. Specify random number seed as one of the following:
 - Default Random Number Seed: If you select this option, then an internally generated seed is used for generating the sequence of random numbers.
 - Random Number Seed: If you select this option, then you will have to provide a seed which is used for generating the sequence of random numbers.
 - **MtM Value:** It is a method of estimating the iteration values of the P&L distribution. Select one of the following:
 - MtM Present Value: If you select this option, then the scenario values of the portfolio at horizon will be discounted using the prevailing rate of the reporting currency before arriving at the P&L distribution.

- MtM Future Value: If you select this option, then the P&L distribution is arrived at using scenario values estimated at the horizon.
- Drift: It is the instantaneous mean of the change in the value of the risk factor for a given time. Select either Yes or No. Specifying drift determines if the drift value of the risk factors is to be taken into account while estimating the values of risk factors. If you select Yes, then the drift values as estimated will be used for computations, else drift is taken to be zero.
- **Cross Correlation:** Specifying Cross Correlation determines if the inter Asset Class correlations are to be taken into account during calculations or not. This is similar to the cross correlation specified.

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Figure 42 Risk Measure Estimation Parameters

- **iii. Historical Simulation Method Parameters:** If you select the Historical Simulation method for risk measure estimation, specify the following parameters:
 - **Historical Period:** Specify the number of days to calculate the historical returns.

If you select the Relative option, then historical period can be specified relative to the execution date. In this case historical period start date specifies the day on which historical period starts and end date specifies the day on which the historical period ends. By default, for an existing model definition, the execution start day is set to 0 and the end day is set to the number of historical days specified.



Figure 43 Historical Simulation Method - Relative

If you select the Absolute option, then historical period can be specified as an absolute period of history. In this case historical period start date and end date are specific dates of history for which the historical data should be selected for simulation.

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Figure 44 Historical Simulation Method - Absolute

9.3.4 Defining a Volatility - Correlation Model

Specify the Volatility – Correlation Data. You can provide the volatility and correlation data as download or, select the model defined in the application.

a. **Model Output**: If you select this option, then specify the corresponding model defined in system. Models

corresponding to EWMA and GARCH technique will be displayed for selection.

b. **External Data**: If you select this option, then system will expect volatility and correlation data as input in staging area.

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Figure 45 Volatility Correlation Method

9.3.5 Defining a Back Test Parameter

Specify the number of days for which back testing needs to be performed. The back testing period is estimated by counting the number of days backwards from the date when back testing is performed.

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Figure 46 Model Definition – Back Test Parameter

9.3.6 Defining a Portfolio Mapping

This step involves portfolio selection, from an existing list of pre-defined portfolios, which are to be mapped to the given VaR Model. The risk measures along with the back test measures for each portfolio are estimated using the Market Risk VaR Model to which they are mapped.

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Figure 47 Model Definition – Portfolio Mapping

Note: You can edit and delete a Market Risk VaR Model. If you modify the following parameters while editing a Market Risk VaR Model, then it results in the model being saved as a new model.

- Confidence Level
- Reporting Currency
- Horizon
- Risk Measure Estimation Method
- Variance-Covariance Method

If any additional parameters of the Market Risk VaR Model are edited, then it results in creation of a new version of the existing model.

9.3.6.1 Portfolio Mapping

This step involves portfolio selection, from an existing list of pre-defined portfolios, which are to be mapped to the given VaR Model. The risk measures along with the back test

measures for each portfolio are estimated using the Market Risk VaR Model to which they are mapped.

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	Audit Trails Comments					`

9.3.7 Defining a Market Risk VaR Model

OFS Market Risk estimates risk measures for a given portfolio as per the parameters specified as part of the Market Risk VaR Model. Follow the below steps to create a Market Risk VaR model:

- 1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select **Financial Services Market Risk**.
- To open the Model Creation screen, Select the Sandbox tab > Modeling > Model Creation on the Left-Hand Side (LHS) menu.
- 3. Click **Add** button in the Model Creation screen.

Financial Services Analytic	al Applications - Internet	Explorer			and the second			
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			1480660439694	CHETHAN	0	garch	MRUSER	02-DEC-2016 12:33:26 PM
			1474640319063	garch	0	garch	MRUSER	23-SEP-2016 08:18:10 PM
			1480928799102	Monte_carlo_var	0	undefined	MRUSER	05-DEC-2016 03:06:07 PM
			1482234619512	Test_New	0	undefined	MRUSER	20-DEC-2016 05:50:08 PM
			1482234905352	Var_New	0	undefined	MRUSER	20-DEC-2016 05:54:30 PM
		-	1474635067146	VOLATILITY	0	volatility	MRUSER	23-SEP-2016 06:50:56 PM
			1482234718343	Volatility_New	0	undefined	MRUSER	20-DEC-2016 05:51:23 PM
About Oracle Contact U:	Legal Notices Terms	s Of Use	Your Privacy Rights				Copyright 6	0 2015 Oracle and/or its affiliates. All rights reserve

Figure 48 Model Management Screen

- 4. Enter the Model Name and Model Description.
- 5. Select the model objective
- 6. Select the technique as Market Risk VaR Model.
- There are four available options Risk Measure Estimation Parameters, Volatility - Correlation Model, Back Test Parameter, and Portfolio Mapping. Follow the steps mentioned in the below section to specify the parameters defined in the options.
- 8. Click Save.

Note: You can edit and delete a Market Risk VaR Model. If you modify the following parameters while editing a Market Risk VaR Model, then it results in the model being saved as a new model.

Confidence Level

- Reporting Currency
- Horizon
- Risk Measure Estimation Method
- Variance-Covariance Method

If any additional parameters of the Market Risk VaR Model are edited, then it results in creation of a new version of the existing model.

10 Annexure A: Generating Download Specifications

Data Model for Market Risk Release 8.0.4.0.0 is available on customer request as an ERwin file. Download Specifications can be extracted from this model.

11 Annexure B: Including a Market Risk Model

Perform the below steps to include a Market Risk model in a run. Before performing the steps ensure that the model is already defined in Sandbox, and has been approved and deployed. For details on approval and deployment, see the OFS Enterprise Modelling User Guide on <u>OHC Documentation Library</u>.

- 1. Navigate to Manage MR Rule > Process.
- 2. Create a Process for the deployed model.

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A 🖾 Manage MR Rules	100	02 VAR	TRSEG	0	Yes
Rule	- 10	03 historical_var	TRSEG	0	Yes
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Run	12	382421 Equity Corporate Action	ns Data Population TRSEG	0	Yes
Managa Rup Execution	12	382421 Instruments Schedule [Data Population TRSEG	0	Yes
Reference Madelies Online	12	382422 Instruments Obligors D	ata Population TRSEG	0	Yes
Enterprise Modeling Option	12	382422 Commodity Future Cur	ve Population TRSEG	0	Yes
io Metadata Browser	12	382434 Interest Rate Mean Re-	version Estimation TRSEG	0	Yes
	12	382440 MR Incremental VaR E	stimation TRSEG	0	Yes
	12	385682 Pricing OTC Instrument	ts TRSEG	0	Yes
	12/	407570 Risk Factor Volatility Cr	orrelation Estimation TRSEG	0	Yes
	12/	407571 Market Risk VaR Estim	ation TRSEG	0	Yes
	<				>

- 3. Click the New button. The Process definition window is displayed.
- 4. Provide inputs in the fields Folder, Code, and Name.
- 5. Select the Type.

Note: Do not check the executable check box for MR application.

 Click the Component tab, to include the MR model in the process. The Component selector is displayed.

Oracle Financial Services Market Risk User Guide Release 8.0.4.0.0

		Process		
Market Risk > Ma	nage MR Rules > Process > Process De	finition(New Mode)		
» Linked to				
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 Select the required model to be included in the run. All the deployed models will be listed under the link Component > Model > Model.

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8. Click **Ok** to save the process.

 To include the created process in the run, navigate to Manage MR Rule > Run.

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 Create new Run similar to the Market Risk VaR Estimation sample run seeded in application. Alternatively you can create a copy of the existing Market Risk VaR Estimation Run and edit it.

Note: Do not edit the seeded run. It is a sample run installed in the MR application for reference.

- 11. Select the new Run and click Edit.
- 12. Select Job under Selector drop-down. The Component selector is displayed.

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- 13. Select the required process to be included in the run. All the processes will be listed under the link **Component** > **Processes**
- 14. Select the process and click **Ok**, to add process in the Run.

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Instruments Obligors Data Population					
	\sim				

- 15. After Process selection is complete, you can select the other required tasks in the run.
- 16. Click **Ok** to save the run.

12 Annexure C: Executing a MR Run/ Batch Execution

Perform the below steps to execute a MR run. Before performing the steps ensure that the Process is already defined. For details on approval and deployment, see the OFS Enterprise Modelling User Guide on <u>OHC Documentation Library</u>.

- 1. Navigate to Manage MR Rule > Run.
- 2. Select the Process for the deployed model.

Applications Sandbox Object Administration													
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🔺 📂 Market Risk				1238481522549		Obligors Data Population			Base Run	OFSTRSEG	0	Yes	
h hin Reference Data Management				1238481545454		Instruments Schedule Data Pop	ulation		Base Run	OFSTRSEG	0	Yes	
A Destation Management			•	1238481568027		MR Incremental VaR Estimation	1		Base Run	OFSTRSEG	0	Yes	
				1238481597437		MR VaR Data Preparation			Base Run	OFSTRSEG	0	Yes	
ta Incremental VaR				1238526006683		Interest Rate Mean Reversion E	stimatio	n	Base Run	OFSTRSEG	0	Yes	
Manage MR Rules				1238568322601		Pricing OTC Instruments			Base Run	OFSTRSEG	0	Yes	
Rule	4			1240757163772		Risk Factor Volatility Correlation	Estimat	ion	Rase Run	OESTRSEG	0	Ves	

- 3. Click Fire Run. The Fire Run window is displayed.
- 4. Specify if the request type is **Single** or **Multiple**.
- 5. In the Batch field, select **Create and Execute** from the drop-down list.
- 6. Provide a **MIS Date**.
- 7. Specify Yes or No, in the Wait field.
- 8. Click **OK**, to execute the batch.

13 Annexure D: Defining Stress Variables

MR application's back end engine VAR –value at risk and Volatility can be stressed using OFSAA stress modelling frame work. MR risk factors are stressed using Oracle Reveleus stress testing framework.

In the Market Risk requirement and design, the stress variable supports only based on Measure type of stress variables. OFS MR provides the capability to generate stress Volatility Model and VaR Model run for the bank's portfolios.

The process flow for Stress Testing is as follows:

- Step 1: Variable Definition Define the variables that need to be shocked during stress run
- Step 2: Variable Shock Define the type and extent to which the variables defined in Step 1 need to be shocked.
- Step 3: Scenario Define a Scenario by adding all the required variable shocks to the scenario
- Step 4: Stress Definition Map the scenario to the VaR/Volatility Model to create a Stress Run
- **Step 5:** Stress Run "Fire Run" the Stress Run from the **Run** Window

The bank can stress the following variables:

- Exchange Rate between Currencies
- Equity Price
- Index Price
- Interest Rate
- Commodity Price
- Volatility of Asset Class
- Correlation between Asset Classes

13.1 Defining a Variable

The process for defining a variable and assigning variable shocks for each of the below listed variables, is explained in this section. After defining the shocks you can add them to a scenario, which will be mapped to a Baseline Model to generate a Stress Run.

Exchange Rate between Currencies

- Equity Price
- Interest Rate
- Commodity Price
- Volatility of Asset Class
- Correlation between Asset Classes

13.1.1 Exchange Rate Between Currencies

Follow the below steps to define a variable, and assign shock for Exchange Rate Between Currencies:

- 1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select Financial Services Market Risk.
- To open the stress testing screen, Select Enterprise Modeling Option > Stress Testing on the Left-Hand Side (LHS) menu.
- 3. Click Add icon in the Variable Definition screen.

Applications	Sandbox C	bject Administration	System	Confi	guratio	n & Identity Managen	My Inbox					
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dia Po	ortfolio Manager	nent		a	ž 🗆	Variable ID	Variable Name 🔺	Variable Property	Based On	Created By	Creation Date	
ස්ථා Inc	cremental VaR					V1252995810267	Account Credit Limit Original	Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
🔺 🚺 Ma	anage MR Rule	•				V1252995987535	Account Delinquency in Previous Period	Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
100	Rule					V1252995188698	Account EOP Interest Amount	Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
<u> </u>	Process					V1252995291307	Account Minimum balance YTD	Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
23	Run					V1252994710280	Account Net Interest Income	Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
23	Manage Run E	xecution	+			V1252995533272	Account original Balance	Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
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N 191	Construction					V1252994933769	Age on Book	Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
	Sandbox Main	ienance				V1200679743561	Banking Book Equity Scenario Loss	Direct	Measure	SYSADMN	02-JUN-2009 08:02:03 PM	
	E rechnique Rei	listration				V1366223988120	Calendar Date	Direct	Measure	baselecuser	17-APR-2013 01:12:06 PM	
4 ¥	2 Stress Testing					V1202124464003	CART ID	Direct	Measure	SYSADMN	03-JUN-2009 10:59:54 AM	
	Variable SI	nock				V1251089028935	Cart1_Id	Direct	Measure	SYSADMN	24-AUG-2009 12:00:00 AM	
	Scenario					V1201072358220	CCF Percentage	Direct	Measure	SYSADMN	03-JUN-2009 02:12:53 PM	
_	😤 Stress Def	nition				V1356696003221	Consumer Price Index Change	Direct	Measure	baselecuser	28-DEC-2012 05:30:00 PM	
	a Variable Defi	nition				V1197616504944	Counterparty Annual Income	Direct	Measure	SYSADMN	02-JUN-2009 06:53:29 PM	
Me Me	etadata Browse		~			V1197548398848	Counterparty Bankruptcy Indicator	Dummy	Hierarchy	SYSADMN	03-JUN-2009 01:20:35 PM	~
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Figure 49 Variable Definition Screen

Variable Definition Add - Internet Explorer					×						
Market Risk > Enterprise Modeling O	ption > Variable Definition > Var	Variable	Definition								
> Variable Definition											
Folder	BIS	V									
Variable Name*	[Variable Description								
Variable Type*	Commodity Variable		Variable Structure*	Single Value							
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» Value											
Maturity Value*											
» Based On											
Based On*	Hierarchy	~	Variable Classification*	Numeric Variable							
» Hierarchy											
Variable Property*	Direct	~	Selected Hierarchy*	Number Of Accounts							
		Save	Cancel								

Figure 50 Variable Definition Screen

Folder	Select the Folder from the drop-down list, in which the Variable Definition is to be saved.
Variable Name	Provide the variable name.
Variable Description	Provide the variable description.
Variable Type	Select the Currency Variable from the drop-down list.
Variable Structure	Select Single Value.
Based On	Select Measures.
Variable Classification	Select Numeric Variable
Apply Filters	Select Yes .
Data Set	Select Exchange Rate Dataset from the drop-down list.
Selected Measures	Select MSR – MR Exchange Rate from the drop-down list
Filters	Click the edit button, and select CURRENCY1 and CURRENCY2 from the Hierarchy browser.
Currency1	Select Currency 1 under Filters. Click the edit button corresponding to Currency1, and select the required first currency.
Currency2	Select Currency 2 under Filters. Click the edit button corresponding to Currency2, and select the required second currency.

4. Define the exchange rate variables as below:

Variable Definition Add - Inter	net Explorer		
		Variable Definition	
Market Risk > Enterprise M	Modeling Option > Variable Definition > Variable Definition(New Mo	xde)	
» Variable Definition			
Folder	EPMSEGMENT		
'ariable Name*	FBN_MR_STRESS_FX_NGN-USD	Variable Description	
'ariable Type*	Currency Variable	Variable Structure*	Single Value
» Based On			
Based On*	Measures	Variable Classification*	Numeric Variable
» Maasura Filter			
Apply filters	●Yes (D No	
» Measures			
Dataset*	Exchange Rate Dataset	Selected Measures*	MSR - MR Exchange Rate
» Filters			1-2/2
Herarchy			
CURRENCY1			
CURRENCY4			
Nodes			2 1-1/1
Nigerian Naira			

Figure 51 Variable Definition Screen

5. Navigate to the Variable Shock screen.

Applications	Sandbox	Object Administration	System Co	onfigu	uratio	in & Identity Manageme	ent My Inbox					
Select Appli	ications		M	Marke	et Ris	ik > Enterprise Mode	eling Option > Stress Testing > V	ariable Shoc	k			
Financial Se	rvices Marke	t Risk	•					Variablo	Shock Library		2	
🔺 🗐 Comr	mon Object N	laintenance						Vallable	SHOCK EIDIALY			- 11
👼 D	ata Model Mr	lintenance		» (Sear	rch					R 🖻	
D	ata Manager	nent		Vari	iable	Shock Name						
) 🗏 (nified Analyti-	cal Metadata										
▶ 180	perations			× \	Varia	able Shock List	Veriable Charle Manage	Manalan	l Verlante		⇒1 - 20 / 31 () (D)	
🔺 🜌 Marke	et Risk			326 [님	Shock ID	Vanable Shock Name 🔺	Version		Created By	17-MAY-2018 02:30:22	2
▶ b ^b _B R ⁱ	eference Dat	a Management			Ц	1526555452217	FBN_MR_EQUITY_SHOCK_1	0	FBN_MR_EQUITY_PRICE_1	EPMFBN	PM 28 ## 2010 07:14:52	
do P	ortfolio Mana	gement		1		1280361953366	by 5%	ed 0	Frequency Correlation Value - Loss Data	SYSADMN	PM	
620 In	cremental Vr	R		1		1280361183267	Loss Data - Frequency Scale increased by	5% 0	Frequency Scale Parameter - Loss Data	SYSADMN	28-JUL-2010 07:02:03 PM	
) 🕅 M	lanage MR R	ules		ſ		1280360986761	Loss Data - Frequency Shape increased b 5%	^ψ 0	Frequency Shape Parameter - Loss Data	SYSADMN	28-JUL-2010 06:58:46 PM	
⊿ & EI	nterprise Mod	seling Option	*	1		1280361413984	Loss Data - Severity Scale increased by 54	% 0	Severity Scale Parameter - Loss Data	SYSADMN	28-JUL-2010 07:05:53 PM	
No. 10	Sandbox M	aintenance	Į	1		1280361367028	Loss Data - Severity Shape increased by 5	5% 0	Severity Shape Parameter - Loss Data	SYSADMN	28-JUL-2010 07:05:06 PM	
× 4 9	4 Technique I Stress Tes'	Registration ing)		1280362001267	Scenario data - Frequency Correlation increased by 5%	0	Frequency Correlation Value - Scenario Data	SYSADMN	28-JUL-2010 07:15:41 PM	
	Variab	e Shock		1		1280361467334	Scenario Data - Frequency Shape increase by 5%	ed 0	Frequency Shape Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:06:47 PM	
	Scenari Charas	0		1		1280361507355	Scenario Data - Frequency Shape increase by 5%	ed 0	Frequency Scale Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:07:27 PM	
	Variable D	Petinition		1		1280361606319	Scenario Data - Severity Scale increased t 5%	^{by} 0	Severity Scale Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:09:06 PM	
Бм	letadata Brov	ser		1		1280361558509	Scenario Data - Severity Shape increased 5%	by 0	Severity Shape Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:08:18 PM	
				1		1528706654891	TEST-CM-BRENT-CRUDE-SPOT2	0	TEST-BRENT_CRUDE_SPOT2	EPMFBN	11-JUN-2018 12:06:57 PM	~

Figure 52 Variable Definition Screen

6. Define the variable shock as follows:

Shock	Specify a Shock Name
Name	
Shock Description	Provide a description for the Shock.
Dataset	Select Exchange Rate Dataset from the drop-down list
Variable	Select the variable which needs to be shocked from under the Currency Variable > Numeric Variable.
Name	

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ls Formula Based	Select Yes.											
Time Hierarchy	Select MR – Time Hiera r	r chy for Time Hierarchy. This hierarc	hy determines the horizo	on of the shock.								
Shock Type	Shock Type selection has	s two options:										
	 Instantaneous 											
	Across Time											
	In you select Across Time	In you select Across Time, provide information in the fields:										
	- Shock in Reference to:	Select whether it is Current Value, or	Future Estimated Value	2								
	- Time Point: Select whet	her Custom or standard										
	- Number of Time Points:	Enter values for Time Points in Pas	st and Time Points in F	uture								
	- Shock Current Value: S	elect the check box and specify the t	time as Davs. Weeks. m	onths or Years and								
	click											
	The points will be consec	cutive values between "Time Points in	Past" to "Time Points ir	າ Future". The value								
	will be in "Days", "Weeks	", "Months" and "Years" depending or	n the value selected									
	In case of "Custom" optio	on selected in "Time Point". The point	s will be custom user sp	ecified values								
	between "Time Points in	Past" to "Time Points in Future"										
	» Time Specification											
	Time Hierarchy *	MR - Time Hierarchy	Shock Type	Across Time								
	Shock in Reference to	Current Value	Time Point	O Standard Custom								
	Number of Time Points * Time Points in Past 5 Time Points in Future 5 💟 Shock current Value											
	Time Point Values* 7 To- 6 To- 4 To- 3 To- 1 To+ 0 To+ 3 To+ 6 To+ 8 To+ 7											
Parameters	Shock Unit: Select one of	of the following:										
	 Percentage Shift 											
	 Absolute Shift 											
	 Absolute Value 											
	- Standard Deviation	. Ch:#										
	 Standard Deviation 											
	 Log Standard Devia 	ation Shift: If you select this option, s	pecify the Time Windo v	v Size.								
	Click 📫 button to add s	shock values as shown below.										

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Shock Unit	Absolute Shift			т	ime Window Size		
Shock Curve	Absolute Value Standard Deviation	Shift tion Shift					
	Time Points	uon onne]			Ŧ	
Shock Values *	To-7 Month	To-6 Month -10	To-4 Month -15	To-3 Month -20	To-1 Month	To+0 Month	To+3 M -50
	<						>

		Vari	able Shock Definition			
Market Risk > Enterprise Mod	eling Option > Stress Testing > Variable	Shock > Variable Shock	Definition(New Mode)			
» Shock Details						
				FBN_MP	SHOCK_FX_NGN-USD	
Shock Name *	FBN_MR_SHOCK_FX_NGN-USD		Shock Description			
)ataset *	Exchange Rate Dataset		Variable Name *	TEST-NO	3N-USD	
» Formula Based						
s Formula Based		⊙ Yes ○ No				
» Time Specification						
Time Hierarchy *	MR - Time Hierarchy		Shock Type	Instanta	neous 🔽	
shock in Reference to			Time Point	 Stational Stational Stationae Sta	andard 🖲 Custom	
lumber of Time Points *	Time Points in Past Ti	me Points in Future	Shock current Value		~	
îme Point Values *	To+	0				
» Filter Specification						0 - 0 / 0 🕅 🕅
L. Selected Dimensions						
Not Applicable						
» Parameters						
Shock Unit	Percentage Shift	~	Time Window Size			
Shock Curve						
	Time Points					1-1/1 🧃 🖉
Shock Values *	To+0 Day					
	-30					

Figure 53 Variable Shock Definition Screen

7. Save the Definition.

13.1.2 Equity Price

Follow the below steps to define a variable, and assign shock for Equity Price:

- 1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select Financial Services Market Risk.
- To open the stress testing screen, Select Enterprise Modeling Option > Stress Testing on the Left-Hand Side (LHS) menu.
- 3. Click Add icon in the Variable Definition screen.

Applications	Sandbox	Object Administration	System	Con	figurat	ion & Identity Manager	nent My Inbox						
Select Appli	cations				-lest 0	inte N. Contactoria Ma	deline Online X Mariable Definition						
Financial Ser	rvices Market i	Risk		ma	rkei k	ык 7 еттегризе мо	being Option 7 Variable Depinition						
-								Variable	Management			?	^
▶ 🔳 Ur	nified Analytica	ni Metadata	^										
► 🖾 O	perations				» Se	arch						B 21	
🔺 🙋 Marke	et Risk				Variab	le Name		1					
► 崎 Re	eference Data	Management			» Va	riable Management						□ = 1 - 20 / 207 (1 × 1)	
dia Po	ortfolio Manage	ement			2 F	Variable ID	Variable Name		Variable Property	Based On	Created By	Creation Date	
deb in	cremental VaR					V1252995810267	Account Credit Limit Original		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	_
🔺 🚺 M	anage MR Rul	es				V1252995987535	Account Delinguency in Previous Period		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
2	Rule					V1252995188698	Account EOP Interest Amount		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
1	Process					V1252995291307	Account Minimum balance YTD		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
22	Run					V1252994710280	Account Net Interest Income		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
20	Managa Run	Execution	-			V1252995533272	Account original Balance		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
1.0	manage Run	line Online				V1251090133509	Acct_Original_Loan_to_Value		Direct	Measure	SYSADMN	24-AUG-2009 12:00:00 AM	
	iterprise Mode	aing Option				V1252994933769	Age on Book		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
F 🖻	J Sandbox Ma	intenance				V1200679743561	Banking Book Equity Scenario Loss		Direct	Measure	SYSADMN	02-JUN-2009 08:02:03 PM	
22	Technique R	egistration				V1366223988120	Calendar Date		Direct	Measure	baselecuser	17-APR-2013 01:12:06 PM	
A 1	Stress Testin	D.				V1202124464003	CART ID		Direct	Measure	SYSADMN	03-JUN-2009 10:59:54 AM	
	💕 Variable	Shock				V1251089028935	Cart1_ld		Direct	Measure	SYSADMN	24-AUG-2009 12:00:00 AM	
	🔲 Scenario					V1201072358220	CCF Percentage		Direct	Measure	SYSADMN	03-JUN-2009 02:12:53 PM	
_	Stress De	efinition				V1356696003221	Consumer Price Index Change		Direct	Measure	baselecuser	28-DEC-2012 05:30:00 PM	
	Variable De	finition				V1197616504944	Counterparty Annual Income		Direct	Measure	SYSADMN	02-JUN-2009 06:53:29 PM	_
Ko M	etadata Brows	er	~			V1197548398848	Counterparty Bankruptcy Indicator		Dummy	Hierarchy	SYSADMN	03-JUN-2009 01:20:35 PM	~
						V1197611789413	Counternarty Current Assets		Direct	Measure	SYSADMN	03ILIN-2009 03:14:21 PM	

Figure 54 Variable Definition Screen

Variable Definition Add - Internet Explorer				-		×				
						5.				
		Variable	Definition							
Market Risk > Enterprise Modeling O	Market Risk > Enterprise Modeling Option > Variable Definition > Variable Definition(New Mode)									
» Variable Definition										
Folder	BIS	✓								
Variable Name*	1		Variable Description							
Variable Type*	Commodity Variable		Variable Structure*	Single Value						
» Single Maturity	> Single Maturity									
Maturity Unit*	Days	~	Maturity Type*	● Value ○ Node						
» Value										
Maturity Value*										
» Based On										
Based On*	Hierarchy	\checkmark	Variable Classification*	Numeric Variable						
» Hierarchy										
Variable Property*	Direct	~	Selected Hierarchy*	Number Of Accounts						
		Save	Cancel							

Figure 55 Variable Definition Screen

4. Define the equity variable as below:

Folder	Select the Folder from the drop-down list, in which the Variable Definition is to be saved.
Variable Name	Provide the variable name.
Variable Description	Provide the variable description.
Variable Type	Select Equity Variable from the drop-down list.
Variable Structure	Select Single Value.
Based On	Select Measures.
Variable	Select Numeric Variable
Classification	

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Apply Filters	Select Yes.	Select Yes.								
Data Set	Select Equity Dataset from the drop-down list.									
Selected	Select Equity Pr	Select Equity Price from the drop-down list								
Measures										
Filters	Click the edit button, and select Equity from the Hierarchy browser.									
Equity	Select Equity under Filters. Click the edit button corresponding to Equity, and select									
	the required Equ	ity.								
Market Risk > Enterprise Modeling G	⊃ption > Variable Definition > Vari	Variable iable Definition(New Mode)	Definition							
Folder	EPMSEGMENT	~								
Variable Name*	Equity Variable		Variable Description	Equity Variable Description						
Variable Type*	Equity Variable		Variable Structure*	Single Value]					
» Based On					-					
Based On*	Measures	×	Variable Classification*	Numeric Variable]					

L	Variable Type*	Equity Variable		Variable Structure*	Single Value	\checkmark
Ì	» Based On					
C	Based On*	Measures	v	Variable Classification*	Numeric Variable	\checkmark
	» Measure Filter					
Ì	Apply filters		●Yes ○No			
Ī	» Measures					
	Dataset*	Equity Dataset		Selected Measures*	Equity Price	
	» Filters					1-1/1 4 0 0
ŀ	Be Hierarchy					
	Equity					
	» Equity					1-1/1 4 0 0
	Honeywell Flour Mills plc					
ſ	» Variable Transformation					

Figure 56 Variable Definition Screen

5. Navigate to the **Variable Shock** screen.

Applications Sandbox Object Administration System Confi	iguratio	n & Identity Managerr	My Inbox					
Select Applications Man	ket Ris	k > Enterprise Mod	leling Option > Stress Testing > Varia	ble Shoc	k			
Financial Services Market Risk 🔻					Charle Liberry			
4 🏝 Common Object Maintenance			V	iriabie	Shock Library		- v	
Data Model Maintenance	• Sear	rch					R 🛛	
Data Management	/ariable	Shock Name						
Unified Analytical Metadata	hylical Metadata							
Operations	▶ 18 Operations >> Variable Shock List Unitship Charles Name >> Variable Shock List							
Karket Risk Created by C								
Eggeterence Data Management T22050452217 FBN_MME_EQUITY_SHOCK_1 U FBN_MME_EQUITY_SHCCE_1 EPM/FBN PM T22050452217 FBN_MME_EQUITY_SHCCE_1 FBN_MME_EQUITY_SHCEE_1 EPM/FBN T22050452217 FBN_MME_EQUITY_SHCEE_1 EPM/FBN_MME_EQUITY_SHCEE_1 EPM/FBN_MME_EQUITY_SHCEE_1 EPM/FBN_MME_EQUITY_SHCEE_1 EPM/FBN_MME_EQUITY_SHCEE_1 EPM/FBN_MME_EQUITY_SHCEE_1 EPM/FBN_ME_EQUITY_SHCEE_1 EPM/FBN_ME_EQUITY_SHCEE_1 EPM/FBN_ME_EQUITY_SHCEE_1 EPM/FBN_ME_EQUITY_SHCEE_1 EPM/FBN_ME_EQUITY_SHCEE_1 EPM/FBN_ME_EQUITY_SHCEE_1 EPM/FBN_FBN_ME_EQUITY_SHCEE_1 EPM/FBN_FBN_ME_EQUITY_SHCEE_1 EPM/FBN_FBN_ME_EQUITY_SHCEE_1 EPM/FBN_FBN_FBN_FBN_FBN_FBN_FBN_FBN_FBN_FBN_					PM 28-IIII-2010-07:14:53			
do Portfolio Management		1280361953366	by 5%	0	Frequency Correlation Value - Loss Data	SYSADMN	PM	
Dincremental VaR		1280361183267	Loss Data - Frequency Scale increased by 5%	0	Frequency Scale Parameter - Loss Data	SYSADMN	28-JUL-2010 07:02:03 PM	
Manage MR Rules		1280360986761	Loss Data - Frequency Shape increased by 5%	0	Frequency Shape Parameter - Loss Data	SYSADMN	28-JUL-2010 06:58:46 PM	
A SEnterprise Modeling Option		1280361413984	Loss Data - Severity Scale increased by 5%	0	Severity Scale Parameter - Loss Data	SYSADMN	28-JUL-2010 07:05:53 PM	
Sandbox Maintenance		1280361367028	Loss Data - Severity Shape increased by 5%	0	Severity Shape Parameter - Loss Data	SYSADMN	28-JUL-2010 07:05:06 PM	
Stress Testing		1280362001267	Scenario data - Frequency Correlation increased by 5%	0	Frequency Correlation Value - Scenario Data	SYSADMN	28-JUL-2010 07:15:41 PM	
Variable Shock		1280361467334	Scenario Data - Frequency Shape increased by 5%	0	Frequency Shape Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:06:47 PM	
Scenario		1280361507355	Scenario Data - Frequency Shape increased by 5%	0	Frequency Scale Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:07:27 PM	
Variable Definition		1280361606319	Scenario Data - Severity Scale increased by 5%	0	Severity Scale Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:09:06 PM	
Metadata Browser		1280361558509	Scenario Data - Severity Shape increased by 5%	0	Severity Shape Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:08:18 PM	
······································		1528706654891	TEST-CM-BRENT-CRUDE-SPOT2	0	TEST-BRENT_CRUDE_SPOT2	EPMFBN	11-JUN-2018 12:06:57 PM	~

Figure 57 Variable Definition Screen

6. Define the variable shock as follows:

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Shock Name	Specify a Shock Name						
Shock Description	Provide a description fo	r the Shock.					
Dataset	Select Equity Dataset	from the drop-down list					
Variable Name	Select the variable whic	h needs to be shocked from und	ler the Equity Variable > Nu	meric Variable.			
Is Formula Based	Select Yes .						
Time Specification	Select MR – Time Hier	archy. This hierarchy determines	s the horizon of the shock.				
Shock Type	Shock Type selection h	as two options:					
	 Instantaneous 						
	Across Time						
	In you select Across Time, provide information in the fields:						
	- Shock in Reference to	: Select whether it is Current Val	ue. or Future Estimated Valu	le			
	- Time Point: Select whe	ether Custom or standard					
	- Number of Time Point	s: Enter values for Time Points i	in Past and Time Points in	Future			
	Shock Current Value	Soloot the aback have and anasif	in the time of Dove Weeks				
	- Shock Current Value.	e point values	y the time as Days, weeks, i	months of rears, and			
	- Time Point Values: Sn	e point values.	select the Standard option	the points will be			
	consecutive values betw	ween Time Points in Past to Tin	ne Points in Future. The va	lue will be in Days ,			
	Weeks, Months and Ye	ears depending on the selection.		•			
	If you select Custom , th	ne points will be custom user spe	cified values between Time	Points in Past to			
	Time Points in Future.						
	» Time Specification	MR - Time Hierarchy	Shock Type	Across Time			
	Shock in Reference to	Current Value	Time Point	Standard Custom			
	Number of Time Points *	Time Points in Past 5 Time Points in Future 5	Shock current Value	Months 🔽 🛋			
	Time Point Values *	7 To- 6 To- 4 To- 3 To- 1 T	To+ 0 To+ 3 To+ 6 To+ 8	To+			
Parameters	Shock Unit: Select one	of the following:					
	 Percentage Shift 						
	 Absolute Shift 						
	Absolute Value						

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 Log Standard Click ⇒ button to 	d Deviation Shift: If you add shock values as s	select thi	s option, spe	cify the Ti i	ne Windo	w Size.
» Parameters			1			
Shock Unit	Absolute Shift				Time Window Size	
Shock Curve	Absolute Value Standard Deviation Sh	ift Shift				
	Time Points	1 Jun]			Ŧ
Shock Values *	To-7 Month	To-6 Month -10	To-4 Month	To-3 Month	To-1 Month	To+0 Month

Variable Shock Definition Add - I	nternet Explorer		-		
	Va	ariable Shock Definition			
Market Risk > Enterprise Mo	deling Option > Stress Testing > Variable Shock > Variable Shoc	ck Definition(New Mode)			
» Shock Details					
Shock Name *	Equity Shock	Shock Description	Equity Shock Description		
Dataset *	Equity Dataset	Variable Name *	TEST-HONEYFLOUR		
» Formula Based					
Is Formula Based	⊙ Yes ○ N	10			
» Time Specification					
Time Hierarchy *	MR - Time Hierarchy	Shock Type	Across Time		
Shock in Reference to	Current Value	Time Point	Standard O Custom		
Number of Time Points *	Time Points in Past 2 Time Points in Future 2	Shock current Value	current Value Monthly V		
Time Point Values *	To- 2 To- 1 To+ 0 To+ 1 T	io+ 2			
» Filter Specification			0 - 0 / 0		
🚵 Selected Dimensions					
Not Applicable					
» Parameters					
Shock Unit	Percentage Shift	Time Window Size			
Shock Curve					
Shock Values *	Time Points To-2 Month To-1 Month To+0 Month -50 -50 -50	To+1 Month To+2 Month -50 -50	e 1-4/4 d		

Figure 58 Variable Shock Definition Screen

7. Save the Definition.

13.1.3 Interest Rate

Follow the below steps to define a variable, and assign shock for Interest Rate:

- 1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select Financial Services Market Risk.
- To open the stress testing screen, Select Enterprise Modeling Option > Stress Testing on the Left-Hand Side (LHS) menu.

- Applications Sandbox Object Administration System Configuration & Identity Management My Inbox Select Applications Market Risk > Enterprise Modelina Option > Variable Definition * Financial Services Market Risk Variable Management ? 🕨 📕 Unified Analytical Metadata ~ <u>s</u> 🗈 » Search Operations Variable Name 🔺 🙋 Market Risk
 Variable Management
 Image: Comparing Status

 > Variable Management
 Variable Name ▲
 Variable Management
 Cariable Management

 | Variable Management
 Variable Name ▲
 Variable Management
 Direct
 Measure
 SYSADMN

 | V1252955810896
 Account Credit Limit Original
 Direct
 Measure
 SYSADMN

 | V1252955810896
 Account Ordingment
 Direct
 Measure
 SYSADMN

 | V125295531327
 Account Ordingment
 Direct
 Measure
 SYSADMN

 | V1252945531327
 Account original Balance
 Direct
 Measure
 SYSADMN

 | V125294533327
 Account original Balance
 Direct
 Measure
 SYSADMN

 | V125294533327
 Account original Stature
 Direct
 Measure
 SYSADMN

 | V12509433769
 Accit Original_Lion_Lionus
 Direct
 Measure
 SYSADMN

 | V12509293120
 Cachedre Date
 Direct
 Measure
 SYSADMN

 | V12601238208
 Cort Precentage
 Direct
 Measure
 SYSADMN

 | V126012328202
 Cort Precentage
 Direc Reference Data Management 📑 🖂 📾 🗃 🕴 🗮 1 - 20 / 207 🖉 🖓 D D nortfolio Management Creation Date 15-SEP-2009 12:00:00 AM 15-SEP-2009 12:00:00 AM Concremental VaR Manage MR Rules Rule 15-SEP-2009 12:00:00 AM 15-SEP-2009 12:00:00 AM Process Run 15-SEP-2009 12:00:00 AM 환 Run 행 Manage Run Execution Enterprise Modeling Option 15-SEP-2009 12:00:00 AM 24-AUG-2009 12:00:00 AM A CEnterprise Modeling Option 15-SEP-2009 12:00:00 AM Sandbox Maintenance 02-JUN-2009 08:02:03 PM Registration 17-APR-2013 01:12:06 PM 03-JUN-2009 10:59:54 AM Stress Testing 💕 Variable Shock 24-AUG-2009 12:00:00 AM Scenario 03-JUN-2009 02:12:53 PM 28-DEC-2012 05:30:00 PM 🔮 Stress Definitio 02-JUN-2009 06:53:29 PM Cariable Definition V1197548398848 Counterparty Bankruptcy Indicator U Dummy Hierarchy SYSADMN 03-JUN-2009 01:20:35 PM YSADMN 197611789413 03-.ILIN-2009 03:14:21 F
- 3. Click Add icon in the Variable Definition screen.

Figure 59 Variable Definition Screen

Variable Definition Add - Intern	net Explorer				>					
			Variable Definition							
Market Risk > Enterprise M	arket Risk > Enterprise Modeling Option > Variable Definition > Variable Definition(New Mode)									
» Variable Definition										
Folder	BIS	~								
Variable Name*	[Variable Description							
Variable Type*	Commodity Variable	✓ 🗈	Variable Structure*	Single Value						
» Single Maturity										
Maturity Unit*	Days	~	Maturity Type*	Value Node						
» Value										
Maturity Value*										
» Based On										
Based On*	Hierarchy	~	Variable Classification*	Numeric Variable						
» Hierarchy										
Variable Property*	Direct	~	Selected Hierarchy*	Number Of Accounts						

Figure 60 Variable Definition Screen

4. Define the exchange rate variables as below:

Folder	Select the Folder from the drop-down list, in which the Variable Definition is to be saved.
Variable Name	Provide the variable name.
Variable Description	Provide the variable description.
Variable Type	Select Interest Rate Variable from the drop-down list.
Variable Structure	Select Single Value.
Maturity Unit	Select one of the following:
	 Days

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	Months
	Quarters
	Years
Maturity Type	Select Node
Selected	Select Standard Time Vertices from the list.
Hierarchy	
Selected Node	Select one of the time vertex points.
Based On	Select Measures.
Variable	Select Numeric Variable
Classification	
Apply Filters	Select Yes.
Data Set	Select Interest Rate Dataset from the drop-down list.
Selected	Select Interest Rate from the drop-down list
Measures	
Filters	Click the edit button, and select Interest Rate Asset Class, Currency Asset and
	Standard Time Vertices from the Hierarchy browser.
Interest Rate	Select Interest Rate Asset Class under Filters. Click the edit button corresponding to
Asset Class	Interest Rate Asset Class, and select the required Interest Rate.
Currency Asset	Select Currency Asset under Filters. Click the edit button corresponding to Currency
	Asset, and select the required Currency Asset.
Standard Time	Select Standard Time Vertices under Eilters. Click the edit button corresponding to
Vertices	Standard Time Vertices, and select the required Standard Time Vertices.

		V	ariable Definition	
Market Risk > Enterprise Modeling	Option > Variable Definition >	Variable Definition(New Mode)		
» Variable Definition				
Folder	EPMSEGMENT	\checkmark		
Variable Name*	Interest Rate		Variable Description	Interest Rate Description
Variable Type*	Interest Rate Variable		Variable Structure*	Single Value
» Single Maturity				
Maturity Unit*	Months	~	Maturity Type*	🔿 Value 🖲 Node
» Node Selection				
Selected Hierarchy*	Standard Time Vertices		Selected Node*	3 Month
» Based On				
Based On*	Measures		Variable Classification*	Numeric Variable
» Measure Filter				
Apply filters		● Yes ○ No		
» Measures				
Dataset*	Interest Rate Dataset		Selected Measures*	Interest Rate
» Filters				1 - 3 / 3 🖑 🔄
Hierarchy				
Interest Rate Asset Class				
Currency Asset Standard Time Vertices				
Olandard Thile Voltage				
» Standard Time Vertices				1.1/1 🖉 🚺

Figure 61 Variable Definition Screen

5. Navigate to the Variable Shock screen.

Applications	Sandbox	Object Administration	System	Con	figuratio	on & Identity Manager	nent My Inbox					
Select App	lications			Ма	rket Ri	sk 🗲 Enterprise Mo	deling Option > Stress Testing > Var	able Shoc	*			
Financial S	ervices Marke	t Risk						ariable	Shook Library		2	
🔺 🗐 Con	mon Object M	faintenance						allable	SHOCK LIDIALY			- 11
B	Data Model M	aintenance			» Sea	rch					R 🖸	
► 🕮 I	Data Manager	nent		,	Variable	Shock Name						
▶ ≣	Jnified Analyti	cal Metadata								-		
+ 🔞	Operations				» Vari	able Shock List			, I <mark>L</mark>		⊋1 - 20 / 31 (1) (1)	2
4 5 Mar	kot Diek			é	西 🗆	Shock ID	Variable Shock Name	Version	Variable	Created By	Creation Date	
- E Mar	Deferrer Del					1526555452217	FBN_MR_EQUITY_SHOCK_1	0	FBN_MR_EQUITY_PRICE_1	EPMFBN	17-MAY-2018 02:30:22 PM	2
	Portfolio Mana	a management				1280361953366	Loss Data - Frequency Correlation increased by 5%	0	Frequency Correlation Value - Loss Data	SYSADMN	28-JUL-2010 07:14:53 PM	
6 31	ncremental V	aR				1280361183267	Loss Data - Frequency Scale increased by 5	6 0	Frequency Scale Parameter - Loss Data	SYSADMN	28-JUL-2010 07:02:03 PM	
+ 🗗 I	Manage MR R	ules				1280360986761	Loss Data - Frequency Shape increased by 5%	0	Frequency Shape Parameter - Loss Data	SYSADMN	28-JUL-2010 06:58:46 PM	
⊿ &	Enterprise Mo	deling Option				1280361413984	Loss Data - Severity Scale increased by 5%	0	Severity Scale Parameter - Loss Data	SYSADMN	28-JUL-2010 07:05:53 PM	
►	Sandbox N	laintenance				1280361367028	Loss Data - Severity Shape increased by 5%	0	Severity Shape Parameter - Loss Data	SYSADMN	28-JUL-2010 07:05:06 PM	
	Stress Tes	ting				1280362001267	Scenario data - Frequency Correlation increased by 5%	0	Frequency Correlation Value - Scenario Data	SYSADMN	28-JUL-2010 07:15:41 PM	
	🕼 Variab	le Shock				1280361467334	Scenario Data - Frequency Shape increased by 5%	0	Frequency Shape Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:06:47 PM	
	Scenar	io Defenition				1280361507355	Scenario Data - Frequency Shape increased by 5%	0	Frequency Scale Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:07:27 PM	
	→ stress	efinition				1280361606319	Scenario Data - Severity Scale increased by 5%	0	Severity Scale Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:09:06 PM	
100	Aetadata Brov	vser				1280361558509	Scenario Data - Severity Shape increased by 5%	0	Severity Shape Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:08:18 PM	
						1528706654891	TEST-CM-BRENT-CRUDE-SPOT2	0	TEST-BRENT_CRUDE_SPOT2	EPMFBN	11-JUN-2018 12:06:57 PM	~
											40.00010040.00.00.00.0	

Figure 62 Variable Definition Screen

6. Define the variable shock as follows:

Shock	Specify a Shock Name
Name	
Shock Description	Provide a description for the Shock.
Dataset	Select Interest Rate Dataset from the drop-down list

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Variable Name	Select the variable which needs to be shocked from under the Interest Rate Variable > Numeric Variable.							
Is Formula Based	Select Yes .	Select Yes.						
Time Specification	Select MR – Time Hiera	Select MR – Time Hierarchy . This hierarchy determines the horizon of the shock.						
Shock Type	 Shock Type selection has two options: Instantaneous Across Time In you select Across Time, provide information in the fields: Shock in Reference to: Select whether it is Current Value, or Future Estimated Value Time Point: Select whether Custom or standard Number of Time Points: Enter values for Time Points in Past and Time Points in Future Shock Current Value: Select the check box, and specify the time as Days, Weeks, months or Years, and click at to load the time point values. Time Point Values: Specify the time point values. If you select the Standard option, the points will be consecutive values between Time Points in Past to Time Points in Future. The value will be in Days, Weeks, Months and Years depending on the selection. 							
	Time Points in Future.							
	Time Hierarchy *	MR - Time Hierarchy	Shock Type	Across Time				
	Shock in Reference to	Current Value	Time Point	○ Standard				
	Number of Time Points *	Time Points in Past 5 Time Points in Future 5 🖌 Shock cu	irrent Value	Months 🔽 📫				
	Time Point Values *	7 To- 6 To- 4 To- 3 To- 1 To+ 0	To+ 3 To+ 6 To+ 8 T	To+ [
Parameters	Shock Unit: Select one	of the following:						
	 Percentage Shift 							
	 Absolute Shift 							
	Absolute Value							
	 Standard Deviation 	on Shift						
	 Log Standard Dev 	viation Shift: If you select this option, s	pecify the Time Windo	w Size.				
	Click 📫 button to add	shock values as shown below.						

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Shock Unit	Absolute Shift			Tim	e Window Size		
Shock Curve	Absolute Shine Absolute Value Standard Deviation	Shift			o mildott oleo		
	Log Standard Devia Time Points	tion Shift				4	
Shock Values *	To-7 Month -20	To-6 Month -10	To-4 Month -15	To-3 Month -20	To-1 Month	To+0 Month	To+3 M -50
	<						>

variable shock Definition Add - In	ternet Explorer				
	Variable	Shock Definition			
Market Risk > Enterprise Mod	eling Option > Stress Testing > Variable Shock > Variable Shock Definiti	ion(New Mode)			
» Shock Details					
Shock Name *	Interest Rate Shock	Shock Description	Interest Rate Shock Description		
Dataset *	Interest Rate Dataset	Variable Name *	TEST-IR-SPOT-NGN-Z		
» Formula Based					
Is Formula Based	⊙ Yes ⊖ No				
» Time Specification					
Time Hierarchy *	MR - Time Hierarchy	Shock Type	Across Time		
Shock in Reference to	Current Value	Time Point	Standard O Custom		
Number of Time Points *	Time Points in Past 2 Time Points in Future 2 🖌 Shock	current Value	Monthly 🗸 🛋		
Time Point Values *	To- 2 To- 1 To+ 0 To+ 1 To+	2			
» Filter Specification					
Selected Dimensions					
Not Applicable					
» Parameters					
Shock Unit	Percentage Shift	Time Window Size			
Shock Curve					
Shock Values *	Time Points To-2 Month To-1 Month To+0 Month To+1 Month 50 50 50 50	To+2 Month F 50 50	4-474 (d. d.). (b. (b.		

Figure 63 Variable Shock Definition Screen

7. Save the Definition.

13.1.4 Commodity Price

Follow the below steps to define a variable, and assign shock for Commodity Price:

- 1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select Financial Services Market Risk.
- To open the stress testing screen, Select Enterprise Modeling Option > Stress Testing on the Left-Hand Side (LHS) menu.
- 3. Click Add icon in the Variable Definition screen.

Applications	Sandbox	Object Administration	System	Con	figurat	ion & Identity Manager	nent My Inbox						
Select Appli	cations				-lest 0	inte N. Contactoria Ma	deline Online X Mariable Definition						
Financial Ser	rvices Market i	Risk		ma	rkei k	ык 7 ептегриве мо	being Option 7 Variable Depinition						
-								Variable	Management			?	^
Image: Market	nified Analytica	ni Metadata	^										
► 🖾 O	perations				» Se	arch						B 21	
🔺 🙋 Marke	et Risk				Variab	le Name		1					
► 崎 Re	eference Data	Management			» Va	riable Management						□ = 1 - 20 / 207 (1 × 1)	
dia Po	ortfolio Manage	ement			2 F	Variable ID	Variable Name		Variable Property	Based On	Created By	Creation Date	
🔂 In	cremental VaR					V1252995810267	Account Credit Limit Original		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	_
🔺 🚺 M	anage MR Rul	es				V1252995987535	Account Delinguency in Previous Period		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
2	Rule					V1252995188698	Account EOP Interest Amount		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
1	Process					V1252995291307	Account Minimum balance YTD		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
22	Run					V1252994710280	Account Net Interest Income		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
20	Managa Run	Execution	-			V1252995533272	Account original Balance		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
1.0	manage Run	Personal Contract				V1251090133509	Acct_Original_Loan_to_Value		Direct	Measure	SYSADMN	24-AUG-2009 12:00:00 AM	
	iterprise Mode	aing Option				V1252994933769	Age on Book		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
F 🖻	J Sandbox Ma	intenance				V1200679743561	Banking Book Equity Scenario Loss		Direct	Measure	SYSADMN	02-JUN-2009 08:02:03 PM	
22	Technique R	egistration				V1366223988120	Calendar Date		Direct	Measure	baselecuser	17-APR-2013 01:12:06 PM	
A 1	Stress Testin	D.				V1202124464003	CART ID		Direct	Measure	SYSADMN	03-JUN-2009 10:59:54 AM	
	💕 Variable	Shock				V1251089028935	Cart1_ld		Direct	Measure	SYSADMN	24-AUG-2009 12:00:00 AM	
	🔲 Scenario					V1201072358220	CCF Percentage		Direct	Measure	SYSADMN	03-JUN-2009 02:12:53 PM	
_	Stress De	efinition				V1356696003221	Consumer Price Index Change		Direct	Measure	baselecuser	28-DEC-2012 05:30:00 PM	
	Variable De	finition				V1197616504944	Counterparty Annual Income		Direct	Measure	SYSADMN	02-JUN-2009 06:53:29 PM	_
Ko M	etadata Brows	er	~			V1197548398848	Counterparty Bankruptcy Indicator		Dummy	Hierarchy	SYSADMN	03-JUN-2009 01:20:35 PM	~
						V1197611789413	Counternarty Current Assets		Direct	Measure	SYSADMN	03ILIN-2009 03:14:21 PM	

Figure 64 Variable Definition Screen

🦉 Varia	🖻 Variable Definition Add - Internet Explorer — 🗆 🗙									
	Variable Definition									
Marl	Market Risk > Enterprise Modeling Option > Variable Definition > Variable Definition(New Mode)									
» V	ariable Definition									
Folde	r	BIS	~							
Varia	ible Name*	I		Variable Description						
Varia	ible Type*	Commodity Variable		Variable Structure*	Single Value	\checkmark				
» s	ingle Maturity									
Matur	rity Unit*	Days	~	Maturity Type*	● Value ○ Node					
» V	alue									
Matur	rity Value*									
» B	ased On									
Base	d On*	Hierarchy	~	Variable Classification*	Numeric Variable	\checkmark				
» H	ierarchy									
Varia	ble Property*	Direct	~	Selected Hierarchy*	Number Of Accounts	~				
			Save	Cancel						

Figure 65 Variable Definition Screen

4. Define the exchange rate variables as below:

Folder	Select the Folder from the drop-down list, in which the Variable Definition is to be saved.
Variable Name	Provide the variable name.
Variable Description	Provide the variable description.
Variable Type	Select Commodity Variable from the drop-down list.
Variable Structure	Select Single Value.
Maturity Unit	Select one of the following:
	 Days
	 Months

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	Quarters				
	Years				
Maturity Type	Select Node				
Selected	Select Standard Time Vertices from the list.				
Hierarchy					
Selected Node	Select one of the time vertex points.				
Based On	Select Measures.				
Variable	Select Numeric Variable				
Classification					
Apply Filters	Select Yes .				
Data Set	Select Commodity Dataset from the drop-down list.				
Selected	Select Commodity Price from the drop-down list				
Measures					
Filters	Click the edit button, and select Commodity Asset and Standard Time Vertices from				
	the Hierarchy browser.				
Commodity	Select Commodity Asset under Eiltere. Click the edit butten corresponding to				
Commonly	Select Commonly Asset under Finers. Click the earl batton corresponding to				
Asset	Commodity Asset, and select the required Commodity Asset.				
Standard Time	Select Standard Time Vertices under Filters. Click the edit button corresponding to				
Vertices	Standard Time Vertices, and select the required Standard Time Vertices.				
		Variable	Definition		
-------------------------------	--	----------------------	--------------------------	--------------------------------	-------------------
Market Risk > Enterprise Mode	ling Option > Variable Definition > Variable	Definition(New Mode)			
» Variable Definition					
Folder	EPMSEGMENT				
Variable Name*	Commodity Variable		Variable Description	Commodity Variable Description	
Variable Type*	Commodity Variable	2	Variable Structure*	Single Value	
» Single Maturity					
Maturity Unit*	Months		Maturity Type*	🔘 Value 💿 Node	
» Node Selection					
Selected Hierarchy*	Standard Time Vertices		Selected Node*	3 Month	
» Based On					
Based On*	Measures		Variable Classification*	Numeric Variable	
» Measure Filter					
Apply filters		● Yes ○ No			
» Measures					
Dataset*	Commodity Dataset		Selected Measures*	Commodity Price	2
» Filters					1-2/2 4 4 5 15
💑 Hierarchy					
Commodity Asset					
Standard Time Vertices					
» Commodity Asset					1-1/1 বা বা চা চা
💑 Nodes					
Brent Crude					

Figure 66 Variable Definition Screen

J. Navigale to the variable officer server	reen.	Shock	Variable	Navigate to the	5.
--	-------	-------	----------	-----------------	----

Applications	Sandbox	Object Administration	System	Configu	uratio	n & Identity Managem	ent My Inbox					
Select Appli	cations			Marke	et Ris	k > Enterprise Mod	leling Option > Stress Testing > Va	iable Shoc	k			
Financial Se	rvices Market	Risk										1.
4 🛱 Comr	non Obiect M	aintenance						/ariable	Shock Library		?	_
👼 Di	ata Model Ma	intenance		*	Sear	ch					6	
Data Management			Var	riable	able Shock Name							
) 🗄 🗉 U	nified Analytic	al Metadata								_		
▶ 180	perations			»	Vari	able Shock List		Lu.	Les 2.25		〒1 - 20 / 31 십 4 ▶	4
🔺 🚾 Marke	at Risk			35	Ц	Shock ID	Variable Shock Name	Version	Variable	Created By	Creation Date	_
► bas	eference Data	Management				1526555452217	FBN_MR_EQUITY_SHOCK_1	0	FBN_MR_EQUITY_PRICE_1	EPMFBN	PM	
do Pr	ortfolio Manai	ement				1280361953366	Loss Data - Frequency Correlation increases by 5%	0	Frequency Correlation Value - Loss Data	SYSADMN	28-JUL-2010 07:14:53 PM	
🔂 in	cremental Va	R				1280361183267	Loss Data - Frequency Scale increased by 5	% 0	Frequency Scale Parameter - Loss Data	SYSADMN	28-JUL-2010 07:02:03 PM	
) 🕅 M	anage MR Ri	les				1280360986761	Loss Data - Frequency Shape increased by 5%	0	Frequency Shape Parameter - Loss Data	SYSADMN	28-JUL-2010 06:58:46 PM	
4 🗞 EI	nterprise Mod	eling Option				1280361413984	Loss Data - Severity Scale increased by 5%	0	Severity Scale Parameter - Loss Data	SYSADMN	28-JUL-2010 07:05:53 PM	
► 🖻	Sandbox M	aintenance	U.			1280361367028	Loss Data - Severity Shape increased by 59	0	Severity Shape Parameter - Loss Data	SYSADMN	28-JUL-2010 07:05:06 PM	
2 ⊾	Stress Test	Registration				1280362001267	Scenario data - Frequency Correlation increased by 5%	0	Frequency Correlation Value - Scenario Data	SYSADMN	28-JUL-2010 07:15:41 PM	
	Variabl	Shock				1280361467334	Scenario Data - Frequency Shape increased by 5%	0	Frequency Shape Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:06:47 PM	
	Scenari	ofinition				1280361507355	Scenario Data - Frequency Shape increased by 5%	0	Frequency Scale Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:07:27 PM	
	Variable De	finition				1280361606319	Scenario Data - Severity Scale increased by 5%	0	Severity Scale Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:09:06 PM	
ы	etadata Brow	ser				1280361558509	Scenario Data - Severity Shape increased b 5%	0	Severity Shape Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:08:18 PM	
						1528706654891	TEST-CM-BRENT-CRUDE-SPOT2	0	TEST-BRENT_CRUDE_SPOT2	EPMFBN	11-JUN-2018 12:06:57 PM	~

Figure 67 Variable Definition Screen

6. Define the variable shock as follows:

Shock	Specify a Shock Name
Name	
Shock	Provide a description for the Shock.
Description	
Dataset	Select Commodity Dataset from the drop-down list
Variable	Select the variable which needs to be shocked from under the Commodity Variable > Numeric Variable .
Name	

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Is Formula Based	Select Yes .								
Time Specification	Select MR – Time Hier	archy. This hierarchy determines the h	norizon of the shock.						
Shock Type	Shock Type selection h	as two options:							
	 Instantaneous 								
	 Across Time 	Across Time							
	In you select Across Tir	In you select Across Time, provide information in the fields:							
	- Shock in Reference to: Select whether it is Current Value, or Future Estimated Value								
	- Time Point: Select whether Custom or standard								
	- Number of Time Points: Enter values for Time Points in Past and Time Points in Future								
	- Shock Current Value: Select the check box, and specify the time as Days, Weeks, months or Years, and								
	click reprint the time point values.								
	- Time Point Values: Specify the time point values. If you select the Standard option, the points will be								
	consecutive values between Time Points in Past to Time Points in Future. The value will be in Days,								
	Weeks, Months and Ye	Weeks, Months and Years depending on the selection.							
	If you select Custom, the	ne points will be custom user specified	values between Time F	'oints in Past to					
	Time Points in Future								
	» Time Specification	MD Time Hierarchy	Charle Turne	Annual Trans					
	Shock in Deference to		Time Deint	Across Time					
	Number of Time Points *	Time Points in Past 5 Time Points in Future 5 D Shock of	Interform	Months V					
	Time Point Values *	7 To- 6 To- 4 To- 3 To- 1 To+ 0	To+ 3 To+ 6 To+ 8 T	0+ C					
Doromotoro	Shack Unit: Salast and	of the following:							
Parameters	Shock Unit. Select one	or the following.							
	 Percentage Shift 								
	 Absolute Shift 								
	 Absolute Value 								
	 Standard Deviation 	on Shift							
	 Log Standard De 	viation Shift: If you select this option, s	pecify the Time Windo v	v Size.					
	Click 📫 button to add	I shock values as shown below.							

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Shock Unit	Absolute Shift			Ті	me Window Size		
Shock Curve	Absolute Value Standard Deviation Log Standard Devia	Shift tion Shift					
	Time Points		1			Ŧ	
Shock Values *	To-7 Month	To-6 Month	To-4 Month -15	To-3 Month	To-1 Month	To+0 Month	To+ -50
	<						2

	Vari	able Shock Definition		
Market Risk > Enterprise Modeli	ng Option > Stress Testing > Variable Shock > Variable Shock	Definition(New Mode)		
» Shock Details				
			Commodity Variable Shock Description	
Shock Name *	Commodity Variable Shock	Shock Description		
Dataset *	Commodity Dataset	Variable Name *	TEST-BRENT_CRUDE_SPOT	
» Formula Based				
is Formula Based	●Yes ○No			
» Time Specification				
Time Hierarchy *	MR - Time Hierarchy	Shock Type	Across Time	
Shock in Reference to	Current Value	Time Point	Standard O Custom	
Number of Time Points *	Time Points in Past 2 Time Points in Future 2	Shock current Value	Monthly V	
Time Point Values *	To- 2 To- 1 To+ 0 To+ 1 To+	2		
» Filter Specification			0 - 0 / 0	
Selected Dimensions				
Not Applicable				
» Parameters				
Shock Unit	Percentage Shift	Time Window Size		
Shock Curve				
	Time Points		1-1/1	
Shock Values *	To-2 Month To-1 Month To+0 Month To	p+1 Month To+2 Month		

Figure 68 Variable Shock Definition Screen

7. Save the Definition.

13.1.5 Volatility

Follow the below steps to define a variable, and assign shock for Volatility:

- 1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select Financial Services Market Risk.
- To open the stress testing screen, Select Enterprise Modeling Option > Stress Testing on the Left-Hand Side (LHS) menu.
- 3. Click Add icon in the Variable Definition screen.

Applications	Sandbox	Object Administration	System	n Co	nfigura	tion & Identity Manag	ement My Inbox						
Select Appli	ications				arkat	lick) Enterprise M	Indeling Option 🔪 Variable Definitio						
Financial Se	rvices Market	Risk		140	urker	isk 7 Enterprise is	oueung Option 7 Variable Defatitio	"					
								Variable	Management			?	^
► ■ U	nified Analytic	al Metadata	^										
► Lõo	perations				» s	earch						19 EI	
🔺 🙋 Marke	et Risk				Varia	ble Name							
⊧ b <mark>é</mark> n R	eference Data	Management			» v	ariable Managemen	1					= 1 . 20 / 207 () ()	
do Pi	ortfolio Manag	ement			- AL 1	Variable ID	Variable Name		Variable Property	Based On	Created By	Creation Date	-
🖏 in	cremental Val	ર				V1252995810267	Account Credit Limit Original		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	-
4 🖾 M	anage MR Ru	les				V1252995987535	Account Delinguency in Previous Perior	d	Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
2	Rule				1	V1252995188698	Account EOP Interest Amount		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
	Process				1	V1252995291307	Account Minimum balance YTD		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
23	Run					V1252994710280	Account Net Interest Income		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
	Manago Du	Execution	+		0	V1252995533272	Account original Balance		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
	e manage Ru				0	V1251090133509	Acct_Original_Loan_to_Value		Direct	Measure	SYSADMN	24-AUG-2009 12:00:00 AM	
	nterprise Modi	eling Option			0	V1252994933769	Age on Book		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
► 1	Sandbox Ma	iintenance			0	V1200679743561	Banking Book Equity Scenario Loss		Direct	Measure	SYSADMN	02-JUN-2009 08:02:03 PM	
29	5 Technique F	Registration			0	V1366223988120	Calendar Date		Direct	Measure	baselecuser	17-APR-2013 01:12:06 PM	
A 1	Stress Testi	ng			0	V1202124464003	CART ID		Direct	Measure	SYSADMN	03-JUN-2009 10:59:54 AM	
	💕 Variable	Shock			0	V1251089028935	Cart1_Id		Direct	Measure	SYSADMN	24-AUG-2009 12:00:00 AM	
	🔲 Scenario	• · · · · · · · · · · · · · · · · · · ·			0	V1201072358220	CCF Percentage		Direct	Measure	SYSADMN	03-JUN-2009 02:12:53 PM	
_	🔮 Stress D	efinition			0	V1356696003221	Consumer Price Index Change		Direct	Measure	baselecuser	28-DEC-2012 05:30:00 PM	
6	Variable De	finition			0	V1197616504944	Counterparty Annual Income		Direct	Measure	SYSADMN	02-JUN-2009 06:53:29 PM	
Re M	etadata Brows	er	~			V1197548398848	Counterparty Bankruptcy Indicator		Dummy	Hierarchy	SYSADMN	03-JUN-2009 01:20:35 PM	\sim
	oluoulu broni				L r	V1197611789413	Counternarty Current Assets		Direct	Measure	SYSADMN	03-ILIN-2009 03:14:21 PM	

Figure 69 Variable Definition Screen

🦉 Varia	🖻 Variable Definition Add - Internet Explorer — 🗌 🖸								
			Variable	Definition					
Marl	Market Risk > Enterprise Modeling Option > Variable Definition > Variable Definition(New Mode)								
» V	» Variable Definition								
Folde	r	BIS	~						
Varia	ible Name*	I		Variable Description					
Varia	ible Type*	Commodity Variable		Variable Structure*	Single Value	\checkmark			
» s	ingle Maturity								
Matur	rity Unit*	Days	~	Maturity Type*	● Value ○ Node				
» V	alue								
Matur	rity Value*								
» B	ased On								
Base	d On*	Hierarchy	~	Variable Classification*	Numeric Variable	\checkmark			
» H	ierarchy								
Varia	ble Property*	Direct	~	Selected Hierarchy*	Number Of Accounts	~			
			Save	Cancel					

Figure 70 Variable Definition Screen

4. Define the exchange rate variables as below:

Folder	Select the Folder from the drop-down list, in which the Variable Definition is to be saved.
Variable Name	Provide the variable name.
Variable Description	Provide the variable description.
Variable Type	Select Idiosyncratic Variable from the drop-down list.
Variable Structure	Select Single Value.
Based On	Select Measures.
Variable	Select Numeric Variable
Classification	

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Apply Filters	Select Yes .
Data Set	Select Market Risk Factor Statistics from the drop-down list.
Selected	Select Risk Factor Volatility from the drop-down list
Measures	
Filters	Click the edit button, and select ASSETCLASS1, ASSET1, TIMEVERTEX1,
	CURRENCY1, ASSETCLASS2, ASSET2, TIMEVERTEX2 and CURRENCY2 from
	the Hierarchy browser.
ASSETCLASS1,	Click each member under Filters. Click the edit button corresponding to each member,
ASSET1,	and select the required item.
TIMEVERTEX1,	
CURRENCY1,	
ASSETCLASS2,	
ASSET2,	
TIMEVERTEX2	
and	
CURRENCY2	

		Variable Definition		
Market Risk > Enterprise Modeling	Option > Variable Definition > Variable Definition(New Mode)		
» Variable Definition				
Folder	EPMSEGMENT			
Variable Name*	Volatility Variable	Variable Description	Volatility Variable Description	
Variable Type*	Idiosyncratic Variable	Variable Structure*	Single Value	
» Based On				
Based On*	Measures	Variable Classification*	Numeric Variable	
» Measure Filter				
Apply filters	● Yes ○ N	10		
» Measures				
Dataset*	Market Risk Factor Statistics	Selected Measures*	Risk Factor Volatility	à
» Filters				1 - 3 / 8 🗇 🚺 🚺
Hierarchy				
ASSETCLASS1				
ASSET1				
TIMEVERTEX1				
» ASSETCLASS1				1-1/1 (1 1 1
Nodes				
Treasury				
» Variable Transformation				00

Figure 71 Variable Definition Screen

5. Navigate to the Variable Shock screen.

Applications	Sandbox	Object Administration	System Cor	nfiguratio	on & Identity Managen	eent My Inbox					
Select App	lications		Mo	arket Ri:	sk > Enterprise Moo	leling Option > Stress Testing > Varia	able Shoc	k			
Financial S	ervices Market	Risk	•			Х		Charle Liberry			
🔺 節 Com	mon Object M	aintenance				v	ariabie	Shock Library		0	<u> </u>
圆口	ata Model Ma	intenance		» Sea	rch					B D	
► 🗟 C	ata Managem	ent		Variable	Shock Name						
) 🕨 🗉 U	- Inified Analytic	al Metadata							_		
► 🖾 o	Operations			» Vari	iable Shock List					🗊 1 - 20 / 31 🔇 🔇 💽 🖸	2
4 📈 Mari	ot Rick			五口	Shock ID	Variable Shock Name	Version	Variable	Created By	Creation Date	
- <u> </u>	at rush				1526555452217	FBN_MR_EQUITY_SHOCK_1	0	FBN_MR_EQUITY_PRICE_1	EPMFBN	17-MAY-2018 02:30:22 PM	2
r 40 F	Portfolio Manac	ement			1280361953366	Loss Data - Frequency Correlation increased by 5%	0	Frequency Correlation Value - Loss Data	SYSADMN	28-JUL-2010 07:14:53 PM	
6 5 (ncremental Va	R			1280361183267	Loss Data - Frequency Scale increased by 5%	0	Frequency Scale Parameter - Loss Data	SYSADMN	28-JUL-2010 07:02:03 PM	
► 🗹 N	lanage MR Ru	iles			1280360986761	Loss Data - Frequency Shape increased by 5%	0	Frequency Shape Parameter - Loss Data	SYSADMN	28-JUL-2010 06:58:46 PM	
	Interprise Mod	eling Option			1280361413984	Loss Data - Severity Scale increased by 5%	0	Severity Scale Parameter - Loss Data	SYSADMN	28-JUL-2010 07:05:53 PM	E .
► L	Sandbox Ma	aintenance			1280361367028	Loss Data - Severity Shape increased by 5%	0	Severity Shape Parameter - Loss Data	SYSADMN	28-JUL-2010 07:05:06 PM	(T)
2 4 1	E Technique I Stress Testi	Registration			1280362001267	Scenario data - Frequency Correlation increased by 5%	0	Frequency Correlation Value - Scenario Data	SYSADMN	28-JUL-2010 07:15:41 PM	
	🕩 Variabl	e Shock			1280361467334	Scenario Data - Frequency Shape increased by 5%	0	Frequency Shape Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:06:47 PM	
	Scenario				1280361507355	Scenario Data - Frequency Shape increased by 5%	0	Frequency Scale Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:07:27 PM	
	Tress L	finition			1280361606319	Scenario Data - Severity Scale increased by 5%	0	Severity Scale Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:09:06 PM	
line in the second s	Aetadata Brow	ser			1280361558509	Scenario Data - Severity Shape increased by 5%	0	Severity Shape Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:08:18 PM	
					1528706654891	TEST-CM-BRENT-CRUDE-SPOT2	0	TEST-BRENT_CRUDE_SPOT2	EPMFBN	11-JUN-2018 12:06:57 PM	~

Figure 72 Variable Definition Screen

Shock Name	Specify a Shock Name
Shock Description	Provide a description for the Shock.
Dataset	Select Market Risk Risk Factor Statistics from the drop-down list.
Variable Name	Select the variable which needs to be shocked from under the Idiosyncratic Variable > Numeric Variable .
ls Formula Based	Select Yes .
Time Specification	Select MR – Time Hierarchy . This hierarchy determines the horizon of the shock.
Shock Type	 Shock Type selection has two options: Instantaneous Across Time In you select Across Time, provide information in the fields: Shock in Reference to: Select whether it is Current Value, or Future Estimated Value Time Point: Select whether Custom or standard Number of Time Points: Enter values for Time Points in Past and Time Points in Future Shock Current Value: Select the check box, and specify the time as Days, Weeks, months or Years, and click to load the time point values.

6. Define the variable shock as follows:

Release 8.0.4.0.0

	consecutive values l	petween Time Points in Past to Tin	ne Points in Future. T	he value will be in Days ,
	Weeks, Months and	d Years depending on the selection.		
	If you select Custon	n, the points will be custom user spe	cified values between	Time Points in Past to
	Time Points in Futu	ure.		
	» Time Specification			
	Time Hierarchy *	MR - Time Hierarchy	Shock Type	Across Time
	Shock in Reference to	Current Value	Time Point	○ Standard
	Number of Time Points *	Time Points in Past 5 Time Points in Future 5	Shock current Value	Months 🗸
	Time Point Values *	7 To- 6 To- 4 To- 3 To- 1 T	0+ 0 T0+ 3 T0+ 6 T0-	+ 8 To+
arameters	Shock Unit: Select	one of the following:		
		3		
	 Percentage SI 	nift		
	 Absolute Shift 			
		_		
	 Absolute value 	8		
	 Standard Devi 	ation Shift		
		Deviation Chiffy If your aslast this and		
	 Log Standard 	Deviation Shift: If you select this opt	ion, specify the Time V	Vindow Size.
	 Log Standard Click button to a 	Deviation Shift: If you select this opt add shock values as shown below.	ion, specify the Time V	Vindow Size.
	Log Standard Click button to a Parameters	Deviation Shift: If you select this opt add shock values as shown below.	ion, specify the Time V	Vindow Size.
	Log Standard Click button to a Parameters Shock Unit	Deviation Shift: If you select this opt add shock values as shown below.	ion, specify the Time V	Vindow Size.
	Log Standard Click button to a Parameters Shock Unit	Deviation Shift: If you select this opt add shock values as shown below.	ion, specify the Time V	Vindow Size
	Log Standard Click button to > Parameters Shock Unit Shock Curve	Deviation Shift: If you select this opt add shock values as shown below.	ion, specify the Time V	Vindow Size
	Log Standard Click button to > Parameters Shock Unit Shock Curve	Deviation Shift: If you select this opt add shock values as shown below.	ion, specify the Time V	Vindow Size
	Log Standard Click button to a vertice sector sec	Deviation Shift: If you select this opt add shock values as shown below.	tion, specify the Time V	Vindow Size
	Log Standard Click button to a botton to a shock Unit Shock Curve Shock Values*	Deviation Shift: If you select this opt add shock values as shown below.	tion, specify the Time V Trime Wir 4 Month To-3 Month To- -15 -20	Vindow Size

	Vorial	bla Shack Definition	
Market Risk > Enterprise Mod	eling Option > Stress Testing > Variable Shock > Variable Shock De	efinition(New Mode)	
» Shock Details			
Shock Name *	Volatility Variable Shock	Shock Description	Volatility Variable Shock Description
Dataset *	Market Risk Risk Factor Statistics	Variable Name *	FBN_MR_RF_VOLATILITY_1
» Formula Based			
Is Formula Based	⊙ Yes ○No		
» Time Specification			
Time Hierarchy *	MR - Time Hierarchy	Shock Type	Across Time
Shock in Reference to	Current Value	Time Point	Standard O Custom
Number of Time Points *	Time Points in Past 2 Time Points in Future 2 🖌 S	hock current Value	Monthiy 🔽 🛋
Time Point Values *	To- 2 To- 1 To+ 0 To+ 1 To+	2	
» Filter Specification			0 - 0 / 0 di di 191
Selected Dimensions			
» Parameters			
Shock Unit	Absolute Value	Time Window Size	
Shock Curve			
	Time Points		1-1/1 4 4 0 1
Shock Values *	To-2 Month To-1 Month To+0 Month To+1 15 <t< td=""><td>1 Month To+2 Month 15 15</td><td></td></t<>	1 Month To+2 Month 15 15	

Figure 73 Variable Shock Definition Screen

7. Save the Definition.

13.1.6 Correlation

Follow the below steps to define a variable, and assign shock for Correlation:

- 1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select Financial Services Market Risk.
- To open the stress testing screen, Select Enterprise Modeling Option > Stress Testing on the Left-Hand Side (LHS) menu.
- 3. Click Add icon in the Variable Definition screen.

Applications	Sandbox	Object Administration S	system C	onfigur	ation	& Identity Managem	ment My Inbox						
Select Appli	cations			Market	Risk	> Enterprise Mon	delina Ontion > Variable Definition	1					
Financial Se	rvices Market F	tisk	•										
								Variable	Management			?	^
) 📃 U	nified Analytica	Metadata	^										
► Kão	perations			» :	Sear	ch						19 12	
🔺 🜌 Marke	et Risk			Vari	able	Name		1					
⊧ b <mark>é</mark> n Re	eference Data	Management	1	20.3	laris	ble Management							
do Pi	ortfolio Manage	ment				Variable ID	Variable Name		Variable Property	Based On	Created By	Creation Date	
d ^e b in	cremental VaR					V1252995810267	Account Credit Limit Original		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	-
4 🗹 M	anage MR Rul	ня I				V1252995987535	Account Delinguency in Previous Period		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
1	Rule					V1252995188698	Account EOP Interest Amount		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
7	Process					V1252995291307	Account Minimum balance YTD		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
22	Run					V1252994710280	Account Net Interest Income		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
		-	+			V1252995533272	Account original Balance		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
4	Manage Kun	Execution				V1251090133509	Acct_Original_Loan_to_Value		Direct	Measure	SYSADMN	24-AUG-2009 12:00:00 AM	
-4 €	nterprise Mode	ing Option				V1252994933769	Age on Book		Direct	Measure	SYSADMN	15-SEP-2009 12:00:00 AM	
▶ 🖻	Sandbox Mai	ntenance				V1200679743561	Banking Book Equity Scenario Loss		Direct	Measure	SYSADMN	02-JUN-2009 08:02:03 PM	
8	Technique R	gistration				V1366223988120	Calendar Date		Direct	Measure	baselecuser	17-APR-2013 01:12:06 PM	
	Stress Testin	9				V1202124464003	CART ID		Direct	Measure	SYSADMN	03-JUN-2009 10:59:54 AM	
	💋 Variable S	hock				V1251089028935	Cart1_Id		Direct	Measure	SYSADMN	24-AUG-2009 12:00:00 AM	
	Scenario					V1201072358220	CCF Percentage		Direct	Measure	SYSADMN	03-JUN-2009 02:12:53 PM	
	Stress De	finition				V1356696003221	Consumer Price Index Change		Direct	Measure	baselecuser	28-DEC-2012 05:30:00 PM	
	Variable De	inition				V1197616504944	Counterparty Annual Income		Direct	Measure	SYSADMN	02-JUN-2009 06:53:29 PM	
	atadata Drawo		~			V1197548398848	Counterparty Bankruptcy Indicator		Dummy	Hierarchy	SYSADMN	03-JUN-2009 01:20:35 PM	~
100 M	etadata Brows	1				V1197611789413	Counternarty Current Assets		Direct	Measure	SYSADMN	03-JUN-2009 03:14:21 PM	1

Figure 74 Variable Definition Screen

Variable Definition Warket Risk > Enterprise Modeling Option > Variable Definition > Variable Definition / New Model) • Variable Definition Foker B5 Variable Definition Variable Definition Foker B5 Variable Definition Variable Definition Variable Name* Variable Type* Commotify Variable Commotify Variable Commotify Variable Single Maturity Multerly Unit* Days Multerly Value* O Single Maturity Multerly Unit* Days Variable Classification* * Manet Single Of* Hierarchy Variable Classification* * Manet Single Of* Unable Of Of Single Of* Unable Of Of O	Variable Definition Add - Interne	tt Explorer			-
Variable Definition Market Rick > Enterprise Modeling Option > Variable Definition/New Mode) > Variable Definition > Variable Definition Faster Image: Colspan="2">Solution > Variable Definition/New Mode) > Variable Definition * Variable Definition Yariable Definition Yariable Definition Yariable Definition Yariable Type* Single Maturity Maturity Unit* Maturity Unit* Days Maturity Yase* Watable Yuke* > Variable On > Based On Based On* > Miterarchy Variable Classification* 'Namber Of Accounts					
Market Risk > Enterprise Modeling Option > Variable Definition > Single Value > Variable Structure* > Single Value > Variable Structure* > Single Maturity + Maturity Type* © Value @ Value			Variable Definition		
> Variable Definition Foder SS Variable Hame* Variable Hame* Variable Hame* Commodity Variable Variable Type* Commodity Variable Commodity Variable Commodity Variable Variable Hame* Sangle Value Single Maturity Maturity Type* Maturity Value* Opyra > Value Variable Gaseffication* > Sased On Eased On* Eased On* Herarchy Variable Gaseffication* Number Of Accounts Variable Spenyr* Dares	Market Risk > Enterprise Me	odeling Option > Variable Definition > Variable Definition(New Mo	de)		
Fadder ps Variable Name* Image: Solution of the scription Image: Solution of the scription Variable Name* Commodity Variable Variable Structure* Single Value > Single Maturity Commodity Variable Variable Structure* Single Value > Single Maturity Commodity Variable Variable Structure* Single Value > Single Maturity Days Matury Type* Over the scription > Value Days Maturity Type* Over the scription > Value Days Matury Type* Over the scription > Value Days Variable Classification* Nametre Variable > Sincerchy Texerchy Nametre Variable Scription* Nametre Variable Scription*	» Variable Definition				
Variable Name* Image: Single Value Variable Type* Commodity Variable > Single Maturity Maturity Unit* Days Maturity Value* Image: Value > Variable Type* Image: Value > Variable Type* Image: Value > Value Image: Value > Days Image: Value > Value Image: Value > Based On Essed On* Essed On* Iterarchy > Hierarchy Variable Tables	Folder	BIS			
Variable Type* Commodity Variable En Variable Structure* Single Value > Single Maturity Maturity Type* Days Maturity Type* Value > Value Maturity Type* Value Node > Based On E E Based On* Herarchy Variable Rogerth* Tameter Variable > Hierarchy Value Salected Herarchy* Number Of Accounts	Variable Name*		Variable Description		
> Single Matarity Malady Uni* Days V Malady Type* Value O Node > Value Malady Vale* Value O Node > Value Malady Vale* Value > Based On Eased On* Herarchy V Value Classification* Thumenic Variable > Hierarchy > Watable Poperty* Direct V Selected Herarchy* Thumber Of Accounts V	Variable Type*	Commodity Variable	Variable Structure*	Single Value	
Maturity Unit* Days Maturity Type* ® Value > Value > Value Maturity Value* > Based On Based On* Hararohy Variable Classification* 'N literarchy 'Valuebe Property*	» Single Maturity				
> Value Maturby Value" > Based On Based On Based On* Iterarchy > Hierarchy Variable Poperty* Detect ♥ Salected Herarchy* Namber Of Accounts ♥	Maturity Unit*	Days	Maturity Type*	● Value ○ Node	
Makerly Value* Image: Constraint of the second	» Value				
» Based On Based On* Herarchy Variable Classification* Numeric Variable » Hierarchy Variable Classification* Numeric Variable » Hierarchy Saleclied Herarchy* Number Of Accounts	Maturity Value*				
Based On* Herarchy Variable Classification* Numeric Variable V > Hierarchy	» Based On				
Hierarchy Valiable Projetty* Direct V Selected Hierarchy* Number Of Accounts V	Based On*	Hierarchy	Variable Classification*	Numeric Variable	
Variable Property* Direct V Selected Hierarchy* Number Of Accounts V	» Hierarchy				
	Variable Property*	Direct	Selected Hierarchy*	Number Of Accounts	

Figure 75 Variable Definition Screen

Folder	Select the Folder from the drop-down list, in which the Variable Definition is to be saved
Variable Name	Provide the variable name.
Variable	Provide the variable description.
Description	
Variable Type	Select Idiosyncratic Variable from the drop-down list.
Variable Structure	Select Single Value.
Based On	Select Measures.
Variable	Select Numeric Variable
Classification	
Apply Filters	Select Yes .
Data Set	Select Market Risk Factor Statistics from the drop-down list.
Selected	Select Risk Factor Correlation from the drop-down list
Measures	
Filters	Click the edit button, and select ASSETCLASS1, ASSET1, TIMEVERTEX1,
	CURRENCY1, ASSETCLASS2, ASSET2, TIMEVERTEX2 and CURRENCY2 from
	the Hierarchy browser.
ASSETCLASS1,	Click each member under Filters. Click the edit button corresponding to each member,
ASSET1,	and select the required item.
TIMEVERTEX1,	

4. Define the exchange rate variables as below:

CURRENCY1,	
ASSETCLASS2,	
ASSET2,	
TIMEVERTEX2	
and	
CURRENCY2	

		Variable	e Definition		
Market Risk > Enterprise	Modeling Option > Variable Definition > Varia	ble Definition(New Mode)			
» Variable Definition					
Folder	EPMSEGMENT	\checkmark			
Variable Name*	Correlation Variable		Variable Description	Correlation Variable Description	
Variable Type*	Idiosyncratic Variable		Variable Structure*	Single Value	
» Based On					
Based On*	Measures		Variable Classification*	Numeric Variable	
» Measure Filter					
Apply filters		● Yes ○ No			
» Measures					
Dataset*	Market Risk Risk Factor Statistics		Selected Measures*	Risk Factor Correlation	
» Filters					1 - 3 / 8 🔄 🚺 🗋
Hierarchy					
ASSETULASS1 ASSET1					
TIMEVERTEX1					
» ASSETCLASS1				🛛	1-1/1 4 1 1
als Nodes					
Treasury					
» Variable Transformati	ion				00

Figure 76 Variable Definition Screen

5. Navigate to the Variable Shock screen.

Applications	Sandbox	Object Administration	System Cr	onfigura	ation & Identity Manager	nent My Inbox						
Select Applic	cations		A	1arket	Risk > Enterprise Mo-	delina Option >	Stress Testing > Varia	able Shoc	k			
Financial Ser	vices Market	t Risk	*				-		Phase In 19 houses			1.
🔺 🛱 Comm	non Object M	taintenance					v	ariabie	Shock Library		0	
👼 Da	ita Model Ma	intenance		» Sr	earch						6	
🕨 🔜 Da	ita Managem	nent		Varia	ble Shock Name							
🕨 📃 Un	lified Analytic	cal Metadata										
▶ 🔯 Op	perations			× Va	sriable Shock List	I verteble Chastell		Manalan	Mariable		#1 - 20 / 31 (G) (G) [2]	
🔺 🙋 Marke	rt Risk			284 L		Vanable Shock Na		Version	CON MD COURTY DDIOG 1	Created By	17-MAY-2018 02:30:22	
▶ b ² Re	ference Dat	a Management		L	1526555452217	FBN_MR_EQUIT	Y_SHOCK_1	0	FBN_MR_EQUITY_PRICE_1	EPMFBN	PM 28-1111-2010-07:14:53	
dia Po	ortfolio Mana	gement		C] 1280361953366	by 5%	ency correlation marcases	0	Frequency Correlation Value - Loss Data	SYSADMN	PM	
🖏 inc	cremental Va	IR		C] 1280361183267	Loss Data - Frequ	ency Scale increased by 5%	. 0	Frequency Scale Parameter - Loss Data	SYSADMN	28-JUL-2010 07:02:03 PM	
🕨 🚺 Ma	anage MR R	ules		Γ	1280360986761	Loss Data - Frequ 5%	ency Shape increased by	0	Frequency Shape Parameter - Loss Data	SYSADMN	28-JUL-2010 06:58:46 PM	
🧃 🖧 En	terprise Mod	Jeling Option	*	Г	1280361413984	Loss Data - Sever	rity Scale increased by 5%	0	Severity Scale Parameter - Loss Data	SYSADMN	28-JUL-2010 07:05:53 PM	
No. 10	Sandbox M	aintenance	ų	C] 1280361367028	Loss Data - Sever	rity Shape increased by 5%	0	Severity Shape Parameter - Loss Data	SYSADMN	28-JUL-2010 07:05:06 PM	
4 ♀	Technique I Stress Test	Registration ting		E	1280362001267	Scenario data - Fr increased by 5%	requency Correlation	0	Frequency Correlation Value - Scenario Data	SYSADMN	28-JUL-2010 07:15:41 PM	
	Variabl	e Shock		C	1280361467334	Scenario Data - Fr by 5%	requency Shape increased	0	Frequency Shape Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:06:47 PM	
	Scenario	D		C	1280361507355	Scenario Data - Fr by 5%	requency Shape increased	0	Frequency Scale Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:07:27 PM	
	Variable Dr	efinition		C	1280361606319	Scenario Data - S 5%	everity Scale increased by	0	Severity Scale Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:09:06 PM	
🛅 Me	etadata Brow	/ser		C] 1280361558509	Scenario Data - S 5%	everity Shape increased by	0	Severity Shape Parameter - Scenario Data	SYSADMN	28-JUL-2010 07:08:18 PM	
				٢] 1528706654891	TEST-CM-BRENT	F-CRUDE-SPOT2	0	TEST-BRENT_CRUDE_SPOT2	EPMFBN	11-JUN-2018 12:06:57 PM	~

Figure 77 Variable Definition Screen

6. Define the variable shock as follows:

Shock Name	Specify a Shock Name			
Shock Description	Provide a description for	or the Shock.		
Dataset	Select Market Risk Ris	sk Factor Statistics from the d	rop-down list.	
Variable Name	Select the variable whit	ch needs to be shocked from u	nder the Correlation Varial	ble > Numeric Variable.
Is Formula Based	Select Yes .			
Time Specification	Select MR – Time Hier	rarchy. This hierarchy determin	es the horizon of the shock	
Shock Type	Shock Type selection h	nas two options:		
	 Instantaneous 			
	 Across Time 			
	In you select Across Ti	me, provide information in the f	ields:	
	- Shock in Reference to	o: Select whether it is Current V	alue, or Future Estimated V	/alue
	- Time Point: Select wh	ether Custom or standard		
	Number of Time Point	te: Enter values for Time Boint	s in Past and Time Points	in Euturo
	- Shock Current Value:	Select the check box, and spe	city the time as Days, Week	s, months or Years, and
		ne point values.	and the Oten dead and	ten de constate colliter
	- Time Point Values: Sp	pecify the time point values. If y	ou select the Standard opt	ion, the points will be
	Weeks Months and Y	ears depending on the selection	n	value will be in Days ,
	If you select Custom t	the points will be custom user s	necified values between Tir	ne Points in Past to
	Time Points in Future			
	» Time Specification			
	Time Hierarchy *	MR - Time Hierarchy	Shock Type	Across Time
	Shock in Reference to	Current Value	Time Point	O Standard Custom
	Number of Time Points *	Time Points in Past 5 Time Points in Future 5	Shock current Value	8 Tot
	Time Point Values *			
Parameters	Shock Unit: Select one	e of the following:		
	 Percentage Shift 			
	 Absolute Shift 			

Log Standard	d Deviation Shift: If yo	u select thi	s option, spe	ecify the Tir	ne Windo	ow Size.
		SHOWIT DEI	Ow.			
Shock Unit	Percentage Shift Absolute Shift			1	Time Window Size	;
Shock Curve	Absolute Value Standard Deviation	Shift lion Shift				
	Time Points	ion onit]			Ŧ
Shock Values *	To-7 Month	To-6 Month	To-4 Month -15	To-3 Month -20	To-1 Month	To+0 Month

Variable Shock Definition							
Market Risk > Enterprise Modeling Option > Stress Testing > Variable Shock > Variable Shock Definition(New Mode)							
» Shock Details							
Shock Name *	Correlation Variable Shock	Shock Description	Correlation Variable Shock Description				
Dataset *	Market Risk Factor Statistics	Variable Name *	Test_Correlation_StressVaR				
» Formula Based	» Formula Based						
Is Formula Based © Yes O No							
» Time Specification							
Time Hierarchy *	MR - Time Hierarchy	Shock Type	Across Time				
Shock in Reference to	Current Value	Time Point	Standard Custom				
Number of Time Points *	der of Time Points in Paints in Paints in Paints in Paints in Future 2 💟 Shock current Value Monitory 🔍 💭						
Time Point Values * To- 2 To- 1 To+ 0 To+ 1 To+ 2							
» Filter Specification			0 - 0 / 0 di di 🔊 🗖				
Selected Dimensions							
» Parameters	Demonstrano Shift	Time Window Size					
Shock Curve		THE THROTT OLD					
Shock Values *	Time Points To-2 Month To-1 Month To+1 Month 50 50 50	To+2 Month 50 50	4-474 314(5)5				

Figure 78 Variable Shock Definition Screen

7. Save the Definition.

13.2 Defining a Scenario

Follow the below steps to define a scenario:

- 1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select Financial Services Market Risk.
- To open the stress testing screen, Select Enterprise Modeling Option > Stress Testing on the Left-Hand Side (LHS) menu.

- 3. Click Scenario.
- 4. Click the Add icon in the Scenario Management screen. Ensure that the variable and variable shocks are defined, before they are added to the Scenario in the below steps.

Applications Sand	box Object Administration	n System	Configu	uration	a & Identity Management	My Inbox				
Select Applications	5		Marke	et Risk	> Enterprise Modelin	a Option > Stress Testina >	Scenario			
Financial Services N	/arket Risk	•				, .,				
4 🖨 Common Obi	iect Maintenance						Scenario Manage	ement		3
Data Mod	Iel Maintenance		»	Sear	rch					降日
Data Man	agement		S	cenario	Name					
Unified Ar	nalvtical Metadata									
Operation	15		»	Scer	nario List					🗏 🗷 📾 📄 🗦 🕸 - 11 / 11 বা বা চাচ
Market Rick			ž		Scenario ID	Scenario Name 🔺		Version	Created By	Creation Date
- Marker Hak	- Data Managament				1280451635683	All Parameters Increased by 5%		0	SYSADMN	29-JUL-2010 08:09:37 PM
	e Data Management				1526556462511	FBN_MR_SCENARIO_1		0	EPMFBN	17-MAY-2018 02:47:12 PM
and Portfolio N	Vlanagement				1528953008975	TEST-EQ-ALL		0	EPMFBN	14-JUN-2018 08:33:13 AM
6/b Increment	tal VaR	a			1528707048421	TEST-FX-EQ-CM-IR-INS-2		0	EPMFBN	11-JUN-2018 12:13:31 PM
🕨 🖬 Manage N	MR Rules				1530089835152	TEST-IR-2Y-NGN-Z		0	EPMFBN	27-JUN-2018 12:22:01 PM
🔺 💑 Enterprise	e Modeling Option	*			1530542489563	TEST_BRENT_CRUDE_SPOT2		0	EPMFBN	02-JUL-2018 06:06:56 PM
🕨 🖻 Sandb	oox Maintenance				1530532267183	Test_Commodity_StressVaR		0	EPMFBN	02-JUL-2018 03:16:32 PM
😤 Techn	ique Registration				1530622618945	Test_correlation_Scenario		0	EPMFBN	03-JUL-2018 04:22:32 PM
🔺 😐 Stress	s Testing				1530536166439	Test_ExchangeNGNUSD		0	EPMFBN	02-JUL-2018 04:21:32 PM
(Va	ariable Shock				1530528363820	Test_Exchange_Rate_StressVaF		0	EPMFBN	02-JUL-2018 02:11:29 PM
	renario				1528630382567	TEST_IR_EQT_FX_INSTANTAN	EOUS	0	EPMFBN	10-JUN-2018 02:55:38 PM
G St	ress Definition									
Statiat	ble Definition									
🐻 Metadata	Browser									



5. The scenario definition screen is displayed.

	Scenario Definition	Scenario Definition				
Market Risk > Enterprise Modeling Option > Stress Testing > Scenario > Scenario Definition(New Mode)						
FBN MR Adverse Scenario						
FBN MR Adverse Scenario Description						
					0-0/0 4 0 0	
Shock Nan	ne	Version	Shock Description			
	FBN MR Adverse Scenario FBN MR Adverse Scenario Description Shock Narr	FBN MR Adverse Scenario FBN MR Adverse Scenario Description Stock Name	FBN MR Adverse Scenario FBN MR Adverse Scenario Description Shock Name Version	FBN MR Adverse Scenario FBN MR Adverse Scenario Description Shock Name Version Shock Description	FBN MR Adverse Scenario FBN MR Adverse Scenario Description Shock Name Version Shock Description	

Figure 80 Scenario Definition Screen

6. Provide a name and description for the scenario. Click the Add icon in **Variable Shocks** section. The below screen is displayed.

Add Variable Shocks to Scenario Market Risk > Enterprise Modeling Option > Stress Testing > Scenario > Add Variable Shocks To Scenario									
» Sea	rch								Q 51
Variable	Name				Variable	е Туре	Select	~	<u> </u>
Shock N	ame				Shock 1	Гуре	Formula Based		
ource	Vame	Select	~		Scenar	io ID	Select	~	
Mag	iabla Chaok Lint								
var	Variable Name		Variable Type		Version	Shock Name		Shock Description	1 - 15 / 34 (0 - 0 - 1
	FBN_MR_EQUITY_PRICE_1		Equity Variable		0	FBN_MR_EQUITY_SHOCK_1		FBN MR EQUITY SHO	CK 1
	FBN_MR_EXCHANGE_RATE_1		Currency Variable		0	Test1			
	Frequency Correlation Value - Loss Data		Correlation Variable		0	Loss Data - Frequency Correlation in	creased by 5%	Correlation Matrix for increasing 5%	oss data been shocked b
	Frequency Correlation Value - Scenario Data		Correlation Variable		0	Scenario data - Frequency Correlation 5%	n increased by	Correlation Matrix for increasing 5%	scenario data been shock
	Frequency Scale Parameter - Lo ss Data		Idiosyncratic Variable		0	Loss Data - Frequency Scale increas	ed by 5%	Scale parameter of Fr 5%	equency Loss data shock
	Frequency Scale Parameter - Sc enario Data		Idiosyncratic Variable		0	Scenario Data - Frequency Shape inc	reased by 5%	Scale parameter of Fr by 5%	equency Scenario data sh
	Frequency Shape Parameter - Lo ss Data		Idiosyncratic Variable		0	Loss Data - Frequency Shape increas	sed by 5%	Shape parameter of F	requency data shocked by
	Frequency Shape Parameter - Sc enario Data		Idiosyncratic Variable		0	Scenario Data - Frequency Shape inc	reased by 5%	Shape parameter of F by 5%	requency Scenario data s
	Severity Scale Parameter - Los s Data		Idiosyncratic Variable		0	Loss Data - Severity Scale increased	by 5%	Scale parameter of S	everity Loss data shocked
	Severity Scale Parameter - Sce nario Data		Idiosyncratic Variable		0	Scenario Data - Severity Scale increa	sed by 5%	Scale parameter of se 5%	verity Scenario data shock
	Severity Shape Parameter - Los s Data		Idiosyncratic Variable		0	Loss Data - Severity Shape increased	d by 5%	Shape parameter of S	everity Loss data shocked
	Severity Shape Parameter - Sce nario Data		Idiosyncratic Variable		0	Scenario Data - Severity Shape increa	ased by 5%	Shape parameter of s 5%	everity Scenario data shoo
	TEST		Interest Rate Variable		0	TEST-SHOCK			
	TEST-BRENT_CRUDE_SPOT		Commodity Variable		1	TEST-COMMODITY-BRENT-CRUDE			
	TEST-BRENT_CRUDE_SPOT		Commodity Variable		0	TEST-COMMODITY-BRENT-CRUDE			

Figure 81 Adding Variable Shocks to Scenario

7. Select the shocks.

Market Risk > Enterprise Modeling Option > Stress Testing > Scenario > Scenario Definition(New Mode) • Scenario Details Scenario Details Scenario Description FBN MR Adverse Scenario Scenario Description • Variable Name • Variable Name • Shock Name
Scenario Name * FBN MR Adverse Scenario Scenario Description Variable Shocka FBN MR Adverse Scenario Description
Scenario Description FBN MR Adverse Scenario Description
Variable Shocks Variable Name Vari
Variable Name Shock Name Version Shock Description
BN_MR_EQUITY_PRICE_1 FBN_MR_EQUITY_SHOCK_1 0 FBN MR EQUITY_SHOCK 1
FBN_MR_EXCHANGE_RATE_1 Test1 0

Figure 82 Adding Variable Shocks to Scenario – Scenario Definition

8. Click Save.

13.3 Defining a Stress

Follow the below steps to define a stress:

1. In Oracle Financial Services Analytical Applications Infrastructure under Select Applications select Financial Services Market Risk.

- To open the stress testing screen, Select Enterprise Modeling Option > Stress Testing on the Left-Hand Side (LHS) menu.
- 3. Click Stress Definition.
- 4. Click the Add icon in the **Stress Definition** screen. Ensure that the scenario is defined, before they are added to the Stress definition in the below steps.

Applications	s Sandbox	Object Administration	System C	onfigu	uratior	n & Identity Mana	agement	My Inbox							
Select App	olications			Market	t Risk	k > Enterprise	Modeling (Option >	Stress Testing > St	ress Definition					
Financial S	Services Markel	Risk	•							Stress Definition					^
🔺 🗟 Cor	nmon Object M	aintenance								Streas Demitton					
圆	Data Model Ma	intenance		>> ş	Searc	ch									🕰 E
▶ 📖	Data Managem	ient		Stre	ess De	finition Name									
▶ ■	Unified Analytic	al Metadata													
▶ 🔞	Operations			> :	Stres	ss Definition Li	ist Church Marrie			Desetes Due		Connecto		1 - 20 / 24	
🔺 🚧 Mar	ket Risk			255		Stress ID	Stress Nam	e 🔺				Scenario			27-JUN
» 崎	Reference Data	a Management			Ш.	1530090849100	FBN_MR_S	TRESS_ANA	ALYTICAL_VAR_EWMA	FBN_MR_ANALYTICAL_VAR_FU	R_STRESS	TEST-IR-2Y-NGN-Z	E	PMFBN	12:38:
	Portfolio Manag	gement				1526556552868	FBN_MR_S	TRESS_DEF	-1	Varestimation		FBN_MR_SCENARIO_1	E	PMFBN	02:48:4
6 3	Incremental Va	R				1524819701039	LRM_Stress	s_Testing		BIS - Liquidity Ratio Run			E	PMFBN	27-API 12:19:
► 🗗	Manage MR Ri	ules				1280453576634	STRESSED RGs	OREC ESTI	IMATION - STANDARD	OREC ESTIMATION - STANDARD	O RGs	All Parameters Increased by	/ 5% S	YSADMN	29-JUL 08:41:
⊿ &	Enterprise Mod	leling Option	*			1530539160939	StressExcha	angeNGNUS	D	FBN_MR_HISTORICAL_VAR2		Test_ExchangeNGNUSD	E	PMFBN	02-JUL 05:11:2
►	Sandbox M	aintenance				1529316885106	Stress_Anal	lytic_EWMA		Stress_Analytic_EWMA		TEST-EQ-ALL	E	PMFBN	18-JUN 01-38-1
	C Technique	Registration			<u>п</u> .	1528988041280	Stress Anal	lytic Garch		Stress Analytic Garch		TEST-EQ-ALL	E	PMFBN	14-JUN
	Stress Test	ing			<u>п</u> .	1530545710220	Stress Bren	nt Crude Sp	ot2	FBN MR HISTORICAL VAR2		TEST BRENT CRUDE SP	ОТ2 E	PMFBN	02-JUL
	Variable	Shock				1530532897724	Stress Corr	odity VaR		Stress Commodity VaR		Test Commodity StressVal	R F	PMERN	07:00:: 02-JUL
	Scenan							iouity_vuit							03:27:(04-JUL
	= Stress	Denniuon			Ц.	1530695689201	Stress_Corr	elation_Garc	h	FBN_MR_GARCH_VOL		rest_correlation_Scenario	E	PMEBN	12:40:1
100	variable De	tinition				1530624162735	Stress_Corr	elation_VaR		FBN EWMA 60 1 0		Test_correlation_Scenario	E	PMFBN	04:48:
1	Metadata Brow	ser				1528983727248	Stress_eq_r	monte_EWM	A	Stress_EQ_MNTCRL_EWMA		TEST-EQ-ALL	E	PMFBN	14-JUN 05:05:-

Figure 83 Stress Definition Screen

5. The Stress definition screen is displayed.

Stress Definition						
Market Risk > Enterprise Modeling Option > Stress Testing > Stress Definition > Stress Definition(New Mode)						
» Stress Definition Details						
			FBN MR Adverse Stress Description			
Stress Name*	FBN MR Adverse Stress	Stress Definition Description				
Segment*	EPMSEGMENT V	Baseline Run*	Test1	🔳		
Scenario	FBN MR Adverse Scenario[0]					
> Run details						
FBN_MR_VaR_Model_Historical_FB	N MR TREASURY BILL HFT PORTFOLIO					



- 6. Provide a name and description for the stress.
- 7. Select the Baseline VaR or Baseline Volatility Run.
- 8. Select the required scenario.

Note: The Volatility and Correlation Shocks affect the Volatility Model runs. When a Stressed VaR model is run, the application first searches for the Stressed Volatility output. In the absence of Stressed Volatility, the application takes the Baseline Volatility for processing.

9. Click Save.

14 Annexure E: Market Risk Reports

The reports which form part of the Market Risk dashboard are grouped into the following subject areas based on their functionality:

- Risk Measures
- Cash Flows
- Component VaR Analytic Method
- Component VaR Simulation Method
- Marginal & Incremental VaR
- Greeks
- Stress & Back Testing
- Comparison Across Portfolios
- Comparison Across VaR Models
- Market Analysis

14.1 Risk Measures Subject Area

The following reports are displayed as part of the Risk Measures subject area:

- Combined Alert
- Portfolio Value Across Time
- Profit and Loss Distribution
- Risk Estimation Static
- Risk Measure Report
- Risk Measures Across Time





14.1.1 Combined Alert

Dashboard Page Name	Risk Measures
Report Name	Combined Alert
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Reveleus Market Risk Dashboard displays the following Alerts: Limit Alert Limit Alert Limit Alert is displayed when the VaR estimate of a portfolio under a given Market Risk VaR Model exceeds the VaR Limit specified. Hypothetical P&L Alert Hypothetical P&L Alert Hypothetical P&L Alert is displayed when the Hypothetical Loss of a portfolio exceeds the VaR estimate. The Alerts are displayed for all portfolios under all Market Risk VaR Models to which they are mapped for the selected date.

14.1.2 Portfolio Value Across Time

Dashboard Page Name	Risk Measures
Report Name	Portfolio Value Across Time
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Portfolio Value across Time is a 3-axis chart for a trailing period of 30 business days on a daily time-step basis. The graph has the date on the horizontal axis, Portfolio Value on the left-side vertical axis and the VaR % of Portfolio Value on the right-side vertical axis.





Dashboard Page Name	Risk Measures
Report Name	Profit and Loss Distribution
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Profit and Loss Distribution is a graphical display of the Profit & Loss Distribution under the Simulation Methods to Risk Measure Estimation. The graph has the P&L values on the horizontal axis and the frequency of the P&L values on the vertical axis. The P&L values are bucketed into equal-width buckets in order to estimate the frequency. The graph is a stacked column graph where the data falling within the 10% mark, 20% mark, 30% mark and 40%-70% is displayed in a different color.

14.1.3 Profit and Loss Distribution

14.1.4 Risk Estimation Static

Dashboard Page Name	Risk Measures
Report Name	Risk Estimation Static
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	On selection of page level filters parameters of selected Market Risk VaR Model are displayed. Details displayed are Risk Measure Estimation Method, Confidence Level, Reporting Currency and Horizon (in days).

14.1.5 Risk Measure Report



Release 8.0.4.0.0

Dashboard Page Name	Risk Measures
Report Name	Risk Measure Report
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Report displays the risk measures for the selected portfolio and VaR model. The following risk measures are reported in a tabular format: Value-at-Risk Conditional Value-at-Risk Current Portfolio Value Simulated Portfolio Value VaR % of Current Portfolio Value Portfolio VaR Limit

14.1.6 Risk Measures Across Time

Dashboard Page Name	Risk Measures
Report Name	Risk Measures Across Time
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Risk Measures across Time is a 2-axis chart for a trailing period of 30 business days on a daily time-step basis. The graph has the date on the horizontal axis and the VaR, CVaR and Portfolio VaR Limit values on the vertical axis.

14.2 Cash Flows Subject Area

The following reports are displayed as part of the Cash Flows subject area:

Aggregate Cash Flow Map



- Allocated Cash Flow Report
- Cash Flow by Asset
- Cash Flow by Asset Class
- Risk Estimation Method

14.2.1 Aggregate Cash Flow Map

Dashboard Page Name	Cash Flows
Report Name	Aggregate Cash Flow Map
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Aggregate Cash Flow Map is a 2-dimensional surface chart which has the Asset Class – Maturity on the x-axis, the cash flows on the y-axis and the Asset indicated as stacked.



14.2.2 Allocated Cash Flow Report

Dashboard Page Name	Cash Flows
Report Name	Allocated Cash Flow Report
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Allocated Cash Flow Report is a report displaying the cash flows of each Asset – Asset Class – Maturity vertex in a tabular format.

14.2.3 Cash Flow by Asset

Dashboard Page Name	Cash Flows
Report Name	Cash Flow by Asset
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Cash Flow Map by Asset is a 2-axis chart which has the Asset on the horizontal axis and the cash flows on the vertical axis.
Drill-through On	On selection of a particular bar, the cash flows from each Asset Class – Maturity in the selected Asset are displayed.

14.2.4 Cash Flow by Asset Class

Dashboard Page Name	Cash Flows
Report Name	Cash Flow by Asset Class
Dashboard Name	Market Risk



Release 8.0.4.0.0

Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Cash Flow Map by Asset Class is a 2-axis chart which has the Asset Class on the horizontal axis and the cash flows on the vertical axis. The cash flows of various maturities of an Asset Class are summed up and the aggregate cash flows from each Asset Class are displayed.





14.2.5 Risk Estimation Method

Dashboard Page Name	Cash Flows
Report Name	Risk Estimation Method
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	On selection of page level filters parameters of selected Market Risk VaR Model are displayed. Details displayed are Risk Measure Estimation Method, Confidence Level, Reporting Currency and Horizon (in days).

14.3 Component VaR - Analytic Method Subject Area

The following reports are displayed as part of the Component VaR - Analytic Method subject area:

- Baseline Portfolio VaR
- Component VaR by Vertex
- Component VaR by Dimension
- Risk Estimation Method
- Top 10 Contributors to Portfolio VaR (by Vertex)

14.3.1 Baseline Portfolio VaR

Dashboard Page Name	Component VaR - Analytic Method
Report Name	Baseline Portfolio VaR
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	The VaR of the selected portfolio under the Market Risk VaR Model selected is displayed.



Dashboard Page Name	Component VaR - Analytic Method
Report Name	Component VaR by Vertex
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Component VaR by Vertex is a detailed report of the Component VaR of each Asset – Asset Class – Maturity vertex of the selected portfolio. It consists of the following: Asset Asset Class – Maturity Component VaR % of Portfolio VaR Rank The ranking is done by displaying a different color for each Asset –Asset Class – Maturity vertex whose Component VaR falls within the following range: Top 10% 10% - 20% 20% -30% Others

14.3.2 Component VaR by Vertex

14.3.3 Component VaR by Dimension

Dashboard Page Name	Component VaR - Analytic Method
Report Name	Component VaR by Dimension
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0



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Depart Departmention	Component VaR by Dimension is a graphical report displaying the component VaR of each member of the selected dimension.
Report Description	Assat
	Assat Class
	Level 1Drill-through
	Asset
	Drill-through to the level of Component VaR of each maturity of each selected Asset (commodity only).
	Asset Class
	Interest Rate/Commodity Asset Classes
	On selection of the interest rate or commodity section of the chart, the
	component VaR of each Maturity in the selected Asset Class is displayed.
	Equity/Currency Asset Classes
	On selection of the equity or currency section of the chart, the component VaR
	of each Maturity in the selected Asset Class is displayed.
Drill-through On	Level 2 Drill-through
	Only the Asset Class dimension has a 2-level drill-through.
	Interest Rate
	On selection of a particular maturity in the Level 1 drill-through chart, the
	component VaR of each Asset (currency) belonging to the selected Asset Class
	 Maturity combination is displayed.
	Commodity
	On selection of a particular maturity in the Level 1 drill-through chart, the
	component VaR of each Asset (commodity) belonging to the selected Asset
	Class – Maturity combination is displayed.
	Note: All dimensions excluding Asset Class have only 1 level of drill-through.
	Also, the Asset Classes Currency and Equity do not have a second level drill-
	tnrougn.

14.3.4 Risk Estimation Method

ne Page Component VaR - Analytic Method	
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Release 8.0.4.0.0

Report Name	Risk Estimation Method
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	On selection of page level filters parameters of selected Market Risk VaR Model are displayed. Details displayed are Risk Measure Estimation Method, Confidence Level, Reporting Currency and Horizon (in days).

14.3.5 Top 10 Contributors to Portfolio VaR (by Vertex)

Dashboard Page Name	Component VaR - Analytic Method
Report Name	Top 10 Contributors to Portfolio VaR (by Vertex)
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	This is a graphical report of the 10 Asset – Asset Class – Maturity vertices which have the highest Component VaR.



14.4 Component VaR - Simulation Method Subject Area

The following reports are displayed as part of the Component VaR - Simulation Method subject area:

- Component VaR by Dimension
- Risk Estimation Method
- Top 10 Contributors to Portfolio VaR (by Instrument)

14.4.1 Component VaR by Dimension

Dashboard Page Name	Component VaR - Simulation Method
Report Name	Component VaR by Dimension
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Component VaR by Dimension is a graphical report displaying the component VaR of each member of the selected dimension. The dimensions to be displayed are as follows: Asset Asset Asset Class Counterparty Currency Instrument Type Legal Entity Line of Business Trading Desk
Drill-through On	Level 1Drill-through Asset Drill-through to the level of Component VaR of each maturity of each selected Asset (commodity only). Asset Class Interest Rate/Commodity Asset Classes



Release 8.0.4.0.0

On selection of the interest rate or commodity section of the chart, the
Equity/Currency Accot Classos
On selection of the equity or currency section of the chart, the component VaR of each Maturity in the selected Asset Class is displayed.
Instrument Type
On selection of a particular instrument type, the component VaR of each instrument of the selected instrument type is displayed.
iv. Trading Desk
On selection of a particular trading desk, the component VaR of each trader belonging to the selected trading desk is displayed.
Note : There is no drill-through for the dimensions Counterparty, Currency, Legal Entity and Line of Business.
Level 2 Drill-through
Only the Asset Class dimension has a 2-level drill-through.
Interest Rate
On selection of a particular maturity in the Level 1 drill-through chart, the component VaR of each Asset (currency) belonging to the selected Asset Class – Maturity combination is displayed.
Commodity
On selection of a particular maturity in the Level 1 drill-through chart, the component VaR of each Asset (commodity) belonging to the selected Asset Class – Maturity combination is displayed.
Note: All dimensions excluding Asset Class have only 1 level of drill-through.
Also, the Asset Classes Currency and Equity do not have a second level drill-
through.

14.4.2 Risk Estimation Method

Dashboard Page Name	Component VaR - Analytic Method
Report Name	Risk Estimation Method
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model



Release 8.0.4.0.0

Report Level Filters	0
Report Description	On selection of page level filters parameters of selected Market Risk VaR Model are displayed. Details displayed are Risk Measure Estimation Method, Confidence Level, Reporting Currency and Horizon (in days).

14.4.3 Top 10 Contributors to Portfolio VaR (by Instrument)

Dashboard Page Name	Component VaR - Analytic Method
Report Name	Top 10 Contributors to Portfolio VaR (by Instrument)
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	This is a graphical report of the 10 Instruments which have the highest Component VaR.

14.5 Marginal & Incremental VaR Subject Area

The following reports are displayed as part of the Marginal & Incremental VaR subject area:

- Incremental VaR
- Marginal VaR by Vertex
- Risk Estimation Method
- Top 10 Marginal VaR Contributors (by Vertex)

14.5.1 Incremental VaR

Dashboard Page Name	Marginal & Incremental VaR
Report Name	Incremental VaR
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model



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Report Level Filters	0
Report Description	This is a tabular report displaying information related to incremental VaR. Following are the information that are displayed in tabular format: Incremental Portfolio VaR Portfolio VaR limit Limit utilization as incremental VaR percentage Baseline portfolio VaR Percentage Increase in portfolio VaR Limit utilization as baseline portfolio percentage

14.5.2 Marginal VaR by Vertex

Dashboard Page Name	Marginal & Incremental VaR
Report Name	Marginal VaR by Vertex
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	This is tabular report displaying marginal VaR by Asset - Asset Class and Maturity. Additionally it also displays the ranking among the given rows. Following is the information that is displayed: Asset Asset Class Maturity Marginal VaR Rank

14.5.3 Risk Estimation Method

Dashboard Page Name	Marginal & Incremental VaR
Report Name	Risk Estimation Method
Dashboard Name	Market Risk



Release 8.0.4.0.0

Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	On selection of page level filters parameters of selected Market Risk VaR Model are displayed. Details displayed are Risk Measure Estimation Method, Confidence Level, Reporting Currency and Horizon (in days).

14.5.4 Top 10 Marginal VaR Contributors (by Vertex)

Dashboard Page Name	Marginal & Incremental VaR
Report Name	Top 10 Marginal VaR Contributors (by Vertex)
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	This is Graphical representation of top ten Marginal VaR. Top ten ranking of marginal VaR is done at Asset, Asset Class and Maturity granularity. X-axis displays Marginal VaR value and Y-axis displays Asset, Asset Class and Maturity.

14.6 Greeks

The following report is displayed as part of the Greeks subject area:

Greeks of Option Instruments

14.6.1 Greeks of Option Instruments

Dashboard Page Name	Greeks
Report Name	Greeks of Option Instruments
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Volatility Model
Report Level Filters	0



Release 8.0.4.0.0

	Report displays the greek values for option instrument in tabular format. Following measures are displayed for each Option Instrument:
	Delta
Report Description	Gamma
	Vega
	Theta
	Rho

14.7 Stress & Back Testing

The following reports are displayed as part of the Stress & Back Testing subject area:

- Back Test Report
- Baseline Portfolio VaR
- P&L Comparison Report
- Loss across Stress Scenarios
- P&L Distribution under Stress Scenarios
- Risk Estimation Static
- Stress Testing Report

14.7.1 Back Test Report

Dashboard Page Name	Stress & Back Testing
Report Name	Back Test Report
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Back Test report is tabular report and displays the following back test measures: Number of Back Testing Days Number of Exceptions P-value Critical value at 1% Significance Level



Release 8.0.4.0.0

Critical Value at 5% Significance Level
Loss Exception Deviation
Average Loss Duration (in days)
Loss Duration Deviation (in days)

14.7.2 Baseline Portfolio VaR

Dashboard Page Name	Stress & Back Testing
Report Name	Baseline Portfolio VaR
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	The baseline VaR of the selected portfolio under the Market Risk VaR Model selected is displayed.

14.7.3 P&L Comparison Report

Dashboard Page Name	Stress & Back Testing
Report Name	P&L Comparison Report
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Hypothetical P&L Report is a 2-axis report which displays the hypothetical P&L and the VaR estimate under the selected Market Risk VaR Model across a trailing period of 30 business days. This graph has the date on the horizontal axis and the VaR and Hypothetical P&L on the vertical axis.

14.7.4 Loss across Stress Scenarios



Release 8.0.4.0.0

Dashboard Page Name	Stress & Back Testing
Report Name	Loss across Stress Scenarios
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	This is a 2-axis bar chart displaying the stressed loss under all the stress scenarios mapped to the selected Portfolio – Market Risk VaR Model combination. The graph has the stressed loss on the horizontal axis and the stress scenarios on the vertical axis.

14.7.5 P&L Distribution under Stress Scenarios

Dashboard Page Name	Stress & Back Testing
Report Name	P&L Distribution under Stress Scenarios
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Stressed P&L Distribution is a graphical display of the P&L Distribution under the selected stress scenario. The graph has the Stressed P&L values on the horizontal axis and the frequency of the P&L values on the vertical axis. The Stressed P&L values are bucketed into equal-width buckets in order to estimate the frequency. The graph is a stacked column graph where the data falling within the 10% mark, 20% mark, 30% mark and 30%-70% is displayed in a different color.

14.7.6 Risk Estimation Static

Dashboard Page Name	Stress & Back Testing
------------------------	-----------------------



Release 8.0.4.0.0

Report Name	Risk Estimation Static
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	On selection of page level filters parameters of selected Market Risk VaR Model are displayed. Details displayed are Risk Measure Estimation Method, Confidence Level, Reporting Currency and Horizon (in days).

14.7.7 Stress Testing Report

Dashboard Page Name	Stress & Back Testing
Report Name	Stress Testing Report
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio, Market Risk VaR Model
Report Level Filters	0
Report Description	Stress Testing Report is tabular report which displays the stressed loss under each scenario mapped to the selected Portfolio.

14.8 Comparison Across Portfolios

The following reports are displayed as part of the Comparison Across Portfolios subject area:

- Back Test Report
- Risk Estimation Method
- Risk Measure Report
- Stress Testing Report

14.8.1 Back Test Report

Dashboard Page Name	Comparison Across Portfolios
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Report Name	Back Test Report
Dashboard Name	Market Risk
Page Level Filters	Date, Market Risk VaR Model
Report Level Filters	0
Report Description	Back Test Report is tabular report which displays the back testing outputs for portfolio associated with Market Risk VaR Model. Number of Back Testing Days, the back test parameter of the selected Market Risk VaR Model, is displayed. In addition, the following back test measures are displayed for all the portfolios mapped to the selected Market Risk VaR Model: Number of Exceptions P-value
	Critical value at 1% Significance Level Critical Value at 5% Significance Level Loss Exception Deviation Average Loss Duration (in days) vii. Loss Duration Deviation (in days)

14.8.2 Risk Estimation Method

Dashboard Page Name	Comparison Across Portfolios
Report Name	Risk Estimation Method
Dashboard Name	Market Risk
Page Level Filters	Date, Market Risk VaR Model
Report Level Filters	0
Report Description	On selection of page level filters parameters of selected Market Risk VaR Model are displayed. Details displayed are Risk Measure Estimation Method, Confidence Level, Reporting Currency and Horizon (in days).

14.8.3 Risk Measure Report



Release 8.0.4.0.0

Dashboard Page Name	Comparison Across Portfolios
Report Name	Risk Measure Report
Dashboard Name	Market Risk
Page Level Filters	Date, Market Risk VaR Model
Report Level Filters	0
Report Description	Risk Measure Report is tabular report which displays the VaR Model outputs for portfolio. Risk Measure Report displays the following risk measures, for all the portfolios which are mapped to the selected Market Risk VaR Model, in a tabular format: Value-at-Risk Conditional Value-at-Risk Current Portfolio Value Simulated Portfolio Value VaR % of Current Portfolio Value vi. Portfolio VaR Limit

14.8.4 Stress Testing Report

Dashboard Page Name	Comparison Across Portfolios
Report Name	Stress Testing Report
Dashboard Name	Market Risk
Page Level Filters	Date, Market Risk VaR Model
Report Level Filters	Stress Scenario
Report Description	Stress Testing Report displays stressed loss of all portfolios, mapped to the selected Market Risk VaR Model, in a tabular format. A list of all the stress scenarios defined are available for selection.



14.9 Comparison Across VaR Models

The following reports are displayed as part of the Comparison Across VaR Models subject area:

- Back Test Report
- Risk Measure Report
- Stress Testing Report

14.9.1 Back Test Report

Dashboard Page Name	Comparison Across VaR Models
Report Name	Back Test Report
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio
Report Level Filters	0
Report Description	Back Test Report is tabular report which displays the back testing outputs for portfolio associated with Market Risk VaR Model. Number of Back Testing Days, the back test parameter of the selected Market Risk VaR Model, is displayed. In addition, the following back test measures are displayed for all the portfolios mapped to the selected Market Risk VaR Model: Number of Exceptions P-value Critical value at 1% Significance Level Critical Value at 5% Significance Level Loss Exception Deviation Average Loss Duration (in days) Loss Duration Deviation (in days)

14.9.2 Risk Measure Report

Dashboard Page Name	Comparison Across VaR Models
Report Name	Risk Measure Report



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Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio
Report Level Filters	0
Report Description	Risk Measure Report is tabular report which displays the VaR Model outputs for portfolio. Risk Measure Report displays the following risk measures, for all the portfolios which are mapped to the selected Market Risk VaR Model, in a tabular format: Value-at-Risk Conditional Value-at-Risk Current Portfolio Value Simulated Portfolio Value VaR % of Current Portfolio Value Portfolio VaR Limit

14.9.3 Stress Testing Report

Dashboard Page Name	Comparison Across VaR Models
Report Name	Stress Testing Report
Dashboard Name	Market Risk
Page Level Filters	Date, Portfolio
Report Level Filters	Stress Scenario
Report Description	Stress Testing Report displays stressed loss of all portfolios, mapped to the selected Market Risk VaR Model, in a tabular format. A list of all the stress scenarios defined is available for selection.

14.10 Market Analysis

The following reports are displayed as part of the Market Analysis subject area:

- Commodity Prices
- Exchange Rates
- Stock Index Values

Interest Rates

14.10.1 Commodity Prices

Dashboard Page Name	Market Analysis
Report Name	Commodity Prices
Dashboard Name	Market Risk
Page Level Filters	Date
Report Level Filters	Commodity
Report Description	On selection of a particular commodity, its spot price is displayed for a trailing period of 90 business days. The chart has the date on the horizontal axis and the commodity prices on the vertical axis.

14.10.2 Exchange Rates

Dashboard Page Name	Market Analysis
Report Name	Exchange Rates
Dashboard Name	Market Risk
Page Level Filters	Date
Report Level Filters	Currency
Report Description	On selection of a particular currency, the following exchange rates are displayed for a trailing period of 90 business days: GBP – Selected Currency USD – Selected Currency EUR - Selected Currency JPY - Selected Currency The chart has the date on the horizontal axis and the exchange rates on the vertical axis.



14.10.3 Stock Index Values

Dashboard Page Name	Market Analysis
Report Name	Stock Index Values
Dashboard Name	Market Risk
Page Level Filters	Date
Report Level Filters	Stock
	This section has 2 reports:
	Index Value across Time
	On selection of a particular stock index, its value across a trailing period of 90
	business days is displayed. The chart has the date on the horizontal axis and
	the index values on the vertical axis. List of all available stock indices is
	displayed for selection.
	Values of Major Stock Indices
Bonort Description	The values of certain key indices are displayed in a tabular format with the
Report Description	following column headers:
	Stock Index
	Index Value
	The closing value of the steel index is displayed for the celested date
	Change
	Change in the value of the index over the previous day's value is displayed.
	% Change
	The % change in the value of the index over the day's value is displayed.

14.10.4 Interest Rates

Dashboard Page Name	Market Analysis
Report Name	Interest Rates
Dashboard Name	Market Risk



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Page Level Filters	Date
Report Level Filters	Currency
Report Description	This section has 2 charts which displays the interest rates for a given currency. Zero Coupon Yield Curve This is a 2-axis chart which displays the Zero Coupon Yield Curve of the Sovereign, Money Market and AAA Interest Rate Asset Classes. It has the maturity on the horizontal axis and the zero coupon rates on the vertical axis. Interest Rate across Time On selection of a particular maturity, the zero coupon rates of the Sovereign, Money Market and AAA Interest Rate Asset Classes for the selected maturity is displayed for a trailing period of 90 business days. It has the date on the horizontal axis and the zero coupon rates for the selected maturity on the vertical axis. A list of all available maturities is displayed for selection.







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