Oracle® Risk Management

User Guide

Release 11*i*

Part No. A97648-01

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ORACLE®

Oracle Risk Management, Release 11*i*

Part No. A97648-01

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Oracle Risk Management, Release 11*i*

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Preface

Welcome to Release 11*i* of the *Oracle Risk Management User Guide*.

This guide includes the information that you need to work with Risk Management effectively. It contains detailed information about the following:

- Overview and reference information

- Risk Management implementation suggestions

- Specific tasks you can accomplish using Risk Management

- How to use Risk Management pages

- Risk Management analysis tools and calculators

- Risk Management system setup

This preface explains how this guide is organized and introduces other sources of information that can help you.

Audience for this guide

This guide assumes you have a working knowledge of the following:

- The principles and customary practices of your business area.

- Treasury

  If you have never used Treasury, we suggest you attend the Treasury training classes available through Oracle University.

- Risk Management

- The Oracle Applications graphical user interface.

To learn more about the Oracle Applications graphical user interface, read the Oracle Applications User Guide.

See Other Information Sources for more information about Oracle Applications product information.

How To Use This Guide

This guide contains the information you need to understand and use Risk Management.

This guide contains the following chapters:

- Chapter 1 provides an overview of Risk Management, including a review of the Oracle Applications graphical user interface.

- Chapter 2 describes how to set up Risk Management to work with your Oracle Applications.

- Chapter 3 describes how to manage position, maturity, and gap analyses. This chapter also explains how to create filters and time buckets.

- Chapter 4 describes how to use calculators. This chapter describes the Discounted Securities Calculator, Foreign Exchange Forward Calculator, Foreign Exchange Option Calculator, Forward Rate Agreement Pricing Calculator, and Forward Rate Agreement Settlement Calculator.

- Appendix A lists deal attributes alphabetically and by deal type.

- Appendix B includes equations that Risk Management uses when calculating outputs.

- Appendix C contains details about the deal examples that are used in previous chapters.

Documentation Accessibility

Our goal is to make Oracle products, services, and supporting documentation accessible, with good usability, to the disabled community. To that end, our documentation includes features that make information available to users of assistive technology. This documentation is available in HTML format, and contains markup to facilitate access by the disabled community. Standards will continue to evolve over time, and Oracle Corporation is actively engaged with other market-leading technology vendors to address technical obstacles so that our documentation can be accessible to all of our customers. For additional information, visit the Oracle Accessibility Program Web site at http://www.oracle.com/accessibility/.

Accessibility of Code Examples in Documentation

JAWS, a Windows screen reader, may not always correctly read the code examples in this document. The conventions for writing code require that closing braces should appear on an otherwise empty line; however, JAWS may not always read a line of text that consists solely of a bracket or brace.

Other Information Sources

You can choose from many sources of information, including online documentation, training, and support services, to increase your knowledge and understanding of Oracle Risk Management.

If this guide refers you to other Oracle Applications documentation, use only the Release 11*i* versions of those guides.

Online Documentation

All Oracle Applications documentation is available online (HTML or PDF).

- **Online Help** - The new features section in the HTML help describes new features in 11*i*. This information is updated for each new release of Oracle Risk Management. The new features section also includes information about any features that were not yet available when this guide was printed. For example, if your administrator has installed software from a mini-pack upgrade, this document describes the new features. Online help patches are available on MetaLink.

- **11*i* Features Matrix** - This document lists new features available by patch and identifies any associated new documentation. The new features matrix document is available on MetaLink.

- **About Document** - Refer to the About document for patches that you have installed to learn about new documentation or documentation patches that you can download. The new About document is available on MetaLink.

Related Guides

Oracle Risk Management shares business and setup information with other Oracle Applications products. Therefore, you may want to refer to other guides when you set up and use Oracle Risk Management.

You can read the guides online by choosing Library from the expandable menu on your HTML help window, by reading from the Oracle Applications Document Library CD included in your media pack, or by using a Web browser with a URL that your system administrator provides.

If you require printed guides, you can purchase them from the Oracle Store at http://oraclestore.oracle.com.

Guides Related to All Products

Oracle Applications User's Guide

This guide explains how to enter data, query, run reports, and navigate using the graphical user interface (GUI) available with this release of Oracle Risk Management (and any other Oracle Applications products). This guide also includes information on setting user profiles, as well as running and reviewing reports and concurrent processes.

Guides Related to This Product

Oracle Treasury

This guide describes how to use Oracle Treasury to manage your financial market transactions and exposures. It also describes how to perform in-house banking.

Installation and System Administration

Oracle Applications Concepts

This guide provides an introduction to the concepts, features, technology stack, architecture, and terminology for Oracle Applications Release 11*i*. It provides a useful first book to read before an installation of Oracle Applications. This guide also introduces the concepts behind Applications-wide features such as Business Intelligence (BIS), languages and character sets, and Self-Service Web Applications.

Installing Oracle Applications

This guide provides instructions for managing the installation of Oracle Applications products. In Release 11*i*, much of the installation process is handled using Oracle Rapid Install, which minimizes the time to install Oracle Applications, the Oracle9 technology stack, and the Oracle9*i* Server technology stack by automating many of the required steps. This guide contains instructions for using Oracle Rapid Install and lists the tasks you need to perform to finish your installation. You should use this guide in conjunction with individual product user guides and implementation guides.

Oracle Applications Implementation Wizard User Guide

If you are implementing more than one Oracle product, you can use the Oracle Applications Implementation Wizard to coordinate your setup activities. This guide describes how to use the wizard.

Upgrading Oracle Applications

Refer to this guide if you are upgrading your Oracle Applications Release 10.7 or Release 11.0 products to Release 11*i*. This guide describes the upgrade process and lists database and product-specific upgrade tasks. You must be either at Release 10.7 (NCA, SmartClient, or character mode) or Release 11.0, to upgrade to Release 11*i*. You cannot upgrade to Release 11*i* directly from releases prior to 10.7.

Maintaining Oracle Applications

Use this guide to help you run the various AD utilities, such as AutoUpgrade, AutoPatch, AD Administration, AD Controller, AD Relink, License Manager, and others. It contains how-to steps, screenshots, and other information that you need to run the AD utilities. This guide also provides information on maintaining the Oracle applications file system and database.

Oracle Applications System Administrator's Guide

This guide provides planning and reference information for the Oracle Applications System Administrator. It contains information on how to define security, customize menus and online help, and manage concurrent processing.

Oracle Alert User's Guide

This guide explains how to define periodic and event alerts to monitor the status of your Oracle Applications data.

Oracle Applications Developer's Guide

This guide contains the coding standards followed by the Oracle Applications development staff. It describes the Oracle Application Object Library components needed to implement the Oracle Applications user interface described in the *Oracle Applications User Interface Standards for Forms-Based Products*. It also provides information to help you build your custom Oracle Forms Developer 6*i* forms so that they integrate with Oracle Applications.

Oracle Applications User Interface Standards for Forms-Based Products

This guide contains the user interface (UI) standards followed by the Oracle Applications development staff. It describes the UI for the Oracle Applications products and how to apply this UI to the design of an application built by using Oracle Forms.

Other Implementation Documentation

Oracle Applications Product Update Notes

Use this guide as a reference for upgrading an installation of Oracle Applications. It provides a history of the changes to individual Oracle Applications products between Release 11.0 and Release 11*i*. It includes new features, enhancements, and changes made to database objects, profile options, and seed data for this interval.

Multiple Reporting Currencies in Oracle Applications

If you use the Multiple Reporting Currencies feature to record transactions in more than one currency, use this manual before implementing Oracle Risk Management. This manual details additional steps and setup considerations for implementing Oracle Risk Management with this feature.

Multiple Organizations in Oracle Applications

This guide describes how to set up and use Oracle Risk Management with Oracle Applications' Multiple Organization support feature, so you can define and support different organization structures when running a single installation of Oracle Risk Management.

Oracle Workflow Guide

This guide explains how to define new workflow business processes as well as customize existing Oracle Applications-embedded workflow processes. You also use this guide to complete the setup steps necessary for any Oracle Applications product that includes workflow-enabled processes.

Oracle Applications Flexfields Guide

This guide provides flexfields planning, setup and reference information for the Oracle Risk Management implementation team, as well as for users responsible for the ongoing maintenance of Oracle Applications product data. This guide also provides information on creating custom reports on flexfields data.

Oracle eTechnical Reference Manuals

Each eTechnical Reference Manual (eTRM) contains database diagrams and a detailed description of database tables, forms, reports, and programs for a specific Oracle Applications product. This information helps you convert data from your existing applications, integrate Oracle Applications data with non-Oracle applications, and write custom reports for Oracle Applications products. Oracle eTRM is available on Metalink

Oracle Applications Message Manual

This manual describes all Oracle Applications messages. This manual is available in HTML format on the documentation CD-ROM for Release 11*i*.

Training and Support

Training

Oracle offers a complete set of training courses to help you and your staff master Oracle Risk Management and reach full productivity quickly. These courses are organized into functional learning paths, so you take only those courses appropriate to your job or area of responsibility.

You have a choice of educational environments. You can attend courses offered by Oracle University at any one of our many education centers, you can arrange for our trainers to teach at your facility, or you can use Oracle Learning Network (OLN), Oracle University's online education utility. In addition, Oracle training professionals can tailor standard courses or develop custom courses to meet your needs. For example, you may want to use your organization structure, terminology, and data as examples in a customized training session delivered at your own facility.

Support

From on-site support to central support, our team of experienced professionals provides the help and information you need to keep Oracle Risk Management working for you. This team includes your technical representative, account manager, and Oracle's large staff of consultants and support specialists with expertise in your business area, managing an Oracle9*i* server, and your hardware and software environment.

Do Not Use Database Tools to Modify Oracle Applications Data

Oracle STRONGLY RECOMMENDS that you never use SQL*Plus, Oracle Data Browser, database triggers, or any other tool to modify Oracle Applications data unless otherwise instructed.

Oracle provides powerful tools you can use to create, store, change, retrieve, and maintain information in an Oracle database. But if you use Oracle tools such as SQL*Plus to modify Oracle Applications data, you risk destroying the integrity of your data and you lose the ability to audit changes to your data.

Because Oracle Applications tables are interrelated, any change you make using Oracle Applications can update many tables at once. But when you modify Oracle Applications data using anything other than Oracle Applications, you may change a row in one table without making corresponding changes in related tables. If your tables get out of synchronization with each other, you risk retrieving erroneous information and you risk unpredictable results throughout Oracle Applications.

When you use Oracle Applications to modify your data, Oracle Applications automatically checks that your changes are valid. Oracle Applications also keeps track of who changes information. If you enter information into database tables using database tools, you may store invalid information. You also lose the ability to track who has changed your information because SQL*Plus and other database tools do not keep a record of changes.

About Oracle

Oracle Corporation develops and markets an integrated line of software products for database management, applications development, decision support, and office automation, as well as Oracle Applications, an integrated suite of more than 160 software modules for financial management, supply chain management, manufacturing, project systems, human resources and customer relationship management.

Oracle products are available for mainframes, minicomputers, personal computers, network computers and personal digital assistants, allowing organizations to integrate different computers, different operating systems, different networks, and even different database management systems, into a single, unified computing and information resource.

Oracle is the world's leading supplier of software for information management, and the world's second largest software company. Oracle offers its database, tools, and applications products, along with related consulting, education, and support services, in over 145 countries around the world.

Your Feedback

Thank you for using Oracle Risk Management and this user guide.

Oracle values your comments and feedback. In this guide is a reader's comment form that you can use to explain what you like or dislike about Oracle Risk Management or this user guide. Mail your comments to the following address or call us directly at (650) 506-7000.

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U.S.A.

Or, send electronic mail to **appsdoc_us@oracle.com**.

1

Overview of Risk Management

This chapter provides an overview of Oracle Risk Management. Oracle Risk Management provides analysis tools that let you measure and control financial risks.

This chapter contains:

Overview of Risk Management

Oracle Risk Management is a comprehensive solution for managing financial risk for global Treasury operations. Oracle Risk Management provides a set of pricing and analysis tools for the financial instruments that you use in Oracle Treasury.

Oracle Risk Management lets you:

- Calculate prices, fair values, and sensitivies of financial instruments.

- Base your pricing calculations on the yield and volatility curves in Oracle Treasury.

- Analyze your Treasury positions: report amounts outstanding, fair values, and sensitivities of Treasury deals in position analyses.

- Revalue your Treasury positions based on the most recent market data available in Oracle Treasury.

- Analyze the maturity profile of your Treasury deals, mapping the maturing deals into your predefined time structure.

- Analyze the interest rate gap in your Treasury deals, showing where your positions are most sensitive to interest rate changes.

- Create filters and time buckets that allow further personalization of your analyses.

Integration of Risk Management with Treasury

Risk Management provides additional analysis tools for your Treasury deals.

Risk Management's calculators supplement the calculators available in Oracle Treasury by providing pricing calculators for different financial deal types. The calculations can be based on the yield and volatility curves in your Treasury system so that you do not have to reenter the underlying rates for every calculation.

Risk Management's analyses are based on your current Treasury deals. When you run an analysis, Risk Management queries the deals in Oracle Treasury and includes these deals in the analysis based on parameters that you define. Since Risk Management directly uses deals in your Treasury system, you do not need to transfer deal information from Treasury to Risk Management. Risk Management always uses the most up to date version of your Treasury deals.

The deal attributes that Risk Management reports are the same as those in Treasury. For example, the analyses in Risk Management use the Companies, Counterparties, Currencies, Deal Types, Product Types that you set up in Oracle Treasury.

Risk Management supports the security model of Oracle Treasury concerning access of particular users to companies. When calculating an analysis, Risk Management only includes deals for companies the user requesting the analysis has access to.

Oracle Applications User Interface

This section includes information that you need to work with the user interface of Oracle Risk Management effectively.

General Functions

Use these general functions to manage your analyses, filters, and time buckets.

Printing	Use your browser's normal printing functionality to print Risk Management pages.
Searching	Use Risk Management's searching functionality to locate a particular analysis, filter, or time bucket.
	Select the duplicate document icon to duplicate an analysis, filter, or time bucket
	Select the details icon to view the details of an analysis, filter, or time bucket
	Select the update icon to update an analysis, filter, or time bucket

Global Buttons

Use these global buttons to navigate through Oracle's web-based user interface.

	Select the Return to Portal button to return to your portal page.
	Select the Logout icon to log out of Risk Management.

Select the Preferences button to edit your user preferences.

Field References

These field references indicate the status of a particular field.

An asterisk next to a field indicates that the field is mandatory.

Select the calendar icon to open a calendar.

Select the search icon to search through a list of values associated with this field.

Run Status Icons

These run status icons indicate the status of your analyses.

Completed: A checkmark indicates that the process completed successfully. You can view the output.

Not Started: A circle with a square inside it indicates that the analysis has not started. There is no output to view.

In Progress: A clock indicates that the analysis is in progress. You cannot view the output while it is processing.

	Error: A circle with an 'x' inside it indicates that the process did not complete due to an error. You can view error messages by clicking on the Error icon. The Error page lists all of the generated errors. You must correct all of the errors before you can complete the process successfully.
	Warning: A triangle with an exclamation mark inside it indicates that the analysis has completed with a warning. Warnings occur, for instance, when deals cannot be valued because of missing market data.

Navigation Options

The Risk Management application is divided into three separate tabbed regions:

- **Analyses:** Contains the Risk Management analysis tools. For more information on Analyses, see: Overview of Analyses on page 3-2.

- **Setup:** Contains tools for setting up filters and time buckets. For more information on setting up filters and time buckets, see: Creating Filters and Creating Time Buckets on page 3-10.

- **Calculators:** Contains the Risk Management calculators. For more information on Calculators, see: Overview of Calculators on page 4-2.

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Setting Up Risk Management

This chapter explains everything you need to know about setting up Oracle Risk Management.

This chapter includes:

- Setting Responsibilities for Risk Management on page 2-2
- Setup Checklist for Oracle Risk Management on page 2-3
- Product Dependencies on page 2-4

Setting Responsibilities for Risk Management

Risk Management provides the following responsibilities:

- Risk Management Super User - Web

- Risk Management View Only - Web

- Risk Management Super User - Forms

- Risk Management View Only - Forms

- Treasury and Risk Management Super User

To successfully set up Risk Management, the system administrator must use the Risk Management Super User - Web responsibility. Any of the other responsibilities can be assigned to users as necessary.

Web responsibilities (1-2)
If you log in through your Personal Home Page (PHP), you can choose Web responsibilities from the Self Service section.

Forms responsibilities (3-5)
If you log in through your PHP, you can choose the Forms responsibilities from the Applications section. The Risk Management functions will be represented in the Forms Navigator. However, to launch Self Service pages from the Navigator, the Navigator needs to be launched from the PHP. If you launch the Navigator using JInitiator, you cannot launch any Self Service pages.

Super User responsibilities (1,3,5)
The super user will have access to all Risk Management functions and concurrent programs.

The Treasury and Risk Management Super User responsibility merges Treasury Superuser and Risk Management Super User - Forms. This responsibility provides access to all functions and concurrent programs/reports available from each responsibility.

View Only responsibilities (2,4)
The View Only responsibilities only lets you access the calculator pages and the view and run analyses. These users cannot access any of the set up areas, specifically Filters, Time Buckets, and Analysis Settings.

Setup Checklist for Oracle Risk Management

To use Risk Management you need to fully implement General Ledger and Treasury. For more information on how to set up General Ledger, see: *Oracle General Ledger User Guide*. For more information on how to set up Treasury, see: *Oracle Treasury User Guide*.

The following table lists the specific General Ledger and Treasury setup steps which directly affect your ability to use Risk Management.

Step Number	Required?	Step Description	AIW Reference
Step 1	Required	Define your chart of accounts.	General Ledger
Step 2	Required	Enable the currencies that you plan to use.	General Ledger
Step 3	Required	Define your accounting period types and accounting calendar periods.	General Ledger
Step 4	Required	Define a set of books. Specify the name for the set of books and assign it a calendar, functional currency, and a chart of accounts structure.	General Ledger
Step 5	Required	If you want to enter foreign currency transactions, define your additional rate types.	General Ledger
Step 6	Optional	Define a transaction calendar to determine which days are business days to be used in date calculation in Risk Management.	General Ledger
Step 7	Required	Define your system parameters.	Treasury
Step 8	Required	Define your currency details.	Treasury
Step 9	Required	Define your company profiles, including the accounting process that you want to use for your company.	Treasury
Step 10	Optional	Define your currency holiday rules.	Treasury
Step 11	Optional	Define your default settlement accounts.	Treasury
Step 12	Optional	Define your default settlement actions.	Treasury
Step 13	Optional	Define your current system rates.	Treasury
Step 14	Optional	If you want to use Risk Management analyses, you must define market data curves and market data sets in order to enable your system to revalue your deals.	Treasury

Product Dependencies

To run Risk Management, you must first apply, at minimum, Oracle Applications Framework 5.6E and Oracle Treasury mini-pack 11i.XTR.F.

All Framework and Treasury-related installation instructions are provided by those products.

3

Financial Analysis

This chapter provides an overview of how to use Risk Management financial analysis tools.

This chapter contains the following topics:

- Overview of Analyses on page 3-2
- Analysis Styles on page 3-7
- Overview of Filters and Time Buckets on page 3-9
- Creating Filters on page 3-10
- Creating Time Buckets on page 3-11
- Creating Analyses on page 3-12

Overview of Analyses

Risk Management enables you to create personalized analyses based on your Treasury deals. In Risk Management, an analysis contains a collection of Treasury deal data that is calculated and displayed in a table, either deal by deal or aggregated. There are three analyses types that you can run in Risk Management:

Position Analysis

A position analysis measures the amount outstanding for a set of Treasury deals. It also measures the fair value and sensitivities for a set of Treasury deals at one or more points in time (time buckets). Only deals that are current on the defined points in time are included in the position analysis.

The following example shows a position analysis of bonds outstanding, which lists every bond that is held as a separate row in a table, and shows the Amount Outstanding, Currency, Maturity Date, Fair Value, Accrued Interest, Duration, Convexity, Position Base Point Value, Yield to Maturity, Coupon Date, and Coupon Frequency. For more information, see: Appendix C, "Examples".

How Oracle Risk Management calculates a position analysis

You can calculate a position for a particular point in time (date) or for several points in time. A deal is included in the analysis for some point in time (position date) if Deal Date <= Position Date < End Date. For a description of the deal attributes, see: Appendix A, "Deal Attributes".

Figure 3–1   Position Analysis

When you include fair values, accrued interest, and sensitivities (duration, convexity, basis point values, greeks, and so on) in your analysis, Oracle Risk Management determines if it needs to recalculate these values based on the threshold specified on the General page of the analysis setup. For every deal included in the analysis, the system checks if these values have been calculated within the threshold. If this is the case, the values are not calculated. This allows Risk Management to avoid spending time calculating all these values when the underlying market data has not changed. For example, if you load fresh market data into the Oracle Treasury tables every hour, you might want to set the Threshold to one hour, so that you do not recalculate all the fair values until new market data is available.

Fair values, accrued interest, and sensitivities (duration, convexity, basis point values, greeks, and so on) are calculated as of the date that you run your analysis. For example, if you define an analysis to view your position as of the end of the month, the system will include the deals in your analysis that are current at the end of the month, but the fair values, accrued interest, and sensitivities will be

calculated as of today (the day you are calculating your analysis). This occurs because Risk Management can only revalue the deals as of today.

Maturity Analysis

A maturity analysis measures the maturity amount for a set of Treasury deals during one or more time intervals. Only deals that come to maturity during the specified time intervals are included in the maturity analysis.

This example shows a maturity analysis of physical Money Market deals, using a rolling time bucket structure with 5 daily buckets followed by 3 weekly buckets and 3 monthly buckets starting on Today. The numbers are aggregated by Company, Currency, Deal Type, and Deal Subtype. For more information, see: Appendix C, "Examples".

How Oracle Risk Management calculates a maturity analysis
You can calculate a maturity analysis for a particular time interval (date range) or for several time intervals. A deal is included in a time interval if the following condition is met: Interval Start Date <= Maturity Date <= Interval End Date (see: Appendix A, "Deal Attributes" for a description of the deal attributes).

Figure 3–2   Maturity Analysis

The most prominent amount to include in the maturity analysis is the Maturity Amount. The *maturity amount* is the amount that comes to maturity on the maturity date, adjusted for any principal changes that could happen before maturity and not including any interest or coupon that would be paid on maturity.

Gap Analysis

A gap analysis measures interest rate exposure for a set of Treasury deals. The analysis monitors the nominal values of investments and funding that are resetting or maturing during a specified time interval. The net difference between both numbers is the gap. The effects of derivative instruments can also be added to the gap analysis, which can increase or decrease the gap.

This example shows a gap analysis of USD Money Market Deals, using a set of time buckets of different lengths. The results are aggregated by Money Market Instrument Type (Fund/Invest/Derivative) and by Deal Type. Totals are displayed

for both levels of aggregation. For more information on how to replicate this scenario, see: Appendix C, "Examples".

How Oracle Risk Management calculates a gap analysis

You can calculate a gap analysis for a particular time interval (date range) or for several time intervals. A deal is included in a time interval if the following condition is met: Interval Start Date <= Gap Date <= Interval End Date.

Figure 3–3   Gap Analysis

Gap Analysis

Last Run **31-Jan-2001 00:00:00**
Gap Analysis over 5 Years
    Filter **Money Market USD**   Currency **Deal Currency**
From Date **System Date**   Units **1**
    To Date **System Date**   Measure **Gap Amount**

Money Market Instrument Type	Deal Type	Less than 1 Month	1-2 Month	2-3 Month	3-6 Month	6-12 Month	1-2 Years	2-5 Years
Derivative	BONDOPT		<980,000.00>		1,000,000.00			
Derivative	FRA	<10,000,000.00>						
Derivative	IRO		1,000,000.00		<1,000,000.00>			
Derivative	IRS		<2,000,000.00>	100,000.00				
	Total (USD)	<10,000,000.00>	<1,980,000.00>	100,000.00	0.00			
Fund	BOND							<10,000,000.00>
Fund	INTERCO	<1,000,000.00>						
Fund	DISCSEC			<1,000,000.00>				
Fund	RTMM							
Fund	TERM			<100,000.00>		<275,000.00>		
	Total (USD)	<1,000,000.00>		<1,100,000.00>		<275,000.00>		<10,000,000.00>
Invest	BOND	10,000,000.00				200,000.00	100,000.00	
Invest	DISCSEC		200,000.00					
Invest	O/N	3,000,000.00						
	Total (USD)	13,000,000.00	200,000.00			200,000.00	100,000.00	
Total (USD)		2,000,000.00	<1,780,000.00>	<1,000,000.00>	0.00	<75,000.00>	100,000.00	<10,000,000.00>

The *gap date* is the maturity date of the deal for fixed rate deals and the next reset (fixing) date for floating rate deals (see: Appendix A, "Deal Attributes" for a description of the deal attributes).

The most prominent amount to include in the gap analysis is the Gap Amount. The *gap amount* is the amount for which the interest rate will need to be fixed on the gap date.

Analysis Styles

In Risk Management there are four different styles of analysis that you can choose to create: table, aggregated table, crosstab, and crosstab with time buckets.

Table

A table analysis lists data in rows and columns. You can specify which deal attributes to use as columns in the table. One row appears for each deal.

Figure 3–4   Table Analysis

Amount Outstanding	Currency	Maturity Date	Fair Value	Accrued Interest	Duration	Convexity	Position BPV	Yield to Maturity	Coupon Rate	Coupon
100,000.00	USD	31-Jan-2002	100,000.00	0.00	0.981909	1.050248	<9.79>	4.000000	4.000000	
100,000.00	USD	31-Jul-2001	100,245.70	0.00	0.500000	0.482949	<4.93>	3.500000	4.000000	
100,000.00	EUR	30-Nov-2001	102,309.17	666.67	0.823624	1.073354	<8.34>	2.000000	4.000000	
100,000.00	CAD	30-Apr-2001	99,024.27	0.00	0.250000	0.288924	<2.38>	4.000000	0.000000	
5,000,000.00	USD	01-Feb-2001	4,999,750.00	0.00	0.002778	0.002687	<1.36>	1.812500	0.000000	
100,000.00	USD	31-Jul-2001	100,245.70	0.00	0.500000	0.482949	<4.93>	3.500000	4.000000	

Aggregated Table

An aggregated table analysis lists deal data in rows and non-aggregated columns. You can specify which deal attributes to use as columns and which attributes to aggregate rows by. For example, you can choose to aggregate rows of your table by deal type and company. Deals are listed using the aggregate criteria that you selected. For example, the data in the table below is aggregated by Base and Contra Currency combination. Therefore, the value of all deals with a currency combination of EUR and CAD is shown in row 1, the value of all deals with a currency combination of EUR and USD is shown in row 2, and so on.

Figure 3–5   Aggregated Table Analysis

Base Currency	Contra Currency	Base Currency Amount	Contra Currency Amount	Fair Value	Transaction Foreign Exchange Rate	Revaluation Foreign Exchange Rate
EUR	CAD	2,071,428.57	<2,926,000.00>	<13,128.01>	1.396414	1.396891
EUR	USD	<2,160,411.89>	2,000,000.00	<45,832.31>	0.925749	0.932435
USD	CAD	1,179,487.19	<1,995,600.00>	28,099.86	1.477169	1.499313

Crosstab

A crosstab analysis displays a matrix of aggregated data. You must specify which deal attributes to use as cells and which attributes to aggregate rows and columns by. You can aggregate rows by one or more attributes and columns by one attribute only. For example, if you aggregate the columns by currency, the CAD, EUR, and USD bond deals appear in separate columns in the second row.

Figure 3–6   Crosstab Analysis

Deal Type	Instrument Type	CAD	EUR	USD
BONDOPT	Derivative		1,020,000.00	1,980,000.00
BOND	Physical	100,000.00	100,000.00	<4,700,000.00>
FRA	Derivative	10,000,000.00	80,000,000.00	10,000,000.00
INTERCO	Physical		500,000.00	<1,000,000.00>
IRO	Derivative		3,000,000.00	2,000,000.00
IRS	Derivative		<2,300,000.00>	1,500,000.00
DISCSEC	Physical		400,000.00	<800,000.00>
O/N	Physical		<2,000,876.71>	3,000,000.00
TERM	Physical	1,000,000.00	9,925,000.00	<400,000.00>

Crosstab with Time Buckets

A crosstab with time buckets analysis displays a matrix of aggregated data. You must specify which deal attributes you want to aggregate rows by and which time buckets you want to aggregate the columns by.

In the following example, data is aggregated by Company, Currency, Deal Type and Deal Subtype and presented using a rolling time bucket structure with 5 daily buckets, 3 weekly buckets, and 3 monthly buckets. You can define time buckets for any set of time intervals that you want. For more information on setting up time buckets for your analyses, see: Creating Time Buckets on page 3-11.

Figure 3–7   Crosstab with Time Buckets

Company	Currency	Deal Type	Deal Subtype	31-JAN-01	01-FEB-01	02-FEB-01	03-FEB-01	04-FEB-01	11-FEB-01	18-FEB-01	25-FEB-01	25-MAR-01	25-APR-01	25-MAY-01
QRM1USD	EUR	INTERCO	INVEST		500,000.00									
QRM1USD	EUR	DISCSEC	BUY_U								400,000.00			
QRM1USD	EUR	O/N	FUND		<2,000,876.71>									
QRM1USD	USD	INTERCO	FUND		<1,000,000.00>									
QRM1USD	USD	DISCSEC	BUY_U								200,000.00			
QRM1USD	USD	O/N	INVEST		1,000,000.00				1,000,000.00					
		Total (USD)			<1,397,016.04>				1,000,000.00		572,320.00			
QRM2USD	CAD	BOND	BUY											100,000.00
QRM2USD	USD	O/N	INVEST		1,000,000.00									
		Total (USD)			1,000,000.00									66,688.90
QRM3EUR	USD	BOND	BUY	5,000,000.00	5,000,000.00									
QRM3EUR	USD	DISCSEC	ISSUE_U									<1,000,000.00>		
		Total (USD)		5,000,000.00	5,000,000.00							<1,000,000.00>		

Overview of Filters and Time Buckets

Risk Management enables you to set up filters and time buckets, which you can apply to your analyses. Filters and time buckets can be set up before you create an analysis. Once you set up a filter or time bucket, you can use it in multiple analyses. For additional information on creating an analysis, see: Creating Analyses on page 3-12.

Filters

Use filters to define which deals you want to include in an analysis. For example, if you want to analyze money market deals, you can set up a filter that will select only those types of deals. To set up a filter, go to the setup tabbed region. Once you have set up a filter, you can apply it to multiple analyses of any style. For additional information on setting up a filter, see: Creating Filters on page 3-10.

Time Buckets

Use time buckets to group data into particular time intervals. For example, if you want to do an analysis for deals by accounting period, you can define your accounting periods as a time bucket. Time buckets can only be used with the Crosstab with Time Buckets analysis. To set up time buckets, go to the setup tabbed region. Once you set up a time bucket, you can apply it to multiple Crosstab with Time Buckets analyses. For additional information on setting up time buckets, see: Creating Time Buckets on page 3-11.

Creating Filters

Risk Management enables you to create, update, duplicate, and delete filters.

To create a new filter:

1. Navigate to the List of Filters page.

2. Click the Create Filter button.

3. Enter information into the Filter Name and Description fields.

4. Choose what condition relation you want to apply to the filter. If you choose AND, the filter ensures that deals meet all conditions. If you choose OR, the filter checks if deals meet any of the conditions.

5. Choose a deal attribute from the list and click the Add Condition button to add that condition to your filter. For more information about deal attributes that you can use in conditions, see: Appendix B, "Deal Calculations" on page B-1.

6. Enter values in the Relation and Value fields for this new condition.

7. Repeat the last two steps until you have added all the conditions that you want to add to your filter.

   You can change or delete a filter's conditions as necessary.

8. Click Apply to create or Cancel to cancel the filter.

Creating Time Buckets

Risk Management enables you to create, update, duplicate, and delete time buckets.

To create a new set of time buckets:

1. Navigate to the List of Time Buckets page.

2. Click the Create Time Buckets button.

3. Enter information in the Time Buckets Name and Description fields.

4. For each time interval that you want to add to the Time Buckets, enter a value in the Length and Type fields.

5. If you want to display labels instead of dates for the time buckets in the analysis output, enter values in the Label field for each time interval.

6. Click the Add 5 Rows button to add more time intervals. You can change or delete a time interval as necessary.

7. Select a row and click the Insert button to insert a new time interval before the selected row.

8. Click the Apply button to create or the Cancel button to cancel the new time bucket.

Creating Analyses

Risk Management enables you to create, update, duplicate, and delete analyses.

To create an analysis:

1. Navigate to the Analyses page.

2. Select the type of analysis (position, maturity, or gap) that you want to work with

3. Click the Create Analysis button.

4. Select the style of the analysis. The style affects how the data of the analysis is aggregated and how the results are shown. You can choose from a Table, Aggregate Table, Crosstab, and Crosstab with Time Buckets analysis style. For more information on the different analysis styles, see: Analysis Styles on page 3-7.

5. Enter a unique name for the analysis in the Analysis Name field. If you want, you can enter a description in the Description field. If you are updating an analysis, you cannot change the name of that analysis.

6. Specify the recalculation threshold.

    The recalculation threshold determines whether deal attributes that are based on market data (for example fair value, sensitivities, yield to maturity, revaluation rate, volatility, and accrued interest) should be recalculated when you run an analysis. For example, if you set a recalculation threshold of 5 minutes, Risk Management recalculates any market-dependent values that are 5 minutes old or older at runtime. All non-market data-dependent deal attributes are recalculated every time you run the analysis.

7. Specify which Data Set to use when revaluing deals. You can choose to:

    ■   leave the Market Data Set blank. In this case, all deals are revalued with the market data set that was assigned to them in Oracle Treasury.

    ■   specify a Market Data Set. In this case, all deals that are included in the analysis are revalued using the specified market data set, regardless of the market data set that was assigned in Oracle Treasury.

    The ability to specify a market data set lets you:

    ■   overwrite the assigned or default market data set for the deal, which is defined in Oracle Treasury. Treasury deals are assigned a market data set either by specifying a market data set during deal input, or by using the default market data set for the deal type or company. The default market

data sets for deals are defined in the Deal Type/Product Type window and defined for companies in the Company Profiles window. Treasury uses the market data set to calculate revaluations. Revaluations are, in turn, used to generate accounting revaluation entries. Eventually you want to use a different market data set to do the Risk Management revaluations than the one you want to use for your Accounting revaluations.

- set up a market data set that points at different underlying rates, if you want to perform a scenario analysis.

8. Enter a filter to use with your analysis. For a Crosstab with Time Buckets analysis style, you must also enter a set of time buckets.

   Note: You must set up filters and time buckets before they can be associated with an analysis. For more information, see: Creating Filters on page 3-10 and Creating Time Buckets on page 3-11.

9. Enter either relative or fixed dates depending on the purpose of your analysis. If the date is fixed, enter a specific date or date range. If the date is relative, select a relative starting point, enter an offset, and select the unit of the offset, such as days or months.

   Define the date ranges for the analysis as follows:

   - For a Crosstab with Time Buckets analysis, specify only a start date for the time buckets.

   - For a position analysis that does not use a Crosstab with Time Buckets analysis style, specify what date to use when Risk Management calculates the position analysis.

   - For all other analyses, specify a date range.

10. For a Crosstab or Crosstab with Time Buckets analysis style, specify the measure that you want to use in the cells that display your results.

11. Select your data series in rows and columns. The number of rows and columns that you can display in your analysis, depends on the style of analysis you are creating:

    - **Table analysis:** Specify which columns to display. You must select at least one column.

    - **Aggregated Table analysis:** Specify which columns to display. You must also select at least one row to display.

- **Crosstab analysis:** Select which rows to display. You must select at least one row and one column attribute to display.

- **Crosstab with Time Buckets analysis:** Select which rows to display. Risk Management displays the time buckets that you previously selected for columns and allows you to select whether to display these column headings by date or label.

12. Specify what currency you want to use to display your analysis results. You can select Deal Currency, Set of Books Currency, or Reporting Currency.

   If you choose Reporting Currency, you can choose any defined currency to view your analysis results.

   Note: You must enter a Reporting Currency because if you select Deal Currency or Set of Books Currency, and the individual deal amounts are in different currencies, Risk Management uses the Reporting Currency to display totals, aggregate figures, or to calculate totals and percentages.

13. Specify the units you would like to use to display your results, such as thousands or millions.

14. Enter the number of decimals (0-9) that you would like to display in your results. If you leave this field blank, Risk Management bases the amount formatting on the NLS definition for the currency of the amount.

15. To show totals for your analysis, do the following:

   - **Table analysis:** Check the Show Totals check box to show totals for all the numerical columns.

   - **Other styles of analysis:** Choose the Advanced Settings button. In the Advanced Settings page, check the Totals check boxes for each individual deal attribute that you want to show a total for.

16. Click the Finish button to confirm your analysis settings. From the Confirmation page, you can run the analysis that you created.

   When you run an analysis, the status of your analysis appears in the Status column on the Analyses Manager page. For more information about the statuses of your analyses, see: Run Status Icons on page 3-5.

4

Financial Calculators

This chapter provides an overview of how to use Risk Management financial calculators.

This chapter contains:

- Overview of Calculators on page 4-2

- Discounted Securities Calculator on page 4-4

- Foreign Exchange Forward Calculator on page 4-7

- Foreign Exchange Option Calculator on page 4-12

- Forward Rate Agreement Pricing Calculator on page 4-17

- Forward Rate Agreement Settlement Calculator on page 4-20

Overview of Calculators

Financial Calculators are an intuitive tool that lets you derive prices, rates, and other important numbers to help you make better investment, funding, and hedging decisions.

Oracle Risk Management provides five calculators:

- **Discounted Securities Calculator:** Calculates prices and sensitivities for your discounted securities. See: Discounted Securities Calculator on page 4-4.

- **Foreign Exchange Forward Calculator:** Calculates prices and sensitivities for your foreign exchange forward financial instruments. See: Foreign Exchange Forward Calculator on page 4-7.

- **Foreign Exchange Option Calculator:** Calculates prices and sensitivities for your foreign exchange options. See: Foreign Exchange Option Calculator on page 4-12.

- **Forward Rate Agreement Pricing Calculator:** Calculates prices for forward rate agreement financial instruments. You can carry over your bid/ask rate to the settlement calculation. See: Forward Rate Agreement Pricing Calculator on page 4-17.

- **Forward Rate Agreement Settlement Calculator:** Calculates settlement amounts and sensitivities for forward rate agreements. You can carry over the bid/ask rate from the pricing calculators. See: Forward Rate Agreement Settlement Calculator on page 4-20.

Common Calculator Parameters

These parameters appear on one or more calculators:

- **Settlement Date:** The start date of the deal.

- **Maturity Date:** The maturity date of the deal.

- **Day Count Basis:** The day count basis of the interest rate.

- **Currency:** The contract currency of the financial instrument.

Common Calculator Buttons

These buttons appear on one or more calculator:

- **Show/Hide:** Press this button to show or hide the Rates Section.

■ **Reset:** Press this button to clear all the calculator parameters and previously calculated results.

Discounted Securities Calculator

Discounted Securities are short-term interest rate instruments that are sold at a discount. They are quoted either on a yield or discount-rate basis. Discounted Securities include instruments such as treasury bills, commercial paper, and bankers' acceptances.

Use the Discounted Securities Calculator to calculate the fair value of discounted securities on a yield or discount rate basis. The yield rate is the return on discounted securities, which is expressed as the annualized percentage of its current value. The discount rate is the return on discounted securities, which is expressed as the annualized percentage of its maturity amount. The Discounted Securities Calculator enables you to calculate the yield rate of an instrument from a discount rate quote. Likewise, this calculator lets you calculate the discount rate from the yield rate.

When you provide a yield or discount rate, maturity amount, and holding period, the calculator determines the fair value of the discounted security so that you can make more informed Treasury decisions. If you know the current amount of the security, you can calculate the value of that security when it is held to maturity.

To use the Discounted Securities Calculator, navigate to the Calculator tabbed region.

Parameters

You can enter the following parameters for this calculator:

- **Reference Amount:** Enter the reference amount. The reference amount is used as the maturity amount when you choose the Calculate Consideration button. It is also used as the consideration when you choose the Calculate Maturity Amount button.

- **Rate Type:** The rate type. Select either Discount Rate or Yield Rate.

- **Rate:** Either the Discount Rate or the Yield Rate depending on what value you chose for Rate Type. Select Yield Rate, if the rate type is Yield Rate or Discount Rate, if the rate type is Discount Rate.

For more information on parameters, see: Common Calculator Parameters on page 4-2.

Buttons

These buttons appear on this calculator:

- **Calculate Consideration:** Press this button to calculate the consideration amount of a discounted security when the maturity amount is given in the Reference Amount field.

- **Calculate Maturity:** Press this button to calculate the maturity amount of a discounted security when the consideration is given in the Reference Amount field.

For more information on buttons, see: Common Calculator Buttons on page 4-2.

Output

The Discounted Securities Calculator displays the following results.

- **Consideration:** The fair value of the discounted security.

- **Interest Amount:** The interest amount earned or paid.

- **Maturity Amount:** The amount due on maturity.

- **Price/100:** The fair value of the discounted security expressed as a percentage of the maturity amount.

- **Holding Period:** The actual number of days from settlement to maturity.

- **Adjusted Holding Period:** The holding period, adjusted to the day count basis (the number of days that interest is earned).

- **Yield Rate:** The yield rate.

- **Discount Rate:** The discount rate.

- **Duration:** The year fraction until the cash flow occurs.

- **Modified Duration:** The measure of proportional change in present value of the discounted security price due to small changes in interest rate.

- **Basis Point Value (Yield):** The dollar value of a one basis point change of the yield rate.

- **Basis Point Value (Discount):** The dollar value of a one basis point change of the discount rate.

- **Dollar Duration (Yield):** The sensitivity of the discounted security price to a small (1%) change in the underlying yield rate.

- **Dollar Duration (Discount):** The sensitivity of the discounted security price to a small (1%) change in the underlying discount rate.

- **Convexity:** The change in price with respect to a small change in the duration.

Case Study for the Discounted Securities Calculator

The following figure shows the Discounted Securities Calculator.

Figure 4–1   Discounted Securities Calculator

After providing the inputs, choosing the Calculate Consideration button yields the results shown.

Foreign Exchange Forward Calculator

The Foreign Exchange (FX) forward is one of the most widely used instruments in financial markets. You can calculate forward rates in this Risk Management calculator for use in FX forward deals. When entering an FX forward deal into Treasury, you need to enter the FX forward rate.

Use the FX Forwards Calculator to calculate FX forward rates from current FX spot rates. The FX Forward Calculator can calculate the forward exchange rate for any currency combination. If neither currency is the U.S. dollar, the calculator uses the forward rates against the U.S. dollar to calculate the forward cross rate. The calculator can also calculate forward points, which are the difference between spot rates and forward rates.

In the Calculation Based On Curves section, select Rate Curves for all currencies involved, an Interpolation Method for each rate curve, and an Interest Market Side for all the curves. Press the Calculate Based On Curves button to calculate results based on the curves that you entered. Any blank Rate Curve field is defaulted based on the currency. Pressing the button overrides Rates section and displays the results.

> **Note:** Rate Curves are set up in Treasury. You must set up the market data curves in Treasury, before you can use this calculator to calculate forward rates based on a curve.

In the Calculate Based On Rates region, you can manually enter or update rates, then press the Calculate Based on Rates button to show results. Rates that you leave blank are defaulted.

To use the Foreign Exchange Forward Calculator, navigate to the Calculator tabbed region.

General Parameters

You can enter the following general parameters:

- **Spot Date:** The valuation date. The default value is the current system date.
- **Forward Date:** The future date on which the FX forward rate is effective.
- **Base Currency:** The base currency of the currency combination.
- **Contra Currency:** The contra currency of the currency combination.
- **Currency Market Side:** The market side for the FX Spot rate (Bid/Ask, Bid, Ask, or Mid).

- **Base Currency Amount:** Currency amount for conversion from base to contra currency.

For more information on parameters, see: Common Calculator Parameters on page 4-2.

Parameters for Curves

You can enter the following parameters for curves:

- **Rate Curve:** Select the interest rate curve that corresponds to the Base currency, Contra currency or USD.
- **Interpolation:** Select the interpolation method you want to use with the curve.
- **Interest Market Side:** Select the market side that you want to use for interest rates, such as Bid, Ask, or Mid.

Parameters for Rates

You can enter the following parameters for rates:

- **Quotation Basis Against USD:** Select a method for quoting the exchange rate against the U.S. dollar.
- **Spot Exchange Rate (Bid/Ask):** If the currency is not USD, enter the FX spot rate between the currency and USD.
- **Day Count Basis:** Select the day count basis of the interest rate.
- **Interest Rate (Bid/Ask):** Enter the current market interest rate for the currency.

Buttons

These buttons appear on this calculator:

- **Calculate Based on Defaults:** Press this button to calculate the results using the default curves that are defined for the required inputs.
- **Calculate Based on Curves:** Press this button to calculate the results using the curves that you specify.
- **Calculate Based on Rates:** Press this button to calculate the results using the rates that you specify.

For more information on buttons, see: Common Calculator Buttons on page 4-2.

Output

The Foreign Exchange Forward Calculator displays the following results.

- **Currency (Base/Contra):** The pair of currencies whose exchange rates are being calculated.
- **Rate Type:** The exchange rate type, either FX spot or FX forward.
- **Rate (Bid/Ask):** The exchange rate output.
- **Points (Bid/Ask):** The forward basis points output.
- **Delta Spot:** The rate of change of the forward rate with respect to the spot rate.
- **Rho Contra:** Rate of change of the forward rate with respect to the Contra interest rate.
- **Rho Base:** Rate of change of the forward rate with respect to the base interest rate.

Case Study for the FX Forward Calculator

The following figure shows the FX Forward Calculator.

Figure 4–2   FX Forward Calculator - Part 1

Figure 4–3   FX Forward Calculator - Part 2

After providing the inputs, 'Calculate Based on Defaults' will look up yield curves for the currencies involved and derive the necessary interest rates from these curves.

Also, the spot exchange rate between both currencies is looked up in the Treasury system rates.

Based on these rates, the forward rate, sensitivities and the amount are calculated.

Although Currency Market Side and Interest Market Side are Bid/Ask, the Bid/Ask Rates are the same in this example since all the underlying rates in Treasury have the same values for Bid and Ask.

Foreign Exchange Option Calculator

The FX Option Calculator is used to determine the foreign exchange option price between two currencies or to calculate the implied volatility of a quoted option price.

The Foreign Exchange Options calculator calculates option prices using the Garman Kohlhagen model. The calculations are based on the current FX spot rate, the volatility of the exchange rate, and the current interest rates of the involved currency pair.

To run the Foreign Exchange Option Calculator, navigate to the Calculator tabbed region.

General Parameters

You can enter the following general parameters for this calculator:

- **Price/Implied Volatility:** When calculating the implied volatility, enter the known price of the option and the type of option the price applies to.

- **Spot Date:** Enter the valuation date. The default value is the current system date.

- **Expiration Date:** Enter the expiration date of the option.

- **Foreign Currency:** Select the foreign currency of the currency combination.

- **Domestic Currency:** Select the domestic currency of the currency combination.

- **Currency Market Side:** Enter the market side for the FX spot rates.

- **Foreign Currency Amount:** Enter the currency amount for conversion from foreign to domestic currency.

- **Strike Price:** Enter the strike price of the option.

- **Volatility:** Enter the volatility of the currency combination. If you leave this field blank, the Calculator will default the volatility from the default Volatility Curve.

For more information on parameters, see: Common Calculator Parameters on page 4-2.

Parameters for Curves

You can enter the following general parameters for curves:

- **Rate Curve:** Select the interest/volatility rate curve that corresponds to the currency or a volatility curve.

- **Interpolation:** Select the interpolation method you want to use with that curve.

- **Interest Market Side:** Select the market side that you want to use for interest rates, such as Bid, Ask, or Mid.

Parameters for Rates

You can enter the following general parameters for rates:

- **Quotation Basis against USD:** Select whether the currency is quoted according to normal quotation convention or reciprocal quotation convention.

- **Spot Exchange Rate (Bid/Ask):** Enter the FX spot rate between the currency you are using and the U.S. dollar.

- **Day Count Basis:** Select the day count basis of the interest rate.

- **Interest Rate (Bid/Ask):** Enter the current market interest rate for the currency.

- **Volatility (Bid/Ask):** Enter the current market volatility rate for the exchange rate.

Buttons

This calculator contains these buttons:

- **Calculate Based on Defaults:** Press this button to calculate using default curves.

- **Calculate Based on Curves:** Press this button to calculate using curves.

- **Calculate Based on Rates:** Press this button to calculate the results using the rates that you specify.

For more information on buttons, see: Common Calculator Buttons on page 4-2.

Output

The Foreign Exchange Options Calculator displays the following results.

- **Call:** The call price of the option.

- **Put:** The put price of the option.

- **FX Forward:** The FX Forward rate calculated when the call/put price is calculated.

- **Call Fair Value:** The fair value of the Call option.

- **Put Fair Value:** The fair value of the Put option.

- **Delta Call/Put:** The rate of change of the Call or Put price with respect to the change of the current market exchange rate.

- **Gamma:** The rate of change of the Call or Put price with respect to the change of the Delta.

- **Theta Call/Put:** The rate of change of a Call or Put price with respect to the change of time.

- **Vega:** The rate of change of the Call or Put price with respect to the change in volatility.

- **Rho Domestic Call/Put:** The rate of change of the Call or Put Price with respect to a change in the domestic interest rate.

- **Rho Foreign Call/Put:** The rate of change of the Call or Put Price with respect to a change in the foreign interest rate.

Case Study for the FX Option Calculator

The following figure shows the FX Option Calculator.

Figure 4–4   FX Option Calculator - Part 1

Figure 4–5   FX Option Calculator - Part 2

Foreign Exchange Option Calculator Page - Microsoft Internet Explorer

File   Edit   View   Favorites   Tools   Help

Calculate Based on Curves

Optional Rates Input

▼ Hide Rates Section

Currency	Quotation Basis Against USD	Bid Spot Exchange Rate	Ask Spot Exchange Rate
Foreign	Commodity Unit Quote	1.499500	1.499500
Domestic	Commodity Unit Quote	1	1

Currency	Day Count Basis	Bid Interest Rate	Ask Interest Rate
Foreign	30 / 360	5.43989	5.43989
Domestic	30 / 360	5.514435	5.514435

Volatility Bid 4.750000   Volatility Ask 4.750000

Calculate Based on Rates

Results Based on Defaults

Prices (Bid/Ask)			Sensitivities (Bid/Ask)		
Call	0.005091	/ 0.005091	Delta Call	0.508965	/ 0.508965
Put	0.004795	/ 0.004795	Delta Put	-0.482644	/ -0.482644
FX Forward	0.666966	/ 0.666966	Gamma	31.646100	/ 31.646100
Call Fair Value	76360.970491	/ 76360.970491	Theta Call	-0.015849	/ -0.015849
Put Fair Value	71919.383514	/ 71919.383514	Theta Put	-0.015376	/ -0.015376
			Vega	0.103994	/ 0.103994
			Rho Domestic Call	0.052007	/ 0.052007
			Rho Domestic Put	-0.050814	/ -0.050814
			Rho Foreign Call	-0.052799	/ -0.052799
			Rho Foreign Put	0.050069	/ 0.050069

Reset

Analyses | **Calculators** | Setup | Return To Portal | Logout | Preferences

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Local intranet

After providing the inputs, 'Calculate Based on Defaults' will look up yield curves for the currencies involved and derive the necessary interest rates from these curves.

Also, the spot exchange rate and the volatility between both currencies is looked up in the Treasury system rates.

Based on these rates, the call and put prices and fair values as well as sensitivities are calculated.

Although Currency Market Side and Interest Market Side are Bid/Ask, the Bid/Ask Rates are the same in this example since all the underlying rates in Treasury have the same values for Bid and Ask.

Forward Rate Agreement Pricing Calculator

A forward rate agreement (FRA) is a money market derivative.

Use the FRA Pricing Calculator to calculate the FRA prices.

To run the Forward Rate Agreement Pricing Calculator, navigate to the Calculator tabbed region.

General Parameters

You can enter this general parameter for this calculator:

- **Spot Date:** Enter the valuation date. The default value is the current system date.

For more information on parameters, see: Common Calculator Parameters on page 4-2.

Parameters for Curves

You can enter these parameters for curves:

- **Rate Curve:** Select an interest rate curve that you want to use to derive interest rates.

- **Interpolation:** Select an interpolation method.

- **Market Side:** Select the market side of the curve. For example, Bid, Ask, Mid.

Parameters for Rates

You can enter these parameters for curves:

- **Bid/Ask Rate (to Settlement):** Enter the current interest rate that covers the period from the Spot Date to the Settlement Date.

- **Bid/Ask Rate (to Maturity):** Enter the current interest rate that covers the period from the Spot Date to the Maturity Date.

Buttons

This calculator contains these buttons:

- **Calculate Based on Curves:** Press this button to calculate using curves.

- **Calculate Based on Rates:** Press this button to calculate the results using the rates that you specify.

- **Bid Settlement:** Press this button to take you to the FRA settlement calculator with the Bid rate.

- **Ask Settlement:** Press this button to take you to the FRA settlement calculator with the Ask rate.

For more information on buttons, see: Common Calculator Buttons on page 4-2.

Output

The Forward Rate Agreement Pricing Calculator displays the following results.

- **Holding Period:** The actual number of days from settlement to maturity.

- **Adjusted Holding Period:** The holding period, adjusted to the day count basis (the number of days that interest is earned).

- **Contract Rate (Bid/Ask):** The contract rate.

Case Study for the FRA Pricing Calculator

The following figure shows the FRA Pricing Calculator.

Figure 4–6   FRA Pricing Calculator

After you input the values in the FRA Pricing calculator and choose the Calculate based on Curves button, Risk Management finds the applicable yield curve for the values provided and derives the necessary interest rates from that curve. Risk Management then calculates the FRA prices based on those derived interest rates.

Although Market Side is Bid/Ask, the Bid/Ask Rates are the same since all the underlying rates in Treasury have the same values for Bid and Ask.

Forward Rate Agreement Settlement Calculator

A forward rate agreement (FRA) is a kind of money market derivative.

Use the FRA Settlement Calculator to calculate the settlement amount, rate, and sensitivities.

The fair contract rate is the forward interest rate that applies to a period starting with a forward date and ending with a later forward date.

To run the Forward Rate Agreement Settlement Calculators, navigate to the Calculator tabbed region.

General Parameters

Enter these general parameters for this calculator:

- **Face Value:** Enter the notional principle amount of the FRA.

- **Contract Rate:** Enter the FRA contract rate.

- **Deal Subtype:** Select the deal subtype, either Fund or Invest.

- **Calculation Method:** Select the calculation method for settlement amount.

For more information on parameters, see: Common Calculator Parameters on page 4-2.

Parameters for Curves

Enter these parameters for curves:

- **Rate Curve:** Enter the interest rate curve that you want to use to derive interest rates.

- **Market Side:** Enter the market side of the rate (Bid/Ask, Bid, Ask, or Mid).

- **Interpolation:** Select the interpolation method.

Parameters for Rates

Enter this parameter for rates:

- **Settlement Rate:** Enter the current market interest rate.

Buttons

This calculator contains these buttons:

- **Calculate Based on Curves:** Press this button to calculate using curves.

- **Calculate Based on Rates:** Press this button to calculate the results using the rates that you specify.

For more information on buttons, see: Common Calculator Buttons on page 4-2.

Output

The Forward Rate Agreement Settlement Calculator displays the following results.

- **Holding Period:** The actual number of days from settlement to maturity.

- **Adjusted Holding Period:** The holding period, adjusted to the day count basis (the number of days interest is earned).

- **Action:** Indicates if the user pays or receives the settlement amount.

- **Settlement Amount:** The absolute profit or loss amount.

- **Duration:** The duration of the FRA.

- **Convexity:** The convexity of the FRA.

- **Basis Point Value (BPV):** The change in Settlement Amount due to a basis point change of the Settlement Rate.

Case Study for the FRA Settlement Calculator

The following figure shows the FRA Settlement Calculator.

Figure 4–7   FRA Settlement Calculator

After providing the inputs, 'Calculate Based on Curves' will look up a yield curve and derive the necessary interest rates from this curve.

Based on these rates, FRA prices are calculated.

A

Deal Attributes

This appendix provides an overview of deal attributes that Risk Management uses for Money Market and Foreign Exchange deals.

Overview of Deal Attributes

The tables in this section describe all the deal attributes that you can select for display in an analysis. Risk Management derives some attributes from deals in Oracle Treasury and calculates others when you run the analysis.

Attributes are listed in three different tables. The first table lists General Attributes, the second table lists Money Market attributes, and the third table lists Foreign Exchange (FX) attributes.

The tables contain the attribute name, an attribute description, and some attribute characteristics.

Meaning of the Characteristics:

- **Aggregation:** Attribute can be used to aggregate on.

- **Measure:** Attribute can be totaled for aggregation and totals.

- **List:** Attribute can be listed only in a table style analysis.

- **Filter:** Attribute can be used in a deal filter.

- **Gap, Position, Maturity:** Attribute can be selected only for the indicated analysis type. If no analysis type is mentioned, the attributes apply to all analysis types.

For more information about deal calculations, see: Appendix B, "Deal Calculations".

Risk Management uses the following logic for aggregating measures and calculating the totals of measures:

- **Amounts:** Sum

- **Days:** Weighted average by amount

- **Number of Deals:** Count

- **Sensitivities:** Weighted average by Fair Value

- **Interest Rate:** Weighted average by amount outstanding

- **Foreign Exchange Rate:** Sum of the absolute values of contra currency amounts divided by the sum of absolute values of base currency amounts

General Deal Attributes

The following table provides attributes for all deals that you analyze in Risk Management.

Attribute	Description	Type
Company	Company as entered in Deal in Oracle Treasury	Aggregation Filter
Deal Type	Deal Type as entered in Deal in Oracle Treasury	Aggregation Filter
Subtype	Subtype as entered in Deal in Oracle Treasury	Aggregation Filter
Product Type	Product Type as entered in Deal in Oracle Treasury	Aggregation Filter
Portfolio	Portfolio as entered in Deal in Oracle Treasury	Aggregation Filter
Dealer	Dealer as entered in Deal in Oracle Treasury	Aggregation Filter
Client	Client as entered in Deal in Oracle Treasury	Aggregation Filter
Counterparty	Counterparty as entered in Deal in Oracle Treasury	Aggregation Filter
Deal Date	Deal Date as entered in Deal in Oracle Treasury	List Filter

Attribute	Description	Type
Start Date	Start Date as entered in Deal in Oracle Treasury	List Filter
Maturity Date	Maturity Date as entered in Deal in Oracle Treasury Only for Money Market deals	List Filter
Value Date	Value Date as entered in Deal in Oracle Treasury Only for Foreign Exchange deals	List Filter
Expiration Date	Expiration Date as entered in Deal in Oracle Treasury Only for Options	List Filter
End Date	Date when the deal comes to an end: ■ Maturity date for physical Money Market deals ■ Settlement date for Forward Rate Agreement ■ Expiration date for Interest Rate and Foreign Exchange Options ■ Value date for physical Foreign Exchange deals	List Filter
Market Type	If the deal type is Foreign Exchange or Foreign Exchange Option, then the market type is Foreign Exchange. Otherwise, it is Money Market.	Aggregation Filter
Instrument Type	If the deal type is Foreign Exchange Option, Interest Rate Option, Forward Rate Agreement, Interest Rate Swap, Swaption, or Bond Option, then the instrument type is Derivative. Otherwise, it is Physical.	Aggregation Filter
Fair Value	The fair value of a deal as calculated on the analysis run date. The Fair Value is always a Present Value on the analysis run date; Oracle Risk Management does not look at the company parameters in Oracle Treasury that determine whether the Fair Value should be calculated on settlement date or on revaluation date. For Money Market deals, the Fair Value always includes accrued interest, for example, the Fair Value is the amount of cash we would receive if we close out the position. This differs from how the Revaluation module in Oracle Treasury calculates the Fair Value. There the Fair Value for Bonds and Term Money is based on the Capital Price, excluding any accrued interest.	Measure

Attribute	Description	Type
Currency	Currency of Fair Value of the Deal. For Money Market deals it is always the deal currency. For Foreign Exchange spot and forward deals, it is the Set of Books currency and for Foreign Exchange Option, it is the Premium currency.	Aggregation
Set of Books Currency	Set of Books currency.	Aggregation
Days	The Number of actual (calendar) days from the analysis run date to the end date of the deal.	Measure
Premium Amount	The premium amount for options.	Measure
Option Style	Either the European or American style, as entered in Deal In Oracle Treasury.	List Filter
Number of Deals	The number of deals aggregated in a cell	Measure
Link Code	Link Code as entered in Deal in Oracle Treasury.	List Filter
Market Data Set	The Market Data Set that has been used to value the deal for the current analysis. This can be the Market Data Set assigned to the deal in Oracle Treasury or the overwrite value for Market Data Set selected in the analysis	List Filter
Pricing Model	The Pricing Model that has been used to value the deal for the current analysis. This can be the Pricing Model assigned to the deal in Oracle Treasury or an overwrite Pricing Model used by Risk Management. If the deal is assigned a pricing model in Oracle Treasury that does not calculate a Fair Value, Oracle Risk Management will use a different model. For example, if a Term Money has "NO" pricing model assigned in Oracle Treasury, Risk Management will automatically use a discounted cash flow pricing model for that particular deal.	List Filter
Deal Number	Deal Number as assigned to Deal in Oracle Treasury.	List Filter

Money Market Deals

The following table contains attributes of Money Market deals.

Attribute	Description	Type
Money Market Instrument Type	Classification for Money Market Deals into Funding, Investment, and Derivative deals. Particularly useful for Gap Analysis. All physical deals are assigned a type 'Fund' if they are funding deals and 'Invest' if they are investments. All derivatives are assigned a type 'Derivative'.	Aggregation Filter
Interest Basis	Classification for Money Market Deals indicating if they are based on a 'Fixed' or 'Floating' interest rate.	Aggregation Filter
Gap Date	Date when the next fixing or repricing for the deal should occur. For fixed rate deals, it is the maturity date, assuming that the deal is rolled over. For floating rate deals, it is the next reset date.	List Gap Position
Maturity Amount	The amount that matures at the Maturity Date.	Measure Maturity Position
Gap Amount	The amount that is repriced at the Gap Date.	Measure Gap Position
Amount Outstanding	Depending on the deal type, this attribute is the Face Value (or Face Value Balance) or the Principal Amount outstanding. For derivatives, it is the Notional.	Measure
Accrued Interest	Accrued interest since last coupon or interest payment on the analysis run date.	Measure
Duration	Macaulay duration.	Measure
Modified Duration	Modified duration	Measure
Convexity	Convexity	Measure
Delta	The option Delta (only for Interest Rate Option)	Measure

Attribute	Description	Type
Gamma	The option's Gamma (only for Interest Rate Option)	Measure
Rho	The option Rho (only for Interest Rate Option)	Measure
Vega	The option Vega (only for Interest Rate Option)	Measure
Position BPV	The Basis Point Value of the Position	Measure
Position Delta	The Delta of the Position (only for Interest Rate Option)	Measure
Position Gamma	The Gamma of the Position (only for Interest Rate Option)	Measure
Position Rho	The Rho of the Position (only for Interest Rate Option)	Measure
Position Vega	The Vega of the Position (only for Interest Rate Option)	Measure
Transaction Interest Rate	Transaction Money Market of Interest Rate. This can be an Interest Rate or a Bond Price. When showing an Interest Rate, it is always converted to a Yield Rate and a Day Count Basis of Act/365.	Measure
Revaluation Interest Rate	Revaluation Money Market or Interest Rate used to Revalue the position. This can be an Interest Rate or a Bond Price. When showing an Interest Rate, it is always converted to a Yield Rate and a Day Count Basis of Act/365.	Measure
Coupon Rate	For a Bond, this is the rate of the coupon. For other Money Market deals, this is the same as the Transaction Interest Rate, except that it is displayed as entered in the deal: in the Day Count Basis of the deal and either discount or yield rate depending on deal input.	List
Day Count Basis	Day count basis of deal	List
Coupon Frequency	Coupon Frequency as number of coupons per year	List
Volatility	Volatility used to revalue the position (only for Interest Rate Option)	List
Margin	Margin as entered in Deal in Oracle Treasury	List

Attribute	Description	Type
Interest Reference	Interest reference as entered in Deal in Oracle Treasury (only for floating leg of Interest Rate Swap)	List
Next Coupon Date	Date of next coupon	List
Swap Reference	Swap Reference as entered in Deal in Oracle Treasury (only for Interest Rate Swap)	List Filter
Issue Code	Issue Code (only for Bond)	Aggregation Filter
Security ID	Security ID (only for Bond and Discounted Securities)	Aggregation Filter
Yield to Maturity	Yield to Maturity that corresponds to the bond price (only for Bond)	List
Issuer	Issuer of a Bond or Acceptor of a Discounted Security (only for Bond and Discounted Securities)	List Filter

Foreign Exchange Market Deals

The following table contains deal attributes for Foreign Exchange Market deals.

Attribute	Description	Type
Base Currency	The base currency in the currency combination of the FX deal as defined in the currency details	Aggregation Filter
Contra Currency	The contra currency in the currency combination of the FX deal as defined in the Currency details	Aggregation Filter
Base Currency Amount	The base currency amount	Measure Filter
Contra Currency Amount	The contra currency amount	Measure Filter
Buy Currency	The buy currency	Aggregation Filter
Sell Currency	The sell currency	Aggregation Filter

Attribute	Description	Type
Buy Currency Amount	The buy currency amount	Measure Filter
Sell Currency	The sell currency	Measure Filter
Foreign Currency	The foreign currency (only for Foreign Exchange Option)	Aggregation Filter
Domestic Currency	The domestic currency (only for Foreign Exchange Option)	Aggregation Filter
Foreign Currency Amount	The foreign currency amount (only for Foreign Exchange Option)	Measure Filter
Domestic Currency Amount	The domestic currency amount (only for Foreign Exchange Option)	Measure Filter
Foreign Exchange Transaction Rate	The Transaction Rate for an Foreign Exchange Spot or Forward or the Strike Rate for a Currency Option	Measure Position
Ref Spot Rate	Reference Spot Rate as entered on the Deal in Oracle Treasury	List
Option Type	Call or Put as entered on the Deal in Oracle Treasury	List
Delta	Delta	Measure
Gamma	Gamma	Measure
Rho Domestic	Rho domestic (only for Foreign Exchange Option)	Measure
Rho Foreign	Rho foreign (only for Foreign Exchange Option)	Measure
Rho Base	Rho base (only for Foreign Exchange Forward)	Measure
Rho Contra	Rho contra for (only for Foreign Exchange Forward)	Measure
Vega	The option Vega (only for Foreign Exchange Option)	Measure
Position Delta	The Delta of the Position	Measure
Position Gamma	The Gamma of the Position	Measure

Attribute	Description	Type
Position Rho Domestic	The Domestic Rho of the Position (only for Foreign Exchange Option)	Measure
Position Rho Foreign	The Foreign Rho of the Position (only for Foreign Exchange Option)	Measure
Position Rho Base	The Base Currency Rho of the Position (only for Foreign Exchange Forward)	Measure
Position Rho Contra	The Contra Currency Rho of the Position (only for Foreign Exchange Forward)	Measure
Position Vega	The Vega of the Position (only for Foreign Exchange Option)	Measure
Volatility	Volatility used to value this deal	List
Foreign Exchange Revaluation Rate	Revaluation rate (forward rate) used to revalue the position	Measure Position Maturity
Knock Type	Knock Type as entered in Deal in Oracle Treasury	List
Knock Level	Knock Type as entered in Deal in Oracle Treasury	List

Deal Attributes by Attribute Name

The following table lists deal attributes by the attribute name.

Attribute	Included in Deals...
Accrued Interest	Money Market Deals
Base Currency	Foreign Exchange Market Deals
Base Currency Amount	Foreign Exchange Market Deals
Buy Currency	Foreign Exchange Spot/Forward, Foreign Exchange Option
Buy Currency Amount	Foreign Exchange Spot/Forward, Foreign Exchange Option
Client	General
Company	General
Contra Currency	Foreign Exchange Market Deals

Attribute	Included in Deals...
Contra Currency Amount	Foreign Exchange Market Deals
Convexity	Money Market Deals
Counterparty	General
Coupon Frequency	Money Market Deals
Coupon Rate	Money Market Deals
Currency	Money Market Deals
Day Count Basis	Money Market Deals
Days	General
Deal Date	General
Deal Number	General
Deal Type	General
Dealer	General
Delta	Money Market Deals, Foreign Exchange Option
Dollar Duration	Money Market Deals
Domestic Currency	Foreign Exchange Spot/Forward, Foreign Exchange Option
Domestic Currency Amount	Foreign Exchange Spot/Forward, Foreign Exchange Option
Duration	Money Market Deals
End Date	General
Expiration Date	General
Fair Value	General
Foreign Currency	Foreign Exchange Spot/Forward, Foreign Exchange Option
Foreign Currency Amount	Foreign Exchange Spot/Forward, Foreign Exchange Option
Gamma	Money Market Deals, Foreign Exchange Spot/Forward, Foreign Exchange Option
Gap Amount	Money Market Deals
Gap Date	Money Market Deals

Attribute	Included in Deals...
Instrument Type	General
Interest Basis	Money Market Deals
Interest Ref	Money Market Deals
Issue Code	Money Market Deals
Knock Level	Foreign Exchange Market Deals
Knock Type	Foreign Exchange Market Deals
Link Code	General
Margin	Money Market Deals
Market Data Set	General
Market Type	General
Maturity Amount	Money Market Deals
Maturity Date	General
Modified Duration	Money Market Deals
Money Market Instrument Type	Money Market Deals
Next Coupon Date	Money Market Deals
Number of Deals	General
Option Style	General
Option Type	Foreign Exchange Market Deals
Outstanding Amount	Money Market Deals
Premium Amount	General
Pricing Model	General
Product Type	General
Portfolio	General
Position BPV	Money Market Deals
Position Delta	Money Market Deals, Foreign Exchange Market Deals
Position Gamma	Money Market Deals, Foreign Exchange Market Deals
Position Rho	Money Market Deals, Foreign Exchange Market Deals
Position Rho Foreign	Foreign Exchange Market Deals

Attribute	Included in Deals...
Position Vega	Money Market Deals, Foreign Exchange Market Deals
Ref Spot Rate	Foreign Exchange Market Deals
Reporting Currency	General
Revaluation Rate	Money Market Deals, Foreign Exchange Spot/Forward
Rho	Money Market Deals, Foreign Exchange Option
Rho Foreign	Foreign Exchange Option
Security ID	Money Market Deals
Sell Currency	Foreign Exchange Spot/Forward, Foreign Exchange Option
Sell Currency Amount	Foreign Exchange Spot/Forward, Foreign Exchange Option
Start Date	General
Subtype	General
Swap Leg	Money Market Deals
Swap Reference	Money Market Deals
Transaction Rate	Money Market Deals, Foreign Exchange Market Deals
Value Date	General
Vega	Money Market Deals, Foreign Exchange Option
Volatility	Money Market Deals, Foreign Exchange Market Deals

B

Deal Calculations

This appendix provides an overview of equations that risk management uses to calculate deals.

General

Discount Factors & Present Value of Cash Flow

When valuing treasury deals using the Discounted Cash Flow model, all future cash flows of the deal are present valued and summed.

When we know a yield rate applicable from spot to the value date of the cash flow, we determine the discount factor that can be used to present value the future cash flow. The discount factor is the present value of one unit (e.g. 1 USD) of currency.

We assume that the rates for less than or equal to one year are simple interest rates and the following formula is used to calculate the Discount Factor:

$$DF = \frac{1}{(1 + R_{t1} * t / N)}$$

Where

DF = Discount factor for time t1 at rate R_{t1}

R_{t1} = interest rate for time t1

t = number of days (or t1 - t0) according to day count basis of R_{t1}

N = Number of days in a year according to day count basis of R_{t1}

Rates for longer periods are supposed to be Zero-coupon rates quoted on an annualized basis and the following equation is used:

$$DF = \frac{1}{(1 + R_{t1})^{(t/N)}}$$

The present value of a cash flow is calculated by multiplying the cash flow amount by the appropriate Discount Factor.

$$PVC = DF * C$$

Where

PVC = Present Value of Cash Flow

DF = Discount factor

C = Amount of future Cash Flow

Forward-Forward Rates

Forward-Forward rates need to be calculated for future coupons on floating rates.

They are used in revaluing Forward Rate Agreements, Term Money deals and Interest Rate Swaps.

The forward-forward rate can be computed using two spot rates, the one from spot to the start of the forward period and the one from spot to the end of the forward period.

Forward rates are calculated based on discount factors:

$$R_{t1x2} = \left[\frac{DF_1}{DF_2} - 1 \right] * \frac{N}{(t2 - t1)}$$

Where

R_{t1x2} = Forward-forward rate for the period from t1 to t2

DF_1 = Discount Factor for t1

DF_2 = Discount Factor for t2

N = Number of days in a year

t1 = the start date of the forward period

t2 = the end date of the forward period

Bonds

This section lists the formulae that Risk Management uses to calculate bonds.

Fair Value

The fair value of bond is calculated based on the bond price found in current system rates. The bond price in current system rates is the clean price.

If the bond deal has a margin specified, the clean price obtained from the current system rates is converted to a yield to maturity and the margin is added to that yield to maturity (since the margin is a yield margin and not a price margin). The margin adjusted yield to maturity is then converted back to clean price.

If the bond has an accrued interest, the accrued interest per 100 is added to the clean price resulting in the dirty price of the bond.

The fair value of the bond is then calculated by multiplying the Face Value (Balance) by the Dirty Price/100.

Discounted Cash Flow

The following formula is used to calculate the present value of a bond cash flow using the Yield to Maturity of the bond as the discount rate. This formula is used in the Duration formula.

$$PVC = \frac{C}{\left(1 + \dfrac{i}{n}\right)^{d * \frac{n}{year}}}$$

where:

PVC = Present Value of Cash flow

C = the Cash flow

d = number of days until Cash flow

i = yield per annum based on n payments per year (YTM)

year = number of days in year

Duration (Macaulay duration)

The following formula is used to calculate the duration of a bond.

Reference: Robert Steiner, *Mastering Financial Calculations*, p. 108.

$$D = \frac{\sum_k \left[PVC_k * \dfrac{d_k}{year} \right]}{\sum_k PVC_k}$$

where:

D = Duration of bond

PVC_k= Present Value of the kth Cashflow (see discounted cash flow formula)

d_k = number of days until Ck

year = number of days in year

Modified Duration

The following formula is used to calculate the modified duration of a bond.

On some markets, modified duration is called "volatility."

Reference: Robert Steiner, *Mastering Financial Calculations*, p. 110.

$$MD = \frac{D}{\left(1 + \dfrac{i}{n}\right)}$$

where:

MD = Modified Duration of bond

D = Duration of bond

Convexity

The following formula is used to calculate the convexity of a bond. It is also sometimes called modified convexity.

Reference: Robert Steiner, *Mastering Financial Calculations*, p. 112.

$$\text{Conv} = \frac{\Sigma_k \left[\frac{C_k}{\left(1+\frac{i}{n}\right)^{n*\frac{d_k}{year}+2}} * \frac{d_k}{year} * \left(\frac{d_k}{year} - \frac{1}{n} \right) \right]}{P}$$

where:

Conv = convexity of bond

P = dirty price of bond

Basis Point Value

Basis Point Value (BPV) or Dollar Value of an 01(DV01) or Price value of a 01 (PV01) is the change in price due to a 1 basis point change in yield.

BPV = P * 0.0001 * MD

where:

BPV = Basis Point Value

P = dirty price of bond

MD = modified duration

Discounted Securities

This section lists the formulae that Risk Management uses to calculate discounted securities.

Fair Value

The fair value of a discounted security is calculated by discounting the Maturity Amount of the security to the spot date.

The rate used to discount the security is derived from the yield curve and eventually a Margin specified in the deal is added to that rate.

Formula used: Present Value of Cash Flow (PVC)

Duration

$$D = \frac{d_m}{year}$$

where:

D = Duration of Discounted Security

d_m = number of days until maturity

year = number of days in year

Modified Duration

$$MD = \frac{D}{(1+i)}$$

where:

MD = Modified Duration of Discounted Security

D = Duration of Discounted Security

i = yield rate of discounted security

n = 1

Convexity

$$Conv = \frac{1}{\left(1+\dfrac{i}{n}\right)^2} * \frac{d}{year} * \left(\frac{d}{year} + \frac{1}{n}\right)$$

where:

Conv = Convexity of Discounted Security

$d = d_{MATURITY}$, number of days until cash flow occurs

$n = \text{year} / d$

Delta and Dollar Duration

Sensitivity of the Discounted Security price to a small change (1%) in the underlying Yield Rate.

Delta = - P * Delta Yield * MD

where:

Delta = delta Discounted Security price

P = price of Discounted Security

DeltaYield = change in underlying rate (1% = 0.01)

MD = modified duration

Dollar Duration, also called dPdY (for delta Price for a delta Yield) or "risk" is equal to minus Delta.

Dollar Duration = - Delta

or

Dollar Duration = $100 * BPV_{YR}$

Dollar Duration with respect to the Discount Rate:

Dollar Duration = $100 * BPV_{DR}$

Foreign Exchange Forward

This section lists the formulae that Risk Management uses to calculate Foreign Exchange Forward deals.

Fair Value

The fair value of an Foreign Exchange Forward deal is calculated by discounting the Pay Amount and the Receive Amount with their respective interest rates and exchanging the Present Values at the Spot Exchange rate.

FV = PVC(base amount) * Spot Foreign Exchange rate + PVC(contra amount)

Delta

The rate of change of the Forward Rate with respect to the Spot Rate. When the underlying Spot rate changes by a small amount, the Forward Rate changes by Delta times that small amount.

$$\text{Delta} = \frac{DF_{Contra}}{DF_{Base}}$$

Rho

The rate of change of the Forward Rate with respect to the Contra/Base Interest Rate. When the underlying Contra/Base Interest Rate changes by a small amount, the Forward Rate changes by $\text{Rho}_{CONTRA/BASE}$ times that small amount.

$$\text{Rho}_{CONTRA} = \frac{\text{Forward}_{(using\ Contra\ Interest\ Rate\ +0.01\%)} - \text{Forward}_{(using\ Contra\ Interest\ Rate)}}{0.01\%}$$

$$\text{Rho}_{BASE} = \frac{\text{Forward}_{(using\ Base\ Interest\ Rate\ +0.01\%)} - \text{Forward}_{(using\ Base\ Interest\ Rate)}}{0.01\%}$$

Foreign Exchange Option

This section lists the formulae that Risk Management uses to calculate Foreign Exchange Option deals.

Price Using Garman-Kohlhagen

Reference: John C. Hull, *Options, Futures, and Other Derivative Securities*, Chapter 12.4 Currency Options, p282-285.

$$Call = S_0 * e^{-r_{for}*T} * N(d_1) - X * e^{-r_{dom}*T} * N(d_2)$$

$$Put = X * e^{-r_{dom}*T} * N(-d_2) - S_0 * e^{-r_{for}*T} * N(-d_1)$$

where:

Call = European call price

Put = European put price

S_0 = value of exchange rate at time zero (Spot)

X = exercise price

r_{dom} = domestic risk free interest rate (continuously compounded)

r_{for} = foreign risk free interest rate (continuously compounded)

T = maturity (year fraction)

σ = volatility of exchange rate (sigma)

$$d_1 = \frac{\ln\left(\frac{S_0}{X}\right) + \left(r_{dom} - r_{for} + \frac{\sigma^2}{2}\right) * T}{\sigma * \sqrt{T}}$$

$$d_2 = \frac{\ln\left(\frac{S_0}{X}\right) + \left(r_{dom} - r_{for} - \frac{\sigma^2}{2}\right) * T}{\sigma * \sqrt{T}} = d_1 - \sigma * \sqrt{T}$$

Delta Using Garman-Kohlhagen

Reference: John C. Hull, *Options, Futures, and Other Derivative Securities*, Chapter 13.4 The Greek Letters - Delta Hedging, p317.

$$\Delta_{Call} = e^{-r_{for}*T} * N(d_1)$$

$$\Delta_{Put} = e^{-r_{for}*T} * \left[N(d_1) - 1 \right]$$

Gamma Using Garman-Kohlhagen

Reference: John C. Hull, *Options, Futures, and Other Derivative Securities*, Chapter 13.6 The Greek Letters - Gamma, p324.

$$\Gamma = \frac{N'(d_1) * e^{-r_{for}*T}}{So * \sigma * \sqrt{T}}$$

where:

Γ = gamma

$$N'(x) = \frac{1}{\sqrt{2\pi}} * e^{\frac{-x^2}{2}}$$

Theta Using Garman-Kohlhagen

Reference: John C. Hull, *Options, Futures, and Other Derivative Securities*, Chapter 13.5 The Greek Letters - Theta, p320.

$$\Theta_{Call} = -\frac{S_0 * N'(d_1) * \sigma * e^{-r_{for}*T}}{2 * \sqrt{T}} + r_{for} * S_0 * N(d_1) * e^{-r_{for}*T} - r_{dom} * X * e^{-r_{dom}*T} * N(d_2)$$

$$\Theta_{Put} = -\frac{S_0 * N^{'}(d_1) * \sigma * e^{-r_{for}*T}}{2 * \sqrt{T}} - r_{for} * S_0 * N(-d_1) * e^{-r_{for}*T} + r_{dom} * X * e^{-r_{dom}*T} * N(-d_2)$$

where:

Θ = theta

Vega Using Garman-Kohlhagen

Reference: John C. Hull, *Options, Futures, and Other Derivative Securities*, Chapter 13.8 The Greek Letters - Vega, p328.

$$V = So * \sqrt{T} * N^{'}(d_1) * e^{-r_{for}*T}$$

where:

V = vega

Rho Using Garman-Kohlhagen

Reference: John C. Hull, *Options, Futures, and Other Derivative Securities*, Chapter 13.9 The Greek Letters - Rho, p329.

$$Rho_{DomCall} = X * T * e^{-r_{dom}*T} * N(d_2)$$

$$Rho_{DomPut} = -X * T * e^{-r_{dom}*T} * N(-d_2)$$

$$Rho_{ForCall} = -T * e^{-r_{for}*T} * S_0 * N(d_1)$$

$$Rho_{ForPut} = T * e^{-r_{for}*T} * S_0 * N(-d_1)$$

Forward Rate Agreement

This section lists the formulae that Risk Management uses to calculate Forward Rate Agreement deals.

Fair Value

When revaluing a Forward Rate Agreement deal, we first calculate the theoretical Forward Rate Agreement price or theoretical forward-forward rate for the period of the Forward Rate Agreement deal. This theoretical Forward Rate Agreement price is then used to calculate the Settlement Amount for the Forward Rate Agreement deal. That Settlement Amount is the Fair Value of the Forward Rate Agreement.

For the calculation of the Theoretical Forward Rate Agreement Price, we use the formula for Forward-Forward Rates.

The Settlement Amount is calculated using one of the following formulas:

Formula 1:

The following formula is used when the input parameter Calculation Method for the deal is set to "Yield", which is the default value.

The following formula for calculating Forward Rate Agreement settlement amount is from Foreign Exchange and Money Markets, vol.3, Interest Rate Risk (Richard Comotto, Euromoney Publications PLC, 1998. P. 45):

Settlement Amount =

$$\frac{|\text{FRA price - settlement rate}| \times \text{face value} \times \text{day count}_{\text{forward - forward period}}}{100 \times \text{annual basis} + \text{settlement rate} \times \text{day count}_{\text{forward - forward period}}}$$

Within this formula,

- means the absolute value between Contract Rate and Settlement Rate.

- means the day count for the period from Settlement Date to Maturity Date.

To apply the above names to the formula, we have Formula 1:

Settlement Amount =

$$\frac{\left| \text{Contract Rate} - \text{Theoretical FRA Price} \right| \times \text{face value} \times \text{day count}_{\text{Settlement to Maturity}}}{100 \times \text{annual basis} + \text{Settlement Rate} \times \text{day count}_{\text{Settlement to Maturity}}}$$

Forward Rate Agreement Settlement amount, as calculated with this formula, is present value of the interest amount differential.

Formula 2:

The Forward Rate Agreement Calculator uses this formula when input parameter Calculation Method is set to "Discount".

The following formula for calculating Forward Rate Agreement settlement amount is from OTC Market Convention published by the Australian Financial Market Association (Forward Rate Agreement Conventions, available at http://www.afma.com.au). Although AFMA states that this formula is for AUD and NZD settlement calculations while formula 1 is for other currency settlement calculations, we do not consider it necessary to enforce any currency-formula relationship in order to make the Forward Rate Agreement Calculator more flexible. Treasury user can select any formula s/he wants to use by selecting the Calculation Method.

Settlement Amount =

$$\frac{100 \times \text{annual basis} \times \text{face value}}{\text{day count}_{\text{forward - forward period}} \times \text{FRA Price} + 100 \times \text{annual basis}}$$

$$\frac{100 \times \text{annual basis} \times \text{face value}}{\text{day count}_{\text{forward - forward period}} \times \text{Settlement Rate} + 100 \times \text{annual basis}}$$

Within this formula,

- means the day count for the period from Settlement Date to Maturity Date;

- Forward Rate Agreement Price means the Contract Rate in our Calculator.

To apply the above names to the AFMA formula, we have Formula 2:

Settlement Amount =

$$\left| \frac{100 \times \text{annual basis} \times \text{face value}}{\text{day count}_{\text{Settlement to Maturity}} \times \text{Contract Rate} + 100 \times \text{annual basis}} \right.$$

$$\left. \frac{100 \times \text{annual basis} \times \text{face value}}{\text{day count}_{\text{Settlement to Maturity}} \times \text{Settlement Rate} + 100 \times \text{annual basis}} \right|$$

(Formula 2)

Forward Rate Agreement settlement amount, as calculated with this formula, is the difference between two present values of the Forward Rate Agreement face value - one discounted by using the Forward Rate Agreement Contract Rate, one discounted by using the Forward Rate Agreement settlement rate.

Duration

$$D = \frac{d_{\text{SETTLE}}}{\text{year}}$$

where:

D = Duration of Forward Rate Agreement

d_{SETTLE} = number of days until maturity

year = number of days in year

Convexity

$$\text{Conv} = \frac{1}{\left(1 + \dfrac{i}{n}\right)^2} * \frac{d}{\text{year}} * \left(\frac{d}{\text{year}} + \frac{1}{n}\right)$$

where:

Conv = Convexity of Forward Rate Agreement

d = d_{SETTLE}, number of days until cash flow occurs

n = year / d

i = Forward Rate Agreement settlement rate or theoretical Forward Rate Agreement price

BPV

Change in Fair Value of the Forward Rate Agreement due to a 1BP change of the forward-forward rate.

BPV = FairValue (market forward-forward rate + 1BP) - FairValue (market forward-forward rate)

Wholesale Term Money

This section lists the formulae used to calculate Wholesale Term Money deals.

Fair Value

The fair value of a Term Money is calculated by discounting all future Cash Flows and summing them up.

The Present Value of Cash Flow (PVC) formula is used to calculate fair value.

$$FV = \sum_k PVC_k$$

When the Term Money is based on a floating rate, the value for the future Cash Flows is determined first by calculating the Forward-Forward rate for each coupon period and then calculating the Cash Flow (coupon amount) using that forward-forward rate.

Duration

Same as the bond duration formula.

$$D = \frac{\sum_k \left[PVC_k * \dfrac{d_k}{year} \right]}{\sum_k PVC_k}$$

where:

D = Duration

PVC_k = Present Value of the kth Cashflow (see discounted cash flow formula) using a rate from the yield curve.

d_k = number of days until Ck

year = number of days in year

BPV

Calculate Fair Value once with the regular yield curve and once with a yield curve shifted up 1BP.

BPV = FairValue (market yield curve + 1BP) - FairValue (market yield curve)

Retail Term Money

The calculations used for each deal are the same calculations as we use for the Wholesale Term Money.

Interest Rate Swap

In Oracle Treasury, Interest Rate Swap deals are stored as two separate deals, one funding and one investment deal. The calculations used for each deal are the same calculations as we use for the Wholesale Term Money.

Interest Rate Option

This section lists the formulae that Risk Management uses to calculate Interest Rate Option deals.

Price Using Black76

Reference: John C. Hull, *Options, Futures, and Other Derivative Securities*, Chapter 20.3 Interest Rate Caps, p540.

$$\text{Caplet} = L * \delta_k * P(0, t_{k+1}) * \left[F_k * N(d_1) - R_x * N(d_2) \right]$$

$$Floorlet = L * \delta_k * P(0, t_{k+1}) * \left[R_x * N(-d_2) - F_k * N(-d_1) \right]$$

where:

Caplet = Value of Caplet

Floorlet = Value of Floorlet

L = Notional Principal

t_k = start (reset) date for caplet/floorlet k

$t_k + 1$ = maturity (payment) date for caplet/floorlet k

$\delta_k = t_k + 1 - t_k$

F_k = Forward rate for the period from tk to tk+1 expressed with a compounding frequency equal to the frequency of resets (as reflected by 'k).

Rx = exercise rate

$P(0, t_k+1)$ = price of a zero-coupon bond paying 1 at time tk+1 (=discount factor for t_k+1) based on a continuously compounded rate.

σ_k = volatility for the forward rate underlying the caplet/floorlet

$$d_1 = \frac{\ln(F_k / R_x) + \sigma_k^2 * t_k / 2}{\sigma_k * \sqrt{t_k}}$$

$$d_2 = \frac{\ln(F_k / R_x) - \sigma_k^2 * t_k / 2}{\sigma_k * \sqrt{t_k}} = d_1 - \sigma_k * \sqrt{t_k}$$

Delta Using Black76

Reference: John C. Hull, *Options, Futures, and Other Derivative Securities*, Chapter 13.6 The Greek Letters - Gamma, p324.

$$\Gamma = \frac{N'(d_1) * e^{-r*T}}{So * \sigma * \sqrt{T}}$$

where:

Γ = gamma

$$N^{'}(x) = \frac{1}{\sqrt{2\pi}} * e^{\frac{-x^2}{2}}$$

Theta Using Black76

Reference: John C. Hull, *Options, Futures, and Other Derivative Securities*, Chapter 13.5 The Greek Letters - Theta, p320.

$$\Theta_{Call} = -\frac{F_k * N^{'}(d_1) * \sigma * e^{-r*T}}{2 * \sqrt{T}} + r * F_k * N(d_1) * e^{-r*T} - r * R_x * e^{-r*T} * N(d_2)$$

$$\Theta_{Put} = -\frac{F_k * N^{'}(d_1) * \sigma * e^{-r*T}}{2 * \sqrt{T}} - r * F_k * N(-d_1) * e^{-r*T} + r * R_x * e^{-r*T} * N(-d_2)$$

where:

Θ = theta

$T = t_k$

r = spot rate from t_0 to T

Vega Using Black76

Reference: John C. Hull, *Options, Futures, and Other Derivative Securities*, Chapter 13.8 The Greek Letters - Vega, p328.

$$V = F_0 * \sqrt{T} * N^{'}(d_1) * e^{-r*T}$$

where:

V = vega

Rho Using Black76

Reference: John C. Hull, *Options, Futures, and Other Derivative Securities*, Chapter 13. The Greek Letters - Rho p

$$Rho_{Call} = R_x * T * e^{-r*T} * N(d_2)$$

$$Rho_{Put} = -R_x * T * e^{-r*T} * N(-d_2)$$

C

Examples

This appendix provides examples of different analyses, filters, and time buckets that you can define in Risk Management. It contains the following examples:

- Position Analysis on page C-2
- Maturity Analysis on page C-3
- Gap Analysis on page C-4
- Filter - Money Market Physic on page C-5
- Filter - Bonds on page C-5
- Filter - Money Market USD on page C-6
- Time Buckets - Gap Time Buckets on page C-6

Position Analysis

The following example shows the various set up parameters required to create a position analysis.

Page	Parameter	Value
Analyses	Position	
Analyses Position	Create Analysis	
Create Analysis: Select Style	Style	Table
Step 1: General	Analysis Name	Bonds
	Description	Bonds held
	Recalculation Threshold	1 Day
	Market Data Set	-
Step 2: Parameters	Filter	Bonds
	Dates	Relative System Date + 0 Days
	Reporting Calendar	7-day Week
Step 3: Table	Columns	Amount Outstanding
		Currency
		Maturity Date
		Fair Value
		Accrued Interest
		Duration
		Convexity
		Position PBV
		Yield to Maturity
		Coupon Rate
		Coupon Frequency
		Deal Currency
	Currency	USD
	Reporting Currency	Unit

Page	Parameter	Value
	Units	
	Decimal Places	

Maturity Analysis

The following example shows the various set up parameters required to create a maturity analysis.

Page	Parameter	Value
Analyses	Maturity	
Analyses Maturity	Create Analysis	
Create Maturity: Select Style	Style	Cross Tab with Time Buckets
Step 1: General	Analysis Name	Maturity Analysis
	Description	Physical Money Market (rolling over 4 Months)
	Recalculation Threshold	1 Day
	Market Data Set	-
Step 2: Parameters	Filter	Money Market Physic
	Time Buckets	Rolling4Months
	Dates	Relative System Date + 0 Days
	Reporting Calendar	7-day Week
Step 3: Table	Measure	Maturity Amount
	Column Header	Date
	Rows	Company
		Currency
		Deal Type
		Deal Subtype
	Currency	Deal Currency
	Reporting Currency	USD

Page	Parameter	Value
	Units	Unit
	Decimal Places	
	Advanced Settings	
Advanced Settings: Total/Percentage		
	Currency	Checked

Gap Analysis

The following example shows the various set up parameters required to create a gap analysis.

Page	Parameter	Value
Analyses	Gap	
Analyses Gap	Create Analysis	
Create Analysis: Select Style	Style	Cross Tab with Time Buckets
Step 1: General	Analysis Name	Gap Analysis
	Description	Gap Analysis over 5 Years
	Recalculation Threshold	1 Day
	Market Data Set	-
Step 2: Parameters	Filter	Money Market USD
	Time Buckets	Gap Time Buckets
	Dates	Relative System Date + 0 Days
	Reporting Calendar	7-day week
Step 3: Table	Measure	Gap Amount
	Column Header	Labels
	Rows	Money Market Instrument Type
		Deal Type
	Currency	Deal Currency

Page	Parameter	Value
	Reporting Currency	USD
	Units	Unit
	Decimal Places	
	Advanced Settings	
Advanced Settings: Total/Percentage		
	Money Market Instrument Type	checked
	Deal Type	checked

Filter - Money Market Physic

The following example shows the various set up parameters required to create a filter.

Page	Choice	Value Entered
Setup	Filters	
Setup Filters	Create Filter	
Create Filter	Filter Name	Money Market Physic
	Description	Money Market Physicals
	Condition Relation	And

Attribute	Relation	Value
Instrument Type	Equal to	Physical
Market Type	Equal to	Money Market

Filter - Bonds

The following example shows the various set up parameters required to create a filter.

Page	Choice	Value Entered
Setup	Filters	
Setup Filters	Create Filter	
Create Filter	Filter Name	Bonds
	Description	Bonds held
	Condition Relation	And

Attribute	Relation	Value
Deal Type	Equal to	BOND
Deal Subtype	Equal to	BUY

Filter - Money Market USD

The following example shows the various set up parameters required to create a filter.

Page	Choice	Value Entered
Setup	Filters	
Setup Filters	Create Filter	
Create Filter	Filter Name	Money Market USD
	Description	Money Market Deals in USD
	Condition Relation	And

Attribute	Relation	Value
Market Type	Equal to	Money Market
Currency	Equal to	USD

Time Buckets - Gap Time Buckets

The following example shows the various set up parameters required to create a filter.

Page	Choice	Value Entered
Setup	Time Buckets	
Setup Time Buckets	Create Time Buckets	
Create Time Buckets	Time Buckets Name	GapTimeBuckets
	Description	Gap Time Buckets

Interval#	Length + Type	Label
1	1 Month	Less than 1 Month
2	1 Month	1-2 Months
3	1 Month	1-3 Months
4	3 Months	3-6 Months
5	6 Months	6-12 Months
6	1 Year	1-2 Years
7	3 Years	2-5 Years

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