FO Modules

Instruments, Market Data, Simulation & Viewer

Target Audience

FO Configuration
P&L Management

- ✓ FO Support team
- ✓ FO Financial Analyst
- ✓ FO Configurators in an implementation team

Prerequisites

MX.3 Core Modules (or basic knowledge of MX.3 Platform)

Very good knowledge of:
- Front-Office desk activity
- Financial products and trade typologies
- Asset classes (e.g. Interest rate swaps, Securities and Options, FX and Commodities)

Duration

3 days

Course Outline

The purpose of this training session is to give trainees a thorough understanding of the Front-Office modules in Murex. This is an essential step for both the implementation and the daily work and support activity surrounding Murex Front-Office modules.

Learning Objectives

At the completion of this training, the attendee will be able to:

- Configure instruments and other static data in Murex
- Design a rate curve and maintain market data in Murex
- Design simulation views for analysis of trades P&L and risk
- Explain portfolio management (position blotters, real time analysis, risk analysis, scenarios, P&L decomposition)

Sample Syllabus

Day 1	Demonstration of an Interest Rate Swap	Follow the flow of trade through the various Front-Office modules from pricing to booking to risk management
	Profit & Loss	P&L components in MX
	Instrument Configuration	FX instruments configuration
Day 2	Instrument Configuration	Interest rate generators
	Market Parameters	
	Rate Curve Overview	
Day 3	Simulation Module	• Simulation module mechanism and features • Design and customization of data to be displayed and monitored
	Simulation Viewer	
	Profit & Loss Variance Module	

MTEK eLearning tutorials included

- **Viewer (starting v3.1.23 for Designer): Tutorial 2: First steps**
- **Viewer (starting v3.1.23 for Designer): Tutorial 3: Format**
- **Viewer (starting v3.1.23 for Designer): Tutorial 5: Filters**
- **Viewer (starting v3.1.23 for Designer): Tutorial 7: Formulas**

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Preparatory Reading List

FO

Title	docid	Content	Key concepts
MX.3 Platform Overview	8564	Overview of the MX.3 platform and how it adapts to clients' needs	One platform - multiple facets,Main features of the MX.3 platform, Global Operating Model, MX Modules, Mx product coverage
Getting Started- (GOM) Global Operating Model Overview	8581	Explanation of what the (GOM) Global Operating Model is and how it functions.	Global Operating Model, GOM building blocks, Users and Groups, GOM organisation overview
Navigation eLearnings	15808	**Navigation tutorial I: Starting up in MX.3**	Start and stop MX.3 services, Determine mandatory and optional services, Start the MX.3 application, Navigate MX.3 screens
	15812	**Navigation Tutorial II: End users in MX.3**	Explain the activities of the different types of End-user groups (FO, MO, BO), Name the main menus available in the standard FO, MO and BO group, Explain the difference between an MX and an MLC group
	15809	**Navigation Tutorial III: Admin Session**	Navigate the ADMIN session, Define a new MX user, Attach an MX user to an MX group, Suspend and lock users, Link and unlink users from user policies, Define a new MLC group, Attach an MLC user to an MLC group
	15810	**Navigation Tutorial IV: Supervisor Session part I**	Explain the role of a Supervisor user, Explain the different tabs used to define the group rights in the Group definition screen, Explain the Navigation Template and how to access it, Add and rename menus in the End-user session, Change the access right of a menu in an End-user session.
	15814	**Navigation Tutorial V: Supervisor Session part II**	Define a new Front Office Group, Define a new P&L Control Group, Define a new Processing Center Group, Define a new Configurator Group
	15911	**Navigation Tutorial VI: Configurator Session**	Navigate the Configurator session, Add a new Counterparty in MX.3, Use the Import/Export Wizard, Explain the GOM screens in the Configurator session
	15815	**Navigation Tutorial VII: Housekeeper Session**	Explain the main usage of the Housekeeper session

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Preparatory Reading List

FO

Title	docid	Content	Key concepts
Navigation Tools	8576	An outline of the basic navigation tools used throughout the application	Login, Accelerators, Navigation, Display, Numerical cells
Trade Hierarchy Overview	8579	Explanation of the key components in the MX.3 Trade hierarchy	Financial Contract Component, Financial Contract and Package, Typologies, Events, Versioning
Trade management eLearnings	8748	Overview of trade management	Define a Financial Contract (FC), Explain the concept of Financial Contract Component (FCC), Distinguish between a simple and a more complex FC, What is a Package?
	8754	Tutorial Events and Versioning	Notion of Events and Versioning, Identify the IDs of Financial Contract, Events Versions, etc.
	15697	Trade Insertion	Trade insertion from e-Tradepad and FDI as well as the Trade Ticket
	15795	Trade Query	How to query trades from the Trade query screen
	14719	Trade Typologies	Overview on the trade typologies and how they are used in the system
Trade & Static Data Life Cycle	8575	A high level, general overview of the key concepts of Trade and Static Data Management in MX.3	Straight Through Processing (STP), One Stop Processing (OSP), Workflow, Settlement Instructions (SI) workflow, Events
Pricing and Structuring Module	8572	Overview of the module Traders use to determine the fair price of a simple or structured trade	eTradepad, Pricing notepads, Structured trade builder (STB), Pricing matrix, Market data, Archiving module, Communication and Distribution hub, Risk analysis
Distribution and Order Management	8569	Explains the key concepts of the Distribution and Order Management module	Structuring, Sales and eCommerce, Deploying eCommerce solutions to clients, Negotiated vs Automated Trading

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Preparatory Reading List

FO

Product Description	8566	List of product typologies per asset class with their descriptions	Commodities Credit Derivatives Equities Fixed Income Fund and Fund Derivatives FX Cash FX Derivatives Hybrids Inflation Interest Rate Derivatives Money Market Securities Finance Securitization

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Instructions to the trainer for DEMO

This demo is given at the beginning of a three-day FO modules training. You need to let the trainees know:

- The training begins with a demo that shows the use of the MX.3 application.
- They will explore in details the modules used for the booking and monitoring of a trade.

You need to explain that you will do this demo **twice**. For that we recommend to open two FO sessions, one with the e-Tradepad open, one with the Simulation viewer open (e.g. portfolio PL_TRAINING).

Some parts of the two demos are mandatory, i.e. should be mentioned, and some other parts are optional, i.e. will be covered if there is time.

1st demo: Will be done in regular speed. **This is what the traders do** and see when they book a trade. The benefit of having everything already configured induces that the traders will book their trade smoothly and you as consultants will not get desperate, angry calls.

You will book a trade using e-Tradepad, look at the simulation screen to check the position. **If possible** you will show that the simulation is automatically refreshed after booking the trade.
You will also query the trade ticket. If possible query it from the blotter (e-Tradepad).
You will run a "Cancel & Reissue" event and query the trade.
Note to trainer: Please do NOT use accelerators.

2nd demo: In slow motion.
Note to trainer: You must pause at each step. At each section, you must pause. You have to explain all the configuration that has been done to achieve this without redoing the configuration yourself (this will be done in the following training presentations).

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Before the demo begins, you tell the trainees the following:

This demo will showcase the FO modules and skills necessary for FO users for trading purposes. For the workshop that follows in the next three days, they will learn to use the e-Tradepad, simulation and viewer. Then they will learn how to configure so there is no need to show that in this FO session.

Keep in mind that this session only lasts 1h30. It goes fast.

There are three main areas used by end-users in the system:

Write on the white board:

1) e-Tradepad
2) Portfolio management (Simulation)
3) Trade Query

Say that this training will focus on the two first areas, as they are the ones mainly used by FO end-users.

Explain to trainees that

- e-Tradepad → this is the central pricing and booking screen for FO users. It has the pricers (models that run the computations), accelerators, automatic completion fields etc.

- Portfolio management screen (known as simulation screen) is the position keeping screen of the system, which is widely used as booking for cash products. The FO and MO (Risk) users use simulations to manage their positions. It allows users to book trades from the FDI (lighter version of the e-Tradepad useful for high volume trading), monitor their position and risk thanks to the simulation viewer, and query trades using the daily blotter and queries.
  The simulation screen can be accessed directly through the e-Tradepad.

- Trade query is most often used by BO end users to search for trades.
  The trade query screen can also be accessed directly through the e-Tradepad.

Write on the white board:

Screens:	**Users**
1) e-Tradepad	FO
2) Simulation	FO/MO
3) Trade Query	BO

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Instructions for Demo 1-A:

This is a typical demo for an IRD desk, whereby each user will have two open sessions: the e-Tradepad for structuring, pricing and trade booking, and the simulation screen to monitor position and risk. The idea is to highlight the fact that with an appropriate configuration it is very easy and quick to book a trade. No time loss here.

Activity	Content
Insert an IRS trade in e-Tradepad	Login as MUREXFO/MUREXFO Choose an FO group, such as "FO_FXMM_TR" Open the e-Tradepad using the search screen tool at the top right Insert an IRS Vanilla trade. The product is saved as favorites. (in the Default Notepad "Multi", the IRS leg should be already saved and available – you can highlight the fact that pricings are already saved which avoids pricing reconfiguration and inserting legs).
Generator	Mandatory: Select Generator USD LIBOR A 6M Optional: Open the USD LIBOR A 6M generator screen in order to customise the generator rate convention, open the payment flows in the leg in e-Tradepad to check that the change has applied
Rate Curve	Open the rate curve screen Change the estimation curve (USD LIBOR 6M → USD STD)
Mandatory Fields	Portfolio: by default, it is MX_PTF Counterparty: select any counterparty
Simulation	Bottom button: "Risk" Check the impact (risk) of the pricing before the booking. The layout should be configured so that the simulation opens with

	the same layout as the simulation
New Trade Ticket with e-Tradepad template	Bottom Button: "Book" Press "OK" (or "Ctrl+Enter") to book trade Check booking confirmation with contract number
Blotter	The blotter is already displayed by default Identify the trade in the Trade blotter screen
Trade query	Query the trade by its financial contract ID Open the trade ticket Identify the version of the trade Show the P&L of the trade
Perform event	Toolbar (from the blotter): Operations/ Cancel & Reissue Change the nominal amount in the generated trade
Trade Query after event	Query the trade using the FC ID Show the modified nominal and the new P&L of the trade

Instructions for Demo 1-B:

The idea in this section is to demonstrate that trade insertion could also be conducted directly from the portfolio management screen, and that the aforementioned blotter is also directly available in the portfolio management screen. Note that the FDI is quite adapted to desks which have a high volume trading activity. So this second demo would make more sense for clients who have a flow based business such as Secfin, FX, MM and vanilla equity.

Activity	Content
Insert an IRD LN_BR trade from FDI	Login as MUREXFO/MUREXFO group FO Load a simulation by position on portfolio "FXMM_PAR" Make sure that simulation screen opens by default with the loan FDI and blotter activated Book a Loan deal from the FDI (upper part of the screen). Ensure you select the portfolio FXMM_PAR. You should just have to fill in the ctp, the currency (field "Instrument"), the maturity, adjust the rate and the pfolio.
Monitoring views	Check the position refreshing in the different monitoring views. Briefly speak about and show views applicable for the type of trade you have inserted
Blotter	Show that deal displays in the daily blotter
Trade query	Say that we are able to add queries in the bottom part of the screen in order to search for trades inserted in the past
Perform event	Perform a cancel and reissue event on the loan directly from the daily blotter (right click on the transaction> Operations> C&R)

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Now you can begin the demo 2 (**SLOW MOTION**):
In the demo 2 we redo the actions in the demo 1 plus we spend some time explaining the configuration that has been done to achieve this without redoing the demo1.
However, in order to explain where the configuration has been done, it is possible to show where the configuration information can be found (navigation).

Instructions for Demo 2-A:

Activity	Content
Insert an IRS trade in e-Tradepad	Login as MUREXFO/MUREXFO Choose an FO group, such as "FO_FXMM_TR" Open the e-Tradepad using the search screen tool at the top right Insert an IRS Vanilla trade. The product is saved as favorites. (in the Default Notepad "Multi", the IRS leg should be already saved and available – you can highlight the fact that pricings are already saved which avoids pricing reconfiguration and inserting legs). → Quickly remind the Group and Desk purpose (rights and configuration) Insert an IRS: ○ Show how to insert additional legs by clicking on the "Insert" icon (explain it has been added by config, explain the buttons are customisable). ○ Choose the product IRS Vanilla from the drop down list (show how to use the search tool). Show how to set products as favorites and how to find them afterwards. ○ Show that the e-Tradepad set of fields are user-definable. Users can add fields to the leg. ○ Explain that notepads and legs can be created and saved, no need to redo everything (which is the case for the IRS in our case). ○ In the instrument field of the leg start typing the generator name: USD LIBOR Click on tab (show how to quickly access the wanted product by typing the first letter then tab). Choose the USD LIBOR A 6M generator by double clicking on it. Explain the list of "preferred products" (Users can have a different "short list" of products). ○ Show everyone how the leg is populated with default values for the fields. Hit space bar on the Template details field to open the USD LIBOR A 6M generator screen.
Generator	○ Open the USD LIBOR A 6M generator. ○ Explain the logic of "generator": A generator is a template that stores the static data used for each kind of trade. The generator accelerates the booking of a trade. ○ Explain the following parts of the generator: 1. Generator naming convention (MXpress): E.g. USD LIBOR A 6M: USD: Currency LIBOR: Market (of the index) A: Frequency of the fixed leg (can be A, S, Q or M) 6M: Tenor of the floating index

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	2. Scheduling 3. Rate conventions ○ You must also explain the concept of a default generator that is used for quick booking. ○ Mention that wherever allowed, users are able to modify the generator chosen (the template) at the pricing level for the current deal insertion. The changes will not be kept at the global level for that generator. Add the field "Generator" to the layout to show if the generator has been customised or not. For now, no customisation has been done so this field should indicate "Template". Customise the generator for the trade. Change the rate convention for example. Now show the field Generator should indicate "Customized". ○ Show also the customised payment flows (open them by click on the "Flows" field in e-Tradepad). ○ Point out the dates and flow amounts (show how to customise the date, payment and rates).
Rate Curve	Next, show the rate curve (market data). ○ Access the rate curves from the e-Tradepad fields "Discount curve" or "Estimation curve". Hit space bar to open a rate curve. ○ Explain that these rate curves are assigned to this trade by default using the rules in the rate curve assignment. ○ Explain that you can also open the rate curves from menu in e-Tradepad: Navigation>Market Data> Rates> Revaluation rate curves. ○ Explain that you can also open the rate curves from menu Market data/ Used market data and that you can run scenarios on market data from here. Also show there is an icon for this menu "Used MD". ○ Insist on the fact that all the related market data and static data can be accessed from the e-Tradepad using the menus. Users do not have to exit this screen. ○ Show how to change the rate curve assigned to this leg by choosing another USD curve. ○ Emphasise that Historical data used at booking are not stored at the deal level. ○ Open the Historical Data screen by accessing it from the Navigation menu. ○ Insert a maturity for the trade. ○ Modify the fixed rate if you want. Explain MX by default calculates the fixed rate of the transaction given NPV=0.
Pricing loaded in simulation	Explain that even if the trade is not booked it is possible to check the impact once booked on the simulation (detailed simulation aka simulation by trade). ○ Click on the "Risk" icon to load the trade in (detailed) simulation. ○ Explain that the layout in the simulation viewer can be defined and changed at the notepad level. ○ Explain that the views in the viewer are entirely customisable based on the data dictionary (if not explained elsewhere). ○ Explain that the view that we see in the simulation screen is an MXpress view. ○ Show the layout, how it consists the different views.

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	○ Say that the clients can configure their own views.
Mandatory Fields and trade booking	Next, insert other mandatory fields for trade booking, without which the trade cannot be inserted into the DB (which of course can be overwritten, but not advised). ○ Insert a portfolio (MX_PTF.) ○ Insert a counterpart. ○ Explain that clients can have automated completion rules to fill in the portfolio name or counterparty name, based on some criteria. E.g: LIBOR 6M, maturity >10yrs, then fill in Portfolio A and Counterparty = NewBank. Other fields can also be set as mandatory or auto-completed. ○ Clients can also use completion rules to block trade insertion if certain business rules are not respected (e.g.: maturity >15 years etc). ○ Explain that these rules are defined in pre-trade in the processing template under a configuration session. No need to show where it is configured (next trainings). ○ Say that they can either: 1. Book the trade: By clicking on the green "Book" icon. 2. Generate the trade: By right clicking on the leg and selecting "Book trade". 3. Capture the trade (no ticket) – not always available, please check your environment first. ○ Explain that the difference is the first method books the trade directly in the DB without generating the trade ticket first. ○ Generate the trade. ○ The new trade ticket screen will appear.
(Optional) New Trade Ticket with e-Tradepad template	Explain the new trade ticket screen: ○ The trade ticket is a representation of the trade that has just been entered by the user. It is broken in three parts: 1. The top and bottom banners: Display all the non-financial information. 2. The middle portion: Resembles the e-Tradepad pricing template and contains all the financial data. The display cannot be modified. ○ Next you will zoom in on the top banner. Point out the contract number and the component number. Note the FC ID and the FCC ID. Explain the difference between both IDs. Note down the FC ID. Say that we will use this ID to query the trade afterwards. ○ Click "Save" or "Ctrl + Enter" to complete the insertion. ○ The trade is now booked. Murex will confirm the contract number.
Blotter	○ Explain how to access the blotter if it is not displayed by default on the e-Tradepad: from the Folders list, go to Tools> Daily ○ The trade now appears in the deal blotter. Point it out. ○ Say that the view in the trade blotter screen is user definable. ○ Click on the "Edit view" design button to open the Data Dictionary screen. ○ Browse the different fields which you can add to the view.

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Trade query	○ Explain there are several way to access the trade query from the e-Tradepad screen: 1. Go to the menu: Processing/ Query/ Trade Query 2. From the Folders list, go to Batches> Trade query (it may be already open in the e-Tradepad) ○ Explain briefly that this trade query screen allows the user to select many fields which act as filters to narrow down the search. For our demo, we will perform a trade query on portfolio "MX_PTF". ○ Locate our trade concerned and open the trade ticket. Say outloud "press spacebar". ○ Mention the look of the trade ticket. It is what the trainees have seen when trade was booked. ○ Locate the version number (should be v1) ○ Go to View/ P&L – note the P&L value. ○ Close the trade ticket ○ Explain you can access the trade ticket as well as its P&L directly from the blotter (spacebar to open the ticket ; right click> P&L or "Alt+P" to get the P&L contribution of this deal).
Perform event	○ Mention that there are two ways of performing an event. 1) Toolbar: Operation 2) Right click on trade: Operation Both can be accessed from the trade query or the blotter. ○ Perform a "Cancel and Reissue" on the trade. ○ Explain the events window: Tab: Target Contract/Package : v1 Tab: Generated Contract/Packages : v2 Question: Ask the trainees in which tab they should define a new nominal amount. (Answer: the **Generated** Contract/Package) ○ Change the nominal to $50 million ○ Save the trade
Trade Query after event	Question: Ask the trainees what should be the trade number (financial contract ID) of our trade now? ○ Get a show of hands for the same ID and one for ID + 1. Explain the answer if necessary. ○ Exit the trade query results screen. Perform the trade query again on portfolio "MX_PTF". ○ Show the results. Exit. ○ Query again: This time query using the FC ID and check the box "All versions". ○ Open the trade ticket with new version. Question: Ask the trainees how to open the trade ticket (Answer: press spacebar) ○ Check the new nominal amount. Open the payment flows. ○ Exit by pressing on ESC button.

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Simulation	You have already explained the simulation when loaded from the e-Tradepad, only insist here on the most important aspects and on the different approach: global portfolio, risk monitoring and not trade impact. ○ Go to the menu: Simulation/ Simulation Detailed. ○ Load the portfolio "MX_PTF". ○ Explain that the screen is populated with "Live" deals and is connected to market data in Real-time mode. Select the view "PL breakdown". ○ (**Optional**) Explain that views are user-definable. You click on the edit the view to access the Data Dictionary and add fields such as "Trade number". ○ (**Optional**) Access the "Curve risk" tab to show the bottom view "Hedge Basket EUR". Check if they are pre-configured. ○ Explain that the trade number is relevant in a detailed simulation. It enables the users to track any issues or incoherence and zoom in on specific trades. ○ Detailed simulation is low in performance in the large-flows business (e.g.: FXMM) though. ○ Views can be exported in report batch. In which case, trade number and counterpart name become relevant. (You do not need to show how to export the batch of trades for a report. ○ Explain that market data and static data are also accessible form the simulation screen using the navigation menu or the View/ Popup market data menu. Explain that from the View/ Popup market data menu one can run scenarios on the market data.

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Instructions for Demo 2-B:

Activity	Content
Insert an IRD LN_BR trade from FDI	Login as MUREXFO/MUREXFO group FO Load a simulation by position on portfolio "FXMM_PAR" Make sure that simulation screen opens by default with the loan FDI and blotter activated. From the loan FDI template: ○ Speak about the FDI, basically how to show/hide fields. ○ Briefly speak also about compliance and completion rules (if not yet done) ○ Speak about the limits button ○ Show how to add as many FDI patterns as we want ○ Show how to open the deal ticket before booking, by clicking on the magnifier button Book a Loan deal from the FDI (upper part of the screen). Ensure you select the portfolio FXMM_PAR. You should just have to fill in the ctp, the currency (field "Instrument"), the maturity, adjust the rate and the pfolio. Check the position refreshing in the different monitoring views.
Monitoring views	Briefly introduce the MX viewer (if not yet done): ○ Quick demo of the capabilities of the viewer from an end-user and config perspective would be good to present. ○ Speak about the real-time aspect of the monitoring screens.

Blotter	Show that the deal is displayed in the daily blotter once booked. Speak about the ability of marking newly inserted deals in a specific color.
Trade query	Show how to add a simple query near the daily tab, allowing to search for previously inserted trades.

After the demo, please recap the steps to book a trade in the e-Tradepad. You DO NOT need to ask for details. The goal is for the trainees to remember the steps to book, they will then "see" the things they will need to learn throughout the different training.

Steps:

Insert an IRS trade in e-Tradepad
○ Generator (static data) – can be customised at the level of the trade
○ Rate curve (market data)
○ Mandatory fields
○ Risk preview in simulation
○ Select Book trade
○ Access trade via blotter or trade query
○ If event to perform, it can be done via trade query or blotter

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MUREX™

Murex Learning

BUILD

FO Modules

Profit & Loss in MX.3

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Learning Objectives

Profit & Loss in MX.3

At the end of this course, you will be able to:

- ✔ Explain the two P&L calculation methods
- ✔ Differentiate between Accounting and Economic P&L
- ✔ Locate the P&L of a given trade in the application and justify the calculations

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Agenda

P&L Calculation Methods
- Accounting P&L
- Economic P&L

Finding P&L in the System

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P&L Calculation Methods

Accounting P&L: Components & breakdown

The accounting P&L can be broken down in two ways:

Accounting P&L = Cash + Market Value

OR

Accounting P&L = Capital Gain + Revenue

The choice of accounting P&L breakdown depends on the asset class and user preference.

MX is able to compute and display both calculation methods for all asset classes.

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P&L Calculation Methods

Accounting P&L: Components & breakdown

Accounting P&L = Cash + Market Value

Component	Definition	Example
Market Value	Market Value = Today's trade value	Option's MV = Premium value today Interest rate Swap's MV = All estimated/known future proceeds discounted to currency spot date
Cash	All past payments (from Capital or Revenue source) & future payments not included in the market value (e.g. premium for an option).	Cash of an equity trade = Initial price + All past dividends Dividend of an equity swap when ex-date is in the past and payment still in future.

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P&L Calculation Methods

Accounting P&L: Components & breakdown

Accounting P&L = Capital Gain + Revenue

Component	Definition	Example
Capital Gain	Capital Gain = Today's value – Initial value	Option's CG = Premium value today – Premium paid Bonds = Current market price – Initial (purchase/sell) price
Revenue	Revenue = Past returns + Upcoming returns	Stock dividends Bond coupons

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P&L Calculation Methods

Accounting P&L: Practice 1

Practice 1: Which accounting formula is used to calculate the Accounting P&L of the following asset classes?

Accounting P&L = Cash + Market Value

OR

Accounting P&L = Capital Gain + Revenue

FX (spot)	Cash + Market Value
FI (Bond)	Capital Gain + Revenue
Equity Cash	
IR (Interest rates)	
Sec Fin	
CRD (Credit)	
COM (Commodities)	

Solution

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P&L Calculation Methods

Accounting P&L: Beyond accounting P&L

Time Value of money:

$1 today is not equal to $1 in one month or $1 a month ago!

The time value of money is the value of money figuring in a given amount of interest earned over a given amount of time.

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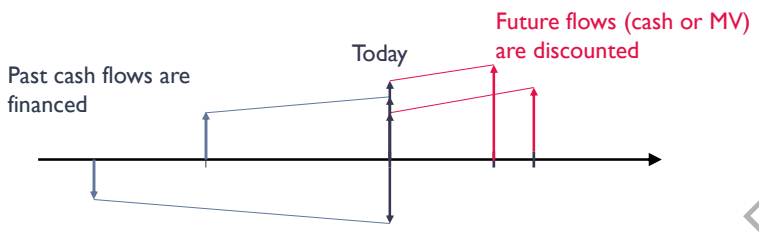
P&L Calculation Methods

Accounting P&L: Beyond accounting P&L

$1 a month ago + $1 today + $1 in one month <> $3

Amounts at various dates should be discounted or capitalized before being totaled and expressed as of current date (Today).



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P&L Calculation Methods

Economic P&L: Components & breakdown

Economic P&L represents the P&L financed and discounted to Today

Economic P&L = Accounting P&L + Financing + PV Effect

Component	Value
Accounting P&L	Cash + Market Value Capital Gain + Revenue
Financing	Cost of carry of past cash Capitalized past cash – Net past cash
PV Effect (Present Value Effect)	Discounted future cash – Net future cash + Discounted MV – Net MV

Note 1: MV of trade includes sum of all future flows not part of the deal's future cash, discounted to instrument spot date.

Note 2: Discounted MV = MV discounted from the instrument (currency/security) spot date to Today.

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P&L Calculation Methods

Economic P&L: Practice 2

Calculate the Accounting and Economic P&L of a US Treasury bond that was bought yesterday and settles today.

Buy quantity	3,000,000
Buy price @ buy date	102.0354%
Accrued coupon (revenue) @ buy date*	0.368%
Sell price @ spot date	103%
Accrued coupon (revenue) @ spot date	0.377%
Discount factor**	0.999990277872299

* If the bond is sold today, settlement would occur tomorrow (delay of 1 business day is equivalent to the instrument spot day).

** Discount factor is given as between today and the spot date of USD cash amount.

Question: Which accounting P&L breakdown would make more sense to use?

Accounting P&L = Cash + Market Value

OR

Accounting P&L = Capital Gain + Revenue

Solution

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P&L Calculation Methods

Economic P&L: Practice 3

To recap, which formulas calculate the Economic P&L?

- **A**: P&L @ T = Accounting P&L + PV Effect + Capital Gain
- **B**: P&L @ T = Past Cash + Financing + PV Effect + Future Cash
- **C**: P&L @ T = Past Cash + Financing + PV Effect + Future Cash + Market Value
- **D**: P&L @ T = Accounting P&L + Economic P&L
- **E**: P&L @ T = Financing + Capital Gain + PV Effect + Revenue

Solution

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Agenda

P&L Calculation Methods

Finding P&L in the System

- Overview
- P&L on one deal
- Simulation viewer
- P&L variation

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Finding P&L in the System

Overview

There are different ways to find the P&L in the system. This training will focus on the P&L on one deal and the P&L displayed in the Simulation screen.

P&L in the system	Typical Usage
P&L on one deal	**Quick check of one particular deal – mainly for testing purposes.**
Simulation	**Dynamic view of P&L during trading activity.**
Dynamic tables	View of P&L and trade attributes with user definable filter – mainly for testing purposes.
Reports / Extracts	P&L closing positions. P&L reconciliation.
P&L Variance Module	Comprehensive view of P&L variation between 2 consecutive days.
Accounting Module	Book keeping of daily positions.

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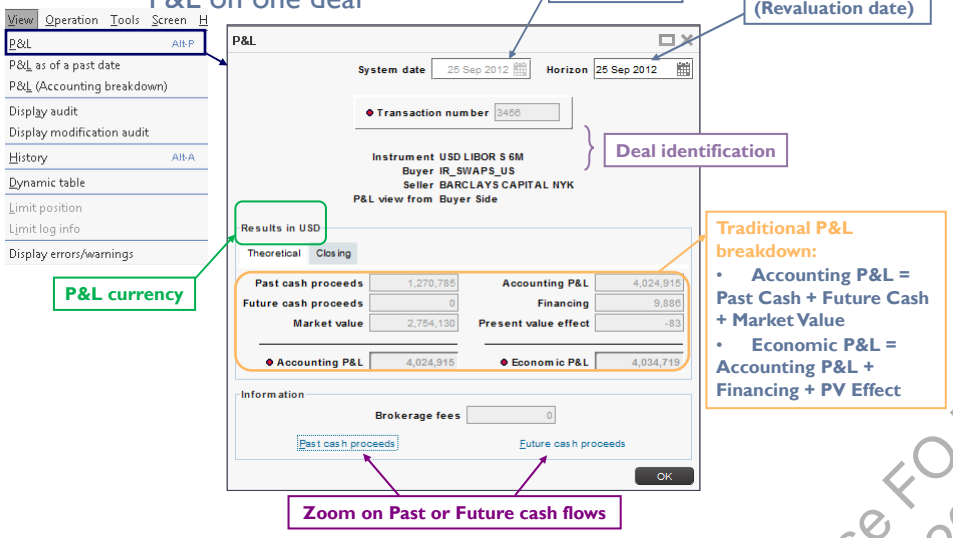
Finding P&L in the System

P&L on one deal



End-user session: Processing/ Trades/ Trade query – Select a deal – View/ P&L

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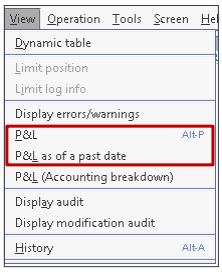
Finding P&L in the System

P&L on one deal

The P&L screen of a trade offers the P&L view for all trade types:

Absolute P&L	Quick check of absolute P&L of any deal.
Is easily accessible	From many parts of the application, via View/ P&L or via a right-click/ P&L.
P&L as of past date	In the same way, you can have a look at a P&L as of a past date by choosing P&L as of past date.



End-user session: Processing/ Trades/ Trade query – Select a deal – View/ P&L

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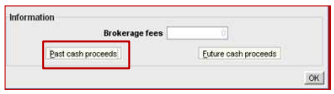
Finding P&L in the System

P&L on one deal: Past cash proceeds

Past cash proceeds can be easily retrieved in two ways:

1. By clicking on **Past cash proceeds** button in P&L window



2. By checking deal ticket flows

Daily cash flows

Date	Type	Ccy	
05 Jul 2011	R	USD	479,650.00
04 Jan 2012	R	USD	458,538.33
05 Jul 2012	R	USD	447,673.33
05 Jul 2012	R	USD	-115,076.50

Global flow schedule Source:Deals Trade:3456

Leg 1 Leg 2 All legs

3456 Aggregated view

...	Flow Tp	Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flow	Cur	Interest flows	Int/flows + Int/Int	Rate Convention	Nb of Days
1	INT	04 Jan 2011	05 Jul 2011	30,000,000		3.18000		0.0000		05 Jul 2011	479,650.00	USD	0.00	0.00	LIN 30/360	181
1	INT	05 Jul 2011	04 Jan 2012	29,000,000		3.18000		0.0000		04 Jan 2012	458,538.33	USD	0.00	0.00	LIN 30/360	179
1	INT	04 Jan 2012	05 Jul 2012	28,000,000		3.18000		0.0000		05 Jul 2012	447,673.33	USD	0.00	0.00	LIN 30/360	181
1	INT	05 Jul 2012	04 Jan 2013	27,000,000		3.18000		0.0000		04 Jan 2013	426,915.00	USD	0.00	0.00	LIN 30/360	179
1	INT	04 Jan 2013	05 Jul 2013	26,000,000		3.18000		0.0000		05 Jul 2013	415,696.67	USD	0.00	0.00	LIN 30/360	181
1	INT	05 Jul 2013	06 Jan 2014	25,000,000		3.18000		0.0000		06 Jan 2014	399,708.33	USD	0.00	0.00	LIN 30/360	181
1	INT	06 Jan 2014	07 Jul 2014	24,000,000		3.18000		0.0000		07 Jul 2014	383,720.00	USD	0.00	0.00	LIN 30/360	181
1	INT	07 Jul 2014	05 Jan 2015	23,000,000		3.18000		0.0000		05 Jan 2015	361,636.67	USD	0.00	0.00	LIN 30/360	178
1	INT	05 Jan 2015	06 Jul 2015	22,000,000		3.18000		0.0000		06 Jul 2015	351,743.33	USD	0.00	0.00	LIN 30/360	181

End-user session: Processing/ Trades/ Trade query – Select a deal – View/ P&L

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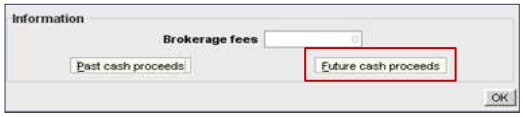
Finding P&L in the System

P&L on one deal: Future cash proceeds

Future cash proceeds are future flows received after the system date and not included in the market value:

- ✔ Mainly premiums, additional customized flows (of type premium only) and settlement payments.
- ✔ Some future flows might be implicitly accounted for in the market value. Hence, they are not considered as future cash proceeds.



For **bond options**: future cash proceeds = premium paid, hence the FC proceeds represent by definition the cash amount invested to enter into the transaction.

End-user session: Processing/ Trades/ Trade query – Select a deal – View/ P&L

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Finding P&L in the System

P&L on one deal: Market value

Market value is either the market quotation or the sum of all futures flows discounted to spot date.
It can be quickly found in a pricing screen or by loading the trade in pricing.
It is also possible to compute manually the flows discounted to spot date using the interpolator to retrieve the discount factors.

End-user session: Processing/ Trades/ Trade query – Select a deal – View/ P&L

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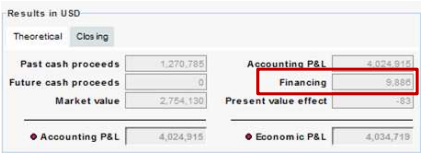
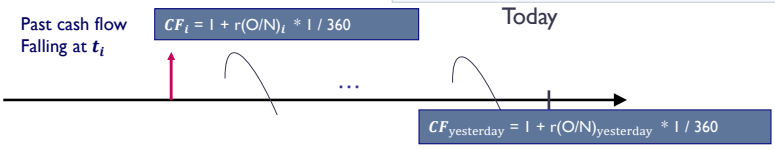
Finding P&L in the System

P&L on one deal: Financing

Financing applies to past cash flows. It is also called "cost of carry".
It assumes that all past flows have been reinvested every day at the overnight financing rate.





To ease the computations, MX provides "Lambda" which is, for a given date, the product of all the capitalization factors between t_i and today:

$$Lambda_i = CF_i * CF_{i+1} * \cdots * CF_{yesterday}$$

The convention used in the computation is inherited from the short term rate convention of the currency. **End-user** session: Configuration/ Forex/ Currencies

End-user session: Processing/ Trades/ Trade query – Select a deal – View/ P&L

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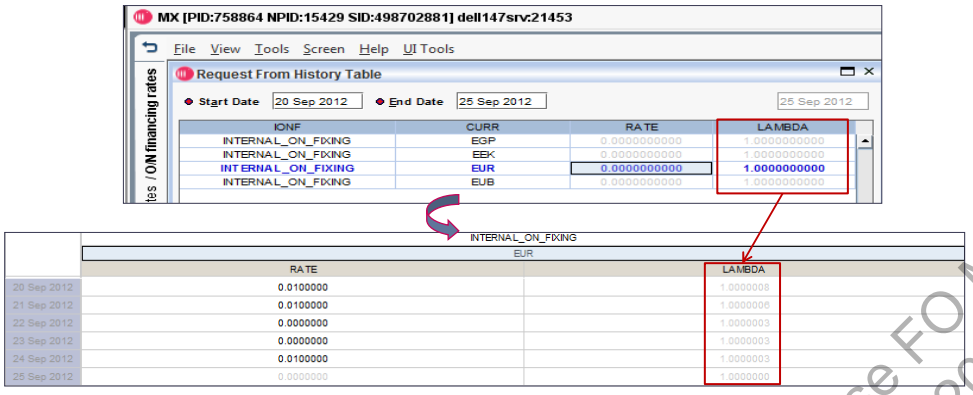
Finding P&L in the System

P&L on one deal: Financing

For each past flow, we can retrieve the lambda coefficient which will give the financed flow. Hence financing effect is:

$$Financing = Past\ flow\ amount\ \times (Lambda\ - 1)$$



End-user session: Historical data/ Rates/ O/N financing rates

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Finding P&L in the System

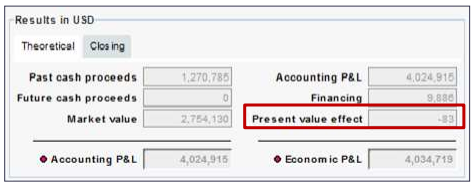
P&L on one deal: Present value effect

The PV effect applies to future flows (future cash proceeds and MV).

It looks at the difference between these future flows and their discounted values (discounted from value date or spot date to today).

The interpolator can be used to get the discount factor between today and spot on the assigned rate curve.

$$PV\ Effect = Future\ Cash * (DF_{Value\ date} - 1) + MV * (DF_{Spot} - 1)$$



End-user session: Processing/ Trades/ Trade query – Select a deal – View/ P&L

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Finding P&L in the System

P&L on one deal: Practice 4

Practice 4: Calculate the Accounting and Economic P&L of a bond with a coupon payment.

Nominal	1,500,000
Start date (settlement date)	14 Dec 2011
Initial price	102.0354%
Accrual @ settlement date	0.366%
Spot date	19 Jul 2014
Closing price	103.0143%
Accrual @ end date	0.106%
Coupon	9,500*
Discount factor (spot → today)	0.999875009
Lambda (coupon → today)	1.000631585
Lambda (settlement → today)	1.002098327

* Fallen on the 20 May 2014 (past)

Question: Which accounting P&L breakdown would make more sense to use?

Accounting P&L = Cash + Market Value

OR

Accounting P&L = Capital Gain + Revenue

Solution

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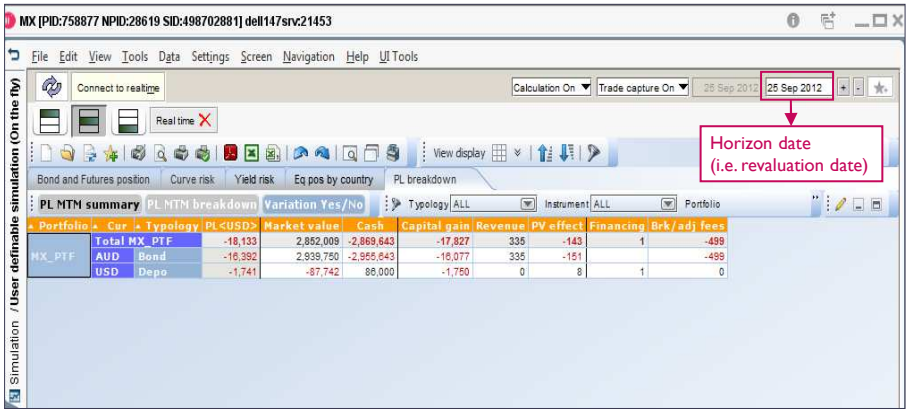
Finding P&L in the System

Simulation viewer

MX Viewer allows users to retrieve their P&L figures in simulation, taking all the benefits from the real time connection.



End-user session: Simulation

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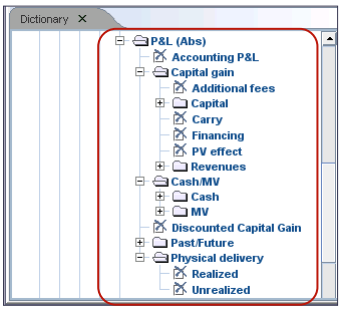
Finding P&L in the System

Simulation viewer: Data dictionary

The Simulation Viewer Dictionary contains fields displaying various P&L components.



Drag and drop different levels from dictionary tree according to granularity of P&L results required.

Economic P&L	Risk Engine.Results.P&L.P&L (Abs)
Market Value	Risk Engine.Results.P&L.P&L (Abs).Cash/MV.MV
Cash	Risk Engine.Results.P&L.P&L (Abs).Cash/MV.Cash
Accounting P&L	Risk Engine.Results.P&L.P&L (Abs).Accounting P&L

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Finding P&L in the System

Simulation viewer: Practice 5

Calculate and verify the computation in MX.3 of the Accounting and Economic P&L of a bond bought today.

1. Log in an MX session using login/pwd MUREXFO/MUREXFO, group FO.
2. Load the contract number 4807 in simulation using the User definable simulation (On the fly)
3. Go to the tab PL breakdown and change the aggregated currency of the simulation to AUD (under Settings> Simulation screen settings,field Aggregation currency)
4. Using Excel, check P&L components calculated by Murex (in AUD).

Product	#1 Bond
Instrument	ACB 6.25% 6/14
Instr. details	Open
Flows	Open
Buy/Sell	Buy
SecCode	AU3TB0000028
Quantity	3,000,000.000
Nominal	3,000,000.00
Bond ccy	AUD
Cap. factor	1.00000000
Trade clean price	109.500
Trade yield	0.663
Acc. coupon	1.793
Trade dirty price	111.293
Payment date	Fri 28/09/12
Settlemt ccy	AUD
Settlemt FX spot	
Settlemt conv	3 BD, 3 BD
Payment conditions	Free of payment
Flat settlement	P 3,338,790... AUD

The Cash and MV fields above already account for the PV effect.

PL MTM summary | PL MTM breakdown | Variation Yes/No | Typology ALL | Instrument ALL | Portfolio ALL

Portfolio	Cur	Typology	PL<AUD>	Market value	Cash	Capital gain	Revenue	PV effect	Financing	Brk/adj fees
MX_PTF	AUD	Bond	36,202	3,374,234	-3,338,032	36,210	0	-8	0	0

Solution

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Finding P&L in the System

Simulation viewer: Practice 6

Calculate and verify the computation in MX.3 of the Accounting and Economic P&L of a back dated loan/deposit trade.

1. Use the same session as in the previous practice.
2. Load the contract number 4808 in a user definable simulation (like in previous practice)
3. Go to the tab PL breakdown and ensure the aggregation currency is USD.
4. Using Excel, check P&L components calculated by Murex (slight difference due to rounding).

Product	#1 Deposit	
Nature	Fixed rate	
Instrument	USD	
Template details	Open	
Payout	Borrow	
Nominal	86,000.00	USD
Start period	spot	Mon 24/09/12
Maturity period	1Y	Tue 24/09/13
Adjusted date	Tue 24/09/13	
Coupons payment freq.	Frequency ratio	
Rate convention	LIN ACT/360	
Rate/Margin	0.5700	
Repayment	86,497	
Initial capital	Exchange	
Intermediate capital	Exchange	
Final capital	Exchange	
Flows	Open	
Amortizing	None	

The Cash and MV fields above already account for the PV effect.

PL MTM summary | PL MTM breakdown | Variation Yes/No | Typology ALL | Instrument ALL | Portfolio ALL

Portfolio	Cur	Typology	PL<USD>	Market value	Cash	Capital gain	Revenue	PV effect	Financing	Brk/adj fees
MX_PTF	USD	Depo	-142	-86,143	86,000	-145	0	3	1	0

Solution

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Finding P&L in the System

P&L variation

The simulation data from the data dictionary provides only information as of the horizon date (updated in real time).
To display values as of different dates, it is possible to display their stored values previously computed at different dates through the Datamart module.
It is also possible to calculate the variation of these displayed values between two dates within the simulation viewer.

The business is generally interested by the **P&L performance** also known as the **daily P&L.** It is the difference between Today's P&L and Yesterday's P&L.

For example: Let's assume the P&L for the previous business day has been stored (i.e. closing P&L based on official rates).

This stored yesterday P&L can be displayed in the simulation viewer together with today's P&L.

The daily P&L can also be computed directly within the simulation viewer.

P&L figures are stored at the close of every business day (within EOD batch).

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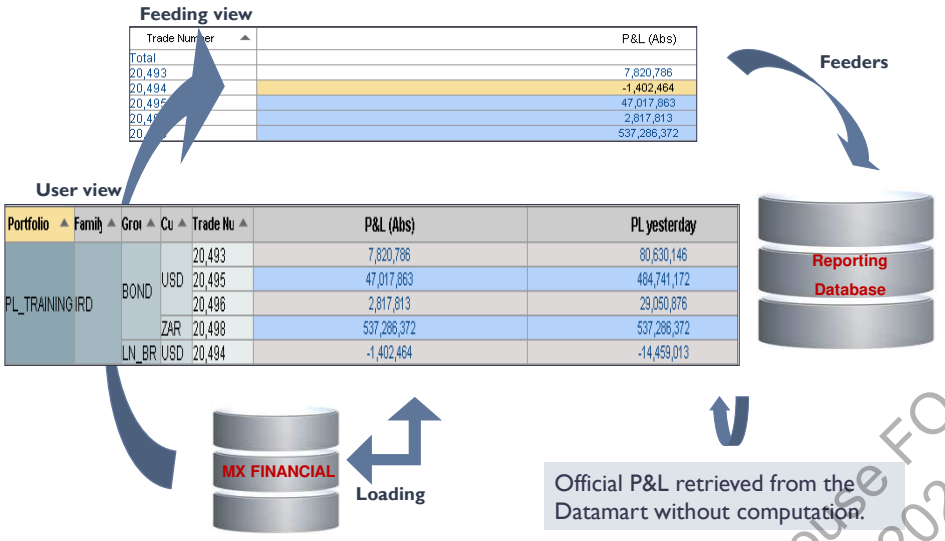
Finding P&L in the System

P&L variation



Official P&L retrieved from the Datamart without computation.

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Finding P&L in the System

P&L variation

To display the P&L variation in the simulation viewer

1. Create a view for the historical outputs which are stored in the Datamart. The matching is done by trade number (or another consolidation key).
2. On the considered field, right-click → Output Settings>Source settings.
3. Choose "Stored" as a source.
4. You can specify in which tables the data should be retrieve, for which data (storing view) and which corresponding Datamart snapshot (tag).

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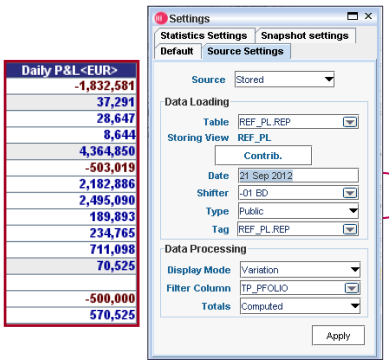
Finding P&L in the System

P&L variation

Displaying the P&L Variation in the Simulation viewer:



Output Settings > Source Settings:

Source	Stored
Table	Name of table within which closing P&L results stored.
Date	Populated automatically based on shifter rule.
Shifter	-1BD for daily P&L.
Type	Public and Tag determine more precisely which stored dataset to recover.
Display Mode	Variation for daily P&L.

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EXERCISE SOLUTIONS

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P&L Calculation Methods

Accounting P&L: Practice 1

Solution 1: Which accounting formula is used to calculate the Accounting P&L of the following asset classes?

Accounting P&L = Cash + Market Value

OR

Accounting P&L = Capital Gain + Revenue

FX (spot)	Cash + Market Value
FI (Bond)	Capital Gain + Revenue
Equity Cash	Capital Gain + Revenue
IR (Interest rates)	Cash + Market Value
Sec Fin	Cash + Market Value
CRD (Credit)	Cash + Market Value
COM (Commodities)	Cash + Market Value

Exercise

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P&L Calculation Methods

Accounting P&L: Practice 2

Solution 2: Calculate the Accounting and Economic P&L of a US Treasury bond that bought yesterday and settles today.

1. **Accounting P&L:**

Accounting P&L = Capital Gain + Revenue

Component	Equals	Value
Capital Gain	(-buy Price + sell Price) * Quantity = (-102.0354% + 103%) * 3,000,000	USD 28,938
Revenue	(-buy Rev + sell Rev) * Quantity = (-0.368% + 0.377%) * 3,000,000	USD 270

Hence:
Accounting P&L = 28,938 + 270 = USD 29,208.00

Exercise

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P&L Calculation Methods

Accounting P&L: Practice 2

Solution 2: Calculate the Accounting and Economic P&L of a US Treasury bond that bought yesterday and settles today.

2. **Economic P&L:**

Economic P&L = Accounting P&L + Financing + PV Effect

Component	Equals	Value
Financing of Past Cash	0 (since bond settles today)	0
MV of Bond	(Price @ spot date + Accrual @ spot date) * Quantity = (103% + 0.377%) * 3,000,000	USD 3,101,310
PVE	Discounted MV @ spot date – MV = 3,101,310 * DF (spot → today) – 3,101,310 = 3,101,310 * 0.999990277872299 – 3,101,310	USD -30.15

Hence:
Economic P&L = 29,208 + 0 – 30.15 = USD 29,177.85

Exercise

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P&L Calculation Methods

Economic P&L: Practice 3

Solution 3:To recap, which formulas calculate the Economic P&L?

C: P&L @ T = Past Cash + Financing + PV Effect + Future Cash + Market Value

E: P&L @ T = Financing + Capital Gain + PV Effect + Revenue

Exercise

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Finding P&L in the System

P&L on one deal: Practice 4

Solution 4: Calculate the Accounting and Economic P&L of a bond with a coupon payment.

1. **Accounting P&L:**

Accounting P&L = Capital Gain + Revenue

Component	Equals	Value
Capital Gain	Quantity * (Closing price – Initial price) = 1,500,000 * (103.0143% – 102.0354%)	USD 14,683.50
Revenue	Quantity * (Accrual @ end – Accrual @ settlement) + Coupon = 1,500,000 * (0.106% – 0.366%) + 9,500	USD 5,600.00

Hence:
Accounting P&L = 14,683.50 + 5,600 = USD 20,283.50

Exercise

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Finding P&L in the System

P&L on one deal: Practice 4

Solution 4: Calculate the Accounting and Economic P&L of a bond with a coupon payment.

2. **Economic P&L:**

Economic P&L = Accounting P&L + Financing + PV Effect

Component	Equals	Value
Financing	Capitalised Past flows – Past flows = where Past flows = Coupon – (Initial price + Accrual) * Quantity → (9,500 * Lambda (coupon → today) – (102.0354% + 0.366%) * Lambda (settlement → today) * 1,500,000) – (9,500 – (102.0354% + 0.366%) * 1,500,000)	USD -3,217.07
MV	Quantity * (Closing price + Accrual @ spot date) = 1,500,000 * (103.0143% + 0.106%)	USD 1,546,804.50
PVE	Discounted MV @ spot date – MV = 1,546,804.50 * DF (spot → today) – 1,546,804.50	USD -193.34

Hence:
Economic P&L = 20,283.50 – 193.34 – 3,217.07 = USD 16,873.09

Exercise

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Finding P&L in the System

Simulation viewer: Practice 5

Solution 5: Calculate & verify the computation in MX.3 of the Accounting and Economic P&L of a bond bought today.

Accounting P&L: Accounting P&L = Capital Gain + Revenue

Component	Equals	Value
Capital Gain	(-buy price + Market price) * Quantity = (-109.50% + 110.7070%) * 3,000,000	AUD 36,210
Revenue	No coupon	AUD 0

Economic P&L: Economic P&L = Accounting P&L + Financing + PV Effect

Component	Equals	Value
Financing	0	AUD 0
MV	Quantity * (Market price + Accrual) = 3,000,000 * (110.7070% + 1.793%)	AUD 3,375,000.00
Future Cash	Quantity * (-buy price – Accrual) = 3,000,000 * (-109.50% – 1.793%)	AUD - 3,338,790.00
PVE	(Discounted Future Cash @ settlement date – Future Cash) + (Discounted MV @ spot date – MV) = (- 3,338,790.00 * DF (settlement → today) – (- 3,338,790.00)) + (3,375,000.00 * DF (spot → today) – 3,375,000.00)	AUD - 8.22

Hence: Economic P&L = 36,210.00 – 8.22 = AUD 36,201.78

Exercise

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Finding P&L in the System

Simulation viewer: Practice 6

Solution 6: Calculate and verify the computation in MX.3 of the Accounting and Economic P&L of a back dated loan/deposit trade.

Accounting P&L: Accounting P&L = Cash + Market Value

Remember:

Cash = All past payments (from Capital or Revenue source) & future payments not included in the market value.

MV= All estimated/known future proceeds discounted to currency spot date.

	Equals	Value
Cash	Borrowed amount received	USD 86,000
MV	Borrowed amount paid back + Interest = (-86,000 – 497.01) * DF (Mat → Spot date) = (-86,000 – 497.01) * 0.995935067377494	USD -86,145.40

Hence:
Accounting P&L = Cash + MV = 86,000 – 86,145.40 = USD -145.40

Exercise

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Finding P&L in the System

Simulation viewer: Practice 6

Solution 6: Calculate and verify the computation in MX.3 of the Accounting and Economic P&L of a back dated loan/deposit trade.

Economic P&L:

Economic P&L = Accounting P&L + Past cash Financing + PV Effect

	Equals	Value
Financing of Past Cash	Capitalised Past Cash – Past Cash = 86,000 * Lambda (start → today) – 86,000 = 86,000 * 1.0000075 – 86,000	USD 0.64
PV Effect	Discounted MV @ spot date – MV = -86,145.40 * DF (spot → today) – (-86,145.40) = -86,145.40 * 0.999970020905769 + 86,145.40	USD 2.58

Hence:
Economic P&L = -145.40 + 0.64 + 2.58 = USD -142.18

Exercise

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Q&A

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Profit & Loss in MX.3

Practice 2: P&L of a bond

Buy quantity	3,000,000.00
Buy price @ buy date	102.0354%
Accrued coupon (revenue) @ buy date	0.368%
Sell price @ spot date	103%
Accrued coupon (revenue) @ spot date	0.377%
Discount factor	0.999990278

Accounting P&L	
Capital Gain	
Revenue	
Accounting P&L	

Economic P&L	
Accounting P&L	
Financing	
Future Cash	
Discounted Future Cash	
MV	
Discounted MV	
PV Effect	
Economic P&L	

Practice 4: P&L of a bond with coupon

Nominal	1,500,000.00
Start date (settlement date)	12/14/2011
Initial price	102.0354%
Accrual @ settlement date	0.366%
Spot date	7/19/2014
Closing price	103.0143%
Accrual @ end date	0.106%
Coupon on 20/05/2014	9,500.00
DF (spot -> today)	0.999875009
Lambda (coupon -> today)	1.000631585
Lambda (settlement -> today)	1.002098327

Accounting P&L	
Capital Gain	
Revenue	
Accounting P&L	

Economic P&L	
Accounting P&L	
Coupon financed	
Past payment financed	
Financing	
Future Cash	
Discounted Future Cash	
MV	
Discounted MV	
PV Effect	
Economic P&L	

Practice 5: P&L of a bond bought today (in MX.3)

Buy quantity	3,000,000.00
Buy price	109.5000%
Accrued coupon (revenue)	1.793%
Current market price	110.7070%
Discount factor (settlement -> today)	0.999773053
Today	9/25/2012
Settlement date = Spot date	9/28/2012
FX spot AUD/USD	1.0453

Accounting P&L	in AUD
Capital Gain	
Revenue	
Accounting P&L	

Economic P&L	in AUD
Accounting P&L	
Financing	
Future Cash	
Discounted Future Cash	
MV	
Discounted MV	
PV Effect	
Economic P&L	

Practice 6: P&L of a back dated loan/deposit in MX.3

Nominal	
Start date	
Current date (Today)	
Maturity date	
Interest rate	
Rate convention	
Interest amount to pay at maturity	
USD currency spot date	
DF (maturity -> spot)	
DF (spot -> today)	
Lambda (start -> today)	

USD LIBOR 3M curve

Accounting P&L	
Past Cash	
Future Cash	
Cash	
Market Value	
Accounting P&L	

Economic P&L	
Accounting P&L	
Past Cash financed	
Financing	
Discounted Future Cash	
Discounted MV	
PV Effect	
Economic P&L	

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Profit & Loss in MX.3

Practice 2: P&L of a bond

Buy quantity	3,000,000.00
Buy price @ buy date	102.0354%
Accrued coupon (revenue) @ buy date	0.368%
Sell price @ spot date	103%
Accrued coupon (revenue) @ spot date	0.377%
Discount factor	0.999990278

Accounting P&L	
Capital Gain	28,938.00
Revenue	270.00
Accounting P&L	**29,208.00**

Economic P&L	
Accounting P&L	29,208.00
Financing	-
Future Cash	-
Discounted Future Cash	-
MV	3,101,310.00
Discounted MV	3,101,279.85
PV Effect	- 30.15
Economic P&L	**29,177.85**

Practice 4: P&L of a bond with coupon

Nominal	1,500,000.00
Start date (settlement date)	12/14/2011
Initial price	102.0354%
Accrual @ settlement date	0.366%
Spot date	7/19/2014
Closing price	103.0143%
Accrual @ end date	0.106%
Coupon on 20/05/2014	9,500.00
DF (spot -> today)	0.999875009
Lambda (coupon -> today)	1.000631585
Lambda (settlement -> today)	1.002098327

Accounting P&L	
Capital Gain	14,683.50
Revenue	5,600.00
Accounting P&L	**20,283.50**

Economic P&L	
Accounting P&L	20,283.50
Coupon financed	9,506.00
Past payment financed	- 1,539,244.07
Financing	- 3,217.07
Future Cash	-
Discounted Future Cash	-
MV	1,546,804.50
Discounted MV	1,546,611.16
PV Effect	- 193.34
Economic P&L	**16,873.09**

Practice 5: P&L of a bond bought today (in MX.3)

Buy quantity	3,000,000.00
Buy price	109.5000%
Accrued coupon (revenue)	1.793%
Current market price	110.7070%
Discount factor (settlement --> today)	0.999773053
Today	9/25/2012
Settlement date = Spot date	9/28/2012
FX spot AUD/USD	1.0453

Accounting P&L	in AUD
Capital Gain	36,210.00
Revenue	-
Accounting P&L	**36,210.00**

Economic P&L	in AUD
Accounting P&L	36,210.00
Financing	-
Future Cash	- 3,338,790.00
Discounted Future Cash	- 3,338,032.27
MV	3,375,000.00
Discounted MV	3,374,234.05
PV Effect	- 8.22
Economic P&L	**36,201.78**

Practice 6: P&L of a back dated loan/deposit in MX.3

Nominal	86,000.00
Start date	9/24/2012
Current date (Today)	9/25/2012
Maturity date	9/24/2013
Interest rate	0.570%
Rate convention	LIN ACT/360
Interest amount to pay at maturity	497.01
USD currency spot date	9/27/2012
DF (maturity -> spot)	0.995935067
DF (spot -> today)	0.999970021
Lambda (start -> today)	1.0000075

USD LIBOR 3M curve

Accounting P&L	
Past Cash	86,000.00
Future Cash	-
Cash	86,000.00
Market Value	- 86,145.40
Accounting P&L	**- 145.40**

Economic P&L	
Accounting P&L	- 145.40
Past Cash financed	86,000.65
Financing	0.64
Discounted Future Cash	-
Discounted MV	- 86,142.82
PV Effect	2.58
Economic P&L	**- 142.18**

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Murex Learning

BUILD

FO Modules

FX Configuration

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Learning Objectives

FX Configuration

At the end of this course, you will be able to:

- ✔ Configure a new currency
- ✔ Configure a new currency pair
- ✔ Explain the impact of this configuration in the application
- ✔ Explain how the spot date is determined in the system
- ✔ Describe listed contracts
- ✔ Provide an overview of the different FX settings

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Agenda

Currency Configuration	• Underlying definition • Default conventions • Rate conventions • Spot schedule • Underlying description
Currency Pair Definition	
FX Listed Contracts	
Settings	

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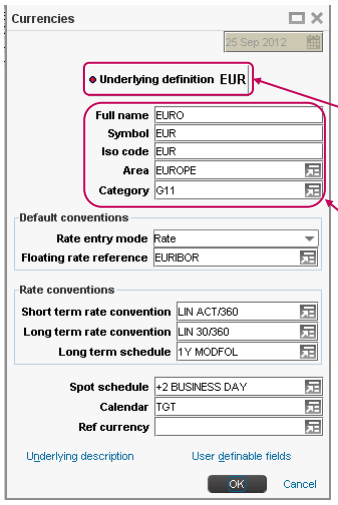
Currency Configuration

Underlying definition



Currency = medium of exchange

Label or name of the currency. Three-letter name consistent with market practice.

Naming conventions (optional fields):
Full name
Symbol
ISO code
Area
Category

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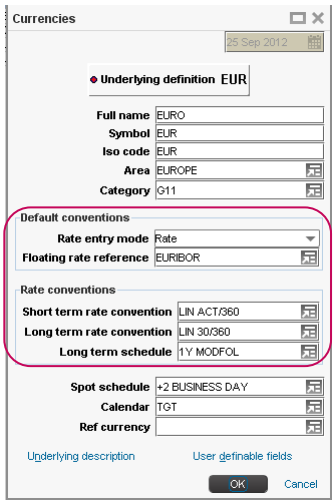
Currency Configuration

Default conventions



Default conventions:

Rate entry mode	Constant swap points vs. constant interest rates, when US rates move
Floating rate reference	Default archiving group for FRA transactions
Short & Long term rate conventions	Default interest rate calculation convention for short/long term loans
Long term schedule	Default frequency of coupon flows

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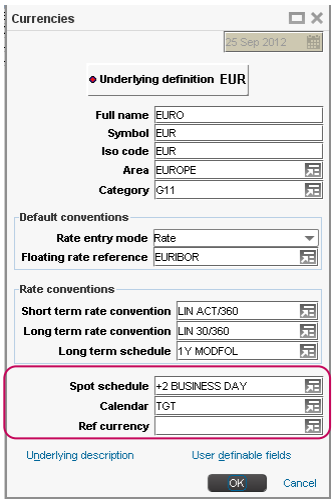
Currency Configuration

Rate conventions

The currency spot schedule and calendar are used only when the product is mono-currency. These settings are default ones but can be overwritten in a rate instrument generator.



Spot schedule	Defines the way to compute spot value date from a given date

Calendar	Links the currency to its corresponding calendar

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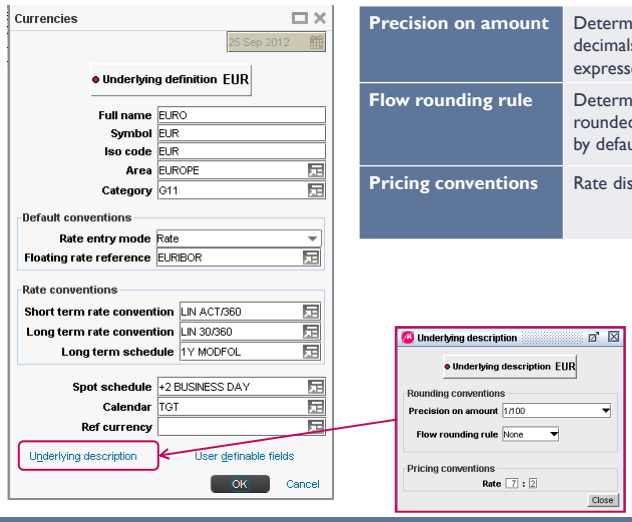
Currency Configuration

Underlying description



Precision on amount	Determines the numbers of decimals of amounts expressed in this currency
Flow rounding rule	Determines if the amount is rounded (nearest, by excess, by default)
Pricing conventions	Rate display

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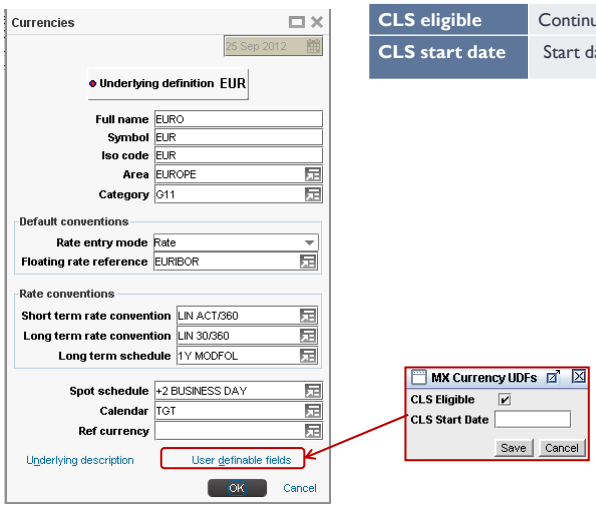
Currency Configuration

User definable fields



CLS eligible	Continuous linked settlement eligible
CLS start date	Start date

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Currency Configuration

Practice 1

Validate your understanding of the currency definition screen options.

1. Log on using MUREXFO/MUREXFO
2. Select the group FO.
3. Answer the questions below:

What is the rate entry mode for CHF?	
What is the calendar used for the GBP currency? What does it do?	
What is the spot schedule used for the JPY currency? What does it imply?	
How many decimals will appear for the sum 135267.6437 CAD in MX.3?	

Solution

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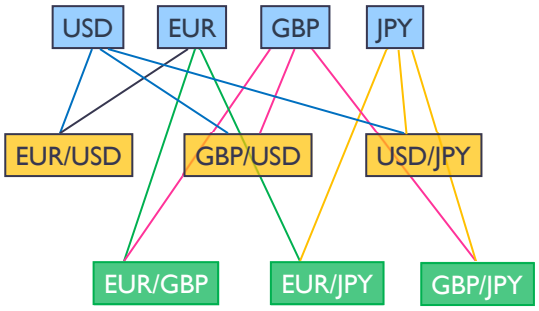
Currency Configuration

From currency to currency pair

Step 1: Currencies

Step 2: Leading contracts (currency pairs including USD)

Step 3: Cross contracts (not including USD)



Note: Leading and cross contracts are defined according to the spot scenario. Usually, all currencies are quoted against USD, called the root currency, as assumed in the example above.
As cross spots are not considered as relevant parameters, it makes more sense to insert leading contracts before the cross contracts.

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Agenda

Currency Configuration

Currency Pair Definition
- Quotation
- Date conventions
- OTC contract description

FX Listed Contracts

Settings

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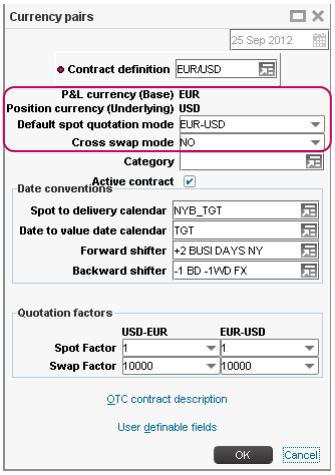
Currency Pair Definition

Quotation



Label of the contract should be consistent with market practice.

P&L currency (Base)	Currency in which the P&L for this currency pair will be expressed.
Position currency (Underlying)	Position currency for this currency pair. Also known as underlying, risky, or foreign currency.

This choice is specific to each bank, the base currency is considered as less risky from the bank point of view.

P&L and position currencies cannot be changed or reversed once the contract has been defined.
They have a great impact on the P&L and the Greeks (explained in the second part of this course).
It is very important to set the correct values at inception!

End-user session: Configuration/ Forex/ Currency pairs

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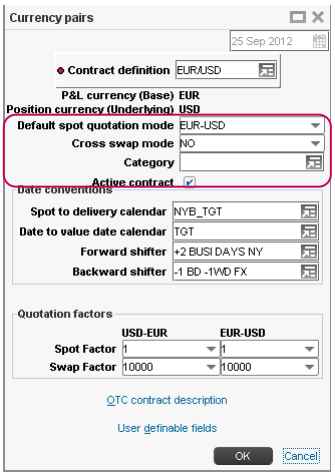
Currency Pair Definition

Quotation



Default spot quotation mode	Spot quotation mode EUR-USD ⇔ 1 EUR = x USD ⇔ x USD per EUR
Cross swap mode	Ability to see cross swap points in the simulation zoom screen
Category	Indicative purposes
Active contract	Contract available/unavailable for selection (in pricing, trade entry…)

End-user session: Configuration/ Forex/ Currency pairs

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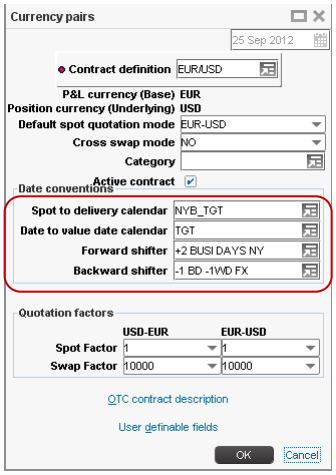
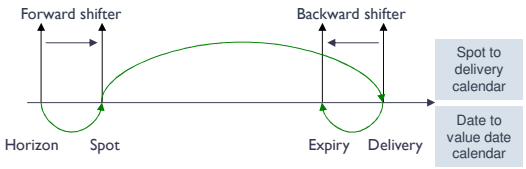
Currency Pair Definition

Date conventions



Spot to delivery calendar	Computes the Delivery date from the Spot date
Date to value date calendar	Computes the Spot date from the Horizon date or the Delivery date from the Expiry date (or the other way around)
Forward shifter	Computes the Spot date from the Horizon date or the Delivery date from the Expiry date. More generally to compute the Value date. It relies on the Date to value date calendar
Backward shifter	For FX Derivatives only. Computes the Expiry date from the Delivery date and to compute the Fixing date from the Delivery date (NDF). It relies on the Date to value date calendar



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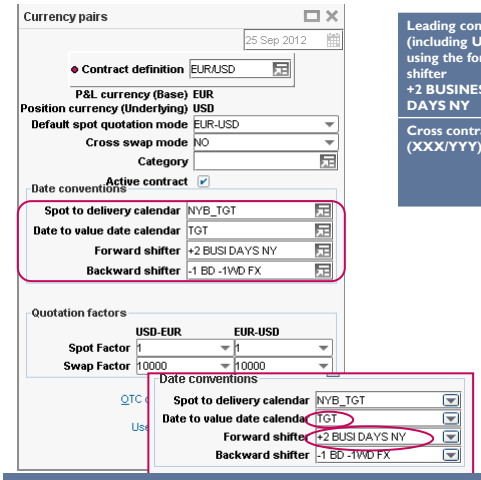
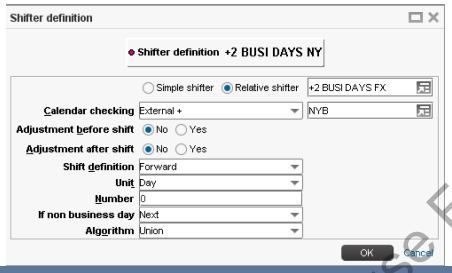
Currency Pair Definition

Date conventions: Spot date computation

General market rules to compute the spot date:



Leading contract (including USD) using the forward shifter +2 BUSINESS DAYS NY	+2 days calculation. If day 1 is a holiday for the USD it is counted as a business day	Determination of the spot date takes both currencies calendars into account. The Spot date should be an open day for both currencies
Cross contract (XXX/YYY)	The first shifter (+2 BUSI DAYS FX) finds the spot date of the cross currency pair. If the date falls on a USD holiday, it is moved to next USD open day	The USD calendar is taken into account as well as the XXX and YYY currencies calendars



End-user session: Configuration/ Forex/ Currency pairs

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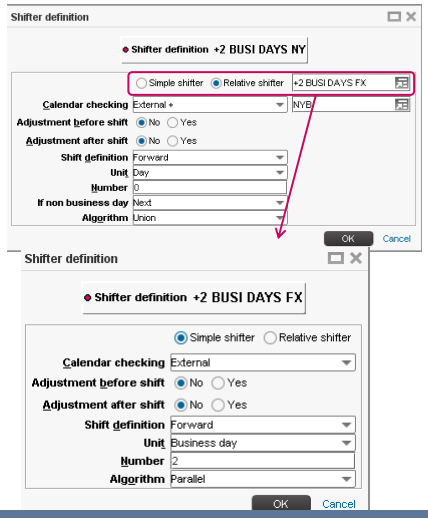
Currency Pair Definition

Date conventions: Shifter definition



Simple shifter / Relative shifter	A relative shifter first calculates the date according to the underlying shifter then applies the shift taking into account the rules defined in the current shifter definition

Calendar checking	Check whether the generated date is Holiday
Adjustment before / after shift	A date adjustment rule may apply on the original date / on the shifted date. Not generally used in the shifter definition.
Shift definition	Sets the step (Number x Unit) to be added or subtracted (Forward/Backward) to the initial date.
Unit	Business day, Day, Week, Month, Quarter, Semester or Year
Number	The shift is in Number of Units.
If non business day	If the result date on the calendars in Calendar checking is not a business day, this setting defines the rule to be applied
Algorithm	Determines how to shift the dates: Union or parallel

End-user session: Configuration/ Market conventions/ Date shifters

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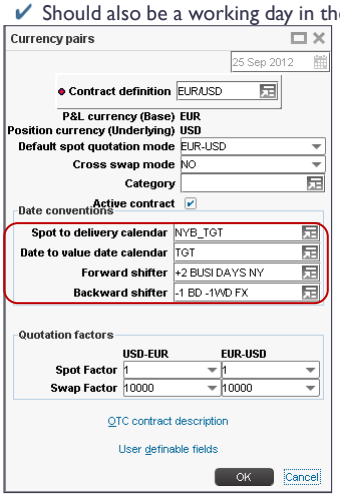
Currency Pair Definition

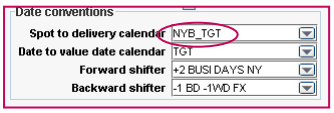
Date conventions: Delivery date computation

General market rules to compute the delivery date:

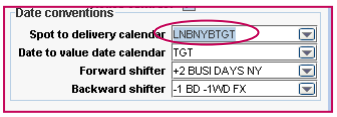
- ✔ Should be open for both countries
- ✔ Should also be a working day in the United States



Leading



Cross



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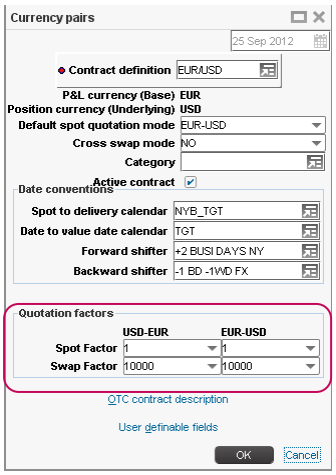
Currency Pair Definition

Quotation factors



Spot factor

If the spot factor is Y, the spot is X, and the quotation mode CUR1-CUR2, this means that there are X units of currency 2 for Y units of currency 1

Spot factor

- Spot factor = 1
  1.4 EUR-USD → 1 EUR = 1.4 USD
- Spot factor = 1/1000
  0.979 USD-KRW → 1/1000 USD = 0.979 KRW

Swap factor

The swap factor is a multiplying factor for display. If quotation mode is CUR1-CUR2, swap points are expressed in CUR2 per Y CUR1

Swap factor

- Swap factor = 10,000
  EUR-USD: F_{IM}=1.4237; S=1.4223
- Swap points = (F_{IM}–S)*10,000 = 0.0014*10,000 = 14

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Currency Pair Definition

OTC contract description

Currency pairs

25 Sep 2012

Contract definition: EUR/USD

P&L currency (Base): EUR

Position currency (Underlying): USD

Default spot quotation mode: EUR-USD

Cross swap mode: NO

Category:

Active contract: ✔

Date conventions

Spot to delivery calendar: NYB_TGT

Date to value date calendar: TGT

Forward shifter: +2 BUSI DAYS NY

Backward shifter: -1 BD -1WD FX

Quotation factors

	USD-EUR	EUR-USD
Spot Factor	1	1
Swap Factor	10000	10000

OTC contract description

User definable fields

OK Cancel

OTC: Over the Counter

OTC contract description

Pricing conventions | Back office conventions | Simulation conventions | Volatility conventions

Default premium quotation: USD/10K EUR

EUR traded quotation: % EUR

USD traded quotation: % USD

Premium decimals: %Numeraire 2 %Asset 2 Numeraire/Asset 0 Asset/Numeraire 0

Premium form factor: USD-EUR 10000 EUR-USD 10000

Format Spot, Strike, Forward: 9 4 9 4 (Size Decimal)

Swap: 9 2 9 2

Volatility: 6 2

Delta: Decimal

Gamma: Decimal 1 9 4

Vega: Decimal 1 9 4

Rho: Decimal 1 9 4

Theta: Decimal 1 9 4

Strike increment: 0.0000

Close

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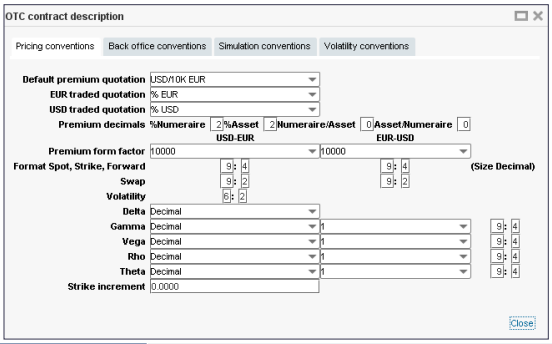
Currency Pair Definition

OTC contract description



Default premium quotation	Premium quotation mode displayed by default in the Pricing screen, the Deal entry ticket, and in Simulation
CUR traded quotation	Default quotation mode displayed when CUR is traded as nominal amount
Premium decimals	Number of decimals displayed for the premium by display quotation mode
Premium form factor	For quotation mode CUR1-CUR2, a Y form factor means the premium is expressed in CUR2 per Y CUR1
Format Spot / Strike / Forward / Swap / Volatility	Display of spot, strike, forward and swap points is defined for both quotation modes.
Delta / Gamma / Vega / Rho / Theta	Rounding conventions for greeks. Options are Decimal, ½ and ¼.

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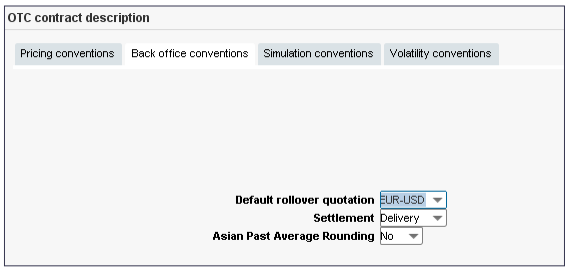
Currency Pair Definition

OTC contract description



Default rollover quotation	Default quotation mode used within the rollover procedure
Settlement	Available options are Delivery and Cash. This field indicates the settlement style by default of the spot forward on this contract
Asian Past Average Rounding	impacts the behavior of the application when an FX Asian option is exercised

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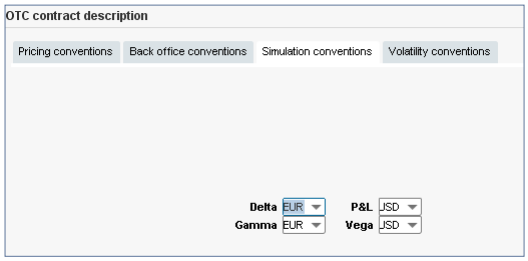
Currency Pair Definition

OTC contract description

Impacts the Simulation and the Notepad Greeks display.
Commonly, the P&L and the Vega currencies are set to the P&L currency of the contract, whereas the Delta and Gamma currencies are set to the first currency of the default quotation.



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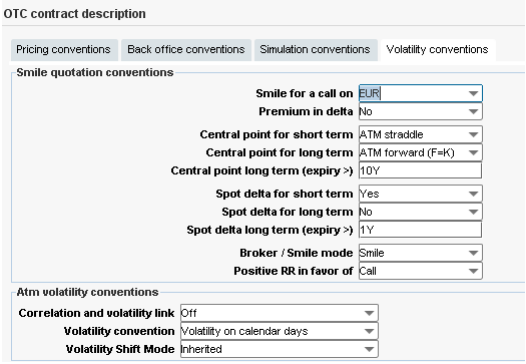
Currency Pair Definition

OTC contract description

The Volatility conventions tab concerns the smile curve definition.



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Currency Pair Definition

Practice 2

Determine the Spot date of each currency pair.
The table below shows the holidays for EUR and USD, where current date = Day0. The date to value date calendar is TGT (EUR calendar). In the below tables, the "?" symbol means that a holiday on this day would not change the spot date

1. **Case 1**

Calendar	Day1	Day2	Day3	Day4	Day5
TGT (EUR)					
NYB (USD)	?				

Spot date: _____

2. **Case 2**

Calendar	Day1	Day2	Day3	Day4	Day5
TGT (EUR)		Holiday			
NYB (USD)	?	?			

Spot date: _____

3. **Case 3**

Calendar	Day1	Day2	Day3	Day4	Day5
TGT (EUR)			Holiday		
NYB (USD)	?	Holiday	?		

Spot date: _____

Solution

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Currency Pair Definition

Practice 3

Determine the Spot date of each currency pair.
The table below shows the holidays for EUR and JPY, where System date = Day0. The date to value date calendar is TGT_TKB which is the union of TGT (EUR calendar) and TKB (JPY calendar).

1. **Case 1**

Calendar	Day1	Day2	Day3	Day4	Day5
TGT (EUR)	Holiday				
TKB (JPY)					
NYB (USD)	?	?			

Spot date: _____

2. **Case 2**

Calendar	Day1	Day2	Day3	Day4	Day5
TGT (EUR)	Holiday				
TKB (JPY)		Holiday			
NYB (USD)	?	?			

Spot date: _____

3. **Case 3**

Calendar	Day1	Day2	Day3	Day4	Day5
TGT (EUR)	Holiday			Holiday	
TKB (JPY)					
NYB (USD)	?	?	Holiday		

Spot date: _____ **Solution**

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Agenda

Currency Configuration

Currency Pair Definition

FX Listed Contracts
- Market definition
- FX futures
- Listed options

Settings

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FX Listed Contracts

Market definition

FX Listed contracts (Futures and Options) are standardized and exchanged on the futures market.

Examples

CME (Chicago Mercantile Exchange) Chicago, USA	Futures and Options Market	Reference Currency	USD
		Calendar	
BMF (Bolsa de Mercadorias & Futuros) São Paulo, Brazil	Futures Market	Reference Currency	BRL
		Calendar	

End-user session: Configuration/ Market conventions/ FX trading conventions

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FX Listed Contracts

FX futures

Examples of Options & Futures Exchange markets:

Common FX Futures contracts:

- ✔ CME EURUSD, CME USDMXN
- ✔ BMF DOL

CBOE	Chicago Board Options Exchange
CME	Chicago Mercantile Exchange
Euronext.liffe	Takeover from the London International Financial Futures and Options exchange (LIFFE)
BMF	Bolsa de Mercadorias & Futuros (São Paulo)

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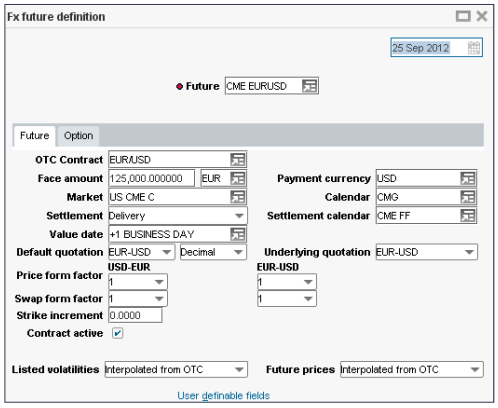
FX Listed Contracts

FX futures

Listed FX futures configuration:



OTC Contract	Underlying OTC currency pair.
Face amount	Contract size. Can be expressed in the underlying currency or base currency according to market conventions.
Market	Organized Market on which the contract is traded.
Settlement	Cash or Delivery .
Value date	Shifter used to compute Spot date from Horizon date and Expiry date from Delivery date.
Default quotation	Quotation mode of the futures
Underlying quotation	Quotation mode of the underlying currency pair.
Price form factor	Factor to apply to the spot notation
Swap form factor	Factor to apply to the swap points notation
Strike increment	For indicative purposes only
Payment currency	Currency in which cash settlements are made.
Calendar	Calendar used to compute spot date from horizon date, delivery date from spot date and expiry date from delivery date.
Settlement calendar	Set of settlement dates for the contract
Contract active	If not ticked, the contract cannot be booked

End-user session: Configuration/ Futures/ FX futures

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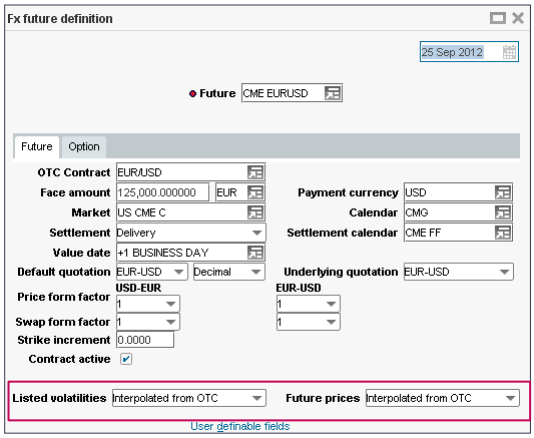
FX Listed Contracts

FX futures



Listed volatilities	This flag determines which volatilities will be used. The values are: • Interpolated from OTC • Listed curve + OTC shift
Future prices	This flag determines which prices will be used and impact the futures contract prices The values are: • Interpolated from OTC • Listed curve + OTC shift

In *Configuration/ Settings/ Simulation settings/ Fx configuration*, the flag Future should be set to Inherited from contract settings.

In *Configuration/ Settings/ FX Pricing settings*, the flag Future on line with forward should be unticked in order to inherit the configuration done at contract level

End-user session: Configuration/ Futures/ FX futures

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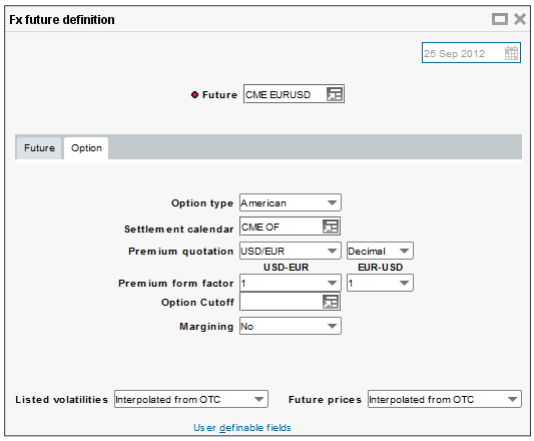
FX Listed Contracts

Listed options

Configuration of the listed options (options on futures):



Option type	American or European
Settlement calendar	Set of settlement dates for the contract
Premium quotation	Default premium quotation mode
Premium form factor	Factor to apply to the premium notation
Option cutOff	Cut off time of the option (if any)
Margining	Option to configure listed option with margining. Margining allows to pay the option premium in MtM

End-user session: Configuration/ Futures/ FX futures

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FX Listed Contracts

Practice 4

Insert FX future trade.

1. Insert the following trade: Buy 10 DEC12 CME EURUSD contracts from CLEARER1.
2. Explain how the fields are populated in the trade ticket based on the configuration of the contract
   - ✔ How is the maturity date defined? And the delivery date?
   - ✔ How is the nominal determined?
   - ✔ What will be delivered on delivery date?
   - ✔ What is the price of the FX future? What does it correspond to?

Solution

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Agenda

Currency Configuration

Currency Pair Definition

FX Listed Contracts

Settings
- Global vs. local
- Settings types
- Example

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Settings
Global vs. Local

There are three scopes for the different types of settings:

Global	Changes impact all users. **End-user session**: Configuration/ Settings/ General settings
User specific	Impacts current user only. **Configurator session**: Infrastructure/ FO desk/ Settings
Current session	Current session settings are temporary and apply to the current session only. **End-user session**: Configuration/ Settings/ Current session settings

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Settings

Settings types

General settings	General settings are configured globally at the FO desk level. They can be customized locally by a given end user if he has the appropriate rights, given in the configurator session.
Current session settings	Current session settings apply to the current session only. If the user opens a new session, he will inherit the settings from the general settings.
FX pricing settings & FX user pricing settings	Configuration flags mainly impact trade evaluation rules, cover models and specific market parameters assumptions. Can be modified locally for one user in the menu Configuration/Settings/FX user pricing settings. **End-user session**: Configuration/ Settings/ FX User Pricing Settings **End-user session**: Configuration/ Settings/ FX Pricing Settings
Simulation settings	Simulation settings apply to the simulation screens. They are organized in a preliminary common configuration part, shared by all transaction types and additional setting screens specific to each activity (FX, Rates, FXMM, credit…) **End-user session**: Configuration/ Settings/ Simulation Settings **End-user session**: Simulation/ Settings/ Simulation screen Settings (per user)
Reporting setup	Provides default calculation assumptions for reporting: printing reports, report batches, risk matrices, running a notepad **End-user session**: Middle Office/ Reporting/ Reporting Setup

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Settings

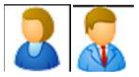
Example

Examples of settings scope:

	User A Session 1	User A Session 2	User B Session 1
General settings	Global set-up Local set-up	Global set-up	Global set-up
Simulation settings	Global set-up	Global set-up	Global set-up User set-up
Pricing settings	User set-up	User set-up	User set-up

In session 1, user A has redefined locally (only in the current session 1) part of the general settings

User B has redefined part of his simulation settings



Users A and B have their own pricing settings.

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Currency Configuration

Practice 1

Validate your understanding of the currency definition screen options.

What is the rate entry mode for CHF?	rate
What is the calendar used for the GBP currency? What does it do?	LNB. The calendar is used to compute dates for interest rate curve. It is usually a single calendar defined with the currency holidays
What is the spot schedule used for the JPY currency? What does it imply?	+2 BUSINESS DAYS. This shifter is used to calculate the spot date of the currency when it is used individually.
How many decimals will appear for the sum 135267.6437 CAD in MX.3?	2 - the pricing convention is 7:2. So the amount will appear as 135267.64

Exercise

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Currency Pair Definition

Practice 2

Practice 2: Determine the Spot date of each currency pair.
The table below shows the holidays for EUR and USD, where current date = Day0. The date to value date calendar is TGT (EUR calendar). In the below tables, the "?" symbol means that a holiday on this day would not change the spot date.

1. **Case 1: spot date = Day 2**

Algorithm:
- +2 BUSI DAYS FX is applied on TGT: Count 2 business days on TGT which leads to Day2
- +2 BUSI DAYS NY is applied on the date found above: As TGT and NYB are both open, spot date is Day2.

Holiday on Day1 in NYB has no effect on spot date calculation in this case

2. **Case 2: spot date = Day 3**

Algorithm:
- +2 BUSI DAYS FX is applied on TGT: Count 2 business days on TGT which leads to Day3
- +2 BUSI DAYS NY is applied on the date found above: As TGT and NYB are both open on Day3, spot date is Day3

Holidays on Day1 and Day2 in NYB have no effect on spot date calculation in this case

3. **Case 3 : spot date = Day 4**

Algorithm:
- +2 BUSI DAYS FX is applied on TGT: Count 2 business days on TGT which leads to Day2
- +2 BUSI DAYS NY is applied on the date found above: As Day2 is a holiday in NYB, the system moves forward until the first day where TGT and NYB are both open (Algorithm set to Union in the forward shifter definition. This leads to spot date being Day4

Exercise

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Currency Pair Definition

Practice 3

Practice 3: Determine the Spot date of each currency pair
The table below shows the holidays for EUR and JPY, where System date = Day0. The date to value date calendar is TGT_TKB which is the union of TGT (EUR calendar) and TKB (JPY calendar).

1. **Case 1: spot date = Day 3**

Algorithm:
- +2 BUSI DAYS FX is applied on TGT_TKB: Count 2 business days on TGT and count 2 business days on TKB, then take the latest day (Algorithm set to Parallel). This leads to Day3
- +2 BUSI DAYS NY is applied on the date found above: As TGT, TKB and NYB are all open, spot date remains Day3

Holidays on Day1 and Day2 in NYB have no effect on spot date calculation in this case

2. **Case 2: spot date = Day 3**

Algorithm:
- +2 BUSI DAYS FX is applied on TGT_TKB: Count 2 business days on TGT and count 2 business days on TKB, then take the latest day (Algorithm set to Parallel). This leads to Day3
- +2 BUSI DAYS NY is applied on the date found above: As TGT, TKB and NYB are all open, spot date remains Day3

Holidays on Day1 and Day2 in NYB have no effect on spot date calculation in this case

3. **Case 3: spot date = Day 5**

Algorithm:
- +2 BUSI DAYS FX is applied on TGT_TKB: Count 2 business days on TGT and count 2 business days on TKB, then take the latest day (Algorithm set to Parallel). This leads to Day3
- +2 BUSI DAYS NY is applied on the date found above: As TGT, TKB and NYB are not all open on Day3, the system moves forward up to Day5 to have TGT, TKB, NYB all open at the same time (Algorithm set to Union). This leads to spot date being Day5

Exercise

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FX Listed Contracts

Practice 4

Insert an FX future trade.

1. Open a session MUREXFO/MUREXFO
2. Go to Processing/ Trades/ Insert trades and select FX future (in FX derivatives) and note the contract number
3. Type the instrument CME EURUSD
4. Select Buy and the maturity DEC 12
5. Type the quantity (e.g 10 contracts)
6. Select the clearer « CME » and the portfolio « CLIENT1_PAR » and book the trade by doing Ctrl Enter
7. Go to Processing/ Trades/ Trade query and perform a search on the contract number
8. Open the deal ticket and check that it is the deal you just inserted

Exercise

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FX Listed Contracts

Practice 4

Insert an FX future trade.

Product	#1 FX Futures		
Instrument | Market	CME EURUSD	US CMEC	
Buy/Sell	Buy		
Maturity	DEC 12	Mon 17/12/12	
Delivery	Wed 19/12/12		
Price	1.29743273366		
Quantity	10		
Nominal	Buy	1,250,000	EUR
Other nominal	Sell	1,621,791	USD
First margin call	Tue 25/09/12		
Market price	1.2974		
Market spot	1.2963		
Clearer	CME		
Portfolio	CLIENT1 PAR		

Exercise

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FX Listed Contracts

Practice 4

Practice 4: Insert FX future trade

How is the maturity date defined? And the delivery date?

The maturity date & delivery dates are deduced from the maturity set. In the config of the FX future, open the settlement calendar.

How is the nominal determined?

The nominal in EUR appears. It is equal to 10 * 125,000 which is the face amount defined in the contract.

What will be delivered on delivery date?

On delivery date, the EUR and USD amounts will be delivered, because the FX future is configured to have a delivery settlement.

What is the price of the FX future? What does it correspond to?

The market price we see in the deal ticket is the same as the market price of a EUR/USD forward trade maturing on 19/12/12, because the futures prices are configured as « interpolated from OTC ».

Exercise

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MUREX™

Murex Learning

BUILD

FO Modules

Interest Rate Generators in MX.3

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MUREX™

Learning Objectives

IR Generators

At the end of this course, you will be able to:

- ✔ Explain a generator and the roles it plays in MX.3
- ✔ Access and modify a pre-configured generator
- ✔ Configure a generator from scratch

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Agenda

Introduction	• Definition • Example: Booking a swap • Global vs. Local change • Link between generator and contract
Swap Generator	
Currency Swap Generator	
Bond Generator	
Cap/Floor, FRA, Loan Generators	
Practice	

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Introduction

Definition

A **Generator** is a template/model which defines a swap or a bond.

It can be used "as is" in a trade or be locally modified.

Enables	Fast insertion of trades	
Contains all the data needed to handle the deal flows	• Calendar, Payment fixing and Calculation schedule • Stub period • Rate convention • In arrears or up front • An index • All… except figures	
Can be changed "globally" or "locally"	Global change:	Means modifying the generator template, which affects all new trades, including existing booked trades with the same generator.
	Local Change:	Means modifying the generator at trade level. A local change only affects that particular trade.

Rights have to be granted in order to change a generator.

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Introduction

Example: Booking a swap

Product	#1 IRS Vanilla	
Instrument	EURIBOR A 6M	
Maturity period	**3Y8M**	Fri 27/05/16
Adjusted maturity	Fri 27/05/16	
Nominal	**100,000,000**	**EUR**
Flows	**Open**	
Leg	**Pay**	**Receive**
Leg type	**Fixed**	**Floating**
Currency	**EUR**	**EUR**
Index		**EUR EURIBOR 6M**
First fixing		**0.0000**
Calculation frequency	1y	6m
Rate/Spread	**4.7003**	**0.0000**
Discount curve	EUR EONIA	EUR EONIA
Estimation curve		EUR EURIBOR 6M
Leg Npv	-13,141,656	13,141,656
Legs details	**No**	
	Additional features	
Amortizing	None	
Additional flows	Open	
Customized flows	No	
Mutual break	**No**	
Npv	**0**	**EUR**
Bpv	**-27,959**	
Typology | Usage	**IRS**	**Libor**
Fees	**Open**	
CSA Type		
Int. | Counterparty	No	**ABBEY NATIONAL PL**
Portfolio	MX_PTF	

- **Nominal: € 100 million**
- **Swap rate: 4.7003% annual**
- **Floating index: EUR EURIBOR 6M**
- **Maturity: 3Y8M**

1) Select the generator
2) Choose Start and Maturity Dates
3) Input the nominal
4) The result of the pricing is
   - ✔ The fixed rate
   - ✔ Or the NPV on settlement date
   - ✔ Or the Margin on the floating leg

Right-click/Set as Implied Parameter on the NPV or the Rate margin in order to fix one and calculate the other.

End-user session: Pricing/ e-Tradepad

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Introduction

Example: Booking a swap

The generator is called from the trade insertion and pricing screens. It conveys data to the trade (in order, for instance, to compute flows schedules).

If the generator is customized in the trade, the label of the generator is displayed in italics and the customized version of it is accessible by clicking on the generator details.

Interest rate swap

Financial definition

Generator	**EURIBOR A 3M**		Generator details
Start date	Spot	27 Sep 2012	
Maturity	4Y	27 Sep 2016	*27 Sep 2016*
Nominal	100,000,000		EUR

Plain vanilla | Exotic | Market data | Leg characteristics

End-user session: Pricing/ e-Tradepad~Instrument details

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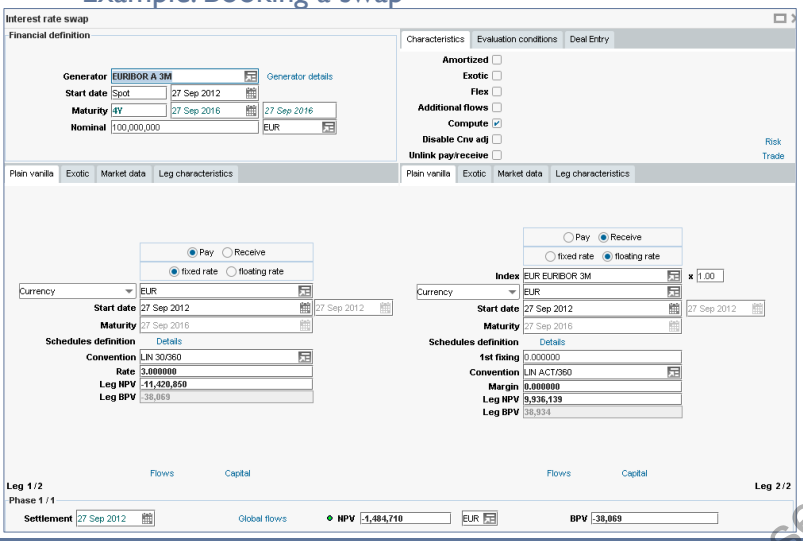
MUREX™

Introduction

Example: Booking a swap



End-user session: Pricing/ e-Tradepad~Instrument details

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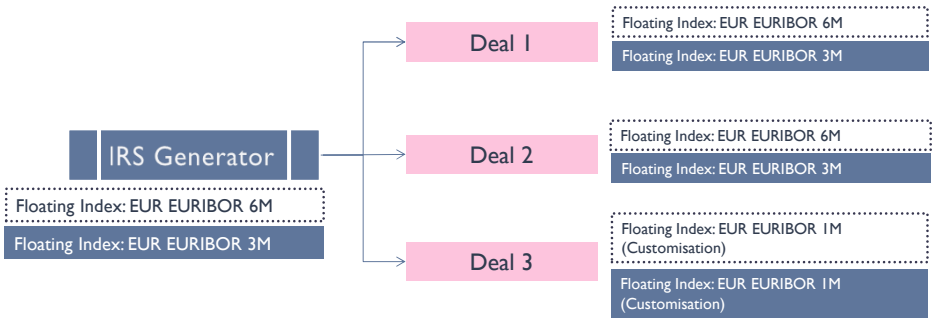
Introduction

Example: Global vs. Local change

Global change	Affects all existings trades (non customised) and future ones
Local change	Affects only the specific trade



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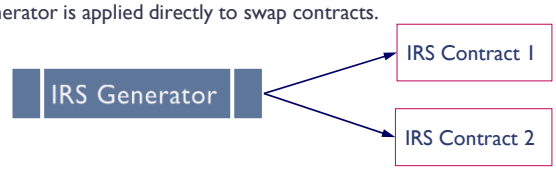
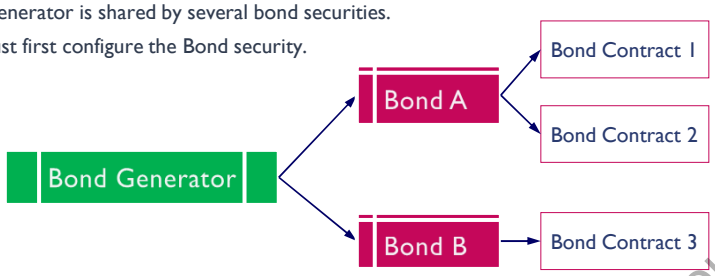
Introduction

Example: Link between generator and contract

A Swap generator is applied directly to swap contracts.



A Bond generator is not applied directly to bond contracts.
A bond generator is shared by several bond securities.
Users must first configure the Bond security.



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Agenda

Introduction	
Swap Generator	• Anatomy of a swap generator • Fixing and payment conventions • Payment date customisation • Compounding • Stub periods • Margin mode • Rate formula • Amortization • Other useful components
Currency Swap Generator	
Bond Generator	
Cap/Floor, FRA, Loan Generators	
Practice	

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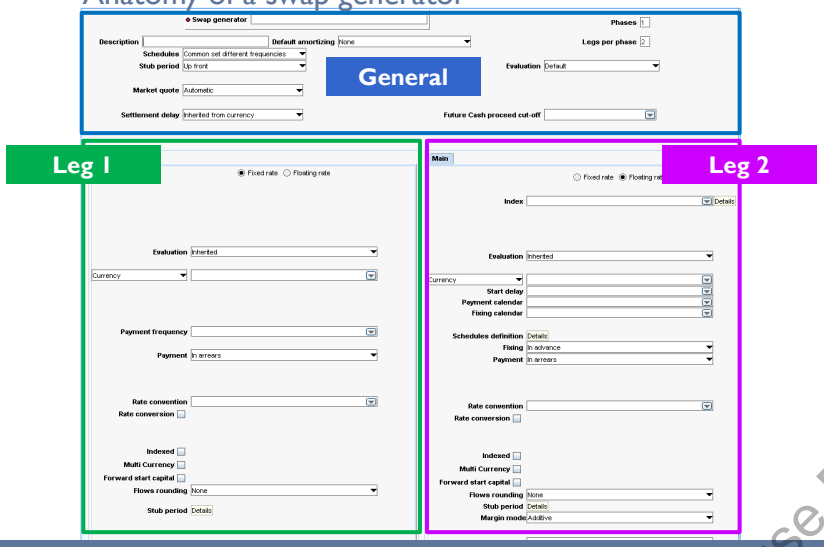
Swap Generator

Anatomy of a swap generator



End-user session: Configuration/ Generators/ Swap generators

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Swap Generator

Anatomy of a swap generator: General

Schedules

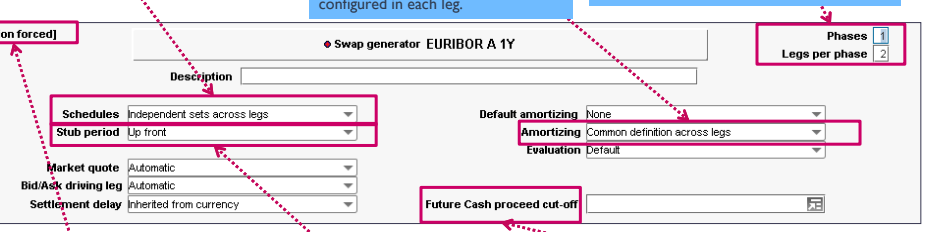
drive legs schedules and capital dependency.

Amortizing

is used only when schedules are "independent sets across legs". Nominals on both legs can be independent: amortizing details are configured in each leg.

Phases / Legs

are MX concepts. On the market, a swap has 2 legs.
Phases are used to represent swaps whose the structure changes over time.
Legs are used as a workaround for some structured products, e.g. 2 legs to accumulate several types of coupons.



Estimation forced

this flag conducts the estimation of the floating rate and thus impacts the revaluation of the deal.

Stub periods

are common to both legs.

Future Cash proceed cut-off

indicates the period for which flows generated by the deal will be accounted for Future proceeds instead of Market value.

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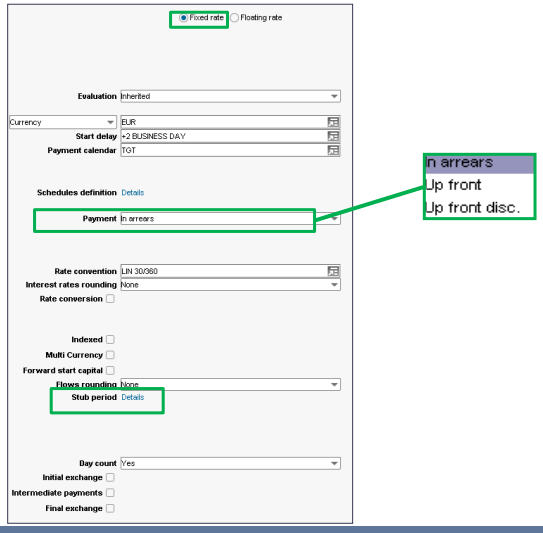
Swap Generator

Anatomy of a swap generator: Fixed leg



Fixed leg:

- Payment frequency: Can be either monthly, quarterly, semi-annually or annually.
- Stub period: Broken period remaining

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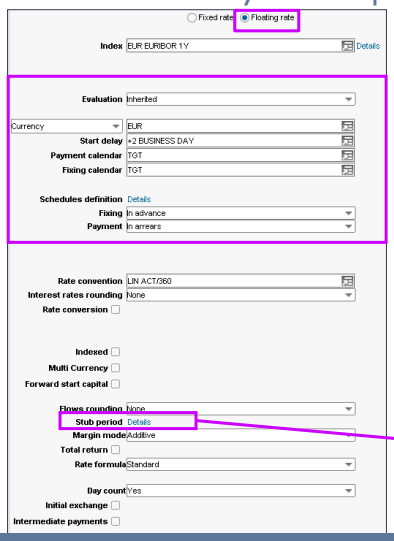
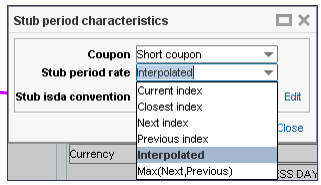
Swap Generator

Anatomy of a swap generator: Floating leg





Floating leg:

Floating leg rates need to be fixed, using the:

- ✔ Fixing calendar
- ✔ Fixing: *In advance/ in arrears*
- ✔ Fixing schedule

A margin can be added

An "on-the-fly" formula on the floating index can be configured

End-user session: Configuration/ Generators/ Swap generators

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Swap Generator

Fixing and payment conventions

Schedules definition	Details:
Fixing	In advance
Payment	In arrears

The Schedules definition screen defines:

- ✔ Schedules for calculation start, calculation end, payment and fixing: Driving/ Equal to/Deduced from/Copy of
- ✔ Frequency ratio

Schedules definition

Calculation start schedule	Driving schedule		
Schedule generator	3M MODFOL		
Calculation end schedule	Equal to	Calculation start schedule	
Payment schedule	Deduced from	Calculation start schedule	
Deduction formula	+0 BUSINESS DAY	Frequency ratio	1
Fixing schedule	Deduced from	Payment schedule	
Deduction formula	-2 BUSINESS DAY	Frequency ratio	1
Calculations follow fixings	No (time series)		
Capital schedules	No		
Single period	No		

There are three sets of dates for a floating flow:

Start/End date	Calculation period
Fixing date	When the floating rate is observed
Payment date	Value date of funds transfer

Floating interest payments EUR

Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Fixing Date	Rate	Margin	Rate Factor	Payment Date	Flows
INT	27 Sep 2012	27 Dec 2012	100,000,000.00	25 Sep 2012	1.53000	0.0000	1.0000	27 Dec 2012	386,750.00
INT	27 Dec 2012	27 Mar 2013	100,000,000.00	21 Dec 2012	1.68146	0.0000	1.0000	27 Mar 2013	420,364.97
INT	27 Mar 2013	27 Jun 2013	100,000,000.00	25 Mar 2013	1.80335	0.0000	1.0000	27 Jun 2013	460,856.51
INT	27 Jun 2013	27 Sep 2013	100,000,000.00	25 Jun 2013	1.93643	0.0000	1.0000	27 Sep 2013	494,866.28
INT	27 Sep 2013	27 Dec 2013	100,000,000.00	25 Sep 2013	2.06878	0.0000	1.0000	27 Dec 2013	522,940.87
INT	27 Dec 2013	27 Mar 2014	100,000,000.00	23 Dec 2013	2.19970	0.0000	1.0000	27 Mar 2014	549,925.54
INT	27 Mar 2014	27 Jun 2014	100,000,000.00	25 Mar 2014	2.33160	0.0000	1.0000	27 Jun 2014	595,854.36
INT	27 Jun 2014	29 Sep 2014	100,000,000.00	25 Jun 2014	2.46648	0.0000	1.0000	29 Sep 2014	644,025.84

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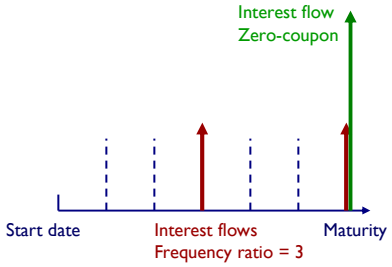
Swap Generator

Payment dates customisation

Payment dates do not always follow the calculation periods. There are 3 possible payment schedules:

Payment schedule	Equal to	Calculation start schedule		
		Frequency ratio	3	Backward (broken periods included)
Fixing schedule	Deduced from	Frequency ratio		
Deduction formula	-2 BUSINESS DAY	Zero coupon	1	
		Formula adjusted		

Zero-coupon	Interest flows are not paid but capitalised at the leg rate at the original payment frequency.
Frequency ratio with ratio n	Flows are only paid every n periods. When not paid, they are capitalised at the leg rate at the original payment frequency.
Formula adjusted	Not relevant for swaps (used for CDS).



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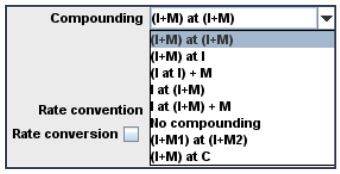
Swap Generator
Compounding

Frequency ratio is an integer that defines the frequency at which the flows are being paid.
Zero-coupon is a mode in which no intermediate flow is paid until the trade maturity.

(I+M) at (I+M)	Interests of period 1 are not paid. They are added to the capital on period 2
No compounding	Interests of period 1 are not paid. They are not used for following periods



Leg 1 | Leg 2 | All legs

Floating interest payments EUR

Flow Tp	Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flow	Cur	Interest flows
INT	27 Sep 2012	27 Dec 2012	100,000,000	25 Sep 2012	1.53000	1.53000	0.0000	1.0000	27 Dec 2012	386,750.00	EUR	386,750.00
INC	27 Dec 2012	27 Mar 2013	100,000,000	21 Dec 2012	1.68146	1.68146	0.0000	1.0000		420,364.97	EUR	420,364.97
INC	27 Mar 2013	27 Jun 2013	100,000,000	25 Mar 2013	1.80335	1.80335	0.0000	1.0000		883,158.76	EUR	460,856.51
INT	27 Jun 2013	27 Sep 2013	100,000,000	25 Jun 2013	1.93643	1.93643	0.0000	1.0000	27 Sep 2013	1,382,395.50	EUR	494,866.28
INC	27 Sep 2013	27 Dec 2013	100,000,000	25 Sep 2013	2.06878	2.06878	0.0000	1.0000		522,940.87	EUR	522,940.87
INC	27 Dec 2013	27 Mar 2014	100,000,000	23 Dec 2013	2.19970	2.19970	0.0000	1.0000		1,075,742.20	EUR	549,925.54
INT	27 Mar 2014	27 Jun 2014	100,000,000	25 Mar 2014	2.33160	2.33160	0.0000	1.0000	27 Jun 2014	1,678,006.42	EUR	595,854.36

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Swap Generator
Practice 1

Identify the payment schedules: which is zero-coupon and which is using a frequency ratio?

A

Leg 1 | Leg 2 | All legs

Floating interest payments EUR

Flow Tp	Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flow
INC	08 Apr 2010	08 Jun 2010	100,000,000	06 Apr 2010	1.10000	1.10000	0.0000	1.0000		186,388.89
INT	08 Jun 2010	08 Dec 2010	100,000,000	04 Jun 2010	1.64250	1.64250	0.0000	1.0000	08 Dec 2010	1,022,882.62
INC	08 Dec 2010	08 Jun 2011	100,000,000	06 Dec 2010	1.00000	1.00000	0.0000	1.0000		505,555.56
INC	08 Jun 2011	08 Dec 2011	100,000,000	06 Jun 2011	3.28353	3.28353	0.0000	1.0000		2,183,121.34
INT	08 Dec 2011	08 Jun 2012	100,000,000	06 Dec 2011	2.71535	2.71535	0.0000	1.0000	08 Jun 2012	3,593,556.31
INC	08 Jun 2012	10 Dec 2012	100,000,000	06 Jun 2012	3.07256	3.07256	0.0000	1.0000		1,578,952.21
INC	10 Dec 2012	10 Jun 2013	100,000,000	06 Dec 2012	3.34783	3.34783	0.0000	1.0000		3,298,192.25
INT	10 Jun 2013	09 Dec 2013	100,000,000	06 Jun 2013	3.47286	3.47286	0.0000	1.0000	09 Dec 2013	5,111,822.66

B

Leg 1 | Leg 2 | All legs

Floating interest payments EUR

Flow Tp	Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flow
INC	08 Apr 2010	08 Jun 2010	100,000,000	06 Apr 2010	1.10000	1.10000	0.0000	1.0000		186,388.89
INC	08 Jun 2010	08 Dec 2010	100,000,000	04 Jun 2010	1.64250	1.64250	0.0000	1.0000		1,022,882.62
INC	08 Dec 2010	08 Jun 2011	100,000,000	06 Dec 2010	1.00000	1.00000	0.0000	1.0000		1,533,609.42
INC	08 Jun 2011	08 Dec 2011	100,000,000	06 Jun 2011	3.28353	3.28353	0.0000	1.0000		3,228,334.73
INC	08 Dec 2011	08 Jun 2012	100,000,000	06 Dec 2011	2.71535	2.71535	0.0000	1.0000		4,653,196.80
INC	08 Jun 2012	10 Dec 2012	100,000,000	06 Jun 2012	3.07256	3.07256	0.0000	1.0000		6,305
INC	10 Dec 2012	10 Jun 2013	100,000,000	06 Dec 2012	3.34783	3.34783	0.0000	1.0000		8,10
INT	10 Jun 2013	09 Dec 2013	100,000,000	06 Jun 2013	3.47286	3.47286	0.0000	1.0000	09 Dec 2013	10,0

Solution

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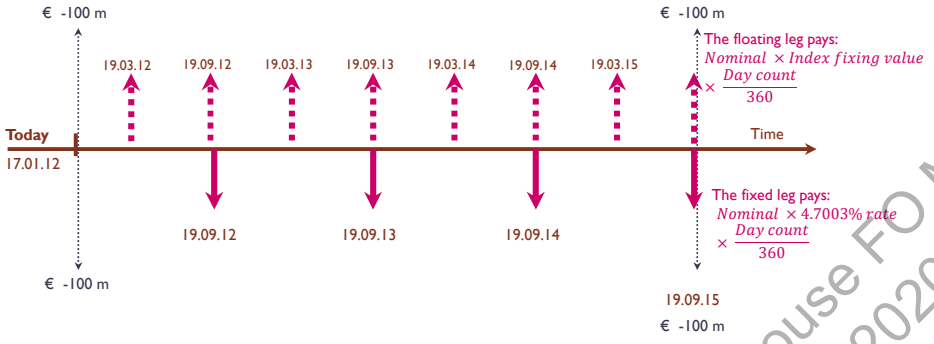
Swap Generator

Stub period: Index

A stub period (also called broken period) is a period that is not multiplicative of the frequency of the leg.

Nominal	€ 100 million
Swap rate	4.7003% annual
Floating index	EUR EURIBOR 6M
Maturity	3Y8M

The stub period on the fixed leg is: 8M.
What is the stub period on the floating leg?



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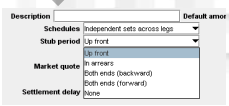
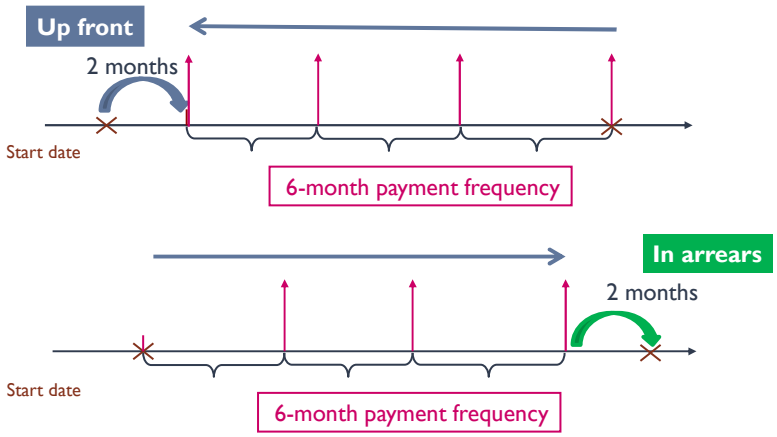
Swap Generator

Stub period: Up front or in arrears



<u>Case</u>: An interest rate swap maturing in 1Y8M is made today with a 6-month payment frequency. What is its stub period?

Answer: There will be a stub period of 2M. The stub period can be upfront or in arrears.



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Swap Generator

Practice 2

Match the right flow schedules to the correct corresponding stub periods
Which is the right flow schedule for "in arrears" stub period?

A

Flow schedule Source:Notepad Leg:2

Floating interest payments EUR

Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Fixing Date	Rate	Margin	Rate Factor	Payment Date	Flows	Cur
INT	03 Jan 2006	01 Mar 2006	100,000,000.00	30 Dec 2005	3.52524	0.0000	1.0000	01 Mar 2006	558,163.00	EUR
INT	01 Mar 2006	01 Sep 2006	100,000,000.00	27 Feb 2006	3.81172	0.0000	1.0000	01 Sep 2006	1,948,214.42	EUR
INT	01 Sep 2006	01 Mar 2007	100,000,000.00	30 Aug 2006	4.64828	0.0000	1.0000	01 Mar 2007	2,337,050.20	EUR
INT	01 Mar 2007	03 May 2007	100,000,000.00	27 Feb 2007	5.31309	0.0000	1.0000	03 May 2007	929,790.57	EUR

B

Flow schedule Source:Notepad Leg:2

20546 Floating interest payments EUR (Rec)

Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Fixing Date	Rate	Margin	Rate Factor	Payment Date	Flows	Cur
INT	03 Jan 2006	03 May 2006	100,000,000.00	30 Dec 2005	3.61324	0.0000	1.0000	03 May 2006	1,204,413.33	EUR
INT	03 May 2006	03 Nov 2006	100,000,000.00	28 Apr 2006	4.11184	0.0000	1.0000	03 Nov 2006	2,101,605.50	EUR
INT	03 Nov 2006	03 May 2007	100,000,000.00	01 Nov 2006	4.88141	0.0000	1.0000	03 May 2007	2,454,264.10	EUR

C

Flow schedule Source:Notepad Leg:2

20546 Floating interest payments EUR (Rec)

Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Fixing Date	Rate	Margin	Rate Factor	Payment Date	Flows	Cur
INT	03 Jan 2006	03 Jul 2006	100,000,000.00	30 Dec 2005	3.65856	0.0000	1.0000	03 Jul 2006	1,839,441.44	EUR
INT	03 Jul 2006	03 Jan 2007	100,000,000.00	29 Jun 2006	4.40626	0.0000	1.0000	03 Jan 2007	2,252,088.23	EUR
INT	03 Jan 2007	03 May 2007	100,000,000.00	29 Dec 2006	4.97030	0.0000	1.0000	03 May 2007	1,656,766.67	EUR

Solution

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Swap Generator

Practice 3

Match the right flow schedules to the correct corresponding stub periods frequency ratio?
Which is the right flow schedule for "up front" stub period?

A

Flow schedule Source:Notepad Leg:2

Floating interest payments EUR

Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Fixing Date	Rate	Margin	Rate Factor	Payment Date	Flows	Cur
INT	03 Jan 2006	01 Mar 2006	100,000,000.00	30 Dec 2005	3.52524	0.0000	1.0000	01 Mar 2006	558,163.00	EUR
INT	01 Mar 2006	01 Sep 2006	100,000,000.00	27 Feb 2006	3.81172	0.0000	1.0000	01 Sep 2006	1,948,214.42	EUR
INT	01 Sep 2006	01 Mar 2007	100,000,000.00	30 Aug 2006	4.64828	0.0000	1.0000	01 Mar 2007	2,337,050.20	EUR
INT	01 Mar 2007	03 May 2007	100,000,000.00	27 Feb 2007	5.31309	0.0000	1.0000	03 May 2007	929,790.57	EUR

B

Flow schedule Source:Notepad Leg:2

20546 Floating interest payments EUR (Rec)

Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Fixing Date	Rate	Margin	Rate Factor	Payment Date	Flows	Cur
INT	03 Jan 2006	03 May 2006	100,000,000.00	30 Dec 2005	3.61324	0.0000	1.0000	03 May 2006	1,204,413.33	EUR
INT	03 May 2006	03 Nov 2006	100,000,000.00	28 Apr 2006	4.11184	0.0000	1.0000	03 Nov 2006	2,101,605.50	EUR
INT	03 Nov 2006	03 May 2007	100,000,000.00	01 Nov 2006	4.88141	0.0000	1.0000	03 May 2007	2,454,264.10	EUR

C

Flow schedule Source:Notepad Leg:2

Floating interest payments EUR

Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Fixing Date	Rate	Margin	Rate Factor	Payment Date	Flows	Cur
INT	03 Jan 2006	01 Feb 2006	100,000,000.00	30 Dec 2005	3.47346	0.0000	1.0000	01 Feb 2006	279,806.47	EUR
INT	01 Feb 2006	01 Aug 2006	100,000,000.00	30 Jan 2006	3.75339	0.0000	1.0000	01 Aug 2006	1,887,120.25	EUR
INT	01 Aug 2006	01 Feb 2007	100,000,000.00	28 Jul 2006	4.52527	0.0000	1.0000	01 Feb 2007	2,312,914.16	EUR
INT	01 Feb 2007	03 May 2007	100,000,000.00	30 Jan 2007	5.21492	0.0000	1.0000	03 May 2007	1,318,215.67	EUR

Solution

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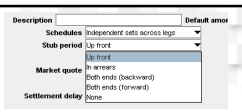
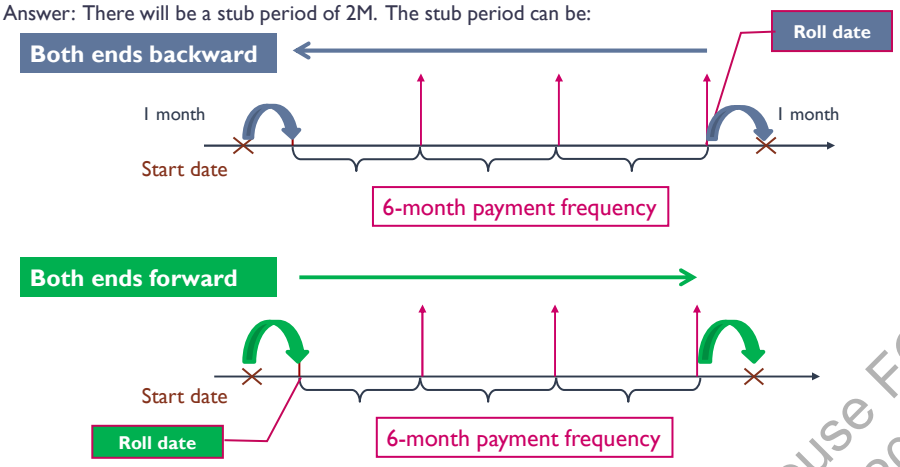
Swap Generator

Stub period: Both ends backward or forward



Case: An interest rate swap maturing in 1Y8M is made today with a 6-month payment frequency. What is its stub period?

Answer: There will be a stub period of 2M. The stub period can be:



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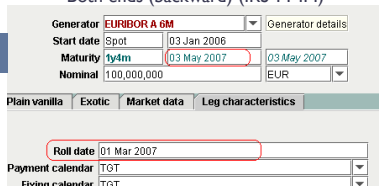
Swap Generator

Practice 4

Practice 4: Match the right flow schedules to the correct corresponding stub periods.

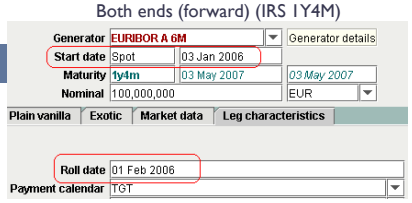
Both ends (backward) (IRS 1Y4M)

1



Both ends (forward) (IRS 1Y4M)

2



A

Flow schedule Source:Notepad Leg:2

Floating interest payments EUR

Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Fixing Date	Rate	Margin	Rate Factor	Payment Date	Flows	Cur
INT	03 Jan 2006	01 Feb 2006	100,000,000.00	30 Dec 2005	3.47346	0.0000	1.000	01 Feb 2006	279,806.47	EUR
INT	01 Feb 2006	01 Aug 2006	100,000,000.00	30 Jan 2006	3.75339	0.0000	1.000	01 Aug 2006	1,887,120.25	EUR
INT	01 Aug 2006	01 Feb 2007	100,000,000.00	28 Jul 2006	4.52527	0.0000	1.000	01 Feb 2007	2,312,914.16	EUR
INT	01 Feb 2007	03 May 2007	100,000,000.00	30 Jan 2007	5.21492	0.0000	1.000	03 May 2007	1,318,215.67	EUR

B

Flow schedule Source:Notepad Leg:2

Floating interest payments EUR

Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Fixing Date	Rate	Margin	Rate Factor	Payment Date	Flow	
INT	03 Jan 2006	01 Mar 2006	100,000,000.00	30 Dec 2005	3.52524	0.0000	1.000	01 Mar 2006	558	
INT	01 Mar 2006	01 Sep 2006	100,000,000.00	27 Feb 2006	3.81172	0.0000	1.000	01 Sep 2006	1,948,	
INT	01 Sep 2006	01 Mar 2007	100,000,000.00	30 Aug 2006	4.64828	0.0000	1.000	01 Mar 2007	2,337,050.20	EUR
INT	01 Mar 2007	03 May 2007	100,000,000.00	27 Feb 2007	5.31309	0.0000	1.000	03 May 2007	929,790.57	EUR

Solution

24

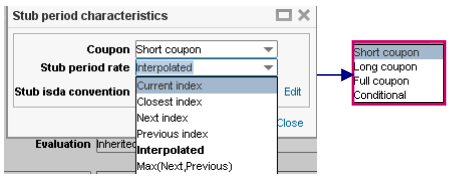
24

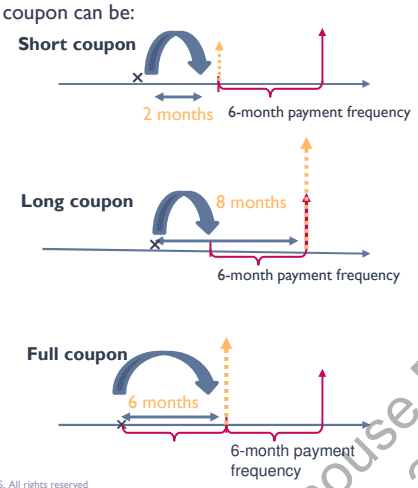
Swap Generator

Stub period: Coupon

Case: An interest rate swap maturing in 8M is made today with a 6-month payment frequency.

Answer: There will be a stub period of 2M. The last coupon can be:





Conditional is used for CDS:
If the stub is shorter than X, then the user can specify the type of coupon. Otherwise, the user should specify another coupon.

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Swap Generator

Practice 5

Practice 5: Match the right flow schedules to the correct stub periods coupon.
Which is the right flow schedule for "short coupon" and "long coupon"?

A

Global flow schedule Source:Notepad

Leg 1 | Leg 2 | All legs

Floating interest payments EUR

Flow Tp	Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flow	Cur
INT	08 Apr 2010	08 Dec 2010	100,000,000	06 Apr 2010	1.50900	1.50900	0.0000	1.0000	08 Dec 2010	1,022,766.67	EUR
INT	08 Dec 2010	08 Jun 2011	100,000,000	06 Dec 2010	1.00000	1.00000	0.0000	1.0000	08 Jun 2011	505,555.56	EUR
INT	08 Jun 2011	08 Dec 2011	100,000,000	06 Jun 2011	3.28353	3.28353	0.0000	1.0000	08 Dec 2011	1,669,127.42	EUR
INT	08 Dec 2011	08 Jun 2012	100,000,000	06 Dec 2011	2.71535	2.71535	0.0000	1.0000	08 Jun 2012	1,380,301.32	EUR
INT	08 Jun 2012	10 Dec 2012	100,000,000	06 Jun 2012	3.07256	3.07256	0.0000	1.0000	10 Dec 2012	1,578,952.21	EUR
INT	10 Dec 2012	10 Jun 2013	100,000,000	06 Dec 2012	3.34783	3.34783	0.0000	1.0000	10 Jun 2013	1,692,516.02	EUR
INT	10 Jun 2013	09 Dec 2013	100,000,000	06 Jun 2013	3.47286	3.47286	0.0000	1.0000	09 Dec 2013	1,755,723.28	EUR

B

Global flow schedule Source:Notepad

Leg 1 | Leg 2 | All legs

Floating interest payments EUR

Flow Tp	Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flow	Cur
INT	08 Apr 2010	08 Jun 2010	100,000,000	06 Apr 2010	1.10000	1.10000	0.0000	1.0000	08 Jun 2010	186,388.89	EUR
INT	08 Jun 2010	08 Dec 2010	100,000,000	04 Jun 2010	1.64250	1.64250	0.0000	1.0000	08 Dec 2010	834,937.50	EUR
INT	08 Dec 2010	08 Jun 2011	100,000,000	06 Dec 2010	1.00000	1.00000	0.0000	1.0000	08 Jun 2011	505,555.56	EUR
INT	08 Jun 2011	08 Dec 2011	100,000,000	06 Jun 2011	3.28353	3.28353	0.0000	1.0000	08 Dec 2011	1,669,127.42	EUR
INT	08 Dec 2011	08 Jun 2012	100,000,000	06 Dec 2011	2.71535	2.71535	0.0000	1.0000	08 Jun 2012	[illegible]	EUR
INT	08 Jun 2012	10 Dec 2012	100,000,000	06 Jun 2012	3.07256	3.07256	0.0000	1.0000	10 Dec 2012	[illegible]	
INT	10 Dec 2012	10 Jun 2013	100,000,000	06 Dec 2012	3.34783	3.34783	0.0000	1.0000	10 Jun 2013	[illegible]	
INT	10 Jun 2013	09 Dec 2013	100,000,000	06 Jun 2013	3.47286	3.47286	0.0000	1.0000	09 Dec 2013	[illegible]	

Solution

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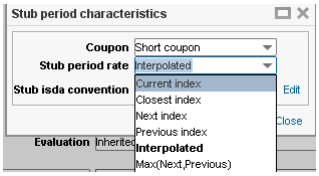
Swap Generator
Stub period: Index

Stub period rate (archiving group) – which index to use?



Current index	The index defined in the floating leg.
Closest index (resp Next/Previous)	The index tenor in the SAME archiving group of the index of the floating leg, whose tenor length is the closest (resp. immediately longer/shorter) of the length of the stub period.
Interpolated	Two index tenors in the same archiving group of the index of the floating leg, whose tenors are immediately shorter and longer than the length of the stub period. Then interpolation pro-rata temporis is performed.

In our example for the stub period of 2M:

- ✔ Current index: EURIBOR 6M
- ✔ Closest index: EURIBOR 2M
- ✔ Interpolated: Interpolated between EURIBOR 2M & EURIBOR 3M

End-user session: Configuration/ Generators/ Swap generators/Stub period: Details/ Stub period rate

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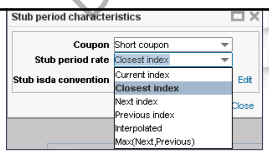
Swap Generator
Stub period: Index



The **Closest index** is the closest index stored in the system in terms of maturity.

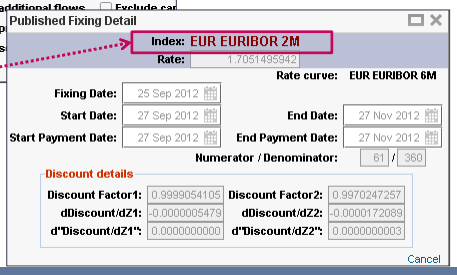
Leg 2 | All legs

Floating interest payments EUR

Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flow
27 Sep 2012	27 Nov 2012	100,000,000	25 Sep 2012	1.10896	1.10896	0.0000	1.0000	27 Nov 2012	187,9
27 Nov 2012	27 May 2013	100,000,000	23 Nov 2012	1.64250	1.64250	0.0000	1.0000	27 May 2013	825,8
27 May 2013	27 Nov 2013	100,000,000	23 May 2013	1.75546	1.75546	0.0000	1.0000	27 Nov 2013	897,2
27 Nov 2013	27 May 2014	100,000,000	25 Nov 2013	2.32638	2.32638	0.0000	1.0000	27 May 2014	1,169,6
27 May 2014	27 Nov 2014	100,000,000	23 May 2014	2.71726	2.71726	0.0000	1.0000	27 Nov 2014	1,388,8

Evaluation flows

EUR EURIBOR 2M



End-user session: Configuration/ Generators/ Swap generators/Stub period: Details/ Stub period rate

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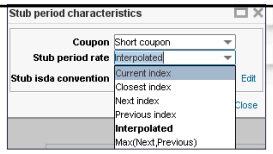
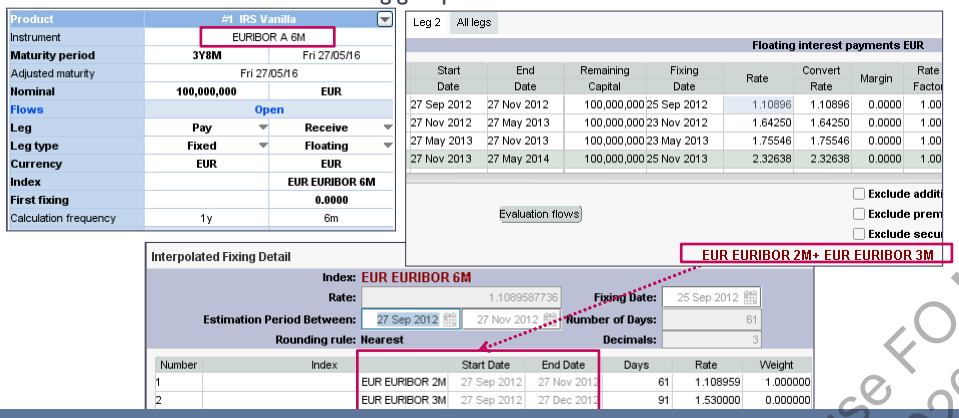
Swap Generator

Stub period: Index



Interpolated index is a computed figure deduced from the interpolation of the previous and the next index (most common configuration). The system will compute the exact forward-forward rate on the archiving group rate curve.



End-user session: Configuration/ Generators/ Swap Generators/Stub period: Details/ Stub period rate

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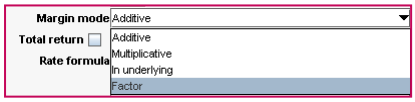
Swap Generator

Margin mode: Floating leg

Margin mode defines how the margin is "added" to the floating rate.



Additive	The margin is added to the floating index at each period.
Multiplicative	The floating index is multiplied by the margin (similar to an index factor).
In the underlying (Applies to formula based indices only)	The margin is added to each underlying index of the formula based resulting index used in the swap. Example: the margin is applied to each daily published index of an OIS used before compounding.

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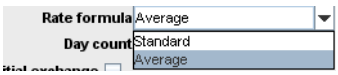
Swap Generator

Rate formula: Floating leg

Rate Formula is a way to create payments on average indices. It is applicable for Zero-coupon or Frequency ratio payments.
The average of all index fixings is applied on all periods rather than each fixing on its period



Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flows	Cur
INC	30 Aug 2006	28 Feb 2007	100,000,000.00	28 Aug 2006	4.64151	4.99112	0.0000	1.0000		2,523,289.07	EUR
INC	28 Feb 2007	30 Aug 2007	100,000,000.00	26 Feb 2007	5.31067	4.99112	0.0000	1.0000		5,124,462.08	EUR
INT	30 Aug 2007	29 Feb 2008	100,000,000.00	28 Aug 2007	5.02118	4.99112	0.0000	1.0000	29 Feb 2008	7,791,630.84	EUR
INC	29 Feb 2008	29 Aug 2008	100,000,000.00	27 Feb 2008	5.30875	5.32044	0.0000	1.0000		2,689,776.37	EUR
INC	29 Aug 2008	27 Feb 2009	100,000,000.00	27 Aug 2008	5.23444	5.32044	0.0000	1.0000		5,451,901.72	EUR
INT	27 Feb 2009	31 Aug 2009	100,000,000.00	25 Feb 2009	5.41812	5.32044	0.0000	1.0000	31 Aug 2009	8,335,076.24	EUR
INC	31 Aug 2009	26 Feb 2010	100,000,000.00	27 Aug 2009	5.45556	5.55515	0.0000	1.0000		2,762,145.48	EUR
INC	26 Feb 2010	30 Aug 2010	100,000,000.00	24 Feb 2010	5.60660	5.55515	0.0000	1.0000		5,695,728.68	EUR
INT	30 Aug 2010	28 Feb 2011	100,000,000.00	26 Aug 2010	5.60330	5.55515	0.0000	1.0000	28 Feb 2011	8,664,128.14	EUR

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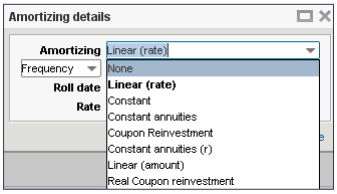
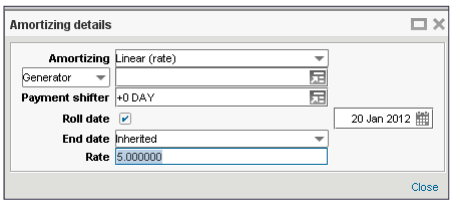
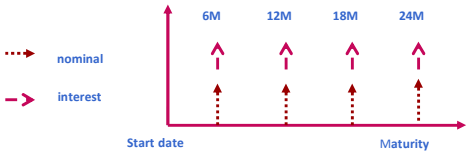
Swap Generator

Amortization

Capital changes do not always follow calculation periods (amortising starts at roll date and follows its own dates generator).







Example: Period 2 (between 6 and 12 months) interests are computed using the amortised nominal after period 6.

Manual adjustment of capitals can be done directly in the flows screen (customised amortising).

End-user session: Pricing/ e-Tradepad/ Right-click Leg: detail/ Characteristics/ Amortizing details

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Swap Generator

Amortization: Constant annuities(r)

Constant annuities(r): Capital repayment is calculated so that (capital repayment + interest) remains constant throughout the trade's life.

Pay / Receive
fixed rate / floating rate

Currency	EUR
Start date	03 Jan 2006
Maturity	04 Jan 2010
Frequency	1y
Convention	LIN ACT/360
Rate	4.000000
Leg NPV	-9,374,738

Amortizing details

Amortizing	Constant annuities (r)
Amortizing leg	1
Rate	5.000000
End nominal	0
Annuity	28,251,147

Global flow schedule SourceNotepad
Leg 1 | Leg 2 | All legs

Fixed interest payments EUR

Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Rate	Payment Date	Flows	Cur	Flows with r=5%	annuities (5%)
NT	03 Jan 2006	03 Jan 2007	100,000,000.00	4.0000000	03 Jan 2007	-4,055,555.56	EUR	-5,069,444.44	
AMO	03 Jan 2007	03 Jan 2008	76,818,297.57		03 Jan 2007	-23,181,702.43	EUR		-28,251,146.87
NT	03 Jan 2007	03 Jan 2008	76,818,297.57	4.0000000	03 Jan 2008	-3,115,408.73	EUR	-3,894,260.92	
AMO	03 Jan 2008	05 Jan 2009	52,461,411.62		03 Jan 2008	-24,356,885.95	EUR		-28,251,146.87
NT	03 Jan 2008	05 Jan 2009	52,461,411.62	4.0000000	05 Jan 2009	-2,145,088.83	EUR	-2681361.038	
AMO	05 Jan 2009	04 Jan 2010	26,891,625.79		05 Jan 2009	-25,569,785.83	EUR		-28,251,146.87
NT	05 Jan 2009	04 Jan 2010	26,891,625.79	4.0000000	04 Jan 2010	-1,087,616.87	EUR		

End-user session: Pricing/ e-Tradepad/ Right-click Leg: detail/ Characteristics/ Amortizing details

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Swap Generator

Amortization: Coupon reinvestment

Coupon reinvestment: The flows will be reinvested into the nominal but will still be paid as well.

Case: At payment date of coupon, the counterparty is "reinvesting" 25% of the fixed rate interest payments.

Amortizing details

Amortizing	Coupon Reinvestment
Fraction	0.250000
Roll date	☑ 20 Jan 2012

Close

Reinvest the fraction specified.
The full coupon is paid.

Leg 1 | Leg 2 | All legs

Fixed interest payments EUR

Flow Tp	Start Date	End Date	Remaining Capital	Rate	Payment Date	Flow	Cur	Interest flows
INT	19 Jan 2012	19 Sep 2012	100,000,000	3.00000	19 Sep 2012	-2,000,000.00	EUR	0.00
INT	19 Sep 2012	19 Sep 2013	100,500,000	3.00000	19 Sep 2013	-3,015,000.00	EUR	0.00
INT	19 Sep 2013	19 Sep 2014	101,253,750	3.00000	19 Sep 2014	-3,037,612.50	EUR	0.00
INT	19 Sep 2014	21 Sep 2015	102,013,153	3.00000	21 Sep 2015	-3,077,396.79	EUR	0.00
AMO	19 Sep 2012	19 Sep 2013	100,500,000		19 Sep 2012	500,000.00	EUR	
AMO	19 Sep 2013	19 Sep 2014	101,253,750		19 Sep 2013	753,750.00	EUR	
AMO	19 Sep 2014	21 Sep 2015	102,013,153		19 Sep 2014	759,403.12	EUR	

End-user session: Pricing/ e-Tradepad/ Right-click Leg: detail/ Characteristics/ Amortizing details

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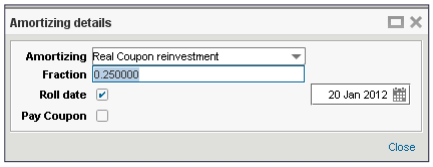
Swap Generator

Amortization: Real coupon reinvestment

Real coupon reinvestment: The flows will be reinvested into the nominal but will not be paid.

Case: At payment date of coupon, the counterparty is only paid 75% of the rate and the counterparty is "reinvesting" 25% of the fixed rate interest payment, which we will get back only at maturity.



Reinvest the fraction specified. The remaining money is paid only at maturity.

Leg 1 | Leg 2 | All legs

Fixed interest payments EUR

Flow Tp	Start Date	End Date	Remaining Capital	Rate	Payment Date	Flow	Cur	Interest flows	Int/flows + Int/Int	Rate Convention	Nb of Days
INT	19 Jan 2012	19 Sep 2012	100,000,000	3.00000	19 Sep 2012	-1,500,000.00	EUR	0.00	0.00	LIN 30/360	240
INT	19 Sep 2012	19 Sep 2013	100,500,000	3.00000	19 Sep 2013	-2,261,250.00	EUR	0.00	0.00	LIN 30/360	360
INT	19 Sep 2013	19 Sep 2014	101,253,750	3.00000	19 Sep 2014	-2,278,209.37	EUR	0.00	0.00	LIN 30/360	360
INT	19 Sep 2014	21 Sep 2015	102,013,153	3.00000	21 Sep 2015	-2,308,047.59	EUR	0.00	0.00	LIN 30/360	362

End-user session: Pricing/ e-Tradepad/ Right-click Leg: detail/ Characteristics/ Amortizing details

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Swap Generator

Other useful settings

Indexed	Generic term (MX terminology): We can input a formula on the coupon or notional with reference to an index that can be an FX rate, an inflation rate, etc. (multi currency below is a case of indexation). Useful for inflation linked swaps, non deliverable swaps, marked-to-market swaps.
Multi Currency	Useful for non deliverable swaps of emergent markets currencies: We trade on a specific currency, interests are calculated with this currency but payments are done in USD (or another liquid currency) with the current FX rate.
Initial exchange	Concern the exchanges of capital. These settings are not used for IRS but for currency swaps or specific swap structures.
Intermediate payments	
Final exchange	
Accrual/Yield calculation	This setting does not impact the structure of coupons and cash flows of a trade. It is for the display of risk views. There are different ways to see the risk: ▪ Standard way: Mark-to-market (PV01: sensitivity to the rate curve). ▪ Duration: Length of the deal in years. ✔ For a swap 5Y, the risk will be only on the 5Y pillar and the duration is 5. ✔ For an amortized swap 5Y (the notional decreases), there are intermediary risks and a lower risk on the 5Y pillar. The duration is inferior to 5 as the flows are weighted.

Currency swaps and IR swaps share the same configuration list (swap generators) but are physically stored as two trade types (same family 'IRD' but different groups 'IRS' and 'CS').

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Agenda

Introduction	
Swap Generator	
Currency Swap Generator	• Definition • Marked to market • Forward start capital
Bond Generator	
Cap/Floor, FRA, Loan Generators	
Practice	

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Currency Swap Generator

Definition

Standard currency swap

Capital of the Currency 2	Remains constant
Equal to	Swap nominal × FX rate on trade date
Capitals are exchanged	At start and end dates

Product	#1 Currency Swap	
Currency swap type		
Instrument	EUR-USD 3M-3M	
Template details	Open	
Start period	Spot	Thu 27/09/12
Maturity period	2Y	Sat 27/09/14
Adjusted maturity	Mon 29/09/14	
Nominal	100,000,000	EUR
Nominal (other leg)	110,000,000	USD
Capital conversion	1.10	
P&L FX rate	1.10	
Flows	Open	
Leg	Pay	Receive
Npv	0	EUR
Bpv	-17,422	
Typology | Usage	Xccy Swap	Libor
CSA Type		
Int. | Counterparty	No	ABBEY NATION
Portfolio	MX_PTF	

Leg 1 | Leg 2 | All legs

Floating interest payments EUR

Flow Tp	Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flow	Cur
NT	27 Sep 2012	27 Dec 2012	100,000,000	25 Sep 2012	1.53000	2.53000	1.0000	1.0000	27 Dec 2012	-639,527.78	EUR
NT	27 Dec 2012	27 Mar 2013	100,000,000	21 Dec 2012	1.68146	2.68146	1.0000	1.0000	27 Mar 2013	-670,364.97	EUR
NT	27 Mar 2013	27 Jun 2013	100,000,000	25 Mar 2013	1.80335	2.80335	1.0000	1.0000	27 Jun 2013	-716,412.07	EUR
NT	27 Jun 2013	27 Sep 2013	100,000,000	25 Jun 2013	1.93643	2.93643	1.0000	1.0000	27 Sep 2013	-750,421.84	EUR
NT	27 Sep 2013	27 Dec 2013	100,000,000	25 Sep 2013	2.06878	3.06878	1.0000	1.0000	27 Dec 2013	-775,718.65	EUR
NT	27 Dec 2013	27 Mar 2014	100,000,000	23 Dec 2013	2.19970	3.19970	1.0000	1.0000	27 Mar 2014	-799,925.54	EUR
NT	27 Mar 2014	27 Jun 2014	100,000,000	25 Mar 2014	2.33160	3.33160	1.0000	1.0000	27 Jun 2014	-851,409.92	EUR
NT	27 Jun 2014	29 Sep 2014	100,000,000	25 Jun 2014	2.46648	3.46648	1.0000	1.0000	29 Sep 2014	-905,136.95	EUR
PRI									27 Sep 2012	100,000,000.00	EUR
PRI									29 Sep 2014	-100,000,000.00	EUR

Evaluation flows

- ☐ Exclude additional flows
- ☐ Exclude premium flows
- ☐ Exclude security flows
- ☐ Exclude capital flows
- ☐ Exclude capitalized interests
- ☑ Exclude residual flows

EUR EURIBOR 3M

Close

End-user session: Pricing/ e-Tradepad

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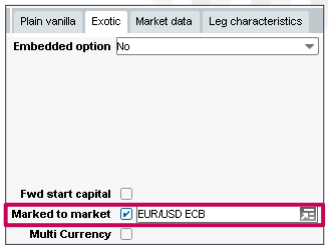
Currency Swap Generator

Marked to market

Marked to market

Nominal of the Currency 2	Evolves with the FX rate of each period start date
Capitals are exchanged	Intermediately at each period



Global flow schedule Source:Notepad

Leg 1 | Leg 2 | All legs

Floating interest payments USD

Flow Tp	Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flow	Cur
INT	27 Sep 2012	27 Dec 2012	135,005,000	25 Sep 2012	1.65000	1.65000	0.0000	1.0000	27 Dec 2012	563,083.35	USD
INT	27 Dec 2012	27 Mar 2013	135,051,915	21 Dec 2012	3.36803	3.36803	0.0000	1.0000	27 Mar 2013	1,137,145.97	USD
INT	27 Mar 2013	27 Jun 2013	135,598,320	25 Mar 2013	3.31007	3.31007	0.0000	1.0000	27 Jun 2013	1,147,035.25	USD
INT	27 Jun 2013	27 Sep 2013	136,123,415	25 Jun 2013	3.38700	3.38700	0.0000	1.0000	27 Sep 2013	1,178,239.75	USD
INT	27 Sep 2013	27 Dec 2013	136,628,321	25 Sep 2013	3.46403	3.46403	0.0000	1.0000	27 Dec 2013	1,196,359.63	USD
INT	27 Dec 2013	27 Mar 2014	136,670,426	23 Dec 2013	3.55131	3.55131	0.0000	1.0000	27 Mar 2014	1,213,398.38	USD
INT	27 Mar 2014	27 Jun 2014	136,523,922	25 Mar 2014	3.59641	3.59641	0.0000	1.0000	27 Jun 2014	1,254,768.30	USD
INT	27 Jun 2014	29 Sep 2014	136,166,464	25 Jun 2014	3.60097	3.60097	0.0000	1.0000	29 Sep 2014	1,280,309.72	USD
PRI									27 Sep 2012	-135,005,000.00	USD
PRI									29 Sep 2014	136,166,463.57	USD
PRI	27 Dec 2012	27 Mar 2013	135,051,915						27 Dec 2012	-46,914.94	USD
PRI	27 Mar 2013	27 Jun 2013	135,598,320						27 Mar 2013	-546,404.96	USD
PRI	27 Jun 2013	27 Sep 2013	136,123,415						27 Jun 2013	-525,094.61	USD

End-user session: Pricing/ e-Tradepad/ Right-click Leg: detail/ Characteristics/ Amortizing details

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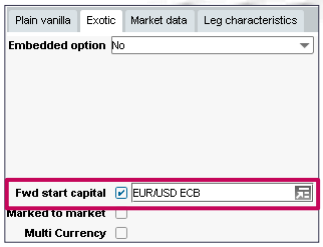
Currency Swap Generator

Forward start capital

Forward start capital

Swap start date	Future date
Nominal of currency 2	Swap nominal * FX rate at forward start date



Leg 1 | Leg 2 | All legs

Floating interest payments USD

Flow Tp	Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flow	Cur
INT	27 Sep 2012	27 Dec 2012	135,005,000	25 Sep 2012	1.65000	1.65000	0.0000	1.0000	27 Dec 2012	563,083.35	USD
INT	27 Dec 2012	27 Mar 2013	135,005,000	21 Dec 2012	3.36803	3.36803	0.0000	1.0000	27 Mar 2013	1,136,750.94	USD
INT	27 Mar 2013	27 Jun 2013	135,005,000	25 Mar 2013	3.31007	3.31007	0.0000	1.0000	27 Jun 2013	1,142,016.32	USD
INT	27 Jun 2013	27 Sep 2013	135,005,000	25 Jun 2013	3.38700	3.38700	0.0000	1.0000	27 Sep 2013	1,168,559.12	USD
INT	27 Sep 2013	27 Dec 2013	135,005,000	25 Sep 2013	3.46403	3.46403	0.0000	1.0000	27 Dec 2013	1,182,145.34	USD
INT	27 Dec 2013	27 Mar 2014	135,005,000	23 Dec 2013	3.55131	3.55131	0.0000	1.0000	27 Mar 2014	1,198,612.26	USD
INT	27 Mar 2014	27 Jun 2014	135,005,000	25 Mar 2014	3.59641	3.59641	0.0000	1.0000	27 Jun 2014	1,240,808.15	USD
INT	27 Jun 2014	29 Sep 2014	135,005,000	25 Jun 2014	3.60097	3.60097	0.0000	1.0000	29 Sep 2014	1,269,389.02	USD
PRI									27 Sep 2012	-135,005,000.00	USD
PRI									29 Sep 2014	135,005,000.00	USD

End-user session: Pricing/ e-Tradepad/ Right-click Leg: detail/ Characteristics/ Amortizing details

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Agenda

Introduction	
Swap Generator	
Currency Swap Generator	
Bond Generator	• Bond security • Anatomy of a bond generator • Schedule definition • Accrual and yield calculations
Cap/Floor, FRA, Loan Generators	
Practice	

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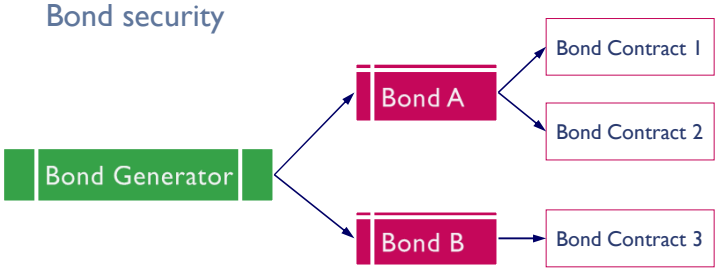
Bond Generator

Bond security



To define a new bond in MX.3:

Specify the following information in the configuration of the security:

- >Nominal amount
- >Maturity
- >Coupon rate
- >Issue date
- >ISIN
- >Issuer …

End-user session: Configuration/ Securities/ Bonds

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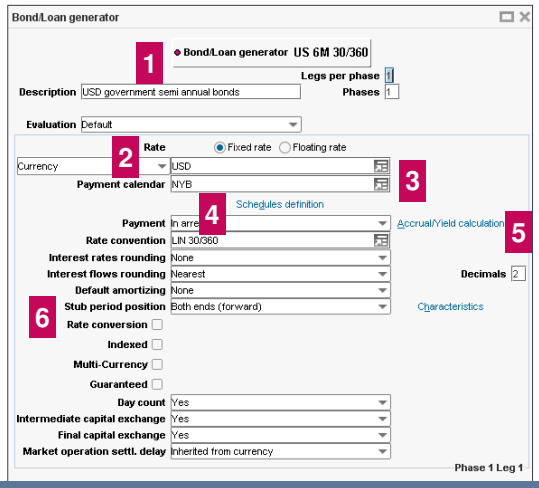
Bond Generator

Anatomy of a bond generator

A **bond generator** is viewed as a **one-leg swap generator**, with all flags available.



To define a new bond generator:

Specify the following information in the configuration of the security:

1) Label of Bond Generator
2) Select rate type
   - If floating rate, select an index
3) Set payment currency and calendar
4) Complete Schedules definition
5) Complete accrual/ yield calculation methods
6) Add features if applicable:
   - Amortization
   - Broken periods etc.

Payment currency	is the currency in which nominal and coupon payments are made
Payment calendar	used for coupon calculation period and coupon payment dates
Schedules definition	stores rules used for coupon calculation and payment dates
Rate convention	used for coupon flow calculation

End-user session: Configuration/ Generators/ Bond generators

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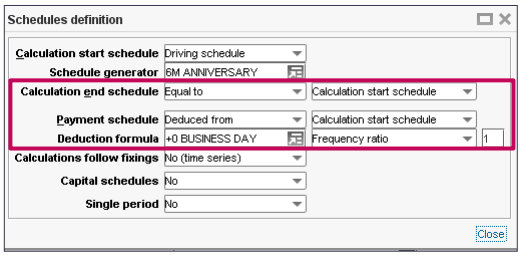
Bond Generator

Schedule definition

Define calculation and payment schedules:

- ✔ One is the driving schedule
- ✔ The others are either Equal to or Deduced from the driving schedule.

If deduced, then a deduction formula is defined (e.g. + 2 open days).



End-user session: Configuration/ Generators/ Bond generators

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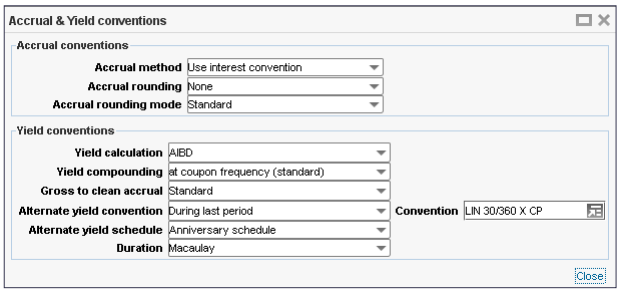
Bond Generator

Accrual and yield conventions

Specific conventions can be defined for accrual and yield calculations.
Yield can be based on the payment schedule or the anniversary schedule (calculation schedule).



End-user session: Configuration/ Generators/ Bond generators

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Agenda

	Introduction	
	Swap Generator	
	Currency Swap Generator	
	Bond Generator	
	Cap/Floor, FRA, Loan Generators	• Overview • Cap-floor generator • Forward Rate Agreements (FRA)
	Practice	

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Other Generators

Overview

Generators are necessary for complex structures, high-volume deal booking. Simple trades are often built on the selection of currency or index only.

Cap Floors (CFs), Forward Loan Agreements (FRAs) and Loan and Borrowing (LN_BR) trades can be booked with or without the use of generators.

The two types of generators are:

One leg generator	Bonds, CFs, LN_BR
Two leg generators	IRS, CS, FRAs

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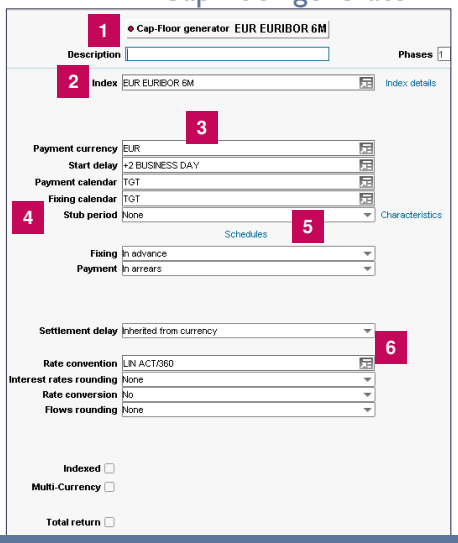
Other Generators

Cap-floor generator



The configuration of a CF generator is similar to an index definition screen and can also be considered as a one-leg swap definition. When a CF generator is not used to book the CF trade, the application applies the index characteristics to the trade (e.g.: generic CF)

To define a new CF generator:

Specify the following information in the configuration of the CF generator:

1) Label of CF Generator
2) Select index
3) Set payment currency and calendar(inherited)
4) Broken period
5) Set schedules
6) Rate convention

End-user session: Configuration/ Rates/Cap/Floor generators

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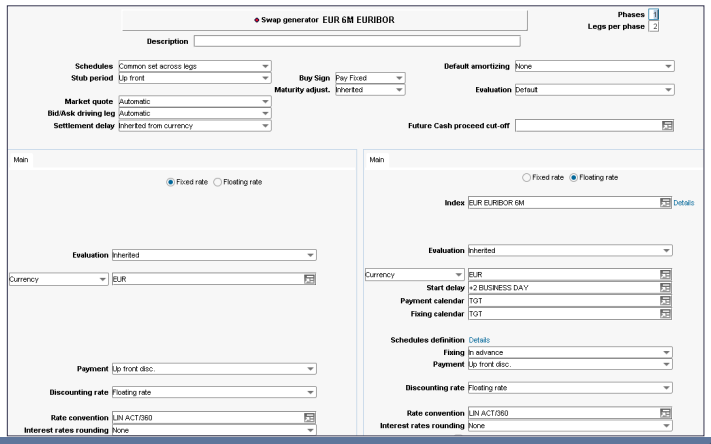
Other Generators

Forward Rate Agreement generator

The configuration of a FRA generator is similar to the configuration of a swap generator (two legs).
Users can customize the terms of the FRA, such as the stub period, conventions etc.



End-user session: Configuration/ FRA generators

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Agenda

- Introduction
- Swap Generator
- Currency Swap Generator
- Bond Generator
- Cap/Floor, FRA, Loan Generators
- **Practice**

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Practice 6

Generator Customization at trade level

Customize a generator when booking a trade.

1. Login & password: MUREXFO into group FO
2. Go to the Pricing/ e-Tradepad
3. Insert a IRS trade by selecting a generator USD LIBOR S 3M and customize it:
   - Receive 1.5% USD semi-annually
   - Pay floating USD LIBOR 3M quarterly
   - USD 250 million as nominal
   - 5Y maturity
4. Create a 2Y customization over the last 2 years with a fixed rate of 1.6% with a margin of 10 bp.

Solution

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Practice 7

Generator Configuration from Scratch

Configure a swap generator from scratch

1. Login & password: MUREXFO into group FO
2. In the end-user session, go to menu: Configuration/ Generators/ Swap generators
3. Hit "Insert" to configure a new swap generator with the following characteristics:
   - Label = "Generator_Training"
   - USD Libor 6M paying every 2 years
   - Stub period: both ends backwards
   - Fixed rate paying annually

Solution

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SOLUTION TO EXERCISES

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Swap Generator

Practice 1

Identify the payment schedules: which is zero-coupon and which is using a frequency ratio?

A is frequency ratio and B is zero-coupon

Leg 1 | Leg 2 | All legs

Floating interest payments EUR

A

Flow Tp	Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flow
INC	08 Apr 2010	08 Jun 2010	100,000,000	06 Apr 2010	1.10000	1.10000	0.0000	1.0000		186,388.89
INT	08 Jun 2010	08 Dec 2010	100,000,000	04 Jun 2010	1.64250	1.64250	0.0000	1.0000	08 Dec 2010	1,022,882.62
INC	08 Dec 2010	08 Jun 2011	100,000,000	06 Dec 2010	1.00000	1.00000	0.0000	1.0000		505,555.56
INC	08 Jun 2011	08 Dec 2011	100,000,000	06 Jun 2011	3.28353	3.28353	0.0000	1.0000		2,183,121.34
INT	08 Dec 2011	08 Jun 2012	100,000,000	06 Dec 2011	2.71535	2.71535	0.0000	1.0000	08 Jun 2012	3,593,556.31
INC	08 Jun 2012	10 Dec 2012	100,000,000	06 Jun 2012	3.07256	3.07256	0.0000	1.0000		1,578,952.21
INC	10 Dec 2012	10 Jun 2013	100,000,000	06 Dec 2012	3.34783	3.34783	0.0000	1.0000		3,298,192.25
INT	10 Jun 2013	09 Dec 2013	100,000,000	06 Jun 2013	3.47286	3.47286	0.0000	1.0000	09 Dec 2013	5,111,822.66

Leg 1 | Leg 2 | All legs

Floating interest payments EUR

B

Flow Tp	Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flow
INC	08 Apr 2010	08 Jun 2010	100,000,000	06 Apr 2010	1.10000	1.10000	0.0000	1.0000		186,388.89
INC	08 Jun 2010	08 Dec 2010	100,000,000	04 Jun 2010	1.64250	1.64250	0.0000	1.0000		1,022,882.62
INC	08 Dec 2010	08 Jun 2011	100,000,000	06 Dec 2010	1.00000	1.00000	0.0000	1.0000		1,533,609.42
INC	08 Jun 2011	08 Dec 2011	100,000,000	06 Jun 2011	3.28353	3.28353	0.0000	1.0000		[illegible]
INC	08 Dec 2011	08 Jun 2012	100,000,000	06 Dec 2011	2.71535	2.71535	0.0000	1.0000		[illegible]
INC	08 Jun 2012	10 Dec 2012	100,000,000	06 Jun 2012	3.07256	3.07256	0.0000	1.0000		[illegible]
INC	10 Dec 2012	10 Jun 2013	100,000,000	06 Dec 2012	3.34783	3.34783	0.0000	1.0000		[illegible]
INT	10 Jun 2013	09 Dec 2013	100,000,000	06 Jun 2013	3.47286	3.47286	0.0000	1.0000	09 Dec 2013	10,[illegible],882.62

Exercise

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Swap Generator

Practice 2

Match the right flow schedules to the correct corresponding stub periods
Which is the right flow schedule for "in arrears" stub period?

C

Flow schedule Source:Notepad Leg:2

20546 Floating interest payments EUR (Rec)

Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Fixing Date	Rate	Margin	Rate Factor	Payment Date	Flows	Cur
INT	03 Jan 2006	03 Jul 2006	100,000,000.00	30 Dec 2005	3.65856	0.0000	1.0000	03 Jul 2006	1,839,441.44	EUR
INT	03 Jul 2006	03 Jan 2007	100,000,000.00	29 Jun 2006	4.40626	0.0000	1.0000	03 Jan 2007	2,252,088.23	EUR
INT	03 Jan 2007	03 May 2007	100,000,000.00	29 Dec 2006	4.97030	0.0000	1.0000	03 May 2007	1,656,766.67	EUR

Exercise

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Swap Generator

Practice 3

Match the right flow schedules to the correct corresponding stub periods frequency ratio? Which is the right flow schedule for "up front" stub period?

B

Flow schedule Source:Notepad Leg:2

20546 Floating interest payments EUR (Rec)

Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Fixing Date	Rate	Margin	Rate Factor	Payment Date	Flows	Cur
INT	03 Jan 2006	03 May 2006	100,000,000.00	30 Dec 2005	3.61324	0.0000	1.0000	03 May 2006	1,204,413.33	EUR
INT	03 May 2006	03 Nov 2006	100,000,000.00	28 Apr 2006	4.11184	0.0000	1.0000	03 Nov 2006	2,101,605.50	EUR
INT	03 Nov 2006	03 May 2007	100,000,000.00	01 Nov 2006	4.88141	0.0000	1.0000	03 May 2007	2,454,264.10	EUR

Exercise

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Swap Generator

Practice 4

Match the right flow schedules to the correct corresponding stub periods

Both ends (forward) (IRS 1Y4M)

I

B

Generator	EURIBOR A 6M
Start date	Spot / 03 Jan 2006
Maturity	1y4m / 03 May 2007
Nominal	100,000,000 / EUR

Plain vanilla | Exotic | Market data | Leg characteristics

Roll date	01 Mar 2007
Payment calendar	TGT

Both ends (backward) (IRS 1Y4M)

2

A

Generator	EURIBOR A 6M
Start date	Spot / 03 Jan 2006
Maturity	1y4m / 03 May 2007
Nominal	100,000,000 / EUR

Plain vanilla | Exotic | Market data | Leg characteristics

Roll date	01 Feb 2006
Payment calendar	TGT

A

Flow schedule Source:Notepad Leg:2

Floating interest payments EUR

Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Fixing Date	Rate	Margin	Rate Factor	Payment Date	Flows	Cur
INT	03 Jan 2006	01 Feb 2006	100,000,000.00	30 Dec 2005	3.47346	0.0000	1.0000	01 Feb 2006	279,806.47	EUR
INT	01 Feb 2006	01 Aug 2006	100,000,000.00	30 Jan 2006	3.75339	0.0000	1.0000	01 Aug 2006	1,887,120.25	EUR
INT	01 Aug 2006	01 Feb 2007	100,000,000.00	28 Jul 2006	4.52527	0.0000	1.0000	01 Feb 2007	2,312,914.16	EUR
INT	01 Feb 2007	03 May 2007	100,000,000.00	30 Jan 2007	5.21492	0.0000	1.0000	03 May 2007	1,318,215.67	EUR

B

Flow schedule Source:Notepad Leg:2

Floating interest payments EUR

Flow Tp	Calculation Start date	Calculation End date	Remaining Capital	Fixing Date	Rate	Margin	Rate Factor	Payment Date	Flows	Cur
INT	03 Jan 2006	01 Mar 2006	100,000,000.00	30 Dec 2005	3.52524	0.0000	1.0000	01 Mar 2006	558	
INT	01 Mar 2006	01 Sep 2006	100,000,000.00	27 Feb 2006	3.81172	0.0000	1.0000	01 Sep 2006	1,948	
INT	01 Sep 2006	01 Mar 2007	100,000,000.00	30 Aug 2006	4.64828	0.0000	1.0000	01 Mar 2007	2,337,	
INT	01 Mar 2007	03 May 2007	100,000,000.00	27 Feb 2007	5.31309	0.0000	1.0000	03 May 2007	929,790.37	EUR

Exercise

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Swap Generator

Practice 5

Match the right flow schedules to the correct stub periods coupon.
Which is the right flow schedule for "short coupon" and "long coupon"?

A is long coupon and B is short coupon

A

Global flow schedule Source:Notepad

Leg 1 | Leg 2 | All legs

Floating interest payments EUR

Flow Tp	Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flow	Cur
INT	08 Apr 2010	08 Dec 2010	100,000,000	06 Apr 2010	1.50900	1.50900	0.0000	1.0000	08 Dec 2010	1,022,766.67	EUR
INT	08 Dec 2010	08 Jun 2011	100,000,000	06 Dec 2010	1.00000	1.00000	0.0000	1.0000	08 Jun 2011	505,555.56	EUR
INT	08 Jun 2011	08 Dec 2011	100,000,000	06 Jun 2011	3.28353	3.28353	0.0000	1.0000	08 Dec 2011	1,669,127.42	EUR
INT	08 Dec 2011	08 Jun 2012	100,000,000	06 Dec 2011	2.71535	2.71535	0.0000	1.0000	08 Jun 2012	1,380,301.32	EUR
INT	08 Jun 2012	10 Dec 2012	100,000,000	06 Jun 2012	3.07256	3.07256	0.0000	1.0000	10 Dec 2012	1,578,952.21	EUR
INT	10 Dec 2012	10 Jun 2013	100,000,000	06 Dec 2012	3.34783	3.34783	0.0000	1.0000	10 Jun 2013	1,692,516.02	EUR
INT	10 Jun 2013	09 Dec 2013	100,000,000	06 Jun 2013	3.47286	3.47286	0.0000	1.0000	09 Dec 2013	1,755,723.28	EUR

B

Global flow schedule Source:Notepad

Leg 1 | Leg 2 | All legs

Floating interest payments EUR

Flow Tp	Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate	Margin	Rate Factor	Payment Date	Flow	Cur
INT	08 Apr 2010	08 Jun 2010	100,000,000	06 Apr 2010	1.10000	1.10000	0.0000	1.0000	08 Jun 2010	186,388.89	EUR
INT	08 Jun 2010	08 Dec 2010	100,000,000	04 Jun 2010	1.64250	1.64250	0.0000	1.0000	08 Dec 2010	834,937.50	EUR
INT	08 Dec 2010	08 Jun 2011	100,000,000	06 Dec 2010	1.00000	1.00000	0.0000	1.0000	08 Jun 2011	505,555.56	EUR
INT	08 Jun 2011	08 Dec 2011	100,000,000	06 Jun 2011	3.28353	3.28353	0.0000	1.0000	08 Dec 2011	[illegible]	EUR
INT	08 Dec 2011	08 Jun 2012	100,000,000	06 Dec 2011	2.71535	2.71535	0.0000	1.0000	08 Jun 2012	[illegible]	
INT	08 Jun 2012	10 Dec 2012	100,000,000	06 Jun 2012	3.07256	3.07256	0.0000	1.0000	10 Dec 2012	[illegible]	
INT	10 Dec 2012	10 Jun 2013	100,000,000	06 Dec 2012	3.34783	3.34783	0.0000	1.0000	10 Jun 2013	[illegible]	
INT	10 Jun 2013	09 Dec 2013	100,000,000	06 Jun 2013	3.47286	3.47286	0.0000	1.0000	09 Dec 2013	[illegible]	EUR

Exercise

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Practice 6

Practice 6

Customize a generator when booking a trade.

Product	#1 IRS Vanilla	
Instrument	USD LIBOR S 3M	
Template details	Open	
Start period	Spot	Thu 27/09/12
Maturity period		Wed 27/09/17
Adjusted maturity	Wed 27/09/17	
Nominal	250,000,000	USD
Flows	Open	
Leg	Pay	Receive
Leg type	Fixed	Floating
Currency	USD	USD
Index		USD LIBOR 3M
Npv	-6,065,709	USD
Bpv	-121,694	
Typology | Usage	IRS	Libor
Fees	Open	
CSA Type		
Int. | Counterparty	No	ABBEY NATIONAL PL
Portfolio	MX_PTF	

Exercise

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Practice 6

Practice 6

Solution 6: Customize a generator when booking a trade.

1. Edit/Define Phases
2. Change Rate/Margin to independent
3. Create a second phase of 2Y
4. 4) Change the rate and margin for the 2nd phase

Phase definition

Constraints across phases

	1 Pay	2 Receive
Rate/margin	Common	Common
Strike	Common	Common
Pay/Receive	Common	Common
Cap/Floor	Common	Common

Joint phases: Yes / No

Phase	Start	Length	End	Payout
1	27 Sep 2012	3Y	27 Sep 2015	Pay USD Receive USD LIBOR 3M
2	27 Sep 2015	2Y	27 Sep 2017	Pay USD Receive USD LIBOR 3M

	Pay / Receive			Pay / Receive	
	fixed rate / floating rate			fixed rate / floating rate	
Currency	USD		Currency	USD	
Start date	27 Sep 2012	27 Sep 2012	Start date	27 Sep 2012	27 Sep 2012
Maturity	28 Sep 2015		Maturity	28 Sep 2015	
Schedules definition	Details		Schedules definition	Details	
Convention	LIN 30/360		1st fixing	0.000000	
Rate	1.600000		Convention	LIN ACT/360	
Leg NPV	-4,586,126		Margin	0.100000	
Leg BPV	-28,663		Leg NPV	5,697,076	
			Leg BPV	29,118	
			Index	USD LIBOR 3M	x 1.00

Exercise

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Practice 7

Practice 7

Configure a swap generator from scratch

Schedules Common set different frequencies
Stub period Both ends (backward)
Market quote Automatic
Bid/Ask driving leg Automatic
Settlement delay Inherited from currency
Default amortizing None
Evaluation Default
Future Cash proceed cut-off

Main
Fixed rate / Floating rate
Evaluation Inherited
Currency USD
Payment frequency 1y
Payment In arrears

Main
Fixed rate / Floating rate
Index USD LIBOR 6M Details
Evaluation Inherited
Currency USD
Start delay +2 BUSINESS DAY
Payment calendar NYB
Fixing calendar LNB
Schedules definition Details
Fixing In advance
Payment In arrears
Compounding (I+M) at (I+M)

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Practice 7

Practice 7

Configure a swap generator from scratch

Schedules definition

Calculation start schedule Driving schedule
Schedule generator 6M MODFOL
Calculation end schedule Equal to — Calculation start schedule
Payment schedule Equal to — Calculation start schedule — Frequency ratio 4 — Backward (broken periods included)
Fixing schedule Equal to — Calculation start schedule — Frequency ratio 1
Calculations follow fixings No (time series)
Capital schedules No
Single period No

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Murex Learning

BUILD

FO Modules

Market Parameters

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Learning Objectives

Market Parameters

At the end of this course, you will be able to:

- ✔ Explain how market data is used in MX.3
- ✔ Explain market data sets and how they are used in the application
- ✔ Explain the different modes to update market data
- ✔ Explain the difference between "Historical data" and "Past market data prices"

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2

2

Agenda

- **Introduction to Market Data**
- **Market Data Sets**
- **Market Data Update**
- **Historical Data**

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Introduction to Market Data

Market data parameters

Needed for	Pricing & deal booking Evaluating open positions: sensitivities and P&L computations Computing risk scenarios, P&L Variance
Can include	Market prices (stock, credit spreads, bond price, spot rate…) Interest rates Volatilities, Recovery rates, Correlations Rate curves and Rate curve assignments Etc…
Require the configuration of	Financial instruments (End-user session/ Configuration menu) FO desks and Processing center (Configurator session) Market data sets

In the market data sets we define:
- ✔ Which market data are used by each desk?
- ✔ How are the different data imported?
- ✔ How are the different data saved?

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Agenda

Introduction to Market Data

Market Data Sets
- Definition
- Organisation
- End-user selection
- Market data screens
- Market data viewer
- Audit and purge

Market Data Update

Historical Data

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Market Data Sets

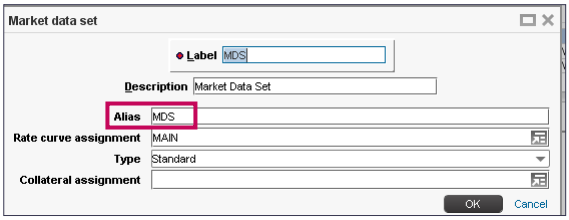
Definition

A **Market data set** is a collection of market parameters values at different dates. It is defined by:

Label	Name of market data set
Alias	Physical set of data stored in tables
Rate Curve Assignment	Specific assignment of curves to instruments, currencies etc.

For each market data type, contained in a market data set, there are 3 dimensions: date, class, value.

Two different market data sets can share the same Alias.
In this case market data modification (e.g. Rate modification) done on one set will impact the sets sharing the same alias.



Configurator session: Infrastructure/ Organization/ Market data set

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Market Data Sets

Organization

Market data sets are assigned at different levels depending on the type of user.

	Market data set definition	Menu
Front office	Desk Level One session refers to one desk → Only one default market data set	Configurator session: Infrastructure/ Organization/ Front Office Desk
Back office	Closing Entity Each portfolio will inherit the market data set of the closing entity it belongs to.	**Configurator** session: Infrastructure/ Organization/ Closing Entity **Configurator** session: Infrastructure/ Trade Classification/ Portfolio Tree Templates

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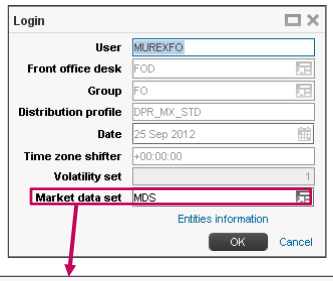
Market Data Sets

End-user selection

Users are able to switch between market data sets, using "ctrl+U":



Market data set

LABEL	DESCRIPTION	ALIAS	RATE CURVE ASSIGNMENT	TYPE	COLLATERAL ASSIGNMENT
MDS	MARKET DATA SET	MDS	MAIN	Standard	
RISK	RISK MARKET DATA SET	./RISK	MAIN	Standard	

Changing the market data set in a session does not change the real-time data feed coming into the session (if connected to real-time).

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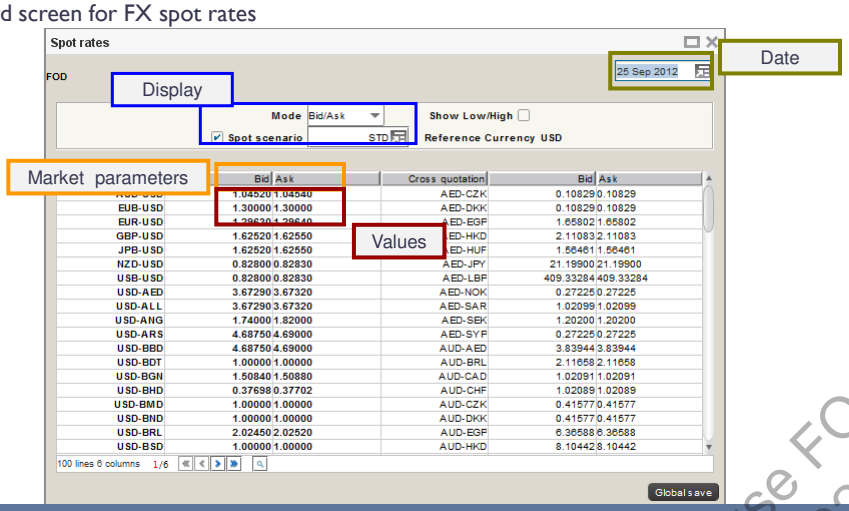
Market Data Sets

Market data screen: FX spots

Standard screen for FX spot rates



End-user session: Market data/ Forex/ Spots

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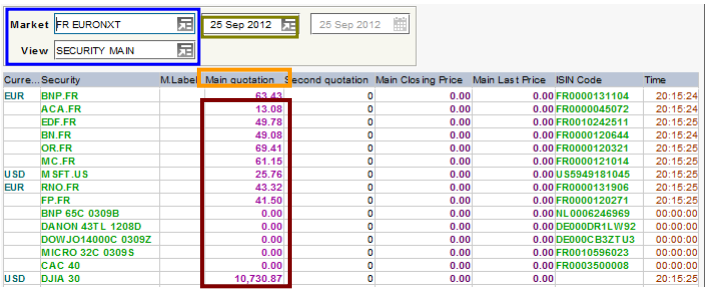
Market Data Sets

Market data screen: Equity and future prices

Standard screen for equity and futures prices



End-user session: Market data/ Equities/Equity and futures prices

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Market Data Sets

Market data screen: Bonds and future prices

Standard screen for bond prices

Market: DE GOV | 25 Sep 2012 | 25 Sep 2012
View: SECURITY MAIN

Currency	Security	M.Label	Main quotation	Second quotation	Main Closing Price	Main Last Price	ISIN Code	Time
EUR	DBR I 1.5% 4/16		101.014	1.205360	101.029	101.046	DE0001030500	17:11:54
	DBR 5.625% 1/28		101.014	5.522015	101.066	101.067	DE0001135069	17:11:54
	OBL 2.25% 4/14		100.879	1.661863	100.948	100.973	DE0001141547	17:11:54
	OBL I 2.25% 4/13		102.685	-2.563852	102.692	102.723	DE0001030518	17:11:54
	DBR 3.75% 1/19		102.493	3.301007	102.509	102.564	DE0001135374	17:11:54
	DBR 3.75% 1/17		101.045	3.479035	101.111	101.127	DE0001135317	17:11:54
	DBR 3.75% 1/15		100.947	3.304267	100.950	100.988	DE0001135267	17:11:54
	OBL 4% 10/13		101.202	2.804152	101.245	101.275	DE0001141539	17:11:54
	DBR 3% 7/20		102.301	2.666908	102.348	102.350	DE0001135408	17:11:54
	BKO 0.75% 9/13		103.260	-2.565565	103.295	103.311	DE0001137354	17:11:54
	DBR 4.5% 1/13		101.082	0.438726	101.117	101.123	DE0001135218	17:11:54
	DBR 3.75% 7/13		103.644	-0.972975	103.704	103.731	DE0001135234	17:11:54
	DBR 3.5% 1/16		101.454	3.022650	101.515	101.549	DE0001135291	17:11:54
	DBR 4.75% 7/40		103.260	4.539877	103.320	103.323	DE0001135366	17:11:54
	DBR 6.5% 7/27		102.493	6.233101	102.537	102.552	DE0001135044	17:11:54
	DBR 4.25% 7/39		102.493	4.094004	102.515	102.543	DE0001135325	17:11:54
	DBR 4.25% 7/14		102.108	2.998754	102.176	102.194	DE0001135259	17:11:54
	DBR 4.75% 7/28		101.342	4.626425	101.355	101.415	DE0001135085	17:11:54
	DBR 4.25% 7/17		100.307	4.173848	100.318	100.363	DE0001135333	17:11:54
	DBR 4.25% 7/18		100.000	4.246841	100.014	100.077	DE0001135358	17:11:54
	DBR 4.75% 7/34		100.000	4.748524	100.009	100.058	DE0001135226	17:11:54
	DBR 3.25% 7/15		101.405	2.712443	101.412	101.503	DE0001135283	17:11:54
	DBR 3.25% 1/20		100.522	3.166934	100.522	100.560	DE0001135390	17:11:54
	OBL 1.75% 10/15		100.559	1.559639	100.564	100.652	DE0001141588	17:11:54
	OBL 2.5% 2/15		101.014	2.062513	101.035	101.067	DE0001141562	17:11:54
	OBL 2.5% 10/14		101.014	1.985537	101.024	101.112	DE0001141554	17:11:54

End-user session: Market data/ Bonds/Equity and futures prices

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Market Data Sets

Market data screen: Revaluation rate curve

Standard screen for revaluation rate curve

Label: EUR EURIBOR 6M
Owner: MUREXFO | Details | Priorities
Currency: EUR
Bid/Ask: No
Storage date: 25 Sep 2012
Horizon: 25 Sep 2012
Zero coupon date: 25 Sep 2012
Compute: On
Last updated: 05 dec 2014-15:10:28 (GMT +0)

ZC | MR | F-1D | F-3M | F-6M | F-1Y

Tp	Start date	Generator	Maturity	ds factor	ds rate	Market quote	Curve spread	Selected
Dp	27 Sep 2012	CASH	27 Mar 2013	6M	0.9991	0.1723	0.0000	
Fr	29 Oct 2012	FRA 6M	29 Apr 2013	1M-7M	0.9978	0.3736	0.4060	0.0000
Fr	27 Nov 2012	FRA 6M	27 May 2013	2M-8M	0.9978	0.3330	0.3840	0.0000
Fr	27 Dec 2012	FRA 6M	27 Jun 2013	3M-9M	0.9977	0.3070	0.3710	0.0000
Fr	28 Jan 2013	FRA 6M	29 Jul 2013	4M-10M	0.9975	0.2929	0.3710	0.0000
Fr	27 Feb 2013	FRA 6M	27 Aug 2013	5M-11M	0.9974	0.2841	0.3750	0.0000
Fr	27 Mar 2013	FRA 6M	27 Sep 2013	6M-12M	0.9972	0.2794	0.3810	0.0000
Fr	29 Apr 2013	FRA 6M	28 Oct 2013	7M-13M	0.9958	0.3846	0.3910	0.0000
Fr	27 May 2013	FRA 6M	27 Nov 2013	8M-14M	0.9957	0.3640	0.4000	0.0000
Fr	27 Jun 2013	FRA 6M	27 Dec 2013	9M-15M	0.9956	0.3502	0.4100	0.0000
Fr	29 Jul 2013	FRA 6M	27 Jan 2014	10M-16M	0.9954	0.3455	0.4270	0.0000
Fr	27 Aug 2013	FRA 6M	27 Feb 2014	11M-17M	0.9952	0.3409	0.4390	0.0000
Fr	27 Sep 2013	FRA 6M	27 Mar 2014	12M-18M	0.9949	0.3386	0.4530	0.0000
Sw	27 Sep 2012	EURIBOR A 6M	29 Sep 2014	2Y	0.9905	0.4725	0.4740	0.0000
Sw	27 Sep 2012	EURIBOR A 6M	28 Sep 2015	3Y	0.9822	0.5971	0.5990	0.0000
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2016	4Y	0.9694	0.7756	0.7780	0.0000
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2017	5Y	0.9519	0.9841	0.9850	0.0000
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2018	6Y	0.9309	1.1922	1.1900	0.0000
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2019	7Y	0.9075	1.3848	1.3780	0.0000
Sw	27 Sep 2012	EURIBOR A 6M	28 Sep 2020	8Y	0.8828	1.5559	1.5440	0.0000
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2021	9Y	0.8576	1.7042	1.6860	0.0000
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2022	10Y	0.8321	1.8360	1.8110	0.0000
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2023	11Y	0.8062	1.9565	1.9240	0.0000
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2024	12Y	0.7804	2.0638	2.0240	0.0000
Sw	27 Sep 2012	EURIBOR A 6M	29 Sep 2025	13Y	0.7553	2.1560	2.1090	0.0000
Sw	27 Sep 2012	EURIBOR A 6M	28 Sep 2026	14Y	0.7314	2.2312	2.1780	0.0000
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2027	15Y	0.7090	2.2901	[illegible]	0.0000

Quick Edit | Quick Insert | Insert | Delete | Graph | OK | Exit

End-user session: Market data/ Revaluation Rate Curve

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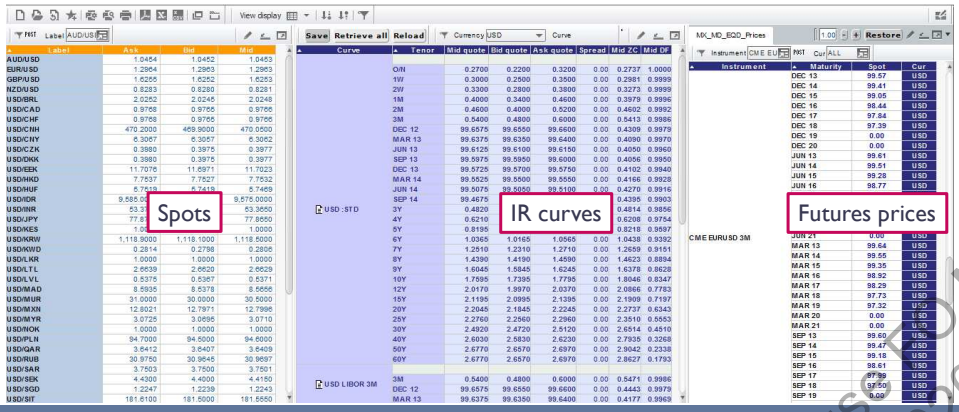
Market Data Sets

Market data viewer

The **Market data viewer** is a powerful tool covering all the aspects of the market data management and monitoring. It allows to update, publish and retrieve in real-time all the market data present into the application.
The tool is viewer based so the monitoring view is fully user-definable.



End-user session: Market data/ Viewer

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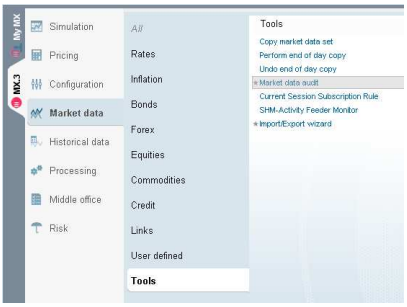
Market Data Sets

Audit and purge

Audit of market data: Helps user to identify gaps in the P&L caused by market parameters changes.
Several filtering criteria are possible:

Time	Modification date, trading date
User	The last modifier
Market Parameter	Date, market data set, type, instrument

Purge of market data can be done per alias or per desk.



Date selection between two dates. Once run, purge cannot be reverted.

Do not remove market data as of system date!

End-user session: Market data/ Tools/ Market data audit
Configurator session: Processing center/ Scripts/ Scripts definition

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Agenda

Introduction to Market Data

Market Data Sets

Market Data Update
- Real-time update
- Update modes

Historical Data

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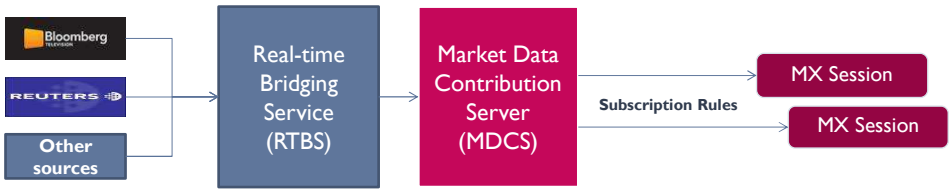
Market Data Update

Real-time update

Market data prices for the different instruments in the Market data, Pricing and Simulation screens can be updated in Real-Time with their corresponding prices in Reuters, Bloomberg, etc. This update is handled by the RT module below.



Real-time update bypasses assigned market data set.
RT prices are refreshed only on screen and not saved in the DB (market data set).
The type of RT refresh however is configured at the level of the Front-office desk settings.

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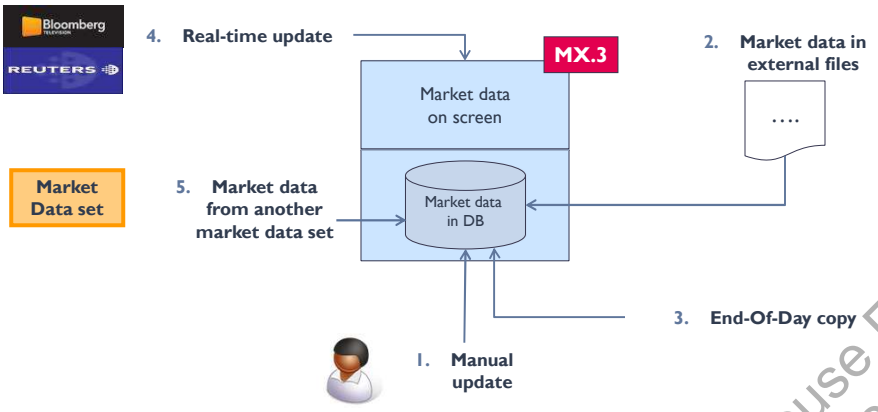
Market Data Update

Update modes

Market data in MX.3 can be:

- ✔ Refreshed on screen every n seconds (Real-time)
- ✔ Imported in MX.3 Database



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Market Data Update

Update modes

	Description	How
Manual entry	To update any rate at any time. However this method is outdated for daily update of an entire set of market data.	Fill in the market quotes in the market data screen
Copy set to set	Copies market data from one set to another. For instance at the end of the day, market data of the front-office desk can be copied to the market data set used for official PL computation.	Processing script using the MARKETDATA.COPY unit
Data file import	Imports market quotes from another software in order to consolidate or reconcile data.	Import through exchange of XML files
Real-time Import	Mostly used by FO users to get the latest rates in pricing and simulation tools.	Traders can choose how often market data is refreshed.
EOD process	Shifts the system date to the next trading date. Copies current market data into next day's market data. Specific parameters are copied into Historical files (O/N financing rates, equity dividends, Futures closings).	Automated to run during the EOD procedures

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Market Data Update

Practice 1

Verify your understanding of market data.
Answer the following questions.

1. **How would you describe a market data set in Murex?**
   From a definition point of view
   From a content point of view
   From a usage point of view

2. **Provide at least two methods to update market data in the system.**

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Agenda

Introduction to Market Data	
Market Data Sets	
Market Data Update	
Historical Data	• Purpose • Contribution to P&L • Historical data vs. past market data • Impacts on P&L

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Historical Data

Purpose

The **Historical data** are a set of official indices and closing values used for trade fixing.

Deals need fixings in their evaluation:	Swaps (Commodity, IRS, Variance swaps) Baskets, Asian options Dividends, Auto-callable notes, etc.
Archiving group types:	Published rates EQ, COM publications FX publications
Fixing Procedure:	Detects all flows remaining to be fixed Secured procedure: fills FXNG_DBF and revokes rights on historical data
Internal fixing sets:	Overnight rates fixing set FX conversion factors (accounting rates) fixing set

Stored in historical files:
HS <file nb>_DBF or HG<file nb>_HIS

Fills FXNG_DBF and revokes rights on historical data

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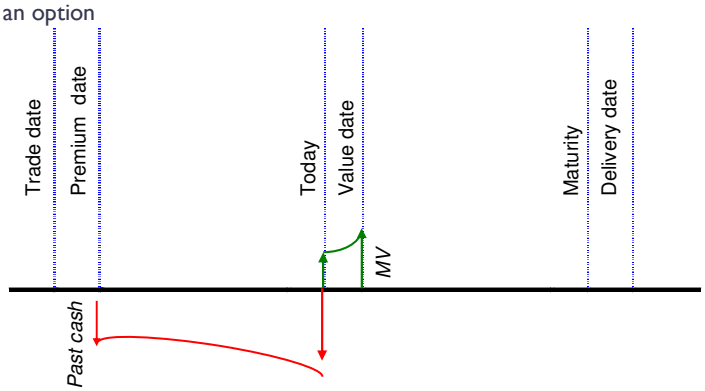
Historical Data

Contribution to P&L

Illustration of OverNight rate (O/N) and today's rate contribution
E.g.: P&L of an option



Historical rates used for financing

Today's rates used for MV and PV effect

PL = Financed past cash + Discounted market value

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Historical Data

Historical data vs. past market data

	Stored in
Entire set of market data as of revaluation date	MARKET RATE SHEETS
Selection of previous days published rates	HISTORICAL DATA TABLES

	Historical data	Past market data
Purpose	Quick access to past data required to compute P&L as of past date or today (i.e.: O/N rates necessary for cash financing, past cash flows etc.)	Entire set on a given past date to compute P&L as of a past date
Type of data	Selection of rates: ▪ O/N rates for financing ▪ Fixing rates for swaps or Asian options ▪ Past dividend rates ▪ Closing prices	Entire set of market data at a past date ▪ Interest rates ▪ Spot rates ▪ Volatilities

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Historical Data

Historical data vs. past market data

What happens when Market data are changed on date T (Past date) ?

	Change of Market rate Sheets	Change of Historical files
Impact on Past P&L	Stored results as of date T ≠ Absolute P&L on date T	Stored results from T until Today ≠ Absolute P&L from T until Today
Impact on Today's P&L	No impact on Today's absolute P&L	Direct impact on Today's absolute P&L

If O/N financing rates or fixing data *originated from rate sheets* should be modified, then both market data and historical data should be updated simultaneously to keep the consistency.

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Historical Data

Practice 2

Modify the Historical data and Market data and explain the impact on the P&L

1. Open an end-user session (MUREXFO/MUREXFO), group FO.
2. Enter a backdated vanilla swap deal (via the e-Tradepad) with the following attributes:

Pricing date	30 Dec 2011
Instrument	EURIBOR A 6M
Maturity	30Y
Fixed rate	2.5
Portfolio & counterpart	As you wish

3. Open the flows and fix the floating rate for the first two past interest rate flows (see screenshot below):

Global flow schedule Source:Deals Trade:4802

Leg 1 | Leg 2 | All legs

4802 — Floating interest

Flow Tp	Start Date	End Date	Remaining Capital	Fixing Date	Rate	Convert Rate
INT	03 Jan 2012	03 Jul 2012	100,000,000	30 Dec 2011	1.60000	1.60000
INT	03 Jul 2012	03 Jan 2013	100,000,000	29 Jun 2012	0.95000	0.95000
				Dec 2012	0.00000	0.00000
				Jul 2013	0.00000	0.00000

Pricing: 30 Dec 2011

Product	#1 IRS Vanilla	
Instrument	EURIBOR A 6M	
Template details	Open	
Start period	Spot	Tue 03/01/12
Maturity period	30y	Fri 03/01/42
Adjusted maturity	Fri 03/01/42	
Nominal	100,000,000	EUR
Flows	Open	
Leg	Pay	Receive
Leg type	Fixed	Floating
Currency	EUR	EUR
Index		EUR EURIBOR 6M
First fixing		1.6170
Calculation frequency	1y	6m
Rate/Spread	2.5000	0.0000
Discount curve	EUR EONIA	EUR EONIA
Estimation curve		EUR EURIBOR 6M
Leg Npv	-54,366,619	54,881,803
Legs details		

Please mark down the contract/trade number while saving the trade.

Solution

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Historical Data

Practice 2

Modify the Historical data and Market data and explain the impact on the P&L.

The following actions should be done in the same session.
Use Excel to keep a copy of each price you modify so you can revert it afterwards.

In the Trade query result screen, select View/P&L on your deal before and after each of the following actions:

3. Modify EUR O/N rate in historical data of yesterday.
   a) Check impact on past market parameter (in the EUR market rate sheet)
   b) Check impact on today P&L
   c) Please revert the change
4. Modify EUR O/N rate in the EUR market rate sheet of yesterday.
   a) Check impact on historical files (in historical data)
   b) Check impact on today P&L
   c) Please revert the change
5. Update yesterday's revaluation rate curve EUR EONIA. Check impact on today P&L. ***Please revert the change.***
6. Update today's revaluation rate curve EUR EONIA. Check impact on today P&L. ***Please revert the change.***

Solution

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APPENDIX

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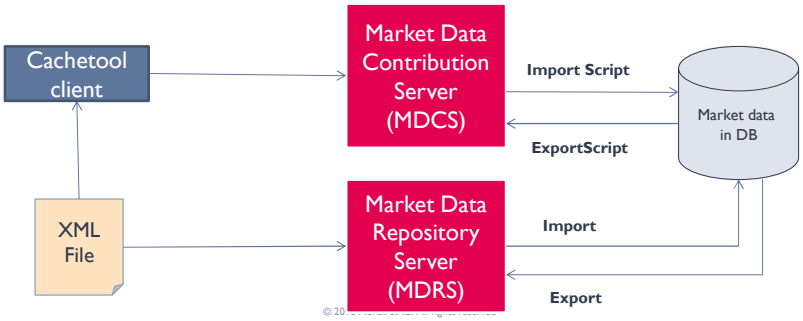
MUREX™

Market Data

Market data XML file import

Cache Tool	Murex tool to update, query and subscribe to the MDCS Graphical User Interface
Market Data Repository Service (MDRS)	Access to the Market data tables Query, updates and inserts market parameters in the DB API provided



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Market Data

End of day processing script

Market Data copy	EOD.FODESK.DATE.MOVE, EOD.PCENTER.DATE.MOVE MARKETDATA.COPY MARKETDATA.IMPORT.CONTRIBUTIONSERVICE, MARKETDATA.EXPORT.CONTRIBUTIONSERVICE
Historical Data copy	FIXING.ENGINE.COPY MARKETDATA.COPY FIXING.IMPORT.CONTRIBUTIONSERVICE, FIXING.EXPORT.CONTRIBUTIONSERVICE SAVE-HS SAVE-FUT-CLOSING

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Q&A

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Historical Data

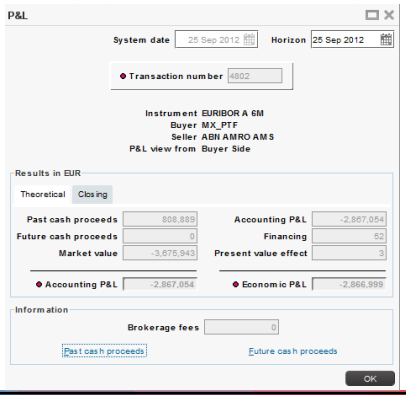
Practice 2

Practice 2: Modify the Historical data and Market data and explain the impact on the P&L

Enter a backdated vanilla swap deal. (via the e-Tradepad).

In the Trade query result screen, select View/P&L on your deal before and after each of the following actions:

Check the P&L of the trade by right-click/View P&L before any change:



Exercise

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Historical Data

Practice 2

Practice 2: Modify the Historical data and Market data and explain the impact on the P&L

3. Modify EUR O/N rate in historical data of yesterday.
   a) Check impact on past market parameter (in the EUR market rate sheet): **No impact**

Before

	INTERNAL_ON_FIXING	
	EUR	
	RATE	LAMBDA
24 Sep 2012	0.0100000	1.0000003
25 Sep 2012	0.0000000	1.0000000

Deposit
CASH
Floating Maturities

Maturity	Market value
O/N	-0.02000 / 0.04000
T/N	-0.02000 / 0.05000
1W	-0.02000 / 0.06000
1M	-0.02000 / 0.08000
2M	0.01000 / 11000
3M	0.06000 / 16000
6M	0.12000 / 22000

After

	INTERNAL_ON_FIXING	
	EUR	
	RATE	LAMBDA
24 Sep 2012	0.0500000	1.0000003
25 Sep 2012	0.0000000	1.0000000

Deposit
CASH
Floating Maturities

Maturity	Market value
O/N	-0.02000 / 0.04000
T/N	-0.02000 / 0.05000
1W	-0.02000 / 0.06000
1M	-0.02000 / 0.08000
2M	0.01000 / 11000
3M	0.06000 / 16000
6M	0.12000 / 22000

End-user session: Historical data/ Rates/ O/N financing rates
End-user session: Market data/ Rates/ Market rate sheets

Exercise

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Historical Data

Practice 2

Practice 2: Modify the Historical data and Market data and explain the impact on the P&L

3. Modify EUR O/N rate in historical data of yesterday.
   b) Check impact on today P&L: **Impacts the Financing Value**

Before

Results in EUR

Theoretical | Closing

Past cash proceeds	808,889	Accounting P&L	-2,867,054
Future cash proceeds	0	Financing	52
Market value	-3,675,943	Present value effect	3
Accounting P&L	-2,867,054	Economic P&L	-2,866,999

After

Results in EUR

Theoretical | Closing

Past cash proceeds	808,889	Accounting P&L	-2,867,054
Future cash proceeds	0	Financing	53
Market value	-3,675,943	Present value effect	3
Accounting P&L	-2,867,054	Economic P&L	-2,866,998

End-user session: Historical data/ Rates/ O/N financing rates
End-user session: Market data/ Rates/ Market rate sheets

Exercise

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Historical Data

Practice 2

Practice 2: Modify the Historical data and Market data and explain the impact on the P&L

4. Modify EUR O/N rate in the EUR market rate sheet of yesterday.
   a) Check impact on historical files (in historical data): **No impact**

Before — 24 Sep 2012

Deposit
CASH
Floating Maturities

Maturity	Market value
O/N	-0.02000 / 0.04000
T/N	-0.02000 / 0.05000
1W	-0.02000 / 0.08000
1M	0.01000 / 11000
2M	0.06000 / 16000
3M	0.12000 / 22000
6M	0.35000 / 45000

Short Fut.
EUREX EURIBOR 3M
Fixed Maturities ERX EUR SF

Maturity	Market value
DEC 12	99.82500 / 3000
MAR 13	-0.01000
JUN 13	-0.01000
SEP 13	-0.01000
DEC 13	-0.01000
MAR 14	-0.01000
JUN 14	-0.01000
SEP 14	-0.01000
DEC 14	-0.01000
MAR 15	-0.01000
JUN 15	-0.01000

	INTERNAL_ON_FIXING	
	EUR	
	RATE	LAMBDA
24 Sep 2012	0.0100000	1.0000003
25 Sep 2012	0.0000000	1.0000000

After — 24 Sep 2012

Deposit
CASH
Floating Maturities

Maturity	Market value
O/N	0.20000
T/N	-0.02000 / 0.05000
1W	-0.02000 / 0.08000
1M	0.01000 / 11000
2M	0.06000 / 16000
3M	0.12000 / 22000
6M	0.35000 / 45000

Short Fut.
EUREX EURIBOR 3M
Fixed Maturities ERX EUR SF

Maturity	Market value
DEC 12	99.82500 / 3000
MAR 13	-0.01000
JUN 13	-0.01000
SEP 13	-0.01000
DEC 13	-0.01000
MAR 14	-0.01000
JUN 14	-0.01000
SEP 14	-0.01000
DEC 14	-0.01000
MAR 15	-0.01000
JUN 15	-0.01000

	INTERNAL_ON_FIXING	
	EUR	
	RATE	LAMBDA
24 Sep 2012	0.0100000	1.0000003
25 Sep 2012	0.0000000	

End-user session: Historical data/ Rates/ O/N financing rates
End-user session: Market data/ Rates/ Market rate sheets

Exercise

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Historical Data

Practice 2

Practice 2: Modify the Historical data and Market data and explain the impact on the P&L

4. Modify EUR O/N rate in the EUR market rate sheet of yesterday.
   b) Check impact on today P&L: **No impact**

Before

Results in EUR

Theoretical | Closing

Past cash proceeds	808,889	Accounting P&L	-2,867,054
Future cash proceeds	0	Financing	52
Market value	-3,675,943	Present value effect	3
Accounting P&L	-2,867,054	Economic P&L	-2,866,999

After

Results in EUR

Theoretical | Closing

Past cash proceeds	808,889	Accounting P&L	-2,867,054
Future cash proceeds	0	Financing	52
Market value	-3,675,943	Present value effect	3
Accounting P&L	-2,867,054	Economic P&L	-2,866,999

End-user session: Historical data/ Rates/ O/N financing rates
End-user session: Market data/ Rates/ Market rate sheets

Exercise

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Historical Data

Practice 2

Practice 2: Modify the Historical data and Market data and explain the impact on the P&L

5. Update yesterday's revaluation rate curve EUR EONIA: **No impact on today P&L**

Before

Label: EUR EONIA
Owner: INSTALL
Currency: EUR
Bid/Ask: Yes
Storage date: 24 Sep 2012
Horizon: 24 Sep 2012
Zero coupon date: 24 Sep 2012
Compute: On
Last updated: 25 nov 2014-16:59:53 (GMT +0)

Tp	Start date	Generator	Maturity		ds factor	ds rate		Market quote		Curve spr
Dp	24 Sep 2012	CASH	25 Sep 2012	O/N	1.0000	1.0000	-0.0203	0.0406	-0.0200	0.0400	0.0000
Dp	25 Sep 2012	CASH	26 Sep 2012	T/N	1.0000	1.0000	-0.0203	0.0456	-0.0200	0.0500	0.0000
Sw	26 Sep 2012	EUR EONIA	04 Oct 2012	1W	1.0000	1.0000	0.0491	0.1466	0.0570	0.1570	0.0000
Sw	26 Sep 2012	EUR EONIA	11 Oct 2012	2W	1.0000	0.9999	0.0406	0.1375	0.0500	0.1500	0.0000
Sw	26 Sep 2012	EUR EONIA	18 Oct 2012	3W	1.0000	0.9999	0.0419	0.1405	0.0470	0.1470	0.0000
Sw	26 Sep 2012	EUR EONIA	29 Oct 2012	1M	0.9999	0.9999	0.0740	0.1081	0.0700	0.1200	0.0000
Sw	26 Sep 2012	EUR EONIA	27 Nov 2012	2M	0.9999	0.9998	0.0628	0.1146	0.0650	0.1150	0.0000
Sw	26 Sep 2012	EUR EONIA	28 Dec 2012	3M	0.9999	0.9997	0.0539	0.1048	0.0550	0.1050	0.0000
Sw	26 Sep 2012	EUR EONIA	29 Jan 2013	4M	0.9998	0.9997	0.0474	0.0983	0.0480	0.0980	0.0000

Results in EUR

Theoretical | Closing

Past cash proceeds	808,889	Accounting P&L	-2,867,054
Future cash proceeds	0	Financing	52
Market value	-3,675,943	Present value effect	3
Accounting P&L	-2,867,054	Economic P&L	-2,866,999

After

Label: EUR EONIA
Owner: INSTALL
Currency: EUR
Bid/Ask: Yes
Storage date: 24 Sep 2012
Horizon: 24 Sep 2012
Zero coupon date: 24 Sep 2012
Compute: On
Last updated: 25 nov 2014-16:59:53 (GMT +0)

Tp	Start date	Generator	Maturity		ds factor	ds rate		Market quote		Curve spr
Dp	24 Sep 2012	CASH	25 Sep 2012	O/N	1.0000	1.0000	-0.0203	0.0406	0.9800	1.0400	0.0000
Dp	25 Sep 2012	CASH	26 Sep 2012	T/N	1.0000	1.0000	-0.0203	0.0456	0.9800	1.0500	0.0000
Sw	26 Sep 2012	EUR EONIA	04 Oct 2012	1W	1.0000	1.0000	0.0491	0.1466	1.0570	1.1570	0.0000
Sw	26 Sep 2012	EUR EONIA	11 Oct 2012	2W	1.0000	0.9999	0.0406	0.1375	1.0500	1.1500	0.0000
Sw	26 Sep 2012	EUR EONIA	18 Oct 2012	3W	1.0000	0.9999	0.0419	0.1405	1.0470	1.1470	0.0000
Sw	26 Sep 2012	EUR EONIA	29 Oct 2012	1M	0.9999	0.9999	0.0740	0.1081	1.0700	1.1200	0.0000
Sw	26 Sep 2012	EUR EONIA	27 Nov 2012	2M	0.9999	0.9998	0.0628	0.1146	1.0650	1.1150	0.0000
Sw	26 Sep 2012	EUR EONIA	28 Dec 2012	3M	0.9999	0.9997	0.0539	0.1048	1.0550	1.1050	0.0000
Sw	26 Sep 2012	EUR EONIA	29 Jan 2013	4M	0.9998	0.9997	0.0474	0.0983	1.0480	1.0980	0.0000

Results in EUR

Theoretical | Closing

Past cash proceeds	808,889	Accounting P&L	-2,867,054
Future cash proceeds	0	Financing	52
Market value	-3,675,943	Present value effect	3
Accounting P&L	-2,867,054		

End-user session: Market data/ Rates/ Revaluation rate curves

Exercise

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Historical Data

Practice 2

Practice 2: Modify the Historical data and Market data and explain the impact on the P&L

6. Update today's revaluation rate curve EUR EONIA: **Impacts PVE and MV**

Before

Label: EUR EONIA
Owner: INSTALL
Currency: EUR
Bid/Ask: Yes
Storage date: 25 Sep 2012
Horizon: 25 Sep 2012
Zero coupon date: 25 Sep 2012
Compute: On
Last updated: 17 dec 2014-09:56:38 (GMT +0)

Tp	Start date	Generator	Maturity		ds factor	ds rate		Market quote	
Dp	25 Sep 2012	CASH	26 Sep 2012	O/N	1.0000	1.0000	0.4867	0.5475	-0.0200	0.0400
Dp	26 Sep 2012	CASH	27 Sep 2012	T/N	1.0000	1.0000	0.4867	0.5526	-0.0200	0.0500
Sw	27 Sep 2012	EUR EONIA	05 Oct 2012	1W	0.9998	0.9998	0.5551	0.6526	0.0560	0.1560
Sw	27 Sep 2012	EUR EONIA	12 Oct 2012	2W	0.9997	0.9997	0.5476	0.6445	0.0500	0.1500
Sw	27 Sep 2012	EUR EONIA	19 Oct 2012	3W	0.9996	0.9996	0.5488	0.6473	0.0470	0.1470
Sw	27 Sep 2012	EUR EONIA	30 Oct 2012	1M	0.9994	0.9994	0.5748	0.6216	0.0700	0.1200
Sw	27 Sep 2012	EUR EONIA	28 Nov 2012	2M	0.9990	0.9989	0.5707	0.6220	0.0660	0.1160
Sw	27 Sep 2012	EUR EONIA	28 Dec 2012	3M	0.9985	0.9984	0.5644	0.6154	0.0590	0.1090
Sw	27 Sep 2012	EUR EONIA	29 Jan 2013	4M	0.9981	0.9979	0.5588	0.6096	0.0530	0.1030

Results in EUR

Theoretical | Closing

Past cash proceeds	808,889	Accounting P&L	-2,867,054
Future cash proceeds	0	Financing	52
Market value	-3,675,943	Present value effect	3

After

Label: EUR EONIA
Owner: INSTALL
Currency: EUR
Bid/Ask: Yes
Storage date: 25 Sep 2012
Horizon: 25 Sep 2012
Zero coupon date: 25 Sep 2012
Compute: On
Last updated: 17 dec 2014-09:56:38 (GMT +0)

Tp	Start date	Generator	Maturity		ds factor	ds rate		Market quote	
Dp	25 Sep 2012	CASH	26 Sep 2012	O/N	1.0000	1.0000	0.4867	0.5475	0.4800	0.5400
Dp	26 Sep 2012	CASH	27 Sep 2012	T/N	1.0000	1.0000	0.4867	0.5526	0.4800	0.5500
Sw	27 Sep 2012	EUR EONIA	05 Oct 2012	1W	0.9998	0.9998	0.5551	0.6526	0.5560	0.6560
Sw	27 Sep 2012	EUR EONIA	12 Oct 2012	2W	0.9997	0.9997	0.5476	0.6445	0.5500	0.6500
Sw	27 Sep 2012	EUR EONIA	19 Oct 2012	3W	0.9996	0.9996	0.5488	0.6473	0.5470	0.6470
Sw	27 Sep 2012	EUR EONIA	30 Oct 2012	1M	0.9994	0.9994	0.5748	0.6216	0.5700	0.6200
Sw	27 Sep 2012	EUR EONIA	28 Nov 2012	2M	0.9990	0.9989	0.5707	0.6220	0.5660	0.6160
Sw	27 Sep 2012	EUR EONIA	28 Dec 2012	3M	0.9985	0.9984	0.5644	0.6154	0.5590	0.6090
Sw	27 Sep 2012	EUR EONIA	29 Jan 2013	4M	0.9981	0.9979	0.5588	0.6096	0.5530	0.6030

Results in EUR

Theoretical | Closing

Past cash proceeds	808,889	Accounting P&L	-2,815,017
Future cash proceeds	0	Financing	52
Market value	-3,524,006	Present value effect	100

End-user session: Market data/ Rates/ Revaluation rate curves

Exercise

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Murex Learning

BUILD

FO Modules

Rate Curves Overview

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Learning Objectives

Rate Curves Overview

At the end of this course, you will be able to:

- ✔ Identify which rate curves are used
- ✔ Build a rate curve from scratch
- ✔ Use the different settings and parameters of rate curves

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Agenda

Introduction to Rate Curves	• Usage • Pricing screen • Using several rate curves • Assignment template
Market Rate Sheets	
Rate Curve Construction	
Configuration and Tools	
Practice	

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Introduction to Rate Curves

Usage

The IR curve (yield curve) is the relation between the interest rate (or cost of borrowing) and the time to maturity known as the "term" of a debt for a given borrower in a given currency.

Traders use rate curves to:	Compute zero-coupon rates for any date. Compute discount factors for any payment date.
Rate curves structure:	Rate curves are built mainly upon IR instruments and Bonds: • Loan/Deposits, Swaps, FRAs, Short term Futures • Bonds, Long term Futures • Basis swaps, FX Forwards, Contango, etc.
Other usage:	Used for discounting and estimation: • Discounting curves for all asset classes: at least one rate curve per currency. • Forward curves for instruments based on IR indices (e.g. calculate the forward value of the EURIBOR 3M Index).

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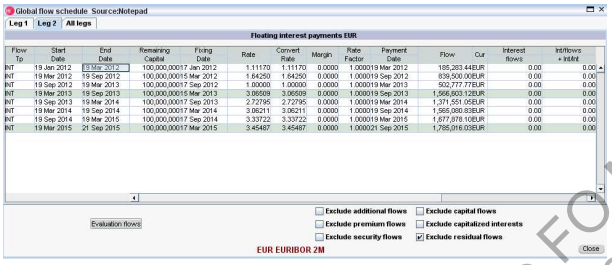
Introduction to Rate Curves

Pricing screen

Illustration with an IRS pricing (fixed vs floating swap):

Product	#1 IRS Vanilla	
Instrument	EURIBOR A 6M	
Template details	Open	
Start period	Spot	Thu 19/01/12
Maturity period	3Y8M	Sat 19/09/15
Adjusted maturity	Mon 21/09/15	
Nominal	100,000,000	EUR
Flows	Open	
Leg	Pay	Receive
Leg type	Fixed	Floating
Currency	EUR	EUR
Index		EUR EURIBOR 6M
First fixing		0.0000
Calculation frequency	1y	6m
Rate/Spread	2.5828	0.0000
Discount curve	EUR EONIA	EUR EONIA
Estimation curve		EUR EURIBOR 6M
Leg Npv	-9,266,896	9,266,896
Legs details	No	
Additional features		
Amortizing	None	
Additional flows	Open	
Customized flows	No	
Mutual break	No	
Define phases	Open	
Npv	-0	EUR
Bpv	-35,879	
Typology | Usage	IRS	Libor
Fees	Open	
CSA Type		
Int. | Counterparty	No	ABBEY NATIONAL PL
Portfolio	MX_PTF	

Fixed Leg:	Discounting
Floating leg: (EURIBOR 6M)	Discounting + Estimation of the floating index



End-user session: Pricing/ e-Tradepad

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Introduction to Rate Curves

Using several rate curves

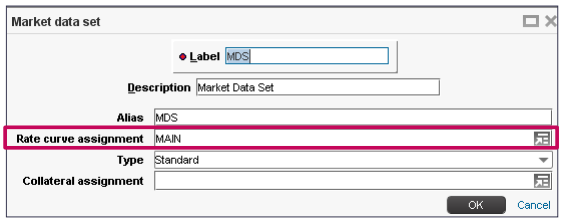
Several rate curves can be defined per currency, e.g.:

- Discounting and estimation curves
- Different indices, classes of indices to forecast
- Different activities: MM, FX, Rate, Inflation…
- Mid vs. Bid-Ask curves

Rate curves assignments:

Templates defined at end-user level

Assignments to FO Desks done through Market Data Set definition:



Configurator session: Infrastructure/ Organization/ Market data set

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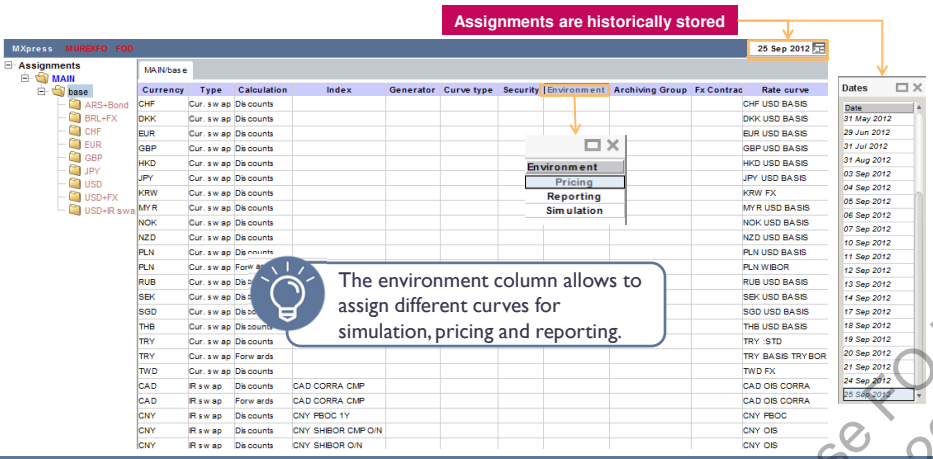
Introduction to Rate Curves

Assignment template

User can assign specific rate curves following various keys such as type, calculation, index, etc. MX will then assign the rate curve following a best matching process.



End-user session : Market data/ Rates/ Rate curve assignments

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Introduction to Rate Curves

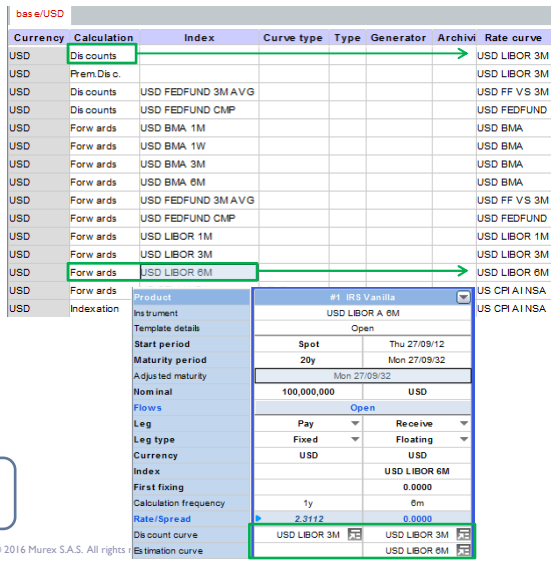
Assignment template

The assignments indicated in this template drive the curves selection in the different pricing screens, e.g. in the e-Tradepad:

Example: a USD IR swap

- paying fixed on an annual basis
- floating on a semi-annual basis

Discount curve (for both legs)	USD LIBOR 3M
Forward curve (for floating leg)	USD LIBOR 6M



Without assignment both curves would have been USD:STD

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Introduction to Rate Curves

Assignment template

Users can change the rate curve assignment locally.

e-Tradepad	Market data>Used Market Data>Market data set → Right click on Rate curve assignment
Pricing	View>PopUp Market Data>Market data set → Right click on Rate curve assignment
Simulation	View>PopUp Market Data>Market data set → Right click on Rate curve assignment

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Agenda

Introduction to Rate Curves	
Market Rate Sheets	• Purpose • Standard screen • Inserting instruments • Financing • Link types • Spreads • Displays
Rate Curve Construction	
Configuration and Tools	
Practice	

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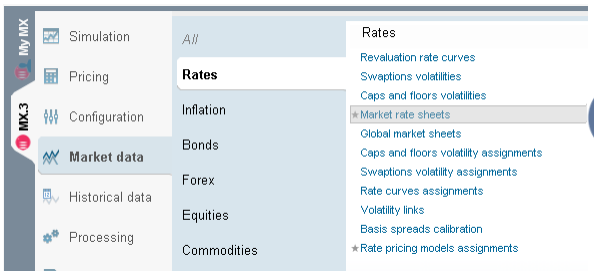
Market Rate Sheets

Purpose

Market Rate Sheets are worksheets, organised per currency and dates, that store the market values and prices of instruments for different maturities, which can be used to build an interest rate curve.
Interest rate data is required for evaluation of any asset class. Users can build their own rate curves based on a selection of instruments defined in the Market Rate Sheets.



Only instruments and maturities defined in the Market Rate Sheets can be used to build the Rate Curve.

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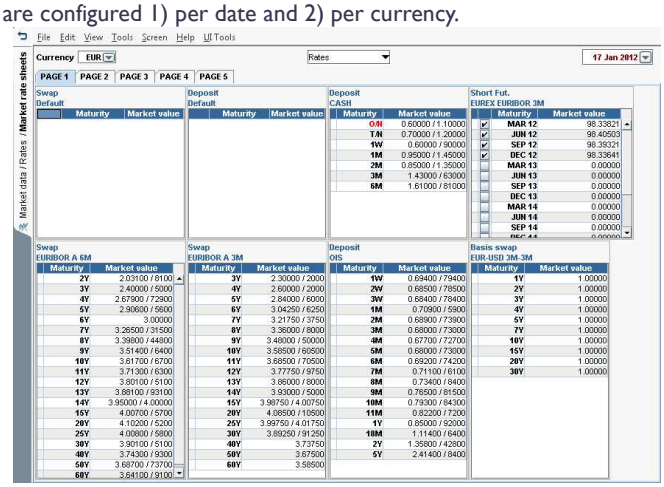
Market Rate Sheets

Standard screen

Rate sheets are configured 1) per date and 2) per currency.



End-user session: Market data/ Rates/ Market rate sheets

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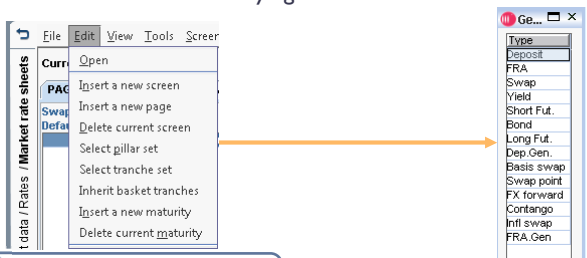
Market Rate Sheets

Insert instruments

All types of instruments and their underlying maturities can be inserted in the market rate sheets.



One and only one screen per instrument.

Market rate sheets are updated like any market data by:

- ✔ Manual entry
- ✔ Real-time import from the cache
- ✔ Import via processing scripts or files

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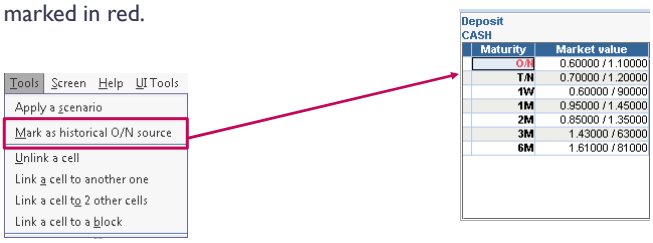
Market Rate Sheets

Financing

P&L financing is computed using the historical O/N rates.

The source data for the historical O/N rate must be defined in the Market Rate Sheet for each currency.

The rate is then marked in red.



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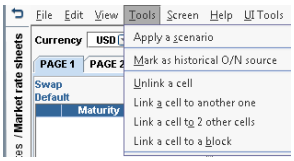
Market Rate Sheets

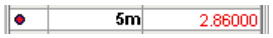
Link types

Links can be defined between the instruments pillars or maturities.



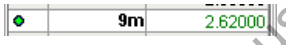
How to link one cell to another one in the market rate sheets screen:

1. Put the cursor on the cell1.
2. Go to Tools>Link a cell to another one.
3. Select the corresponding value.
4. A red ball is displayed on the original cell to indicate that it has been linked. The original cell value will be equal to the linked cell.



How to link one cell to two other cells in the market rate sheets screen:

1. Put the cursor on the cell1.
2. Go to Tools>Link a cell to 2 other cells.
3. Select the corresponding values.
4. A green ball is displayed on the original cell to indicate it has been linked to 2 other cells. The new cell value will be linearly interpolated on the two other cells.



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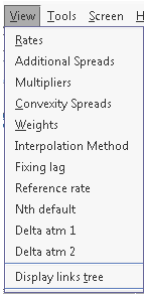
Market Rate Sheets

Spreads

Additional Spreads can be applied **only to cells** linked with other cells.



For example:
USD LIB 6M_1Y = USD LIB 6M_6M + spread

The sum of the "link spread" and the market value is displayed in the linked cells.

To add a spread to the pillar 5m:

1. Rates without Spreads

Maturity	Market value
O/N	3.25000
1w	3.25000
1m	3.30000
2m	3.10000
3m	3.05000
4m	3.00000
5m	2.86000
6m	2.86000
9m	2.62000
1y	2.88000

2. View>Additional Spreads

Maturity	Spread
O/N	0.00000
1w	0.00000
1m	0.00000
2m	0.00000
3m	0.00000
4m	0.00000
5m	0.00277
6m	0.00000
9m	0.00000
1y	0.00000

3. View>Rates

Maturity	Market value
O/N	3.25000
1w	3.25000
1m	3.30000
2m	3.10000
3m	3.05000
4m	3.00000
5m	2.86277
6m	2.86000
9m	2.61169
1y	2.88000

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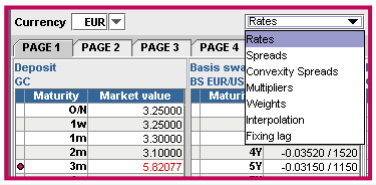
Market Rate Sheets

Displays

Market rate sheets display modes:



Rates	Standard market rate sheet
Spreads	Displays spreads defined for linked cells
Convexity spreads	Spreads that are added to the prices or rates of the corresponding instruments during rate curve calculation (typically used for short futures)
Multipliers	Displays multipliers applied on linked cells
Weights	Display weights applied to linked cells, if any
Interpolation	Display interpolation method
Fixing lag	Used for inflation swaps

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Agenda

Introduction to Rate Curves	
Market Rate Sheets	
Rate Curve Construction	• Per currency • Pillar selection • Standard screens • Spread displays
Configuration and Tools	
Practice	

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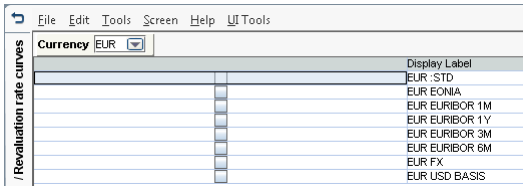
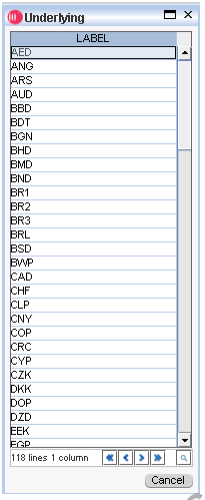
Rate Curve Construction

Per currency

Rate curves are built on selected currencies.

A standard curve (STD) is always defined in the system: It is used for instruments which have not been assigned to a particular rate curve.
Multiple curves can be configured for a currency.





End-user session: Market data/ Rates/ Revaluation rate curves

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Rate Curve Construction

Pillar selection

Link with market rate sheet:

- ✔ Market value changes in the market rate sheets are reflected back on the rate curve market values, recalibrating the curve.

Instrument Selection:

- ✔ Any or all pillars of instruments inserted in the market rate sheets may be selected to build the curve.

Discount factors and zero-coupon computation:

- ✔ Computed only for pillars with non-zero value.
- ✔ All instruments belonging to the curve have a 0 value if priced on the curve.

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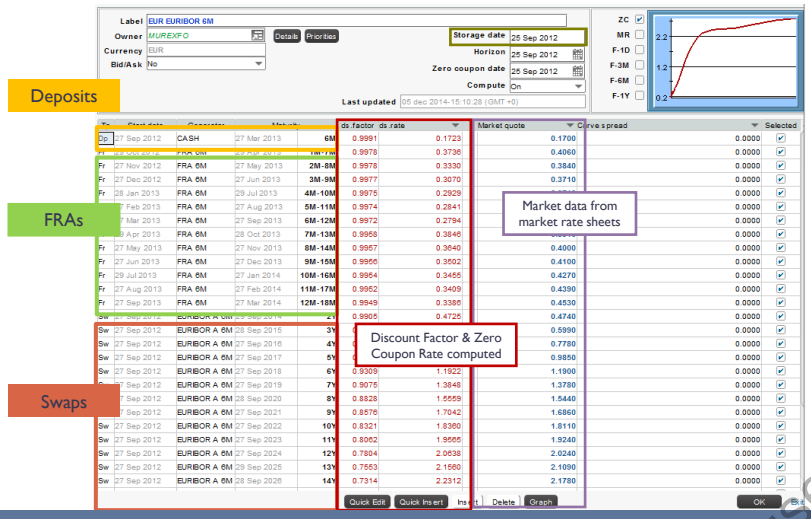
Rate Curve Construction

Standard screen for Revaluation Rate Curve



End-user session: Market data/ Rates/ Revaluation rate curves

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Rate Curve Construction

Standard screen

The link spread defined in the rate sheet can be viewed in the rate curve by selecting the option "Mkt val+Link".

Example: For the 1W maturity, the link spread is 0.05, representing the same value defined in the rate sheet.

Linked cells are tagged with "u", "i":

- ✔ **"i"** refers to an interpolated value,
- ✔ **"u"** means that the pillar is linked to one value.

Tp	Start date	Generator	Maturity		Mid ds.factor	Mid ds.rate			Market quote	Curve spread
Dp	19 Jan 2005	CASH	20 Jan 2005	O/N	0.9999	2.1291			2.1000	0.0000
Dp	20 Jan 2005	CASH	21 Jan 2005	T/N	0.9999	2.1316			2.1050	0.0000
Dp	21 Jan 2005	CASH	28 Jan 2005	1W	0.9995	2.1727	u		2.1550	0.0000
Dp	21 Jan 2005	CASH	21 Feb 2005	1M	0.9980	2.2226			2.2000	0.0000
Dp	21 Jan 2005	CASH	21 Mar 2005	2M	0.9961	2.3162	i		2.2949	0.0000
Dp	21 Jan 2005	CASH	21 Apr 2005	3M	0.9939	2.4197			2.4000	0.0000
Dp	21 Jan 2005	CASH	21 Jul 2005	6M	0.9875	2.5147			2.5000	0.0000

Tp	Start date	Generator	Maturity		Mid ds.factor	Mid ds.rate			Mid val+Link	Curve spread
Dp	19 Jan 2005	CASH	20 Jan 2005	O/N	0.9999	2.1291			2.1000	0.0000
Dp	20 Jan 2005	CASH	21 Jan 2005	T/N	0.9999	2.1316			2.1050	0.0000
Dp	21 Jan 2005	CASH	28 Jan 2005	1W	0.9995	2.1727	u		0.0500	0.0000
Dp	21 Jan 2005	CASH	21 Feb 2005	1M	0.9980	2.2226			2.2000	0.0000
Dp	21 Jan 2005	CASH	21 Mar 2005	2M	0.9961	2.3162	i		0.0000	0.0000
Dp	21 Jan 2005	CASH	21 Apr 2005	3M	0.9939	2.4197			2.4000	0.0000
Dp	21 Jan 2005	CASH	21 Jul 2005	6M	0.9875	2.5147			2.5000	0.0000

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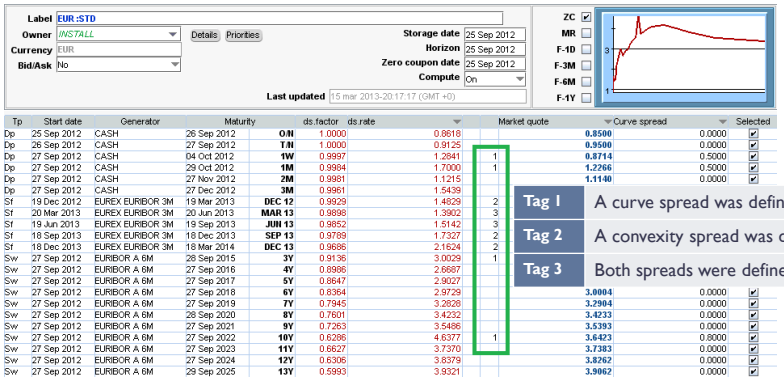
Rate Curve Construction

Spreads displays

Spreads can be defined for all instrument cells



Tp	Start date	Generator	Maturity		ds.factor	ds.rate		Market quote	Curve spread	Selected
Dp	25 Sep 2012	CASH	26 Sep 2012	O/N	1.0000	0.8618		0.8500	0.0000	✓
Dp	26 Sep 2012	CASH	27 Sep 2012	T/N	1.0000	0.9125		0.9500	0.0000	✓
Dp	27 Sep 2012	CASH	04 Oct 2012	1W	0.9997	1.2841	1	0.8714	0.5000	✓
Dp	27 Sep 2012	CASH	29 Oct 2012	1M	0.9984	1.7000	1	1.2266	0.5000	✓
Dp	27 Sep 2012	CASH	27 Nov 2012	2M	0.9981	1.1215		1.1140	0.0000	✓
Dp	27 Sep 2012	CASH	27 Dec 2012	3M	0.9961	1.5439				
Sf	19 Dec 2012	EUREX EURIBOR 3M	19 Mar 2013	DEC 12	0.9929	1.4829	2			
Sf	20 Mar 2013	EUREX EURIBOR 3M	20 Jun 2013	MAR 13	0.9898	1.3902	3			
Sf	19 Jun 2013	EUREX EURIBOR 3M	19 Sep 2013	JUN 13	0.9852	1.5142	3			
Sf	18 Sep 2013	EUREX EURIBOR 3M	18 Dec 2013	SEP 13	0.9789	1.7327	2			
Sf	18 Dec 2013	EUREX EURIBOR 3M	18 Mar 2014	DEC 13	0.9686	2.1624	2			
Sw	27 Sep 2012	EURIBOR A 6M	28 Sep 2015	3Y	0.9136	3.0029	1			
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2016	4Y	0.8986	2.6687				
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2017	5Y	0.8647	2.9027				
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2018	6Y	0.8364	2.9729		3.0004	0.0000	✓
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2019	7Y	0.7945	3.2828		3.2904	0.0000	✓
Sw	27 Sep 2012	EURIBOR A 6M	28 Sep 2020	8Y	0.7601	3.4232		3.4233	0.0000	✓
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2021	9Y	0.7263	3.5486		3.5393	0.0000	✓
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2022	10Y	0.6286	4.6377	1	3.6423	0.8000	✓
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2023	11Y	0.6627	3.7370		3.7383	0.0000	✓
Sw	27 Sep 2012	EURIBOR A 6M	27 Sep 2024	12Y	0.6306	3.8379		3.8262	0.0000	✓
Sw	27 Sep 2012	EURIBOR A 6M	29 Sep 2025	13Y	0.5993	3.9321		3.9062	0.0000	✓

Tag 1	A curve spread was defined
Tag 2	A convexity spread was defined
Tag 3	Both spreads were defined

Convexity spreads apply only to short futures.

End-user session: Market data/ Rates/ Revaluation rate curves

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Agenda

Introduction to Rate Curves

Market Rate Sheets

Rate Curve Construction

Configuration and Tools
- Details box
- Interpolator
- Graphs

Practice

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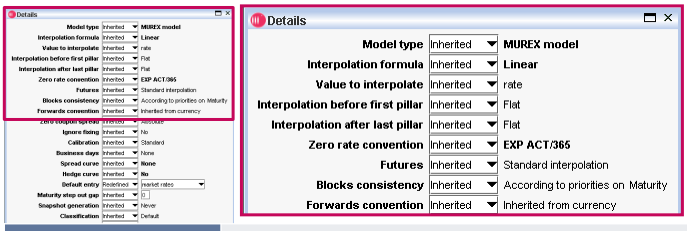
Configuration and Tools

Details box

Docid: 925



Murex Model	Represents interpolation model offered by Murex other models (require DLL interface).	
Interpolation formula	Spline	3rd degree polynomial resolution
	Linear	1st degree polynomial resolution
Value to interpolate	Rate, Rate * time, Factor, Log (factor).	
Zero rate convention	Specific rate convention of revaluation curve, used as specified in the flag Convention.	
Futures	Standard interpolation, or no intermediate interpolation.	
Block consistency	Checking Disabled, or According to priorities.	
Forward convention	Generally inherited from currency.	

End-user session: Market data/ Rates/ Revaluation rate curves/ Details

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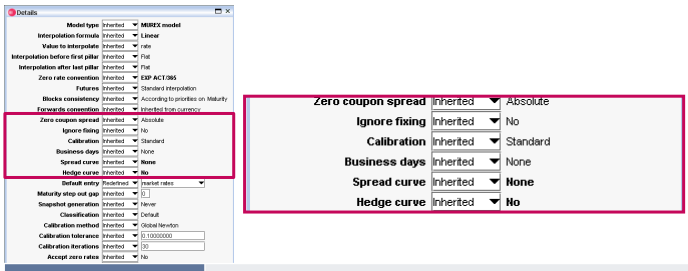
Configuration and Tools

Details box

Docid: 925



Zero coupon spread	Curve spreads can be input as percentage or absolute value.
Ignore fixing	Instruments based on floating rate index can take into account the official reset rate in the zero curve building. The reset date can be "Today" or any date prior to Today .
Calibration	Standard / Estimation / Curve assignments
Business days	Used in the Brazilian market.
Spread curve	Relevant to basis swap curves, BMA swaps, Brazilian bonds, and USD swaps quoted in spreads over the Treasury Yield.
Hedge curve	Possibility to define a hedge curve.

End-user session: Market data/ Rates/ Revaluation rate curves/ Details

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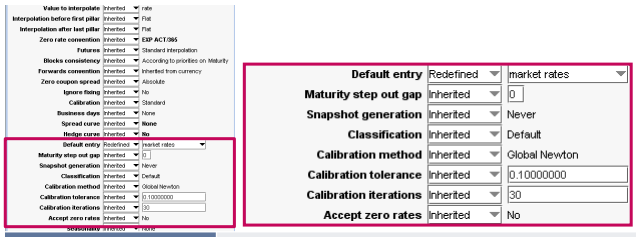
Configuration and Tools

Details box

Docid: 925



Default entry	Import market rate or swap points.
Maturity step out gap	Futures are automatically deleted from the rate curve when they arrive at Maturity + Maturity step out gap.
Snapshot generation	If set to "After save", each time the rate curve is modified and saved, it is saved in a file at the level of the application directory.
Classification	If set to hedge, the curve is considered to be a hedge curve and you can specify the native curve to be used to calibrate it.
Calibration method	Calibrate each pillar separately or all together (minimisation of the absolute error of the NPV).
Accept zero rates	To ignore or take into account pillars with zero rates .

End-user session: Market data/ Rates/ Revaluation rate curves/ Details

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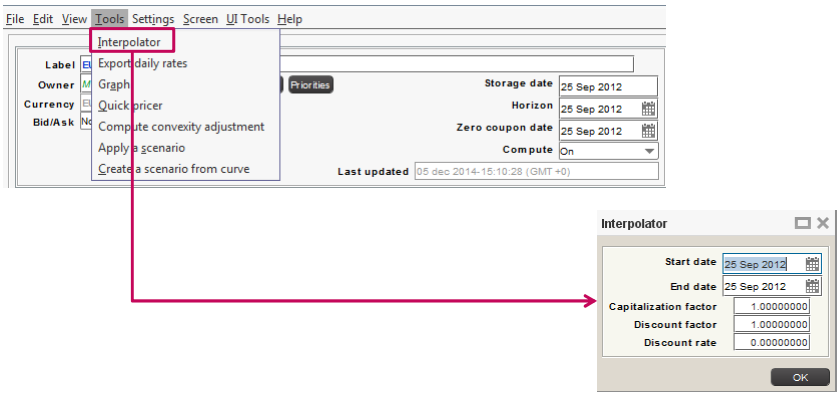
Configuration and Tools

Interpolator

Allows the user to compute capitalization factor, discount factor and discount rate between any two dates based on current curve.



End-user session: Market data/ Rates/ Revaluation rate curves/ Tools/ Interpolator

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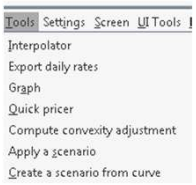
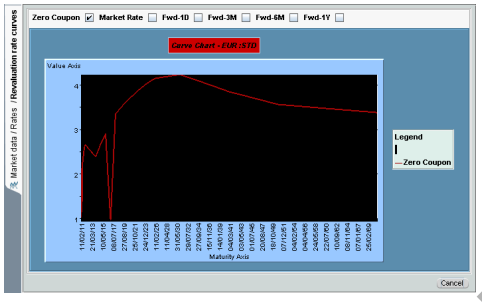
Configuration and Tools

Graphs

Tools/Graph:
View rate curve





End-user session: Market data/ Rates/ Revaluation rate curves/ Tools

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Agenda

- **Introduction to Rate Curves**
- **Market Rate Sheets**
- **Rate Curve Construction**
- **Configuration and Tools**
- **Practice**

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Practice

Practice 1: Build links in market rate sheets

Build links in the market rate sheets screen.

1. Open an end-user session (MUREXFO/MUREXFO), group FO.
2. Go to Market data/ Rates/ Market rate sheets for the EUR currency.
3. Use the *FX EUR (USD) Dep. Gen.* instrument to build links on the *Default deposit* for the following pillars: O/N, T/N, 1M & 3M.
4. Add a +10 basis points spread on all linked pillars.

Dep.Gen.
FX EUR (USD)
Floating Maturities

Maturity	Market value
O/N	-0.06324 / 0.0770
T/N	-0.17433 / 0.04784
S/N	-0.09101 / 3547
1M	0.04938 / 5806
2M	0.09502 / 10613
3M	0.17433 / 865
4M	-0.02858 / 171
5M	-0.01060 / 0.02637
6M	0.05176 / 6855
7M	-0.05443 / 0869
8M	-0.02461 / 0082
9M	0.01539 / 3878
10M	-0.04374 / 2165
11M	-0.02723 / 0602
1Y	0.00867 / 1636
2Y	0.01665 / 4045

Deposit
Default
Floating Maturities

Maturity	Market value
O/N	0.00000
T/N	0.00000
1M	0.00000
3M	0.00000

Solution

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Practice

Practice 2: Build a rate curve

Build a new rate curve for EUR and assign it to discount EUR transactions.

1. Using the same session as in practice 1, go to Market data/ Rates/ Revaluation rate curves.
2. Insert a new rate curve "EUR CURVE TRAINING" for the EUR currency.
3. Insert the following instruments into a new rate curve:
   - Deposit Default: O/N, T/N, 1M, 3M
   - Short Futures EUREX EURIBOR 3M: DEC 12, MAR 13, JUN 13, SEP 13, DEC13
   - Swap EURIBOR A 1M: 2Y, 3Y, 5Y, 7Y, 8Y, 10Y, 12Y
4. Assign the rate curve to EUR trades, in the MAIN template, for discounting only (under Market data/ Rates/ Rate curve assignments).

Solution

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Practice
Quiz

1. What are the steps to follow to configure a rate curve starting from a database where no rate sheet is configured?
2. Where can we modify the interpolation method for a given rate curve?
3. Why do clients have several rate curves for a given currency?

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Q&A

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Practice

Practice 1: Build links in market rate sheets

Practice: Build links in the market rate sheets screen.

1. Open an end-user session (MUREXFO/MUREXFO), group FO.
2. Go to Market data/ Rates/ Market rate sheets for the EUR currency.
3. Use the FX EUR (USD) Dep. Gen. instrument to build links on the Default deposit for the following pillars: O/N, T/N, 1M & 3M.
4. Add a +10 basis points spread on all linked pillars.

Linking **Adding spreads**

Dep.Gen.
FX EUR (USD)
Floating Maturities

Maturity	Market value
O/N	-0.06324 / 0770
T/N	-0.17433 / 0.04784
S/N	-0.09101 / 3547
1M	0.04938 / 5806
2M	0.09502 / 10613
3M	0.17433 / 865
4M	-0.02858 / 171
5M	-0.01060 / 0.02637
6M	0.05176 / 6855
7M	-0.05443 / 0869
8M	-0.02461 / 0082
9M	0.01539 / 3878
10M	-0.04374 / 2165

Deposit
Default
Floating Maturities

Maturity	Market value
O/N	-0.06324 / 0770
T/N	-0.17433 / 0.04784
1M	0.04938 / 5806
3M	0.04938 / 5806

Deposit
Default
Floating Maturities

Maturity	Spread
O/N	0.10000
T/N	0.10000
1M	0.10000
3M	0.10000

Deposit
Default
Floating Maturities

Maturity	Market value
O/N	0.03676 / 9230
T/N	-0.07433 / 0.14784
1M	0.14938 / 5806
3M	0.14938 / 5806

Exercise

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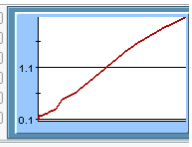
Practice

Practice 2: Build a rate curve

Practice: Build a new rate curve for EUR and assign it to discount EUR transactions.

Label: EUR CURVE TRAINING
Owner: MUREXFO
Currency: EUR
Bid/Ask: No
Details | Priorities
Storage date: 25 Sep 2012
Horizon: 25 Sep 2012
Zero coupon date: 25 Sep 2012
Compute: On
Last updated: 17 dec 2014-17:07:38 (GMT +0)

ZC ☑ MR ☐ F-1D ☐ F-3M ☐ F-6M ☐ F-1Y ☐



Tp	Start date	Generator	Maturity		ds.factor	ds.rate		Market quote	Curve spread
Dp	25 Sep 2012	Default	26 Sep 2012	O/N	1.0000	0.0654	u	0.0645	0.0000
Dp	26 Sep 2012	Default	27 Sep 2012	T/N	1.0000	0.0513	u	0.0368	0.0000
Dp	27 Sep 2012	Default	29 Oct 2012	1M	0.9999	0.1497	u	0.1537	0.0000
Dp	27 Sep 2012	Default	27 Dec 2012	3M	0.9996	0.1536	u	0.1537	0.0000
Sf	19 Dec 2012	EUREX EURIBOR 3M	19 Mar 2013	DEC 12	0.9992	0.1773		99.8025	0.0000
Sf	20 Mar 2013	EUREX EURIBOR 3M	20 Jun 2013	MAR 13	0.9985	0.2001		99.7600	0.0000
Sf	19 Jun 2013	EUREX EURIBOR 3M	19 Sep 2013	JUN 13	0.9977	0.2325		99.6772	0.0000
Sf	18 Sep 2013	EUREX EURIBOR 3M	18 Dec 2013	SEP 13	0.9968	0.2582		99.6441	0.0000

base/EUR

Currency	Calculation	Index	Curve type	Type	Generator	Archiving Group	Fx Contract	Underlying	Mari	Rate curve
EUR	Discounts									EUR CURVE TRAINING
EUR	Prem.Disc.									EUR EONIA
EUR	Forwards	EUR EONIA CMP								EUR EONIA
EUR	Forwards	EUR EURIBOR 1M								EUR EURIBOR 1M
EUR	Forwards	EUR EURIBOR 1Y								EUR EURIBOR 1Y

Exercise

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MUREX™

MUREX™

Murex Learning

BUILD

FO Modules

Introduction to the Viewer

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MUREX™

Learning Objectives

Introduction to the Viewer

At the end of this course, you will be able to:

- ✔ Explain the purpose and features of the Viewer.
- ✔ Customize an MXpress view and layout.

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Agenda

Introduction to the Viewer

- What is the Viewer?
- Where is the Viewer used?
- What are the basic components of the Viewer?
  - > Viewer components
  - > Single View components
  - > Edit View mode
  - > Edit Layout mode
- Hands on

View Customization

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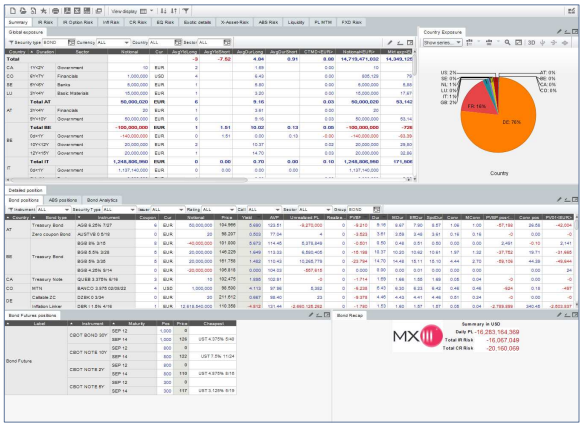
Introduction to the Viewer

What is the Viewer? (1/3)

The Viewer is an **interactive data visualization tool** used in main MX.3 business screens.



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Introduction to the Viewer

What is the Viewer? (2/3)

It displays **aggregated results** with possibility to **drill down on details**.

Country	Notional
AT	50,000,020
BE	-20,000,000
CA	10
CO	1,000,000
DE	12,948,540,140
FR	-3,004,420,000
GB	0
IT	111,666,950
LU	15,000,000
NL	201,000,020
SE	5,000,000
US	0

Country	Bond type	Notional
AT	Treasury Bond	50,000,000
	Zero coupon Bond	20
BE	Treasury Bond	-20,000,000
CA	Treasury Note	10
CO	MTN	1,000,000
DE	Callable ZC	20
	Inflation Linker	12,618,540,000
	MTN	120
	Treasury Bill	30,000,000
	Treasury Bond	280,000,000
		20,000,000
FR	Bullet Bond	305,000,000
	Callable Fixed	1,000,000
	Inflation Linker	-3,441,420,000
	MTN	31,000,000
	Treasury Bond	100,000,000
GB	MTN	0
	Treasury Bond	100,000,000
	Inflation Linker	21,667,000

Country	Bond type	Instrument	Notional
AT	Treasury Bond	AGB 6.25% 7/27	50,000,000
	Zero coupon Bond	AUSTVB 0 5/18	20
BE	Treasury Bond	BGB 8% 3/15	-40,000,000
		BGB 5.5% 3/28	20,000,000
		BGB 5% 3/35	20,000,000
		BGB 4.25% 9/14	-20,000,000
CA	Treasury Note	QUEB 3.375% 6/16	10
CO	MTN	BANCO 3.875 02/08/22	1,000,000
	Callable ZC	DZBK 0 3/34	20
	Inflation Linker	DBR I 1.5% 4/16	12,618,540,000
	MTN	KFW 3.5% 7/15	120
	Treasury Bill	OBL 2.5% 2/15	20,000,000
		OBL 2.5% 10/14	10,000,000
		DBR 6.5% 7/27	-50,000,000
		DBR 5.625% 1/28	60,000,000
		DBR 5.5% 1/31	20,000,000
		DBR 4.75% 7/40	10,000,000
		DBR 4.75% 7/34	30,000,000
		DBR 4.75% 7/28	40,000,000

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Introduction to the Viewer

What is the Viewer? (3/3)

It offers many **customization** tools: format, user actions, calculation settings…

Region/Country | Sector | Rating | Currency/Maturity | Mkt value | Exp % | Duration | Rebalance by exposure

Country	Notional<EUR>	Mkt exp<EUR>	PVBP<EUR>	PV01<EUR>	ZC risk<EUR>	Aswp risk<EUR>
Total	53,050,033,872	45,277,842,118	-19,093,674	443,184	424,700	-18,324,911
AR	70,605	67,121	-19	-20	-19	-21
DE	15,000,000	16,686,557	-29,007	-30,199	-30,186	-24,495
FR	1,031,842	981,167	-392	-412	-411	-458
QA	-529,611,055	-505,841,879	435,112	456,287	455,594	695,727
US	535,502	508,815	-48	-50	-50	-53
	9,639,028	2,620,217	-397	-137	-386	-396
QA	-535,502	-509,597	440	461	461	703
	53,551,656,654	45,761,217,053	-19,498,839	17,738		-18,995,594
	1,149,702	1,069,714	-226	-183		
AR	1,097,096	1,042,950	-297	-303	-302	-325

Gradient coloring : 3-color scale
First point | Transition point | End point
Color palette :
Automatic scale — Minimum | 0 | Maximum

Gradient coloring : 2-color scale
First point | End point
Color palette :
Automatic scale — Minimum | Maximum

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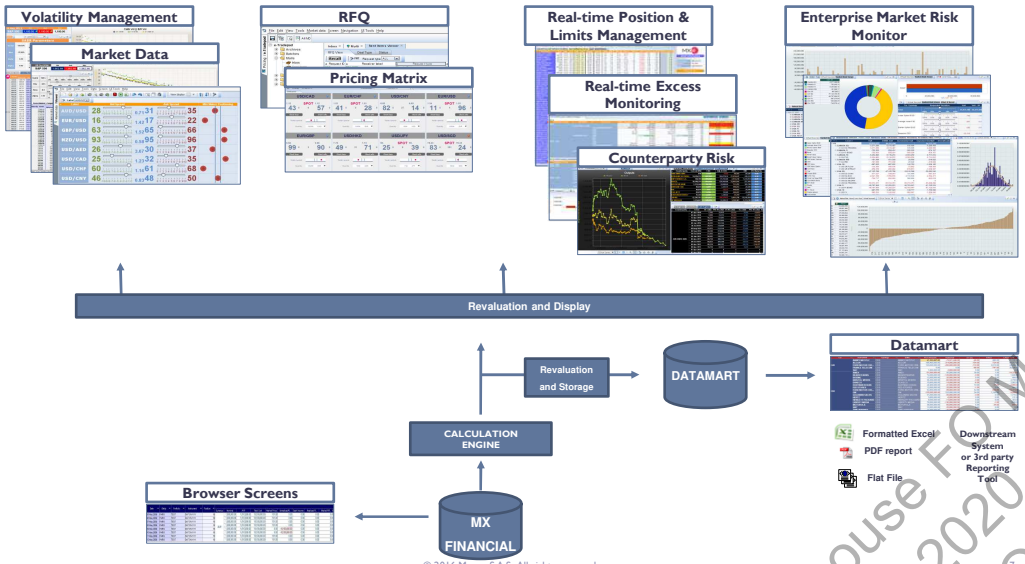
Introduction to the Viewer

Where is the Viewer used?



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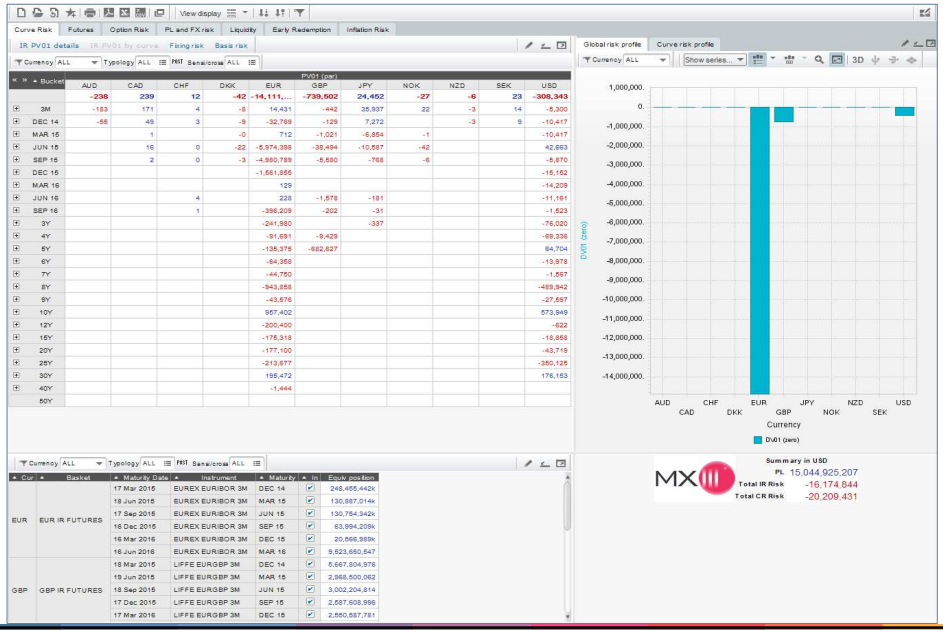
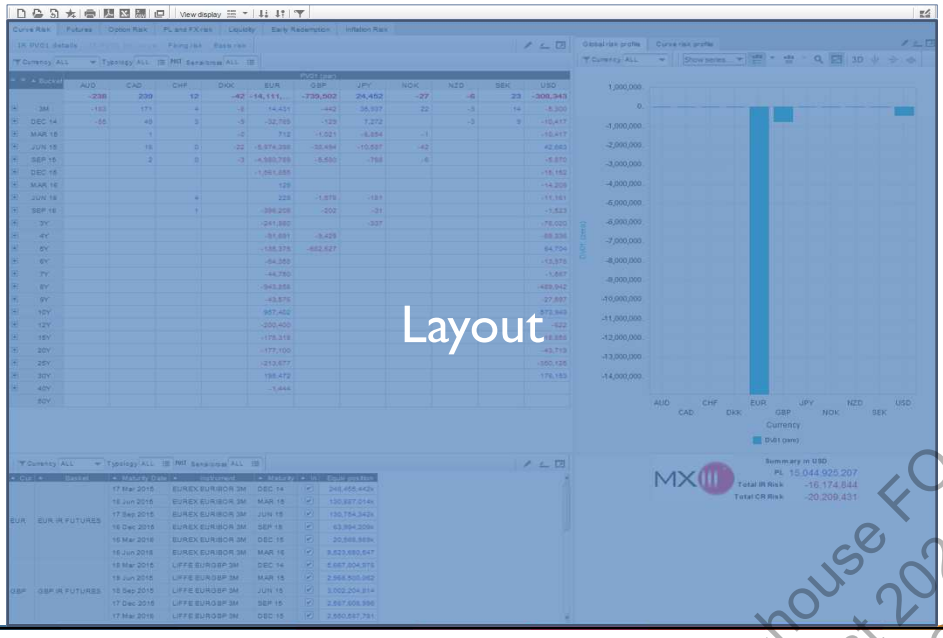
What are the Viewer components?



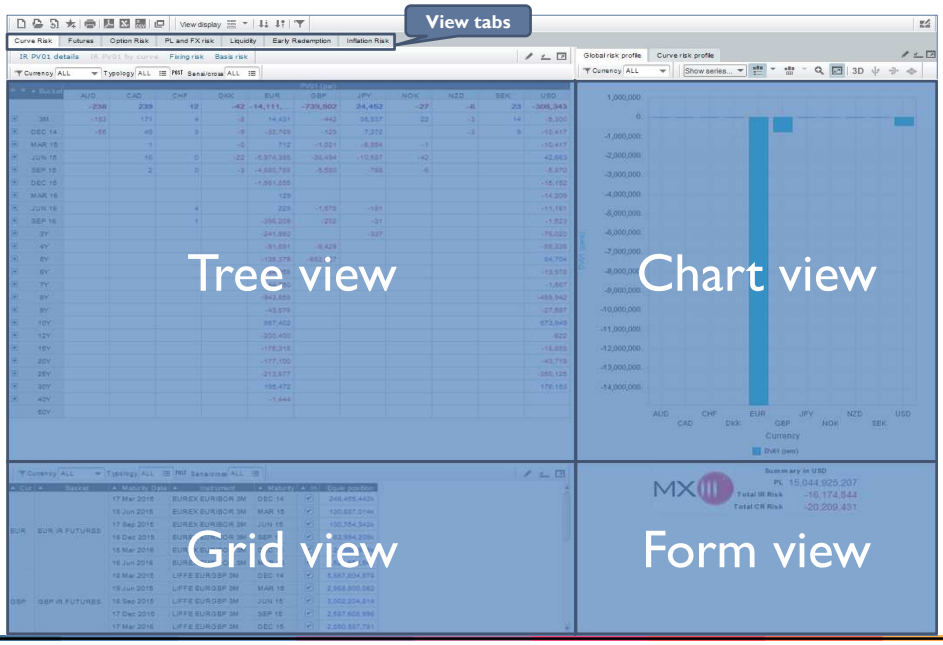
8

What are the Viewer components?



9

What are the Viewer components?



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What are the Viewer components?

Standard toolbar
for standard actions
(New, Reload, Print, …)

View display toolbar
(change display type, sort, filter)

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What are the Viewer components?

Single View Components

P&L

PL MTM summary | PL MTM breakdown | Variation Yes/No | Typology ALL | Instrument ALL | Portfolio ALL

Portfolio	Cur	Typology	Instrument	Daily PL < EUR >	MTD PL < EUR >	YTD PL < EUR >
Total				**15,044,925,207**	**120,359,401,654**	**180,539,072.47k**
EQD_NYC	GBP	Equity	BARC.GB	-758,927	-6,071,415	-9,137,132.57
	Total FI_BND_CORP_EU			**105,262,253**	**842,098,027**	**1,263,117,030.33**
		Total EUR		**-98,387,906**	**-787,103,249**	**-1,180,684,883.15**
			Total Asset Swap IRS	**-3,527,801**	**-28,222,408**	**-42,363,622.30**
		Asset Swap IRS	AXASA VAR 160440	-970,091	-7,760,726	-11,671,098.80
			BXP 5.875 151019	-2,557,710	-20,461,682	-30,722,533.50
			Total Bond	**-104,632,175**	**-837,057,400**	**-1,255,616,110.67**
			ABNANV FRN 25 310518	18,981	151,851	197,765.93
			ALOFP 3.625 051018	603,400	4,827,199	7,210,788.16
			ALVGR VAR 080741	10,512,270	84,098,160	126,117,230.01
			AUSTVB 0 5/18	-205	-1,641	-32,471.02
			AXASA VAR 160440	1,629,026	13,032,207	19,518,299.99
FI_BND_CORP_EU	EUR		BPCEGP 9.25 291049	1,666,584	13,332,672	19,968,997.87
			DZBK 0 3/34	-187	-1,493	-32,250.09
		Bond	EADS 5.5% 9/18	-206	-1,651	-32,486.68
			FRTEL 5.625 22MAY18	15,355,345	122,842,760	184,234,129.42
			ISPIM 4.125 140420	516,295	4,130,358	6,165,526.67
			ISPIM 5.15 160720	1,275,632	10,205,055	15,277,573.19
			ISPIM 6.625 080518	1,387,984	11,103,875	16,625,802.25
			KFW 3.5% 7/15	-308	-2,466	-33,709.25
			MCD 4 170221	39,900	319,197	448,785.66
			MTNA STEP 290318 S	2,220,642	17,765,136	26,617,693.90
			NDASS 4 290321	277,823	2,222,587	3,303,870.43
			QUEB 3.375% 6/16	-104	-832	-31,258.42

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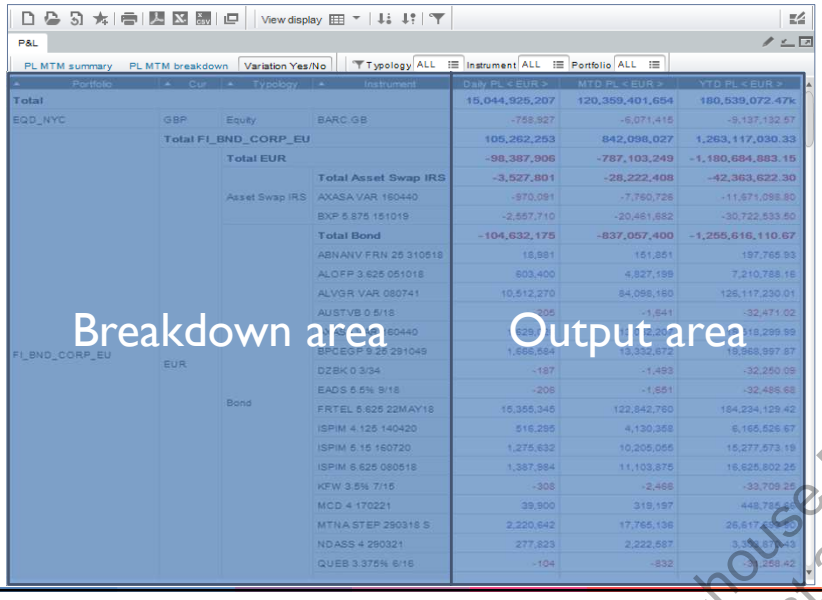
What are the Viewer components?

Single View Components



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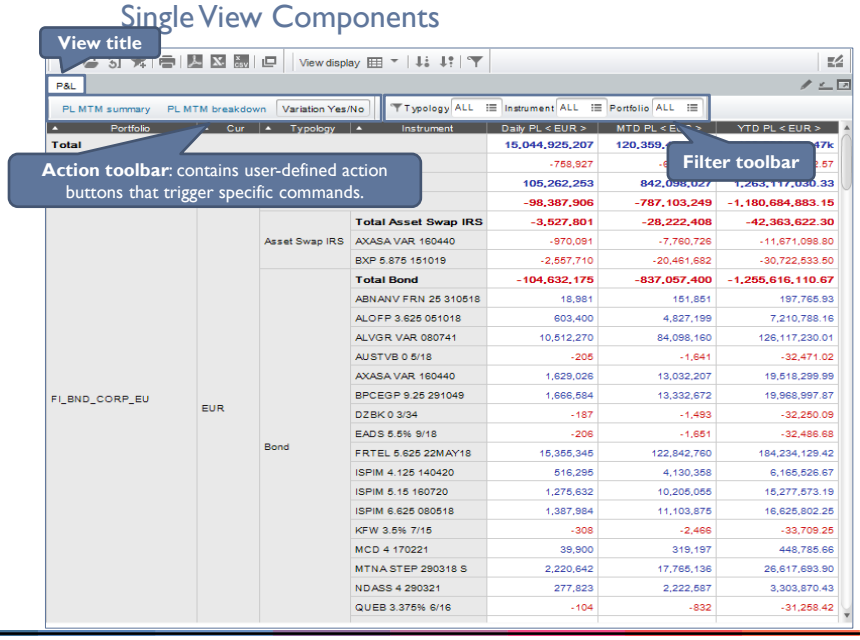
What are the Viewer components?

Single View Components



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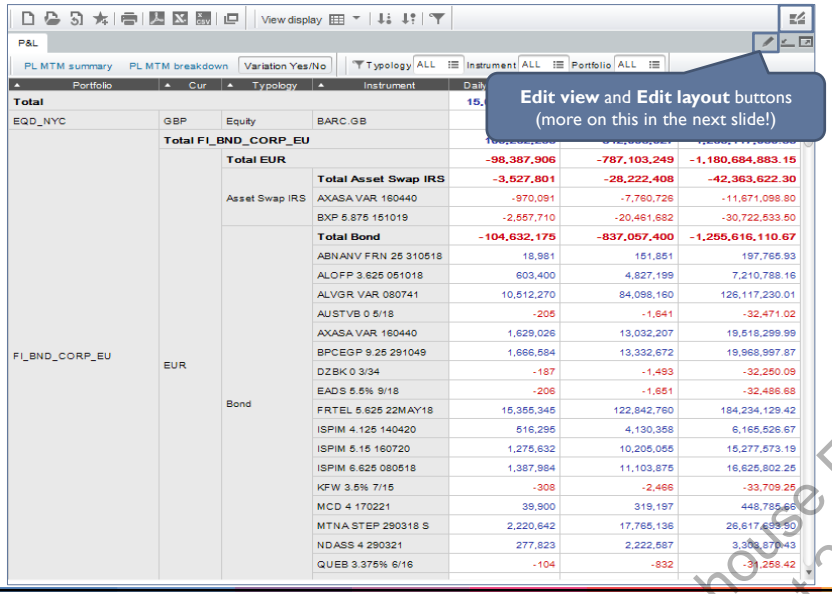
What are the Viewer components?

Single View Components



Portfolio	Cur	Typology	Instrument	Daily		
Total				15.		
EQD_NYC	GBP	Equity	BARC.GB			
FI_BND_CORP_EU	Total FI_BND_CORP_EU					
	EUR	Total EUR		-98,387,906	-787,103,249	-1,180,684,883.15
		Asset Swap IRS	Total Asset Swap IRS	-3,527,801	-28,222,408	-42,363,622.30
			AXASA VAR 160440	-970,091	-7,760,726	-11,671,098.80
			BXP 5.875 151019	-2,557,710	-20,461,682	-30,722,533.50
		Bond	Total Bond	-104,632,175	-837,057,400	-1,255,616,110.67
			ABNANV FRN 25 310518	18,981	151,851	197,765.93
			ALOFP 3.625 051018	603,400	4,827,199	7,210,788.16
			ALVGR VAR 080741	10,512,270	84,098,160	126,117,230.01
			AUSTVB 0 5/18	-205	-1,641	-32,471.02
			AXASA VAR 160440	1,629,026	13,032,207	19,518,299.99
			BPCEGP 9.25 291049	1,666,584	13,332,672	19,968,997.87
			DZBK 0 3/34	-187	-1,493	-32,250.09
			EADS 5.5% 9/18	-206	-1,651	-32,486.68
			FRTEL 5.625 22MAY18	15,355,345	122,842,760	184,234,129.42
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			ISPIM 5.15 160720	1,275,632	10,205,055	15,277,573.19
			ISPIM 6.625 080518	1,387,984	11,103,875	16,625,802.25
			KFW 3.5% 7/15	-308	-2,466	-33,709.25
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			MTNA STEP 290318 S	2,220,642	17,765,136	26,617,693.90
			NDASS 4 290321	277,823	2,222,587	3,303,870.43
			QUEB 3.375% 6/16	-104	-832	-31,258.42

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What are the Viewer components?

Use mode versus Edit modes

The Viewer has three operation modes:

Use (default mode)

Restricted to navigation, filtering, sorting and business-related actions.

Edit View

Zoom and design one view at a time.

Edit Layout

Shape the views arrangement (split the screen, add new views, reorder views position in the screen).

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What are the Viewer components?

Edit View Mode

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What are the Viewer components?

Edit View Mode

View design toolbar

Format toolbar

View fields

Dictionary:
list of data fields

Preview

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What are the Viewer components?

Edit Layout Mode

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What are the Viewer components?

Edit Layout Mode

Layout design toolbar: split the screen into tabs and panels

Gallery: list of views and layouts

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Introduction to the Viewer

Practice 1: View and Layout manipulation

Manipulate a view.

1. Log into MX with user MUREXFO/MUREXFO.
2. Select the group FO.
3. Load a consolidated simulation (by position) on portfolio FI_BND_ALL.
4. Split the "PL breakdown" tab horizontally.
5. Rename the tab "PL MTM".
6. Add the view "MX_PL_MTM summary (c)" to the bottom of the tab.
7. Add the field "Risk Engine.Results.PL.P&L (Abs).Cash/MV" to the outputs of the view "MX_PL_MTM summary (c)".
8. Change its view display to Tree.
9. Save the layout as "<your name>_BOND".

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Agenda

Introduction to the Viewer	
View Customization	• Filters > Pre-filters > Post-filters > Differences • Field settings • Format • Viewer actions

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View Customization

Comparison between Pre-filters and Post-filters

Pre-filters (data source filters)	Post-filters (ad hoc filters)
Data → Pre → Build → Post → Client	Data → Pre → Build → Post → Client
Filter out data from the data source, before the view is built.	Hide or show rows of data, after the view is built.
Limited to non-calculated fields.	Can be applied on any fields displayed in the view (calculated fields, totals and formulas).
Accelerate initial load and market data refresh. Changing a pre-filter value is not very fast, because it rebuilds the view.	Do not accelerate initial load nor market data refresh. Changing a post-filter value is fast.
Should be pre-configured and hidden. Not meant to be modified by the user.	Can be added and used on the fly by the user.
Impact totals.	By default, do not impact totals. Setting available to impact totals: View Format > Post filters : display like pre filters

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View Customization

Practice 2: Filters

Add filters and observe difference between pre and post filters.

1. In the bottom view of the "Bond and Futures position" tab, remove the filters "Security Type" and "Typology".
2. Add a pre-filter and a post-filter on the field "Sec code".
3. Display these filters as combo boxes.
4. With the pre-filter: filter on a single Sec code, then filter on ALL Sec code.
5. Do the same with the post-filter and notice the difference in performance.

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Agenda

Introduction to the Viewer

View Customization

- Filters
- Field settings
  - > Viewer generic properties
  - > Specific FO settings
- Format
- Viewer actions

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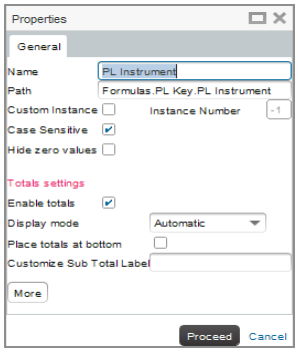
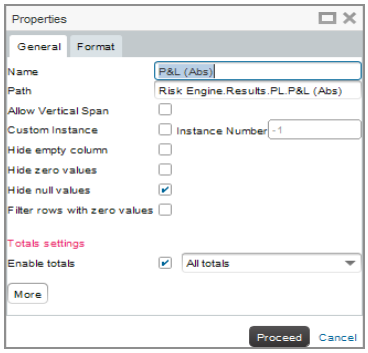
View Customization

Generic Viewer Properties

In Edit view mode, right click > Properties
These settings are common to all fields.



Breakdown properties



Output properties

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View Customization

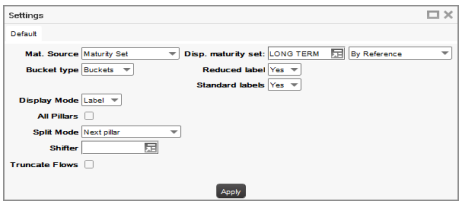
Specific FO Settings

In Edit view mode, right click > Breakdown settings… or right click > Output settings…
These settings are specific to the field and to the context (e.g. Simulation).

Set date fields to bucketed/pillar set mode:

Bucket	DV01 (zero)
26 Sep 2014	9
27 Sep 2014	0
29 Sep 2014	10
30 Sep 2014	0
01 Oct 2014	-2
02 Oct 2014	0
03 Oct 2014	-2
04 Oct 2014	-0
05 Oct 2014	0

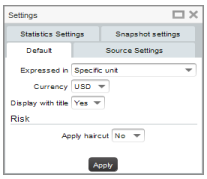
Bucket	DV01 (zero)
1M	-76
3M	-143
6M	114
9M	84
1Y	-9,749
2Y	-5
3Y	-5
5Y	-0



Convert values to a specific currency:

PL Instrument	P&L (Abs)
Total	
AUD	2,804,602,511
AUD/USD	242,766
EUR	9,300,539,932
EUR/JPY	872,514
EUR/USD	-1,067,845
GBP	2,500,889,192
GBP/JPY	-4,956,294

PL Instrument	P&L (Abs)<USD>
Total	**39,059,695,289**
AUD	2,416,943,430
AUD/USD	209,210
EUR	11,551,612,060
EUR/JPY	1,083,695
EUR/USD	-1,326,303
GBP	3,961,882,619
GBP/JPY	-7,851,709



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View Customization

Practice 3: FO Settings

Customize a view.

1. In the top view of the "Bond and Futures position" tab, change the "Duration" display to "All data" instead of buckets.
2. Change the "Notional<USD>" currency to EUR instead of USD.

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Agenda

Introduction to the Viewer

View Customization

- Filters
- Field settings
- Format
  - View Format
  - Field Format
  - Conditional Format
- Viewer actions

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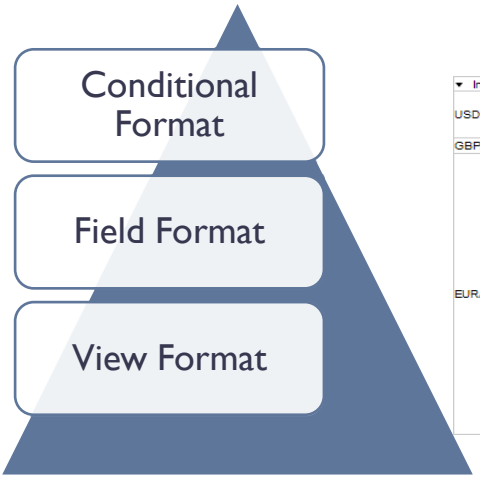
View Customization

Format



Instrument	Type	Bar type	End Date	Knock	Distance	Delta Gap EUR
USD/JPY	BAR2	IN	22 Feb 2015	KNOCKED	-0.29	0.00
		OUT	29 Nov 2014	KNOCKED	-0.23	0.00
		OUT	24 Jan 2015	KNOCKED	-0.23	0.00
GBP/USD	BAR	DI	25 Sep 2015	NEAR	-0.02	661,170,976.40
EUR/USD	BAR	UI	22 Nov 2014	NEAR	0.01	-2,775,046.84
		UI	28 Sep 2014	NEAR	0.01	98.57
		UI	08 Oct 2014	NEAR	0.00	13,470.08
		UI	31 Oct 2014	NEAR	0.03	-23,574,678.45
		UI	25 Mar 2015	KNOCKED	0.00	0.00
		UO	25 Mar 2015	KNOCKED	0.00	0.00
		UI	24 Oct 2014	NEAR	0.01	82,864.85
		DI	31 Oct 2014	NEAR	-0.01	-6,303,373.37
	BAR2	IN	24 Jan 2015	KNOCKED	0.00	0.00
		IN	24 Sep 2017	KNOCKED	0.00	0.00
		IN	24 Sep 2017	KNOCKED	0.00	0.00
		OUT	24 Sep 2017	KNOCKED	0.00	0.00
		IN	25 Sep 2016	KNOCKED	0.00	0.00
		OUT	25 Sep 2016	KNOCKED	0.00	0.00
		OUT	25 Sep 2016	KNOCKED	0.00	0.00
		OUT	25 Sep 2016	KNOCKED	0.00	0.00
		IN	02 Oct 2014	KNOCKED	0.00	0.00
		OUT	02 Oct 2014	KNOCKED	0.00	0.00

Default format

Change the appearance of your view with Formatting.

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View Customization

View Format

Conditional Format

Field Format

View Format

Applies to all fields in the view:
- Font size
- Cell colors
- Action button format…

Instrument	Type	Bar type	End Date	Knock	Distance	Delta Gap EUR
USD/JPY	BAR2	IN	22 Feb 2015	KNOCKED	-0.29	0.00
		OUT	29 Nov 2014	KNOCKED	-0.23	0.00
		OUT	24 Jan 2015	KNOCKED	-0.23	0.00
GBP/USD	BAR	DI	25 Sep 2015	NEAR	-0.02	661,170,976.40
EUR/USD	BAR	UI	22 Nov 2014	NEAR	0.01	-2,775,046.84
		UI	28 Sep 2014	NEAR	0.01	98.57
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		UI	31 Oct 2014	NEAR	0.03	-23,574,678.45
		UI	25 Mar 2015	KNOCKED	0.00	0.00
		UO	25 Mar 2015	KNOCKED	0.00	0.00
		UI	24 Oct 2014	NEAR	0.01	82,864.85
		DI	31 Oct 2014	NEAR	-0.01	-6,303,373.37
	BAR2	IN	24 Jan 2015	KNOCKED	0.00	0.00
		IN	24 Sep 2017	KNOCKED	0.00	0.00
					0.00	0.00
					0.00	0.00
					0.00	0.00
					0.00	0.00
					0.00	0.00
					0.00	0.00
		OUT	02 Oct 2014	KNOCKED	0.00	0.00

View format

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View Customization

Field Format

Conditional Format

Field Format

View Format

Applies to individual fields:
- Highlight color
- Number of decimals
- …

Instrument	Type	Bar type	End Date	Knock	Distance	Delta Gap EUR
USD/JPY	BAR2	IN	22 Feb 2015	KNOCKED	-0.29	0.00
		OUT	29 Nov 2014	KNOCKED	-0.23	0.00
		OUT	24 Jan 2015	KNOCKED	-0.23	0.00
GBP/USD	BAR	DI	25 Sep 2015	NEAR	-0.02	661,170,976.40
	BAR	UI	22 Nov 2014	NEAR	0.01	-2,775,046.84
		UI	28 Sep 2014	NEAR	0.01	98.57
		UI	08 Oct 2014	NEAR	0.00	13,470.08
		UI	31 Oct 2014	NEAR	0.03	-23,574,678.45
					0.00	0.00
					0.00	0.00
					0.01	82,864.85
					-0.01	-6,303,373.37
					0.00	0.00
					0.00	0.00
					0.00	0.00
		OUT	24 Sep 2017	KNOCKED	0.00	0.00
	BAR2	IN	25 Sep 2016	KNOCKED	0.00	0.00
		OUT	25 Sep 2016	KNOCKED	0.00	0.00
		OUT	25 Sep 2016	KNOCKED	0.00	0.00
		OUT	25 Sep 2016	KNOCKED	0.00	0.00
		IN	02 Oct 2014	KNOCKED	0.00	0.00
		OUT	02 Oct 2014	KNOCKED	0.00	0.00

Field format

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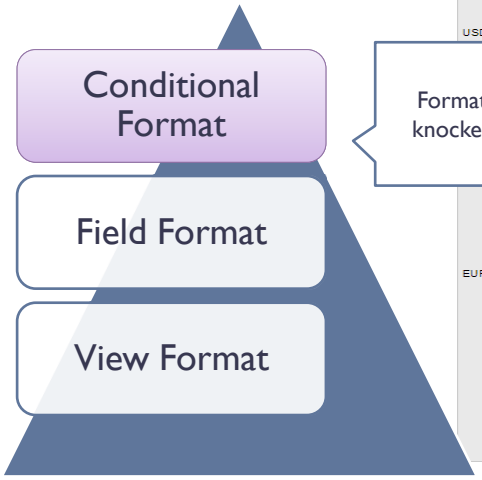
View Customization

Conditional Format



Format based on a condition, e.g.: knocked barriers become red, etc.

Instrument	Type	Bar type	End Date	Knock	Distance	Delta Gap EUR
		IN	22 Feb 2015	KNOCKED	-0.29	0.00
USD/JPY	BAR2	OUT	29 Nov 2014	KNOCKED	-0.23	0.00
				ED	-0.23	0.00
					-0.02	661,170,976.40
					0.01	-2,775,046.84
					0.01	98.57
					0.00	13,470.08
					0.03	-23,574,678.45
				ED	0.00	0.00
EUR/USD		UO	25 Mar 2015	KNOCKED	0.00	0.00
		UI	24 Oct 2014	NEAR	0.01	82,864.85
		DI	31 Oct 2014	NEAR	-0.01	-6,303,373.37
	BAR2	IN	24 Jan 2015	KNOCKED	0.00	0.00
		IN	24 Sep 2017	KNOCKED	0.00	0.00
		IN	24 Sep 2017	KNOCKED	0.00	0.00
		OUT	24 Sep 2017	KNOCKED	0.00	0.00
		IN	25 Sep 2016	KNOCKED	0.00	0.00
		OUT	25 Sep 2016	KNOCKED	0.00	0.00
		OUT	25 Sep 2016	KNOCKED	0.00	0.00
		OUT	25 Sep 2016	KNOCKED	0.00	0.00
		IN	02 Oct 2014	KNOCKED	0.00	0.00
		OUT	02 Oct 2014	KNOCKED	0.00	0.00

Conditional format

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View Customization

Practice 4: Formatting

Modify View formats.

The MXpress formatting template should be already unzipped in the cfg folder of your client directory.

1. Reset all field formatting from your view.
2. Import and apply the template to your view.
3. Highlight an output by setting its background color to RGB(242,225,255).

Check design recommendations in the MXpress views design document (docid:6407).

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Agenda

Introduction to the Viewer

View Customization

- Filters
- Field settings
- Format
- **Viewer actions**

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Viewer Actions

Actions are buttons or links that can be added to a view.

They have various effects:

- ✔ Viewer-specific actions (open a new view, input parameter…)
- ✔ Functional actions (build a smile, insert what-if orders…)

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View Customization

Practice 5: Actions

Create a new action in a view.

1. Add a view action button to the "MX_PL_MTM summary (c)" view (dictionary path: Actions.Default Actions.View).
2. Configure the new action to open the "MX_BOND_Position" view in a new window.

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APPENDIX

Viewer e-learning
Viewer documentation
Viewer features
MXpress views

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Viewer E-learning

MUREX KB: Getting started > MX.3 Platform Overview > Navigation and rendering tools > Viewer > Viewer starting v3.1.23

Section	Details
Viewer for Designer	Tutorial 1: Introduction Tutorial 2: First Steps Tutorial 3: Format Tutorial 4: Sorting Tutorial 5: Filters (Part1) Tutorial 5: Filters (Part2) Tutorial 6: Action Tutorial 7: Formulas Tutorial 8: Totals Tutorial 9: Layout Tutorial 10: Form Tutorial 11: Charts Tutorial 12: Data Export
Viewer for End Users	Tutorial 1: Introduction Tutorial 2: Viewer for End User Tutorial 3: Gallery Tutorial 4: Data Export

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Viewer Documentation

Doc title	Doc ID	Preview
Viewer FAQ	12074	Short questions & answers on the viewer, related to installation, upgrade, layout & view construction, menus, use & design modes, find & filter, toolbars, data display, printing and rights management.
MX Viewer Technical guide	7037	Detailed technical doc on the viewer features and settings
Data Visualization Catalog	19521	Description of the available charts in MX in order to make users aware of the many possibilities of data visualization in the Viewer and help them find the most appropriate representation for their data.
Viewer Configuration Management	14366	Viewer import/export through the Import/export wizard
Views & Layouts assignment	10302	General views & layout assignment (excluding Simulation views)
Simulation screen assignments	12990	Simulation views & layout assignment
Linked views	17066	How to create linked views
Viewer Rights management	17065	How to set rights on views at view level or using Rights tempaltes
Viewer Forms	16545	How to design forms
Viewer 3D Charts	17747	How to set up a view in 3D
Viewer Data Export & Printing	17100	How to export data to Excel, CSV, PDF or send it to a printer
Viewer User Guide	7037	Getting started with the viewer

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Viewer Features
Data Selection

Comprehensive Data Dictionary	Choose the data fields to feed your view from the data dictionary.
Breakdown Grouping and Columns Arrangement	Group your data fields by adding, reordering, hiding columns.
Aggregated Calculations	Display summed totals, average or standard deviation for each grouping level.

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Viewer Features
Data Display

Layout Organization	Split the screen into different panels and tabs to design the most efficient data dashboard.
Cells Format	Resize cells, set their background/foreground/border colors, choose the text font and alignment.
Conditional Format	Update the cells format depending on a certain condition.
Wide Range of Data Visualization Types	Choose the best suited data visualization type to display your data (grids, charts…).

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Viewer Features
Data Interaction

Drill-down Navigation	Expand/Collapse nodes to investigate data in increasing detail.
Filtering and Sorting	Individual or shared filters across views. Absolute sorting or within grouping levels.
User-defined Actions	Add action buttons to trigger specific commands.

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Viewer Features
Other Distinctive Features

View and Layout Assignment	Assign a default view or layout to load automatically for particular users.
Reusable Objects	Viewer objects can be exported and reused in different environments (formatting templates, view an layout definitions, gallery organization…).
Exportable Data	Data can be exported to CSV, Excel and PDF files.

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MXpress Views

The MXpress package is a set of out-of-the-box views.
Use MXpress preconfigured views as a building base to get recommended Viewer settings.
The following list is a sample of MXpress views categories.

- P&L, liquidity, e-Tradepad blotter for all assets
- IRD blotter, PV01, position
- CRD blotter, CR01 risk and exposure
- EQD sensitivities and risk
- FXMM position, blotter, trade contribution
- Security finance inventory, delivery
- COM risk and hedge position
- FXD risk and position

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Murex Learning

BUILD

FO Modules

P&L Variance

1

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Learning Objectives

P&L Variance

At the end of this course, you will be able to:

- ✔ Explain how the P&L Variation Analysis module is used
- ✔ Configure a P&L Variance Scenario and View
- ✔ Drill down through the results of the P&L Variance view
- ✔ Explain the differences between the P&L Explain and P&L predict figures

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Agenda

Introduction

Definition of a Scenario

Viewing the Results

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Introduction

P&L Variance module

P&L Variance module is a cross-asset tool enabling analysis of P&L variations between two dates. The P&L Variance module:

Provides detailed breakdown of the P&L change	Between the closing P&L of the previous open day and today's current P&L due to: ✔ Time decay ✔ All market data variations ✔ All market operations on deals
Quantifies	The impacts on the P&L of each effect individually
Zooms	As far as deal level to understand a PL change
Computes	In addition to the P&L Explain, it also computes the P&L Predict values based on sensitivities.

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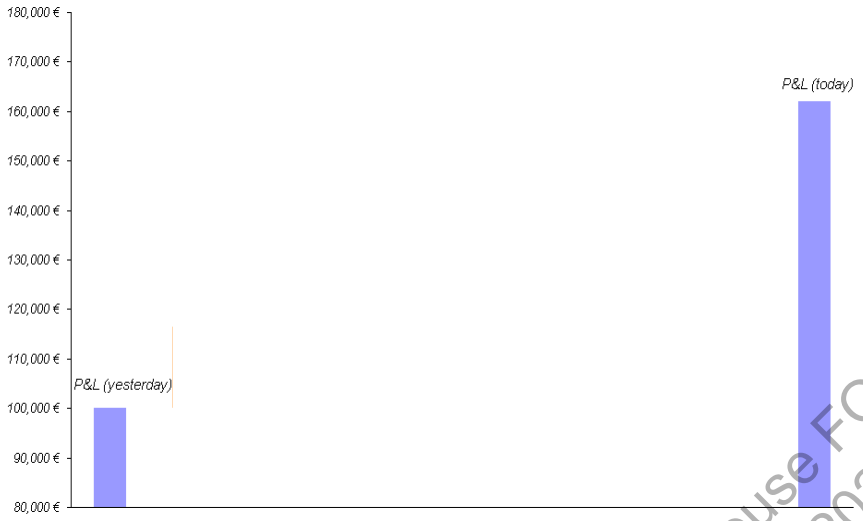
Introduction

P&L Variance module: Example (1/2)



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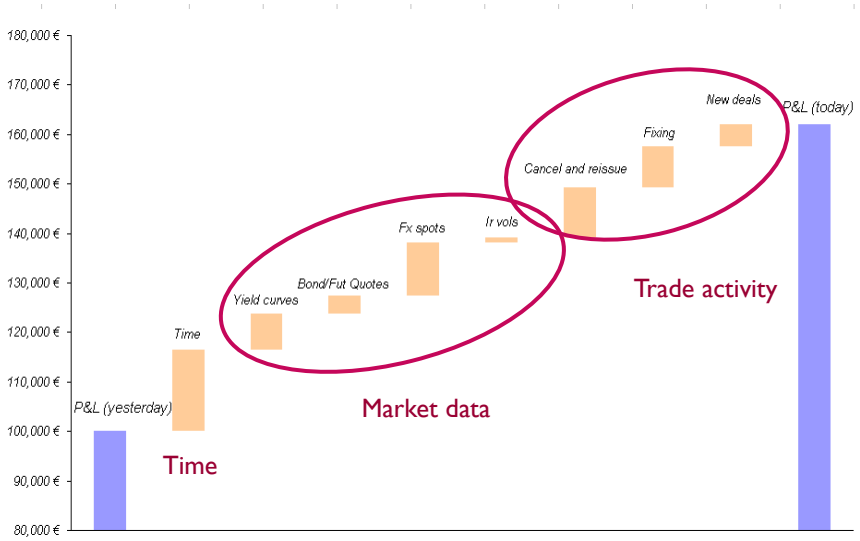
P&L Variance module: Example (2/2)



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Agenda

Introduction

Definition of a Scenario
- Scenario
- Scenario header
- List of available effects
- P&L predict

Viewing the Results

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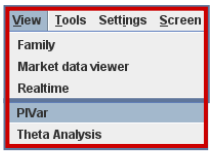
Definition of a Scenario

Scenario

A scenario is a set of overall settings and of ordered effects to be processed by the tool. The scenario is configured via the simulation module.

View/ PlVar	List of available scenarios
Space bar	To open an existing one
Insert	To create a new one



Complex and comprehensive scenarios can be created by combining different effects.

End-user session: Simulation/ Simulation

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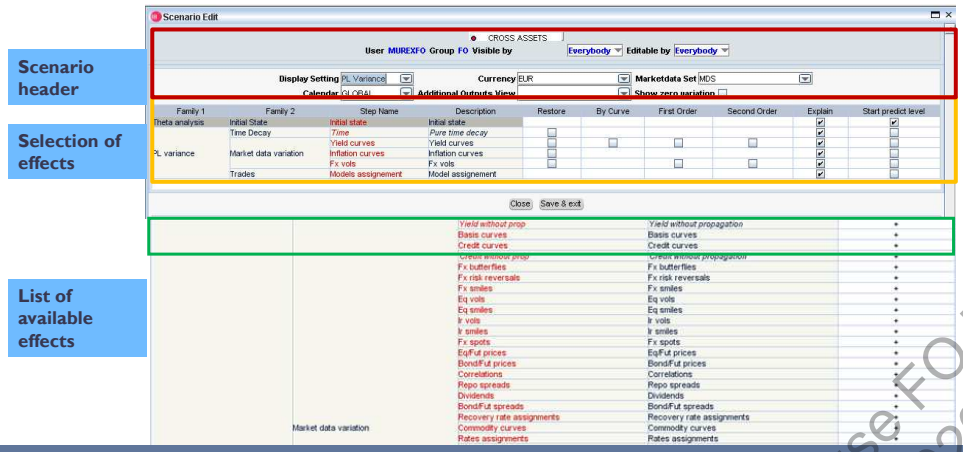
Definition of a Scenario

Scenario header (1/3)

The Scenario definition screen is divided into three parts:



End user session: Simulation/ Simulation/ Tools/ PlVar

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Definition of a Scenario

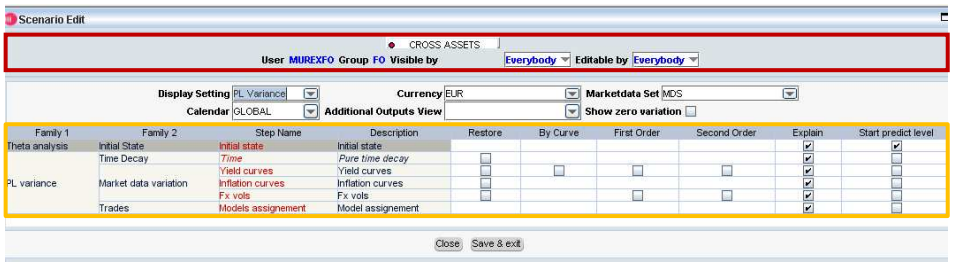
Scenario header (2/3)

The Scenario definition screen is divided into three parts:

Scenario header: Label, overall settings

Selection of effects: Initial State is mandatory

- "No effect" is selected by default
- Effects selected using '+' button in 'Action' column
- Order can be changed with drag & drop function



End user session: Simulation/ Simulation/ Tools/ PlVar

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Definition of a Scenario

Scenario header (3/3)

The Scenario definition screen is divided into three parts:

List of available effects:

- ✔ Categories:
  - > Time decay
  - > Market data variation
  - > Trades
- ✔ User-defined step: combination of effects

End user session: Simulation/ Simulation/ Tools/ PlVar

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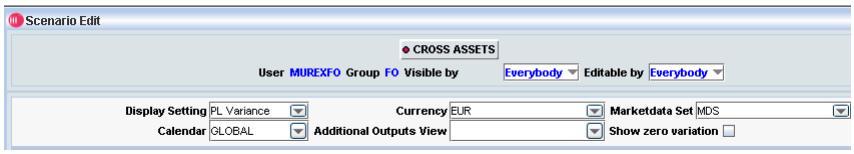
Definition of a Scenario

Scenario header

The following fields are set in the scenario header screen:



Label	Label of the scenario
Display setting	Default layout considered to display results
Calendar	A specific calendar can be defined
Currency	A specific accounting currency can be defined
Additional Outputs View	Defines outputs in addition to the P&L (clean P&L for example)
MarketdataSet	A specific MDS can be defined
Show zero variation	Yes/No

End user session: Simulation/ Simulation/ Tools/ PlVar

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Definition of a Scenario

List of available effects

The P&L scenario provides detailed breakdown of the P&L change due to a wide range of effects that are classified into three categories:

- ✔ Time decay
- ✔ Market data variation
- ✔ Trades

PL variance	Time Decay	*Time*	*Pure time decay*	+
	Market data variation	Yield curves	Yield curves	+
		Yield without prop	*Yield without propagation*	+
		Basis curves	Basis curves	+
		Inflation curves	Inflation curves	+
		Credit curves	Credit curves	+
		Credit without prop	*Credit without propagation*	+
		Fx vols	Fx vols	+
		Fx butterflies	Fx butterflies	+
		Fx risk reversals	Fx risk reversals	+
		Fx smiles	Fx smiles	+
		Eq vols	Eq vols	+
		Eq smiles	Eq smiles	+
		Ir vols	Ir vols	+
		Ir smiles	Ir smiles	+
		Fx spots	Fx spots	+
		Eq/Fut prices	Eq/Fut prices	+
		Bond/Fut prices	Bond/Fut prices	+
		Correlations	Correlations	+
		Repo spreads	Repo spreads	+
		Dividends	Dividends	+
		Bond/Fut spreads	Bond/Fut spreads	+
		Recovery rate	Recovery rate	+
		Commodity curves	Commodity curves	+
		Rates assignements	Rates assignements	+
		Commodity vols	Commodity vols	+
		Commodity smiles	Commodity smiles	+
		Option prices	Option prices	+
		Base Correlation curves	Base Correlation curves	+
		Credit Entity event	Credit Entity event	+
		Substitution event	Substitution event	+
		Credit vols	Credit vols	+
		Credit Curve Assignment	Credit Curve Assignment	+
		Fx Future prices	Fx Future prices	+
		Eq Vol+Smile	Eq Vol+Smile	+
		Fx vanna	Fx vanna	+
		Dividends yield	Dividends yield	+
		Com. trans. smil	Com. trans. smil	+
		All Market Data	*All Market Data*	+
	Trades	Fixings	Fixings	+
		Market Operation	Market Operation	+
		Gmp curves	Gmp curves	+
		Models assignement	Model assignement	+
		Closing	Closing	+
		Security Modification	Security Modification	+
Other		Global other	Global other	+
		Other	Other (Time)	+
		Spot PL Conversion	Spot PL Conversion	+

End user session: Simulation/ Simulation/ Tools/ PlVar

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Definition of a Scenario

List of available effects

For each effect, the user has the choice between two methods:

	Definition	Advantage	Disadvantage
Cumulative mode (default mode):	Moving the parameters in a specific order, one after the other, keeping the already shifted parameters in their final value.	The sum of all effects matches the daily P&L (cross effects are taken into account)	Contribution of each effect may vary depending on the scenario order
Restore mode	Each parameter is shifted to new value, then reset to its initial value before any other parameter is moved.	It gives the exact contribution of each parameter independently of the other effects.	The sum of all effects does not match the daily P&L

PL Var module assumes several computation settings (which are hard-coded for the module) under Configuration/ Settings/ Simulation settings (Simulation setup):

- Rate configuration>Reaction to time decay>Rate curve: Keep market rates constant.
- Rate configuration>Reaction to time decay>Volatilities: EOD mode.
- Fx configuration>Volatility>ATM Volatility Shift mode: Roll pillar dates and keep volatility curve constant.
- Fx configuration>Evaluation>Pricing configuration>Roll spot on forward curve: Off

Without those settings in simulation, it will not be possible to match the figures.

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Definition of a Scenario

P&L predict

The P&L predict shows the variations of P&L based on a Taylor expansion:

To Activate the Predict mode:

1) Check the "Start predict level" flag.

2) Check the First Order column for the desired effects.

Family 1	Family 2	Step Name	Description	Restore	By Curve	By Curr. Pair	By Index	By Asset Class	First Order	Second Order	Explain	Start predict level
Theta analysis	Initial State	Initial state	Initial state								✔	✔
	Time Decay	*Time*	*Pure time decay*	☐							✔	☐
		Yield curves	Yield curves	☐	☐				✔	☐	✔	☐
		Basis curves	Basis curves	☐	☐				☐		✔	☐
		Inflation curves	Inflation curves	☐							✔	☐
		Rates assignements	Rates assignements	☐							✔	☐
		Recovery rate	Recovery rate	☐					☐		✔	☐
		Credit curves	Credit curves	☐	☐				✔		✔	☐

Computations are done using a first order Taylor expansion.

Sensitivities used in P&L predict are the sensitivities of the day i.e. after the time effect movement.

End user session: Simulation/ Simulation/ Tools/ PlVar

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Definition of a Scenario

Practice 1: Configure a P&L Variance scenario

Configure a P&L Var scenario

1. Open an end-user session (MUREXFO/MUREXFO), group FO.
2. Go to Simulation/ Portfolio simulation by trade.
3. Select portfolio US_P_FLOW_ST.
4. Go to View/ PlVar
5. Create a PL Var scenario labeled "PLVAR_EX" with layout *MX_ALL_PL Variance_lyt*, calendar *GLOBAL*, currency *USD*, market data set *MDS* , *Show zero variation* activated and with the following steps:

- ✔ Time
- ✔ Yield curves
- ✔ Repo spreads
- ✔ Eq/Fut prices
- ✔ Bond/Fut prices
- ✔ Fx spots
- ✔ Eq vols
- ✔ Eq smiles
- ✔ Dividends
- ✔ Dividends yield
- ✔ Correlations
- ✔ Option prices
- ✔ Fixings
- ✔ Closing
- ✔ Gmp curves
- ✔ Spot PL Conversion
- ✔ Market Operation
- ✔ Global other

Solution

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Agenda

Introduction

Definition of a Scenario

Viewing the Results

- Results in Viewer
- Viewer configuration
- Troubleshooting tools

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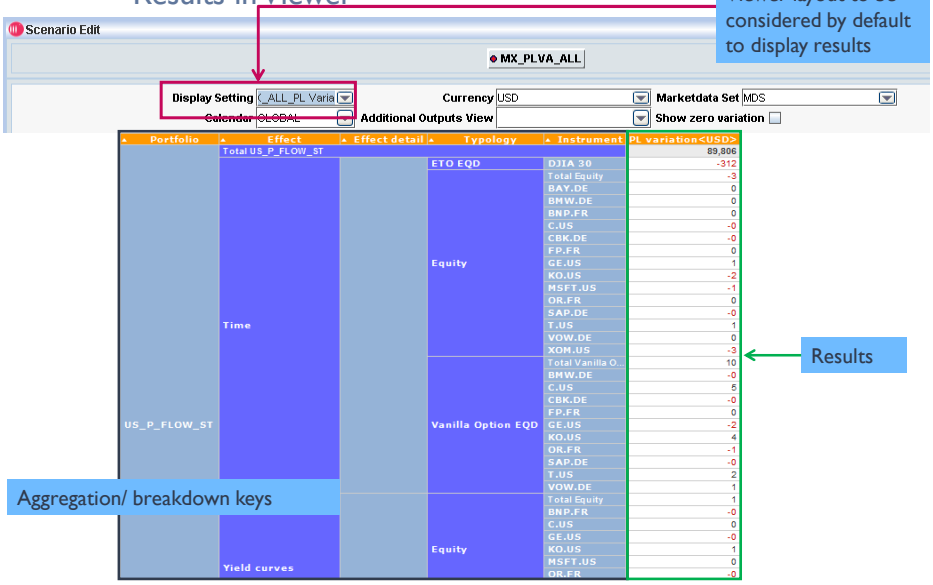
Viewing the results

Results in Viewer

Default layout: Viewer layout to be considered by default to display results



Results

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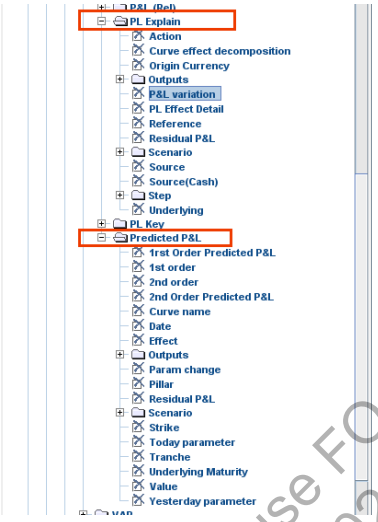
Viewing the results

Viewer configuration

PlVar fields are available under:
Risk Engine/ Results/ PL/ PL Explain and Predicted P&L

Main output	P&L variation
The contribution of each effect	Step label
Sub-effects	Underlying
Other standard P&L breakdown keys can be added	Portfolio, Group, Contract Number, etc.



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Viewing the results

Troubleshooting tools

What could go wrong?

- ✔ Different market data sets
- ✔ Native currency for a multi-currency portfolio
- ✔ Missing effects
- ✔ Change of configuration between yesterday and today

PLVAR log	***Help/ Monitor/ Rates library "Display Theta Analysis Flows"*** It produces a log file rt.<NPID>.trc showing each trade evaluation
PLVAR debug mode	***Help/ Monitor/ PlVariance Debug*** and check the "Debug" box on the right hand side for each effect requiring troubleshooting. ▪ It opens a simulation at each step ▪ It allows to check the trade pricing and market data after each step ▪ As such, it is best used in parallel with a simulation as of today

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Viewing the results

Practice 2: Explain the P&L Variance effects

Explain the P&L Variance effects

1. In same end-user session as practice 1, open another MX tab so to have 2 screens simultaneously:
   - ✔ Portfolio simulation as of past date by trade
     - > Select the date 24/09
     - > Select the portfolio US_P_FLOW_ST
   - ✔ Portfolio simulation by trade on the portfolio US_P_FLOW_ST

   Use the PL Breakdown tab (MX_PL_MTM breakdown daily (c)) to monitor the P&L
2. Compute the PL of trade number 29 (NB=29) as of 24/09/2012 & 25/09/2012.You may have to add the "Trade number" field to your view.
3. Launch the PlVar on portfolio US_P_FLOW_ST with the scenario defined in practice 1.
4. Check the PL Variance is in line with the expected total variation.

Solution

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Thank You!

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EXERCISE SOLUTIONS

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Definition of a Scenario

Practice 1: Configure a P&L Variance scenario

Configure a P&L Var scenario

P&L Variance Scenario "PLVAR_EX"

Scenario Edit

PLVAR_EX

User MUREXFO Group FO Visible by Everybody Editable by Everybody

Display Setting MX_ALL_PL Var Currency USD Marketdata Set MDS

Calendar GLOBAL Additional Outputs View Show zero variation ☑

Family 1	Family 2	Step Name	Description	Restore	By Curve	By Curr. Pair	By Index	By Asset Class	First Order	Second Order	Explain	Start predict level
Theta analysis	Initial State	Initial state	Initial state								☑	☑
PL variance	Time Decay	Time	Pure time decay	☐							☑	☐
		Yield curves	Yield curves	☐	☐				☐	☐	☑	☐
		Repo spreads	Repo spreads	☐							☑	☐
		Eq/Fut prices	Eq/Fut prices	☐					☐	☐	☑	☐
		Bond/Fut prices	Bond/Fut prices	☐							☑	☐
		Fx spots	Fx spots	☐		☐			☐	☐	☑	☐
	Market data variation	Eq vols	Eq vols								☑	☐
		Eq smiles	Eq smiles	☐							☑	☐
		Dividends	Dividends	☐							☑	☐
		Dividends yield	Dividends yield	☐							☑	☐
		Correlations	Correlations	☐				☐			☑	☐
		Option prices	Option prices	☐							☑	☐
	Trades	Fixings	Fixings				☐				☑	☐
		Closing	Closing								☑	☐
		Gmp curves	Gmp curves	☐	☐						☑	☐
Other		Spot PL Conversion	Spot PL Conversion						☐		☑	☐
PL variance	Trades	Market Operation	Market Operation									
Other		Global other	Global other									

Exercise

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Viewing the results

Practice 2: Explain the P&L Variance effects

Solution: Explain the P&L Variance effects

Please refer to the MTEK_PLVar_exercise.doc file for details on reconciliation

Exercise

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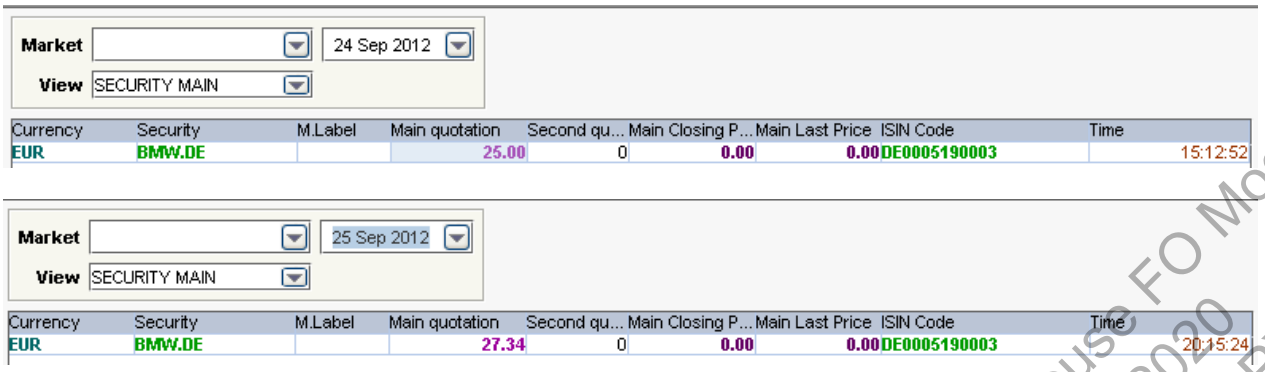
FO Module training

PL Variance: Practice 2: Solution

Note: There might be slight differences in the numbers with the numbers on your environment due to changes made on the market data during the training.

Consider the trade number **29** which is an Equity Deal on the BMW.DE Equity. Portfolio **US_P_FLOW_ST.**

Market data for the **BMW.DE**:



Open 2 screens simultaneously.

1) **Portfolio Simulation As of Past date by trade.**
   a. Select the portfolio **US_P_FLOW_ST.**
   b. Select the date **24/09**
2) **Portfolio Simulation by Trade**.
   a. Select the portfolio **US_P_FLOW_ST**.

3) Go to the View **PL Breakdown** in both screens and add the field **Trade number** to the breakdown columns.
4) Look at the **PL <USD>** column in both screens for the trade **29**. Record the values.

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For 24/09 the value is $ 23,318

Simulation / Portfolio simulation as of a past date by trade

US_P_FLOW_ST | Connect to realtime | Calcula

Real time | View display

Bond and Futures position | Curve risk | Yield risk | Eq pos by country | PL breakdown

PL MTM summary | PL MTM breakdown | Variation Yes/No | Typology ALL | Instrument ALL | Portfolio ALL

Portfolio	Cur	Typology	Instrument	Trade Number	PL<USD>	Market value	Cash	Capital gain	Revenue	PV effect	Financing	Brk/adj fees
Total US_P_FLOW_ST					-35,014,738	25,150,867	-59,294,695	-34,143,721		-107	-870,910	
	Total EUR				5,715,231	21,765,136	-15,904,002	5,861,155		-21	-145,903	
			Total Equity		-63,673	-1,849,864	1,767,698	-82,166		0	18,493	
			VOW.DE		-106,735	-1,067,562	950,874	-116,688		0	9,953	
			SAP.DE		-6,051	144,278	-148,772	-4,494		-0	-1,557	
			OR.FR		16,306	-430,291	441,976	11,685		0	4,621	
			FP.FR		3,470	-107,188	109,513	2,325		0	1,145	
			CBK.DE		-5,350	102,177	-106,413	-4,236		-0	-1,114	
		Equity	BNP.FR		12,168	-315,107	323,889	8,782		0	3,386	
			BMW.DE	Total BMW.DE	28,652	-96,857	124,209	27,352		-0	1,300	
				28	-8,341	67,800	-74,580	-6,780	0	-0	-1,561	0
	EUR			29	23,318	-116,228	136,684	20,456	0	0	2,861	0
				3,440	-6,780	67,800	-74,580	-6,780	0	0	0	0
				3,441	20,456	-116,228	136,684	20,456	0	-0	0	0
			BAY.DE		-6,133	-79,314	72,423	-6,891		0	758	
		Future EQD	EUREX DAX		4,397,293	4,397,293	0	4,397,295		-1		

For 25/09 the value is $ 12,486

Simulation / Portfolio simulation by trade

US_P_FLOW_ST | Synchronized | Calcula

Real time | View display

Bond and Futures position | Curve risk | Yield risk | Eq pos by country | PL breakdown

PL MTM summary | PL MTM breakdown | Variation Yes/No | Typology ALL | Instrument ALL | Portfolio ALL

Portfolio	Cur	Typology	Instrument	Trade Number	PL<USD>	Market value	Cash	Capital gain	Revenue	PV effect	Financing	Brk/adj fees
Total US_P_FLOW_ST					-34,962,783	25,211,807	-59,303,522	-34,091,622		-93	-871,068	
	Total EUR				5,767,502	21,826,061	-15,912,827	5,913,254		-19	-145,732	
			Total Equity		-85,640	-1,878,615	1,774,411	-104,204		1	18,563	
			VOW.DE		-107,140	-1,071,616	954,485	-117,131		0	9,991	
			SAP.DE		-6,074	144,826	-149,337	-4,511		-0	-1,563	
			OR.FR		16,368	-431,925	443,655	11,729		0	4,639	
			FP.FR		3,483	-107,595	109,928	2,333		0	1,149	
			CBK.DE		-5,370	102,565	-106,817	-4,252		-0	-1,118	
		Equity	BNP.FR		-412	-326,830	325,119	-3,711		0	3,399	
			BMW.DE	Total BMW.DE	19,661	-105,825	124,681	18,856		0	1,305	
				28	-2,003	74,427	-74,863	-436	0	-0	-1,567	0
	EUR			29	12,486	-127,590	137,203	9,614	0	0	2,872	0
				3,440	-436	74,427	-74,863	-436	0	0	0	0
				3,441	9,614	-127,590	137,203	9,614	0	-0	0	0
			BAY.DE		-6,156	-79,615	72,698	-6,917		0	761	
		Future EQD	EUREX DAX		4,413,991	4,413,991	0	4,413,993		-1		

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The PL Variance should be equal to **23,318 – 12,486 = - $ 10,382**

5) From the **portfolio simulation by trade** screen, hit **View-> PlVar.**
6) Select the scenario configured in exercise1.
7) Drag and Drop the **Trade number** field to filter on the trade number **29**.
8) Let's reconcile to numbers which contribute to this PL Variance for the trade **29** (do not consider the variation indicated on the "Total US_P_FLOW_ST" line since it corresponds to the PL variation for the entire portfolio):

Instrument ALL | Effect ALL | Portfolio ALL | Typology ALL | POST | Trade Number 29.00

Portfolio	Effect	Effect detail	Typology	Instrument	Currency	Trade Number	PL variation<USD>
US_P_FLOW_ST	Total US_P_FLOW_ST						120,263
	Time		Equity	Total Equity			-3
				BMW.DE	EUR	Total EUR	0
						29	0
	Yield curves		Equity	Total Equity			1
				BMW.DE	EUR	Total EUR	
						29	0
	Repo spreads						
	Eq/Fut prices		Equity	Total Equity			-21,644
				BMW.DE	EUR	Total EUR	-9,066
						29	-10,879
	Bond/Fut prices						
	Fx spots						
	Eq vols						
	Eq smiles						
	Dividends						
	Dividends yield						
	Correlations						
	Option prices						
	Fixings						
	Closing						
	Gmp curves						
	Spot PL Conversion		Equity	Total Equity			-324
				BMW.DE	EUR	Total EUR	74
						29	47
	Market Operation						
	Global other						-0

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Step	PL in USD	Step effect
Initial PL (on 24/09)	**23,318**	
Shift horizon to 25/09	12,486	**-10,831.6642**
Made of these steps		
Time	0.0387626881129108	
Yield curves	0	
Eq/Fut prices	-10878.9378180884	The biggest effect
Spot PL Conversion	47.2348515235935	The underlying is in EUR while the PL is displayed in USD, therefore, there is an exogenous FX effect
Total	**-10,831.6642**	

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FO Profile

Introduction to Simulation

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Learning Objectives

Simulation Introduction

At the end of this course, you will be able to:

- ✔ Launch a simulation session with different choices according to your needs
- ✔ Manage the settings in the simulation screen and explain their impacts
- ✔ Present basic concepts of all existing screens and their adequacy to each financial product

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Agenda

- **Simulation Overview**
- **Simulation Screen Types**
- **Simulation Behavior**
- **P&L**
- **Examples of Simulation Screens**
- **Practice**

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Simulation Overview

Definition

Simulation is a tool that shows the portfolio positions. It is a core Front Office module and is used across asset classes.

Used by	Traders, sales and risk managers.
Purpose	• Follow online positions, P&L and sensitivities. • Run what-if scenarios. See immediate impact on current positions, P&L and sensitivities. • Check changes due to new trades or to market data variations. • Analyse and hedge risk.
Results	Delivered with high performance.

End-user session: Simulation/ Simulation

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Simulation Overview

Definition

Simulation Engine processes the following inputs to provide the following outputs:

Dynamic inputs

- Evaluation date
- Loaded trades
- Market parameters
- Calculation conventions

Automatic refresh

Simulation engine

Live outputs

Positions, P&L and sensitivities:

- Projected in a large selection of customized screens.
- Global, or tailored to a specific financial area.
- Total and/or detailed results.

End-user session: Simulation/ Simulation

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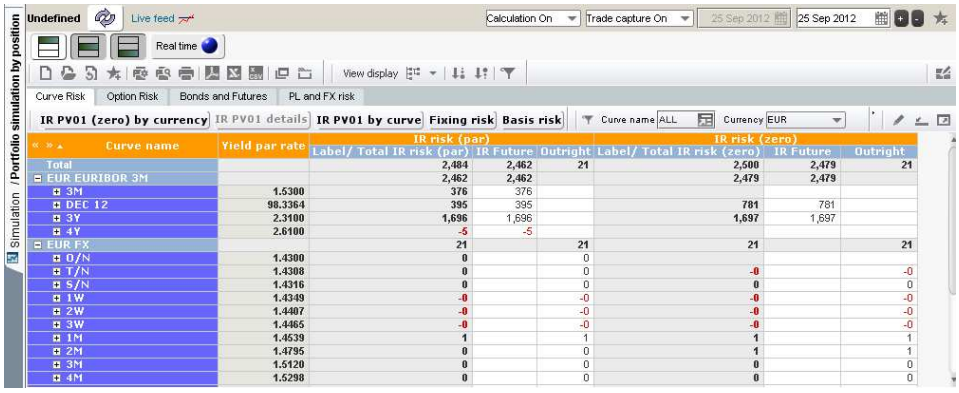
Simulation Overview

Definition

From the simulation screen, end-users can **access** positions, P&L and sensitivities **for all asset classes** using **Viewer** tool.



Curve name	Yield par rate	IR risk (par) Label/ Total IR risk (par)	IR Future	Outright	IR risk (zero) Label/ Total IR risk (zero)	IR Future	Outright
Total		2,484	2,462	21	2,500	2,479	21
EUR EURIBOR 3M		2,462	2,462		2,479	2,479	
3M	1.5300	376	376				
DEC 12	98.3364	395	395		781	781	
3Y	2.3100	1,696	1,696		1,697	1,697	
4Y	2.6100	-5	-5				
EUR FX		21		21	21		21
O/N	1.4300	0		0			
T/N	1.4308	0		0	-0		-0
S/N	1.4316	0		0	0		0
1W	1.4349	-0		-0	-0		-0
2W	1.4407	-0		-0	-0		-0
3W	1.4465	-0		-0	-0		-0
1M	1.4539	1		1	1		1
2M	1.4795	0		0	1		1
3M	1.5120	0		0	0		0
4M	1.5298	0		0	0		0

End-user session: Simulation/ Simulation

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Agenda

Simulation Overview	
Simulation Screen Types	• How to access simulation • Simulation by position • Simulation by trade • Simulation as of past date • Other simulation screens
Simulation Behaviour	
P&L	
Examples of Simulation Screens	
Practice	

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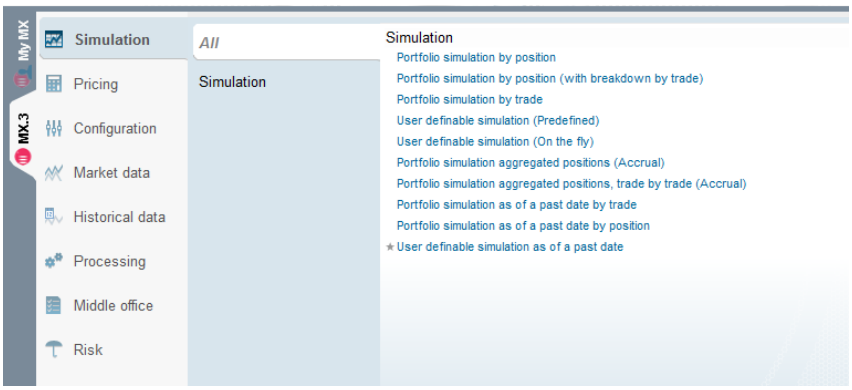
Simulation Screen Types

How to access simulation

To launch the Simulation, the user has several choices:



End-user session: Simulation/ Simulation

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Simulation Screen Types

Simulation by position: Warehouse

The **Warehouse** is a position server that aggregates and stores financial figures for trades and their events according to some given aggregation keys.

Advantage	To increase the consolidated simulation performance.
Computation	The warehouse service maintains computation/aggregation in real-time.
Warehouse rebuild	The following processing scripts should be executed in order to rebuild the consolidated data model based only on the trade repository (i.e. detailed data model) data: 1. Stop Engine 2. Warehouse Rebuild 3. Maintenance 4. Start Engine

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Simulation Screen Types

Simulation by position

These are the fastest simulations:

Portfolio simulation by position	Results are consolidated, trades accessible via trade contribution.
Portfolio simulation by position (with breakdown by trade)	Results are read from the warehouse non aggregated tables (providing access to trade number).
Portfolio simulation aggregated positions (Accrual)	Results are consolidated, but MM trades are loaded with a lower level of aggregation to compute accrual P&L figures.
Portfolio simulation aggregated positions, trade by trade (Accrual)	Results are read from the warehouse non aggregated tables, and MM trades are loaded with a lower level of aggregation to compute accrual P&L figures.

When this screen is loaded:
$simulation\ date \geq consolidation\ date$
otherwise nothing is loaded.

End-user session: Simulation/ Simulation/ Portfolio simulation by position

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Simulation Screen Types

Simulation by trade

The calculations are done on each deal using detailed simulation screens.

Portfolio simulation by trade	Results are detailed, by trade Loading by portfolio

The user definable simulation screen require the user to enter a filter criteria to apply on the calculations.

User definable simulation (Predefined)	Predefined filter, selected from the list
User definable simulation (On the fly)	Filter criteria selected on the fly Similar to trade query screen

The user definable simulations are not refreshed by new trades/events.

This simulation is slower than aggregated simulations.

End-user session: Simulation/ Simulation/ Portfolio simulation by trade

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Simulation Screen Types

Practice 1 (1/2)

Compare portfolio simulation by position, by position (with breakdown by trade) and portfolio simulation by trade.

1. Open 3 end-user sessions with the login MUREXFO/MUREXFO.
2. Open the group FO in each session.
3. Open one type of simulation screen in each of the different sessions.
4. Load in each simulation screen all FI, FWD and MMA portfolios.
5. Load the view MX_PL_MTM breakdown daily (c) (or (d)).
6. Compare the 3 sessions.
7. Add a breakdown by trade number by adding the field « Trade number » from the Data Dictionary.
8. Compare the 3 sessions. Why are there differences in the same view in the different sessions?

Solution

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Simulation Screen Types

Practice 1 (2/2)

Compare portfolio simulation by position, by position (with breakdown by trade) and portfolio simulation by trade.

9. In the portfolio simulation by position, select a position to view the trades contributing to it. To do so, right click on the position and select the « Trade contribution/ Explain position » menu.
10. Once the screen is open, select the view REF_PL_TRAINING_SIMULATION.
11. Check the P&L fields by trade in the trade contribution and compare it to the portfolio simulation by trade.
12. Open another similar end-user session and load a user definable simulation (on the fly) on a set of the trades that you see in the trade contribution.
13. Compare the P&L to the portfolio simulation by position (breakdown by trade).

Solution

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Simulation Screen Types

Simulation as of past date

Simulation as of past date prompts the user to select the past date, then any filter, and finally select a portfolio.
Loads trades that correspond to status of database as of selected past date.
Bases the revaluation past date market data of the corresponding data set.

Portfolio simulation as of past date by trade	Results are detailed, by trade, at past date Loading by portfolio
Portfolio simulation as of past date by position	Results are consolidated, by position, at past date Loading by portfolio
User definable simulation as of past date	Results are detailed, by trade, at past date Filter on the fly

Simulation as of past date can be by position, trade or user definable.

End-user session: Simulation/ Simulation/ Portfolio simulation as of a past date by trade/position

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Simulation Screen Types

Other simulation screens

Other simulation screens:

Today Portfolio simulation by trade	Filtered on today's activity (deals & events).
Counterpart side simulation	Filtered on one counterpart, the buy/sell is reversed compared to portfolio simulations.
Fund simulation by trade	Filtered on a fund in detailed mode – asset management specific simulation.
Fund simulation by position	Filtered on a fund in consolidated mode – asset management specific simulation.

End-user session: Simulation/ Simulation/

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Agenda

- **Simulation Overview**
- **Simulation Screen Types**
- **Simulation Behavior**
  - Trade selection
  - Market parameters
  - Evaluation date
  - Calculation assumptions
  - Common features
- **P&L**
- **Examples of Simulation Screens**
- **Practice**

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Simulation Behavior

Trade selection

Simulation by portfolio can be dynamically refreshed when these operations are performed:

- ✔ New trades are inserted into the loaded portfolios.
- ✔ Events (market operations) are performed on existing trades of the loaded portfolios.

Rights to the automatic refresh can be set from an end-user session under:

End-user session: Simulation/ …/ Settings> Simulation screen settings> Simulation server

All users	Automatic refresh.
By user	Only trades or events inserted by current user and attached to loaded portfolio impact the simulation.
Inactive	Only trades or events inserted from current session and attached to loaded portfolio impact the simulation.

"Autotrade capture" flag available in simulation screen.

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Simulation Behavior

Market parameters

The market data viewer connected to RT can be used to both publish and retrieve market data.

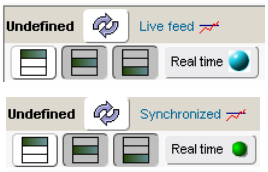
The market data loaded when the user enters the simulation screen are based on the default market data set assigned to the user's FOD.

The simulation screen can be connected to real-time feed.

Real-time activated	Will refresh the market data in the simulation screen. The P&L and different figures on screen are recomputed using the real-time market data.
Real-time deactivated	The DB market data is loaded on screen. The P&L and different figures are computed using the DB market data.

Two real-time connectivity modes are available:

Live Feed	Market data are refreshed automatically according to a user defined refresh cycle.
On demand	User is prompted when new market data becomes available. Market data are refreshed only on when requested by user.



End-user session: Simulation/ …/ File> Realtime

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Simulation Behavior

Market parameters

Users connected to MX with different sessions can update the market data simultaneously.

Active session can be protected from changes made to other sessions unless:

1. A refresh is requested (top toolbar) File> Market data> Reload stored market data or click on
2. Simulation is re-launched.

The user can do two types of changes on the market data in the simulation screen:

Local changes	Performed on market data (loaded in memory) from within simulation screens: • Directly on-screen • Zooming on Loaded Market Data, but without global save
Global changes	Performed on « official » market data set by saving Loaded Market Data.

Zooming on the individual screens from the Market data tree in View> Popup market data can also allow performing live changes or saving them to the database

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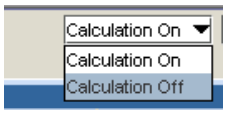
Simulation Behavior

Market parameters

Two calculation modes are available to the users in the simulation screen:

ON	Any change in market data or horizon date re-computes the position.
OFF	Single changes do not imply a recalculation, this allows several changes before the system re-computes the position.



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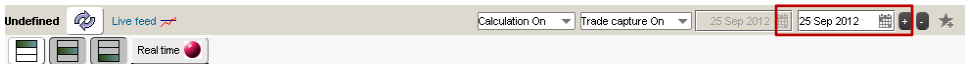
Simulation Behavior

Evaluation date



The simulation can run on two dates:

Current trading date	Default date It can be shifted forward.
Past dates	1. Trades loaded with their status as of selected date. 2. Trades loaded from detailed tables. 3. Revaluation uses market data as of selected date.

Theta & horizon date: From simulation screen, forward move of horizon date shows actual time decay effect (Theta).

Theta as of past date: When simulation is loaded as of past date and horizon is moved forward, system considers loaded deals only.

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Simulation Behavior

Calculation assumptions

The different calculation settings in simulation can customize the display choices.

They are applied on three levels:

	Scope	Set under the screen	Example
General settings and pricing settings	Shared by all users	Configuration/ Settings/ General settings	Gamma calculation: bucketed
Current session settings	Applied in the scope of current session only	Configuration/ Settings/ Current session settings	Same as general settings
Simulation settings	Used exclusively in simulation screens	Configuration/ Settings/ Simulation settings	Real-time status: Connected (Automatic retrieve)

Some flags impact calculations only if market conditions change.

Example: When moving horizon, Rates may remain constant or equal Fwd-Fwd rates.

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Simulation Behavior

Practice 2

View the market data changes effects in the simulation.

1. Using two of the sessions of practice 1, launch a portfolio simulation by trade in these separate sessions on the portfolio FWD_EUR_LN, view MX_PL_MTM summary (c).
2. Stop the real time feed in both sessions. How would you do that?
3. Reload stored market data:
   a) How?
   b) Has anything changed in current session?
4. Record the P&L figures.
5. Change the EUR/USD spot rate in the loaded market data:
   a) How?
   b) Do not save and exit => Has anything changed in current session? In second session? Why?
6. Restore the previous values.
7. Change the EUR/USD spot rate but save globally this time:
   a) Has anything changed in current session? In second session? Why?
   b) Update the second session's P&L.
8. Compare the two sessions.

Solution

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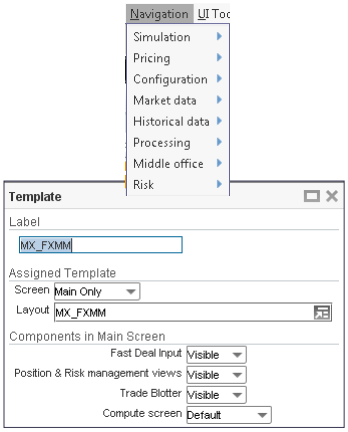
Simulation Behavior

Common features

The main common tool across products is the viewer, which allows the building of customized views to fit each asset class needs.

Access to general menu	The user does not need to exit from the simulation screen to access the different screens in MX. All the screens are accessible from the Navigation menu in Simulation.
Configurable access to the different screens in simulation	Access to the various screens can be set in a configurator session: • Main only • Specific screens • Include Fast deal input & trade blotter



End-user session: Simulation/ Simulation/ Portfolio simulation by position

Configurator session: Infrastructure/ FO desk/ Settings/ Simulation screen assignments

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Agenda

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P&L	• Absolute P&L vs. relative P&L • Stored P&L • Debugging tips
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P&L

Absolute P&L vs. relative P&L

P&L in simulation screens can be displayed in two modes:

Relative P&L can be displayed in the views by changing the field settings to read from the Datamart table. The origin date is specified at this level.

Absolute	Since inception (evaluation date).
Relative	Between an origin date and evaluation date.

For optimization reasons, P&L as of origin date is not recomputed but read from a stored P&L table in the DataMart.

The PL Variance module can be used to explain the P&L movement between yesterday and today.

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P&L

Stored P&L

The Stored P&L is the absolute P&L of a position or a trade, copied and saved in the Datamart table. In the simulation, it is used when there is a need to display a relative P&L e.g. daily P&L, monthly P&L etc.

Stored P&L settings	Reads the "reporting setup" settings (in opposition to Simulation settings).
Stored P&L Storage	In the Datamart by a feeder during the EOD based on a simulation view.

Note that it is possible to use stored fields and display them in absolute or in variations is available for any output of the risk viewer.

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P&L

Stored P&L

Feeding view

Trade Number	P&L (Abs)
Total	
20,493	7,820,786
20,494	-1,402,464
20,495	47,017,863
20,496	2,817,813
20,498	537,286,372

Feeders

User view

Portfolio	Famil	Gro	Cu	Trade Nu	P&L (Abs)	PL yesterday
PL_TRAINING	IRD	BOND	USD	20,493	7,820,786	80,630,146
				20,495	47,017,863	484,741,172
				20,496	2,817,813	29,050,876
			ZAR	20,498	537,286,372	537,286,372
		LN_BR	USD	20,494	-1,402,464	-14,459,013

Reporting Database

MX FINANCIAL

Loading

Official P&L retrieved from the DataMart **without computation.**

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P&L

Debugging tips

P&L is wrong:

Daily P&L = Today's absolute P&L – Yesterday's absolute P&L

The incorrect value can come from today's evaluated P&L or yesterday's stored P&L.

Stored P&L is incorrect:

It can be recomputed manually by loading a simulation as of past date and looking at the view used for P&L storage.

The Stored P&L is different from the recomputed P&L:

This happens when changes affecting past dates P&L are made, such as:

- ☑ Modification of past market data.
- ☑ Insertion of a back-traded deal.

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Simulation Overview	
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Practice	

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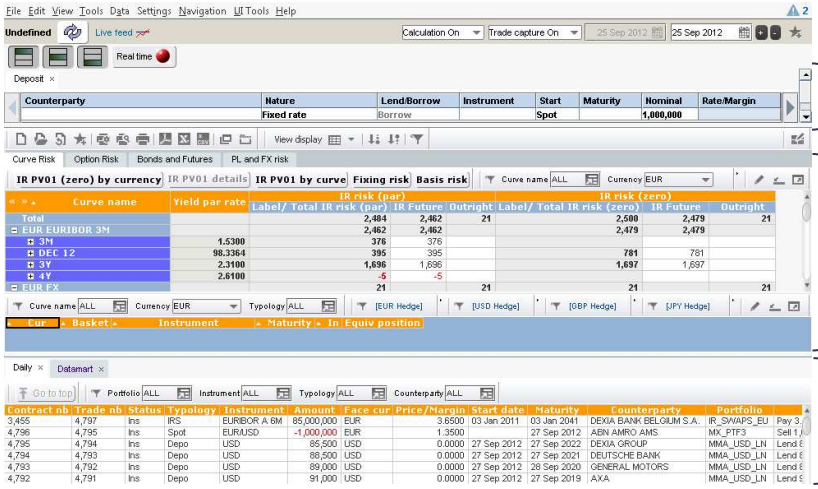
Examples of Simulation screens

FXMM



Fast Deal Input

Position keeping and P&L monitoring

Deal Blotter

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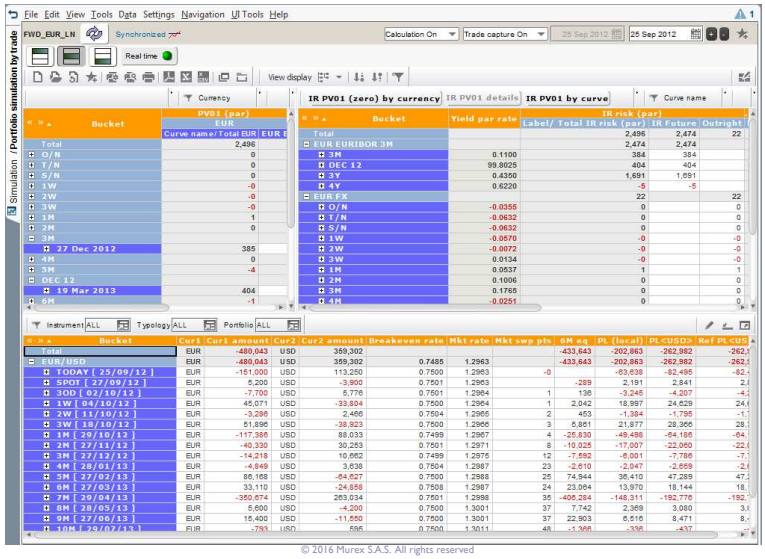
Examples of Simulation screens

Simulation viewer

Views are built for each asset class. The different views are customizable and flexible.



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Agenda

- Simulation Overview
- Simulation Screen Types
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- P&L
- Examples of Simulation Screens
- **Practice**

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Practice

Practice 3

Test the behavior of a simulation as of past date.

1. Log in an end-user session using MUREXFO/MUREXFO and the group FO_IRD.
2. Launch the portfolio CLIENT1_PAR in a portfolio simulation by trade. Select the view MX_PL_MTM summary (d).
3. Enter a plain vanilla IRS as of today using the fast deal input (top section of the screen). Hint: you can use Tools> New deal entry template
4. Open another end-user session with the same credentials and group and launch a simulation as of past date (yesterday) with the same view. Check the P&L.
5. Shift the horizon forward by 1 day.
6. Add a breakdown by trade number in your view in both sessions. Can you identify the trade you inserted?

Solution

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Practice

Practice 4

Practice 4 – hands on: Customize the Simulation screen settings

1. In a Configurator session, change the screen Simulation by trade for the FO_IRD group so the default layout is MX_IRD_Market quotes and the trade blotter is no longer visible.
2. Change the « Trade capture » setting for your current user only and check the impacts on the simulation when entering a trade. You may want to open another session to insert a trade to test this setting (do not close your current session).
3. Change the aggregation currency to EUR for your current user only and check the impact in the P&L view MX_PL_MTM summary (c).

Solution

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EXERCISE SOLUTIONS

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Simulation Screen Types
Practice I Solution

Compare portfolio simulation by position, by position (with breakdown by trade) and portfolio simulation by trade.

6. Compare the three sessions.

The three sessions should display the same results.

8. Compare the three sessions. Why are there differences in the same view in the different sessions?

Trade number is available in the dictionary under Murex Formulas/ Trade number.

The portfolio simulation by position does not load the information deal by deal. It loads aggregated positions from the warehouse.

11. Check the P&L fields by trade in the trade contribution and compare it to the portfolio simulation by trade.

Open it on the total P&L figure.

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Simulation Screen Types
Practice I Solution

Compare portfolio simulation by position, by position (with breakdown by trade) and portfolio simulation by trade.

The P&L by trade in the trade contribution (simulation by position) should be the same as the portfolio simulation by trade. This shows that the consolidated simulation offers very similar functionalities to the detailed one but with much better performances.

13. Compare the P&L to the portfolio simulation by position (breakdown by trade).

You can take one trade only. The P&L should be the same.

Exercise

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Simulation Behavior

Practice 2 Solution

View the market data changes effects in the simulation

1. Once in the simulation, open the views gallery and select the view *MX_PL_MTM summary (c).*
2. Go to File> Real time> Disconnect or click on the Real time button.
3. Reference market data:
   a) Click on « Reload stored market data ».
   b) Yes, the P&L is different because it is now calculated from the stored market data (MDS).
4. Copy the P&L for each type of trade.
5. Change of EUR/USD spot:
   a) Go to View> Pop-up market data> FX spot and change the spot.
   b) The P&L is changed in the view of this session. The 2nd session is not impacted.
6. Click on « Reload stored market data ».
7. Click on "Save global".
   a) Current session's P&L has changed. Second session P&L has not changed since the real-time feed is disconnected.
   b) To update it, click on "Reload reference market data".
8. → Both sessions should be identical.

Exercise

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Practice

Practice 3 Solution

Test the behavior of a simulation as of past date

3. Enter a plain vanilla IRS as of today using the fast deal input (top section of the screen). Hint: you can use Tools> New deal entry template
4. Open another end-user session with the same credentials and group and launch a simulation as of past date (yesterday) with the same view. Check the P&L.

→ The new inserted trade does not contribute to the P&L.

5. Shift the horizon forward by one day.
6. Add a breakdown by trade number in your view in both sessions. Can you identify the trade you inserted?

→ The new inserted trade still does not contribute to the position. Shifting the horizon just shows the real theta but does not show the simulation as of today.

Exercise

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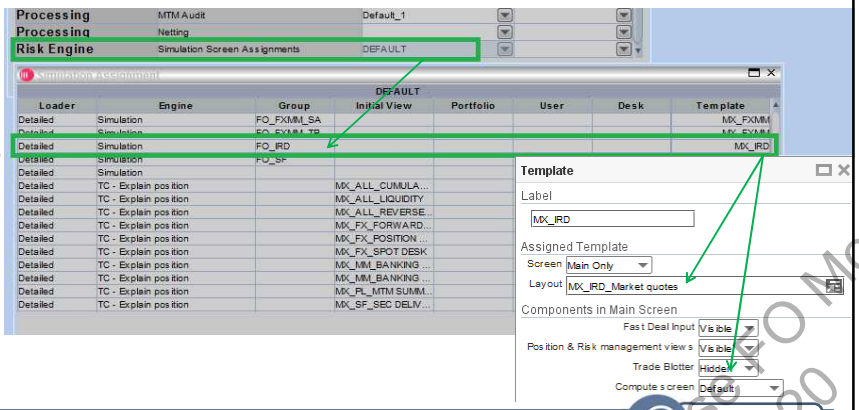
Practice

Practice 4 Solution

Customize the Simulation screen settings

1. In a Configurator session, change the screen Simulation by trade for the FO_IRD group so the default layout is MX_IRD_Market quotes and the trade blotter is no longer visible.



Configurator session: Infrastructure/ FO desk/ Settings/ Simulation screen assignments

Exercise

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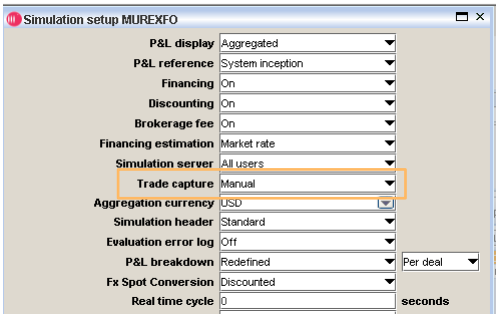
Practice

Practice 4 Solution

Customize the Simulation screen settings

2. Change the « Trade capture » setting for your current user only and check the impacts on the simulation when entering a trade. You may want to open another session to insert a trade to test this setting (do not close your current session):

Inside the simulation, go to Settings/ Simulation screen settings. Change the "Trade capture" flag from Automatic to Manual. When entering a trade, it does not impact the positions immediately.



Exercise

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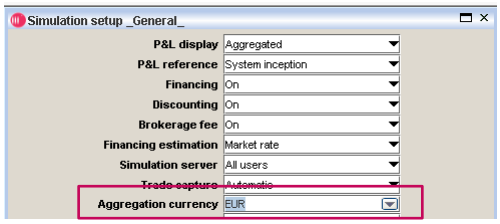
Practice

Practice 4 (Solution)

Customize the Simulation screen settings

3. Change the aggregation currency to EUR for all users and check the impact in the P&L view MX_PL_MTM summary (c):

From outside the simulation, go to Configuration/ Settings/ Simulation screen settings and change the "Aggregation currency" to EUR. Load the simulation afterwards → the P&L is expressed in EUR.



PL MTM summary | PL MTM breakdown | Variation Yes/No | Typology ALL | Instrument ALL | Portfolio ALL

Portfolio	Cur	Typology	Instrument	PL<EUR>	Market value	Cash	Capital gain	Revenue	PV effect	Financing	Brk/adj fees
FWD_EUR_LN	EUR	Total EUR		-617,966	-108,737	-508,638	-617,356		-19	-591	
		IR Future	LIFFE EURIBOR 3M	-414,514	30,489	-445,000	-414,511	0	-0	-3	0
		Outright	EUR/USD	-203,452	-139,226	-63,638	-202,845	0	-19	-588	0

Exercise

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FO Profile

Post-Training Reference List

FO Configuration

Title	docid	Content	Key concepts
Interest Rate Swaps Generator Definition	748	This document presents in detail the definition of a standard swap, as the elementary blocks have been defined elsewhere.	Introduction to IRS generator, General flags, Currency and Rates components, Capital exchange, Rate conversion, Accruals /Yield, Schedules and dates components, Stub period, Rate factor applied, Margin mode, Rate formula, Total return, Day count, Exotic features with phases and legs
FX Currency Definition	1039	This document describes how currencies are configured within the system.	Naming conventions, Default conventions, Rate conventions, Definition of Forex parameters, User definable fields
FX Swap	9448	This document describes how FX Swaps, Split FX Swaps, Multi Leg Swaps (MLS) and Split Multi Leg Swaps are handled in MX.3.	Business definition, Configuration settings, Details of FX Swaps, Details of Split FX Swaps, Details of Multi Leg Swaps, Details of Split Multi Leg Swaps
FX Spot Rates	478	FX Spot price is a conversion rate for a transaction involving two flows in two different currencies.	Financial definitions, Spot rates screen, More details on the Spot rates
Currency Pair Configuration	1060	This document describes how currency pairs are configured in the application for handling the FX Cash and FX Derivatives businesses.	FX OTC contract, OTC contract description, User definable fields
FX Settings	1050	FX Settings screens deal with user definable assumptions on FX market parameters and FX deals pricing, revaluation rules and display of results.	General organization, FX General settings, FX Pricing and FX User Pricing settings, Simulation settings, Reporting Set-up

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Post-Training Reference List

FO Configuration

Title	docid	Content	Key concepts
Profit and Loss Analysis	288	This article presents the building blocks of profit and loss (P&L) analysis in MX.	P&L Breakdown: Nomenclature, P&L Analysis by Deal, Consolidated vs. Detailed Database
P&L Cycle and End of Day Cycle	1325	The current paper documents the role of the middle-office, which is focused on the generation of an official P&L per entity, for all the entities it is responsible for. It entails a typical cycle made of successive tasks and procedures achieving the generation, the validation and the distribution of official figures.	Position of the Middle-Office: On the Front-Office side, Sales or traders people, Traders using global funding tools, On the Processing-centre side, Middle-Office, Processing Center, Accounting, FO desk EOD cycle, Processing center EOD cycle, Interaction Front Office / Processing : EOD Workflow Summary
Market Interest Rate Sheets	924	Market Parameters / Rates /Market Rate sheets store the interest rate market parameters that can be used to build a zero coupon curve.	Rate sheet description, Rate sheet functionalities, Market Rate Sheet Data model
Generic Market Parameters	2047	This document describes how Generic Market Parameters (GMP) are handled in the application. The first part describes how to create a set of GMP and the second part describes how to retrieve them in a formula.	GMP Type Definition, GMP Group Definition, Retrieve through formula
Basis Curve Building and Risk	12947	This document describes how to build the curves needed to price basis swaps.	Multi curve environment, Basis swap quotes and basis risk, Implementation in MX of Basis Swap Spread Curve for a separate Basis Risk versus Interest Rate Risk, Implementation in MX of curves mixing Basis swaps and other quotes for a Risk by Curve based on quotes, Summary of typical configuration cases

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FO Configuration

Title	docid	Content	Key concepts
MX Viewer Technical User Guide	7037	The aim of this document is to describe the generic functionality available in the MX Viewer tool. It complements other functional documents available for MX Viewer.	Introduction, Native view, Dictionary, Gallery, Formatting, Settings, Actions, Filters, Formulas, Layouts, Loader viewer, Stored data, Visibility, Clipboard, Best practices, Form Mode
Simulation Feeder	1359	This document describes how to set up Real time on a v3.1 environment in a simple and quick way.	Overview, General configuration when starting from scratch, Creation of a reference XML input file, SimulationFeeder
Simulation Viewer Overview	2075	This document, for internal use only, targets transversal teams requiring an overview of the data usually produced in simulation views and the meaning of the commonly used data dictionary fields.	Types of views and basic principles, Usage per asset class, Documentation
P&L Variation Practical Analysis	1897	The function P&L explains the profit and loss (P&L) variation of the book between yesterday (closing time) and now. This document presents a practical overview of this function, and details some effects that can be used to zoom on the P&L variation.	P&L explain overview, Details on effects computation
P&L Variance: P&L Explain Validation Guidelines	2186	The purpose of this document is to provide guidelines for testing the new P&LVAR tool. It details different testing strategies used to reconcile the figures given by the P&LVAR with the main simulation screen.	General Principals: Launcher Configuration, P&LVAR Scenario Setup, P&LVAR View Setup, Simulation Settings, Simulation Setup, FX Simulation Setup, Rates Setup; Validation of P&LVAR: P&LVAR due to the Movement of the Market Parameters, Spot P&L Conversion, Time Effect, Yield Curve Effect, FX Spot Effect, FX Volatility Effect, FX Smile Effect, P&LVAR due to the Market Operations

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Glossary | FO Profile

Term	Definition
A	
Active contract	Contract available/unavailable for selection (in pricing, trade entry…)
Adjustment before/after shift	A date adjustment rule may apply on the original date / on the shifted date. Not generally used in the shifter definition.
Algorithm	Determines how to shift the dates: Union or parallel.
Asian Past Average Rounding	Impacts the behavior of the application when an FX Asian option is exercised.
B	
Backward shifter	For FX Derivatives only. Computes the Expiry date from the Delivery date and to compute the Fixing date from the Delivery date (NDF). It relies on the Date to value date calendar.
Bond	A bond is a debt security where the issuer owes the investor a debt, where the issuer pays an interest (a coupon) and repays the principal at the maturity of the Bond.
C	
Calendar checking	Check whether the generated date is Holiday.
Capital Gain	Today's value - Initial value.
Cash	All past payments (from Capital or Revenue source) & future payments not included in the market value (e.g. premium for an option).
Closest index	The closest index stored in the system in terms of maturity.
CLS eligible	Continuous linked settlement eligible.
CLS start date	Start date
Contract active	If not ticked, the contract cannot be booked.
Cost of carry	See "Financing"
Cross swap mode	Ability to see cross swap points in the simulation zoom screen.
Cumulative mode (default mode)	For P&L Variance. Moving the parameters in a specific order, one after the other, keeping the already shifted parameters in their final value.

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Term	Definition
Currency	Unit of exchange
Current session settings	Current session settings apply to the current session only. If the user opens a new session, he will inherit the settings from the general settings.
CUR traded quotation	Default quotation mode displayed when CUR is traded as nominal amount.

D

Data Dictionary	A “list” of available fields arranged by categories.
Date to value date calendar	Computes the Spot date from the Horizon date or the Delivery date from the Expiry date (or the other way around).
Default quotation	Quotation mode. E.g. futures but not only. Futures are the most used quotation mode for a currency pair according to business practices.
Default premium quotation	Premium quotation mode displayed by default in the Pricing screen, the Deal entry ticket, and in Simulation.
Default rollover quotation	Default quotation mode used within the rollover procedure.
Default spot quotation mode	Spot quotation mode EUR-USD <> EUR = x USD <> x USD per EUR

F

Face amount	Contract size. Can be expressed in the underlying currency or base currency according to market conventions.
Financing	Applies to past cash flows. It is also called cost of carry. It assumes that all past flows have been reinvested every day at the overnight financing rate.
Floating rate reference	Default archiving group for FRA transactions
Flow rounding rule	Determines if the amount is rounded (nearest, by excess, by default)
Foreign currency	See “Position currency “(Underlying)”
Format Spot/Strike/Forward/ Swap/Volatility	Display of spot, strike, forward and swap points is defined for both quotation modes.

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Term	Definition
Forward shifter	Computes the Spot date from the Horizon date or the Delivery date from the Expiry date. More generally to compute the Value date. It relies on the Date to value date calendar.
Future cash proceeds	Are particular flows received in the future and not included in the market value. It could be the cash amount invested to enter into the transaction or any fixed but not yet settled flow e.g. the option premium which can be found in deal ticket.
Future prices	This flag determines which prices will be used and impact the futures contract prices. The values are: 1) Interpolated from OTC 2) Listed curve + OTC shift.
FX pricing settings & FX user pricing settings	Configuration flags mainly impact trade evaluation rules, cover models and specific market parameters assumptions. Can be modified locally for one user in the menu Configuration/Settings/FX user pricing settings.
FX SPOT	A spot trade is a contract between two parties to convert an amount in one currency into another currency (buying one, selling another) at a spot date i.e. very short term trade.

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G

General settings	General settings are configured globally at the FO desk level. They can be customized locally by a given end user if he has the appropriate rights, given in the configurator session.
Generator	Is a template/model which defines a swap or a bond. Can be used “as is” in a trade or be locally modified. Enables fast insertion of trades. Contains everything that is needed: Calendar, Payment fixing and Calculation schedule, Stub period, Rate convention, In arrears or up front, An index, All… except figures. Can be changed “globally” or “locally”.
Global change	Means modifying the generator template, which affects all new trades, including existing booked trades with the same generator.
Greeks	**Delta:** is the measure of the ratio of the change in price of the underlying asset to the change in the price of the option/ derivative **Gamma :** is the measure of the rate of change of the delta according to the price of the underlying asset **Rho:** is the measure of the sensitivity of an option to a change in the interest rate

Term	Definition
	Theta: is the measure of the rate of decline of an option due to the passing of time **Vega:** is the measure of an option's sensitivity to the changes in the volatility of the underlying asset

I

If non business day	If the result date on the calendars in Calendar checking is not a business day, this setting defines the rule to be applied.
Interpolated index	A computed figure deduced from the interpolation of the previous and the next index (most common configuration). The system will compute the exact forward-forward rate on the archiving group rate curve.
Interpolator	Allows the user to compute capitalization factor, discount factor and discount rate between any two dates based on current curve.

L

Listed volatilities	This flag determines which volatilities will be used. The values are: **1)** Interpolated from OTC **2)** Listed curve + OTC shift
Local Change	Means modifying the generator at trade level. A local change only affects that particular trade. (See "Generators")
Long term schedule	Default frequency of coupon flows

M

Margining	Option to configure listed option with margining. Margining allows to pay the option premium in MtM.
Market	Organized Market on which the contract is traded.
Market Value	Market Value = Today's trade value. Market value is either the market quotation or the sum of all futures flows discounted to spot date.

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Term	Definition
O	
Option cut off	Cut off time of the option (if any)
OTC	Over The Counter
OTC Contract	Underlying OTC currency pair
P	
P&L currency (Base)	Currency in which the P&L for this currency pair will be expressed.
Payment calendar (FO Generators)	Used for coupon calculation period and coupon payment dates.
Payment currency (FO Generators)	Is the currency in which nominal and coupon payments are made.
Payment currency (FO Configuration)	Currency in which cash settlements are made.
Precision on amount	Determines the numbers of decimals of amounts expressed in this currency.
Premium decimals	Number of decimals displayed for the premium by display quotation mode.
Premium form factor	Factor to apply to the premium notation.
Premium quotation	Default premium quotation mode.
Position currency (Underlying)	Position currency for this currency pair. Also known as underlying, risky, or foreign currency.
R	
Rate convention	Used for coupon flow calculation.
Rate entry mode	Constant swap points vs. constant interest rates when US rates move.
Reporting setup	Provides default calculation assumptions for reporting: printing reports, report batches, risk matrices, running a notepad.
Restore mode	Each parameter is shifted to new value then reset to its initial value before any other parameter is moved.

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Term	Definition
Revenue	Revenue = Past returns + upcoming returns
Rights	Have to be granted in order for change of a generator.
Risky	See “Position currency (Underlying)”

S

Scenario	A set of overall settings and of ordered effects to be processed by the tool. The scenario is configured via the simulation module.
Schedules definition	Stores rules used for coupon calculation and payment dates.
Settlement	Available options are Delivery and Cash. This field indicates the settlement style by default of the spot forward on this contract
Settlement calendar	Set of settlement dates for the contract.
Shift definition	Sets the step (Number x Unit) to be added or subtracted (Forward/Backward) to the initial date.
Short & Long term rate conventions	Default interest rate calculation convention for short/long term loans.
Simple shifter / Relative shifter	A relative shifter first calculates the date according to the underlying shifter then applies the shift taking into account the rules defined in the current shifter definition.
Simulation settings	Simulation settings apply to the simulation screens. They are organized in a preliminary common configuration part, shared by all transaction types and additional setting screens specific to each activity (FX, Rates, FXMM, credit…)
Spot schedule	Defines the way to compute spot value date from a given date.
Spot to delivery calendar	Computes the Delivery date from the Spot date
Swap factor	Is a multiplying factor for display. Like the spot price, it follows the quotation mode of the currency pair.
Swap form factor	Factor to apply to the swap points notation.

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Term	Definition
U	
Underlying quotation	Quotation mode of the underlying currency pair.
Unit	Can be expressed as Business day, Day, Week, Month, Quarter, Semester or Year
V	
Value date	Shifter used to compute Spot date from Horizon date and Expiry date from Delivery date.

Accenture: In-house FO Modules
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