Nasdaq Calypso

Market Data Server

Version 18

Revision 1.0

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Approved

Document History

Revision	Published	Summary of Changes
1.0	February 2024	First revision for version 18.

This document describes the Market Data Server that manages market data flowing into the system from live-feed providers, and distributes them in real-time throughout the system, for pricing and intraday risk calculations.

Table of Contents

1. Market Data Server Overview

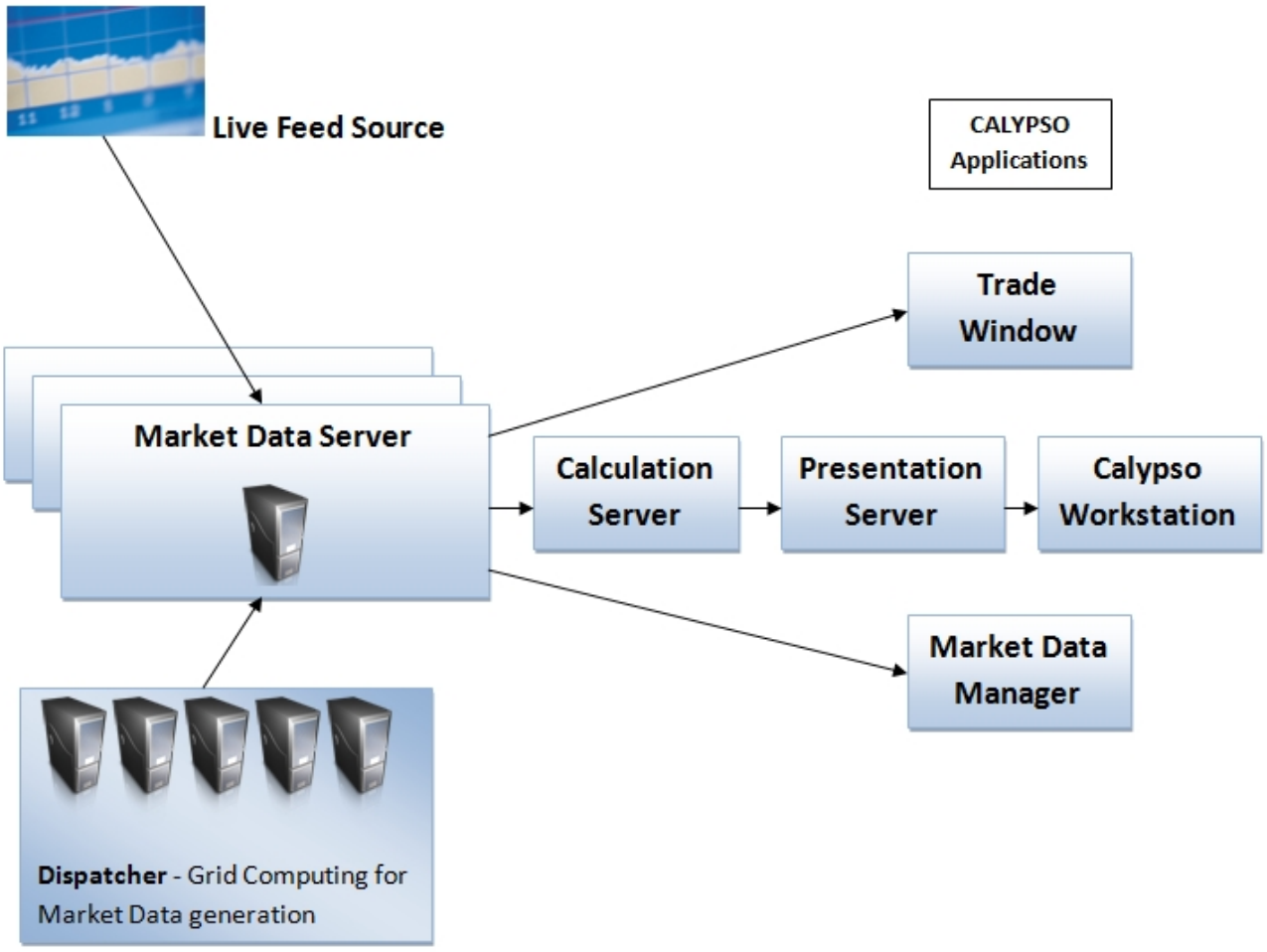
A Market Data Server manages market data flowing into the system from live-feed providers, and distributes them in real-time throughout the system, for pricing and intraday risk calculations.

A Market Data Server is part of a Risk Server.

You may run multiple instances of a Risk Server / Market Data Server to handle various types of market data, various update frequencies, or various policies.

When a Market Data Server is running, you can turn on and off real-time updates on-the-fly.

The following picture illustrates the architecture of the Market Data Server.

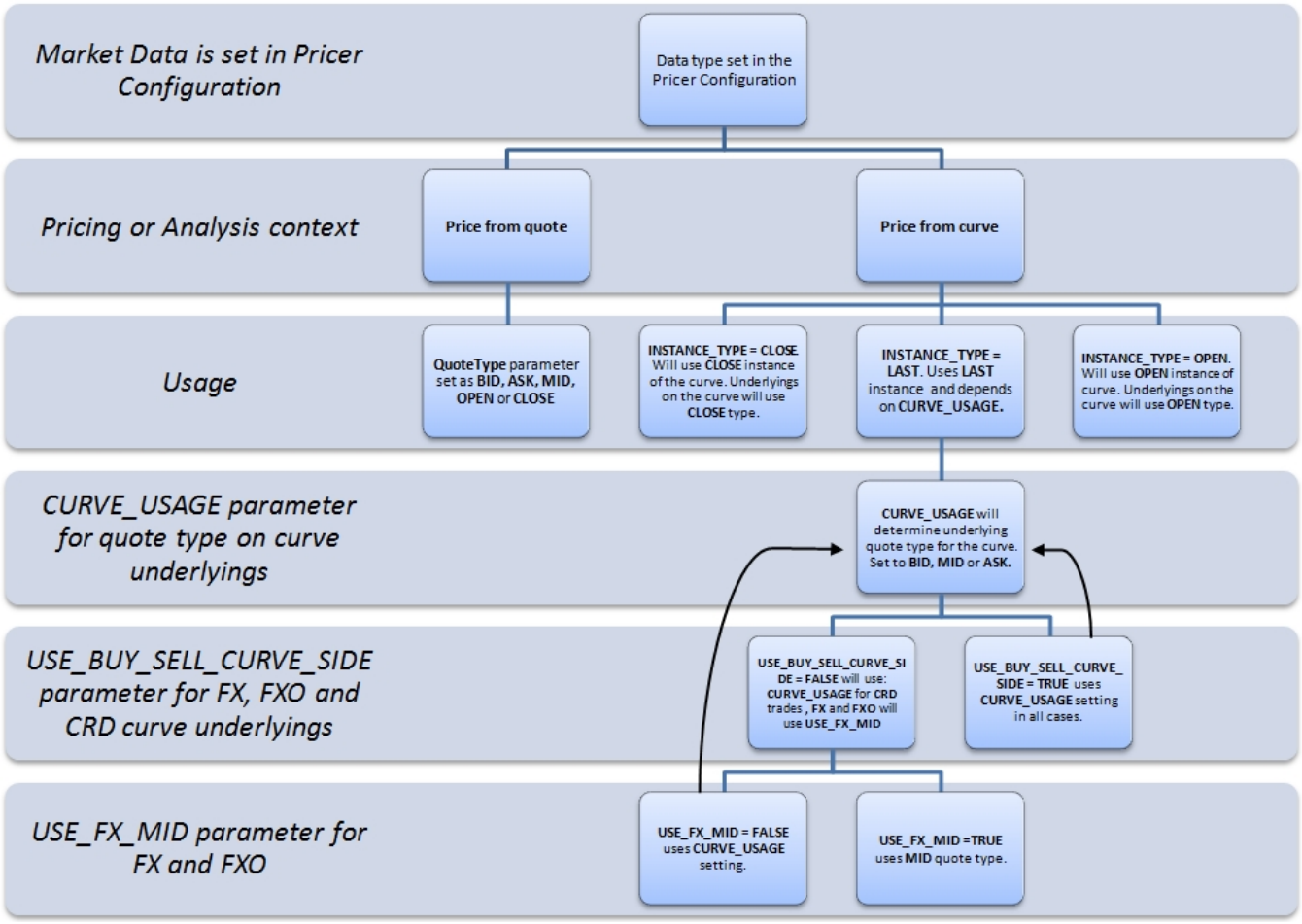


Market Data Server Architecture

2. Market Data Usage Settings

This topic provides a hierarchical view of market data usage in Calypso. Market quotes are used throughout the system to price instruments.

The graphic below describes the dependencies when pricing or running a risk analysis.



When pricing a trade from curves, the curves are selected based on the pricer configuration and the pricing parameter INSTANCE_TYPE. The INSTANCE_TYPE can be set for a given pricing environment and product type.

ⓘ **[NOTE: When pricing a trade in a Trade window in real-time mode, the latest curve is used, regardless of INSTANCE_TYPE]**

INSTANCE_TYPE = CLOSE	The system uses the CLOSE instance of the curve defined in the pricer

	configuration. CLOSE curves use CLOSE quotes for the underlying instruments regardless of other settings.
INSTANCE_TYPE = OPEN	The system uses the OPEN instance of the curve defined in the pricer configuration. OPEN curves use OPEN quotes for the underlying instruments regardless of other settings.
INSTANCE_TYPE = LAST	The system uses the LAST instance of the curve defined in the pricer configuration. If the environment property CURVE_USE_CLOSE_AFTER_LAST is True (default value), and there is a more recent CLOSE instance, then the CLOSE instance will be used instead. When using the LAST instance, the quote side of the underlying instruments depends on the setting of the pricing parameter CURVE_USAGE: • CURVE_USAGE = BID – The curve uses BID quotes • CURVE_USAGE = ASK – The curve uses ASK quotes • CURVE_USAGE = MID – The curve uses MID quotes For FX, FX Options, and CRD trades, the quote side of the underlying instruments depends on the setting of the pricing parameter USE_BUY_SELL_CURVE_SIDE • USE_BUY_SELL_CURVE_SIDE = True - The system uses ASK quotes for Sell trades, and BID quotes for Buy trades, regardless of CURVE_USAGE. • USE_BUY_SELL_CURVE_SIDE = False. For CRD trades, the system uses CURVE_USAGE. For FX and FX Options trades, the quote side of the underlying instruments depends on the setting of the pricing parameter USE_FX_MID. – USE_FX_MID = True, the system uses MID quotes regardless of CURVE_USAGE. – USE_FX_MID = False, the system uses CURVE_USAGE. **[NOTE: The recommended setting for USE_BUY_SELL_CURVE_SIDE is False because of the way risk analyses and numerical pricer measures perturb LAST curves. They only perturb the MID quotes, so the generated perturbed curve points will have BID = MID = ASK, regardless of USE_BUY_SELL_CURVE_SIDE]**

When pricing a trade from quotes, the quotes are selected based on the pricing parameter QuoteUsage: BID, MID, ASK, LAST, OPEN, or CLOSE.

3. Access Permissions

The access permissions may be set using **Configuration > User Access Control > Access Permissions** from the Calypso Navigator.

- You may refer to Calypso Security Documentation for details on using the Access Permissions window.

The following table shows the access permissions for the Market Data Server.

Application	Access Permissions
Market Data Server Configuration	Access permissions for market data server configurations (host name and port number) are twofold: - The user must be granted the functions described below as applicable. - The user must be granted read-only or read-write access to individual market data server configurations under Access > MktData Server Config as applicable. ***CreateMktDataServerConfig*** Permission to create new market data server configurations. ***ModifyMktDataServerConfig*** Permission to modify market data server configurations. ***RemoveMktDataServerConfig*** Permission to delete market data server configurations. ***MktDataServerAllowForceGenerate*** Permission to allow force generating market data on-the-fly. In the trade worksheet in the Market Data panel, click ▾ and choose "Force generate". ***MktDataServerAllowMultiSelection*** Permission to allow selecting multiple market data servers on-the-fly. In the trade worksheet in the Market Data panel, click ▾ and choose "Select Market Data Server" to choose to a different Market Data Server.

What's Next?

- You can configure a live-feed source.

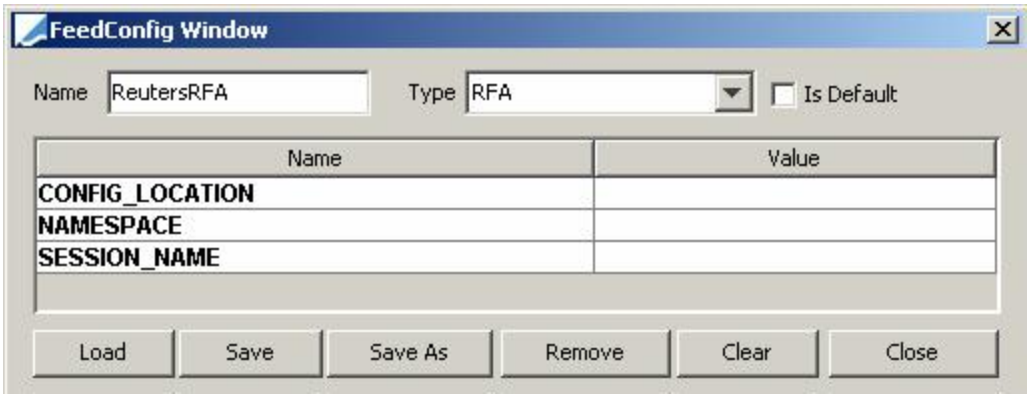
4. Configuring a Live-Feed Source

Configuring a live-feed source is a two-step process:

- You first need to define a feed source
- Then you need to map the Calypso quote names with the quote names of the feed source

4.1 Defining a Feed Source

From the Calypso Navigator, navigate to **Configuration > Market Data > Feed** (menu action `util.FeedConfigWindow`) to define a feed source.



Feed Source Definition

» Select the type of feed source you want to use: RFA (Reuters RFA), Bloomberg (Bloomberg Data License), Bloomberg SAPI, Random (random quote generator for test purposes), or Composite.

A number of attributes are displayed, define the attributes as needed.

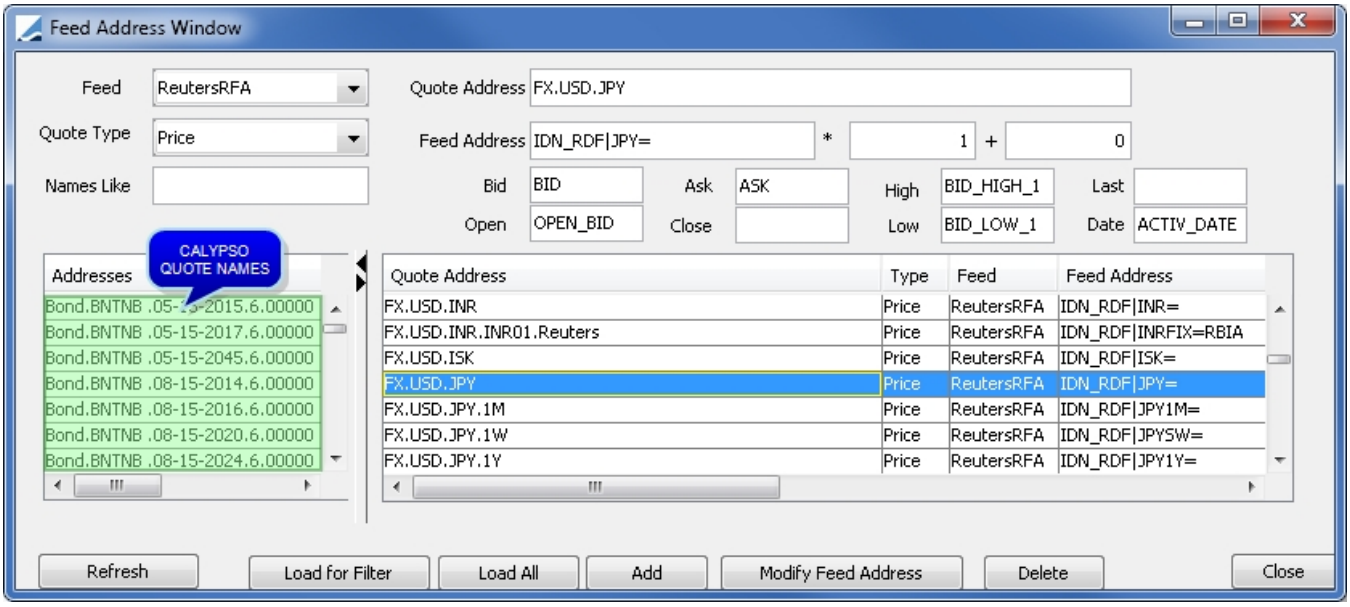
- For RFA, refer to the *Calypso Reuters RFA Integration Guide* for details.
- For Bloomberg, refer to the *Calypso Bloomberg Data License Integration Guide* for details.
  - Security definitions, historical market data, snapshot of market data (including CLOSE quotes)
  - Send Bloomberg data requests and retrieve data via FTP/SFTP
  - Does not require Bloomberg Terminal access
  - Allows for high volume of data
- For BloombergSAPI, refer to the *Calypso Bloomberg SAPI Integration Guide* for details.
  - Real-time and delayed market data (no CLOSE quotes)
  - Obtains data from Bloomberg via a client-side dedicated Server API process
  - Each user must be logged into the Bloomberg Terminal while using the feed in Calypso
- For Random, see Random Feed Setup for details.
- For Composite, see Creating a Composite Feed Source for details.

- Enter a name in the Name field. The feed configuration will be identified by its name throughout the system.
- Click **Save** to save the configuration.

4.2 Feed Mapping

You need to map the quote addresses of the feed source to the actual quote names in Calypso.

From the Calypso Navigator, navigate to **Configuration > Market Data > Feed Address Mapping** (menu action `marketdata.FeedAddressWindow`).



Feed Source Mapping

- Select a feed definition from the Feed field, and click **Load All** to load all Calypso quote names. They appear in the Addresses list on the left-hand side.

  You can search specific quote names using the Names Like field, and click **Refresh** to update the list of Calypso quote names.

- Select a Calypso quote name from the Addresses list. The selected address appears in the Quote Address field.

  Clicking **Load for Filter** will load all quotes matching the Names Like field into the Quote Address field.

  Enter the corresponding address from the feed source in the Feed Address field, and any multiplicative or additive factor.

  Enter the instance names from the feed source corresponding to the Calypso instance names (Bid, Ask, High, Last, Open, Close, Low, and Date).

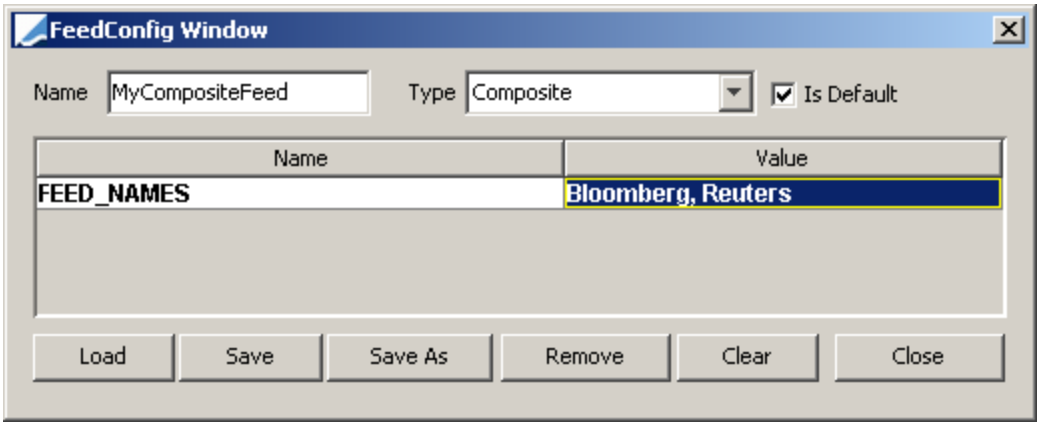
[NOTE: The date that the system saves with the quote defaults to today's date. However, you may want to save a different date with the quote, depending on what the feed offers. For example, when using the Reuters feed, you could map ACTIVE_DATE, VALUE_DT1 (yesterday's quote), or VALUE_DT2 (quote from the day before

yesterday) to the Calypso Date field - Please refer to the *Calypso Reuters RFA Integration Guide* for complete details]

» Click **Add** to save the mapping.

4.3 Creating a Composite Feed Source

The composite feed source allows aggregating data from multiple feeds.



» Select the Composite feed source option from the Type drop-down list.

» Enter the feed sources to include in the composite source. These need to be defined as feed sources as well.

[NOTE: An error message will appear if the sources provide conflicting information for the same quote]

» Click **Save** to save the configuration.

What's Next?

▶ You can now configure a market data server.

5. Configuring a Random Feed

The random feed randomly generates real-time quotes from a quote file.

[NOTE: It is intended for testing purposes]

5.1 Quote File Setup

A sample quote file is available under `<calypso home>/client/resources/samples/QuoteGenTest.txt`.

The format is the following:

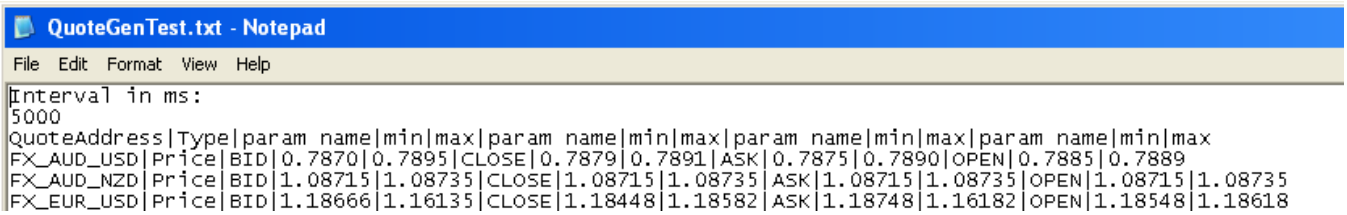
- First line: Label "Interval in ms:"
- Second line: Specify the interval in milliseconds between each quote generation.

  For example, a value of `2000` generates all quotes every 2 seconds.

  Optionally, you can specify a range of quotes that are generated at every interval.

  For example, if you set `2000,25,75`, a minimum of 25% percent of the quotes will be generated every 2 seconds, and a maximum of 75% of the quotes will be generated every 2 seconds. So the actual generation frequency of the quotes is random.
- Third line: Labels to describe the format.
- Fourth line and after: Quote values, separated by "|", in this order:
  - Quote Name
  - Type of the quote (price, yield, etc.), as defined in the Feed Address Mapping.
  - 7 times 3 fields representing: the instance of the quote (BID, ASK, OPEN, CLOSE, HIGH, LOW, LAST), as defined in the Feed Address Mapping, the Minimum value for the quote, the Maximum value for the quote.

Example:



Sample quote file format

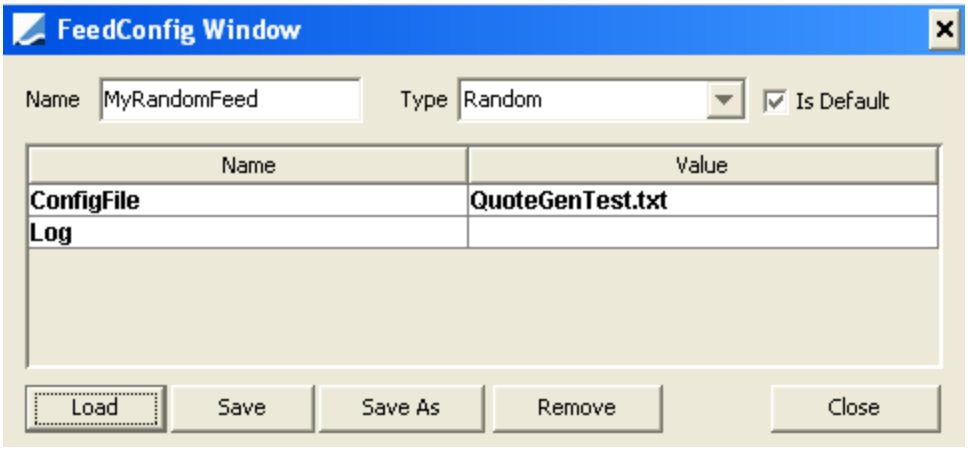
If you do not complete all of the fields, the program tries to create consistent quotes, but it works better if you complete all of the fields correctly. However, if it detects something wrong, it issues a warning in the log and continues to the next line.

[NOTE: All quotes are required: BID, ASK, OPEN, CLOSE, HIGH, LOW, LAST]

Before deploying the file to the application servers, you need to copy it to: `<calypso home>/tools/calypso-templates/resources/samples`.

5.2 Feed Configuration

From the Calypso Navigator, navigate to **Configuration > Market Data > Feed** (menu action `util.FeedConfigWindow`).



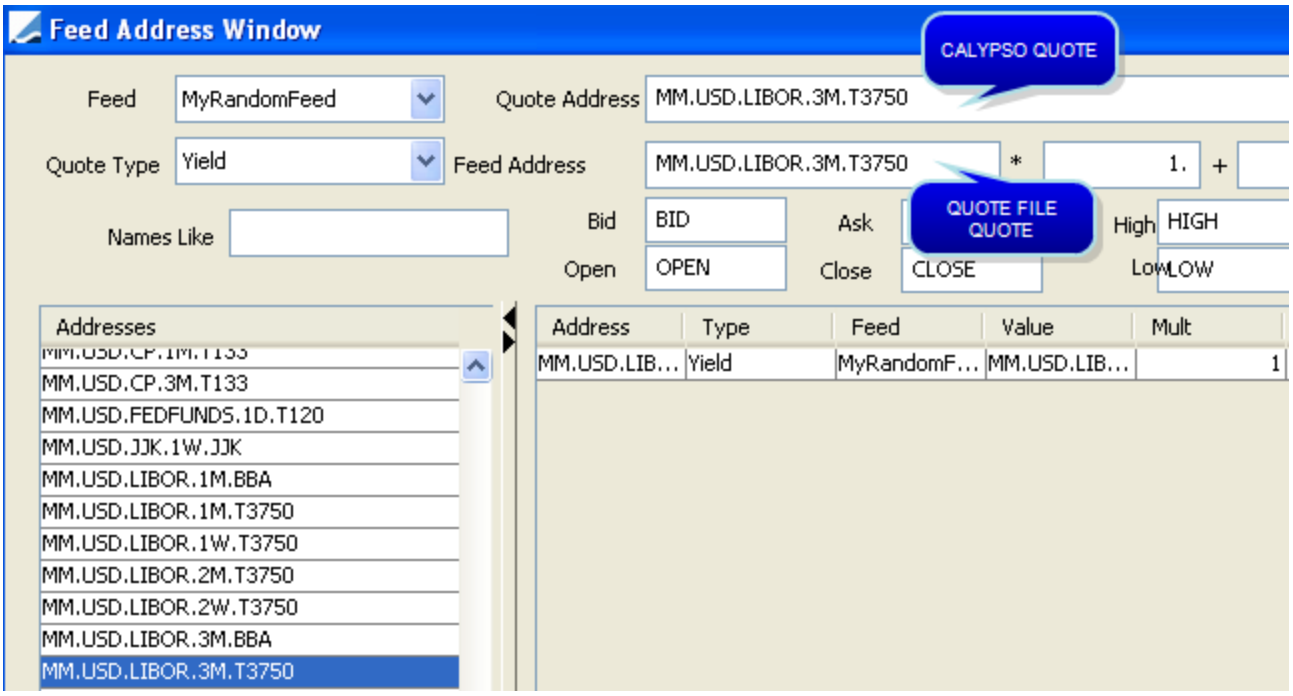
Sample random feed configuration

- Select Random from the Type field. Feed types are registered in the feedType domain.
- Enter a name in the Name field. The feed configuration will be identified by its name throughout the system.
- Enter the name of the quote file in the ConfigFile parameter. For example `QuoteGenTest.txt`.
- Click **Save** to save the configuration.

5.3 Feed Addresses Mapping

You need to map the quote addresses of the quote file to the actual quote names in Calypso.

From the Calypso Navigator, navigate to **Configuration > Market Data > Feed Address Mapping** (menu action `marketdata.FeedAddressWindow`).



Sample feed address mapping

» Select a feed configuration from the Feed field, and click **Load All** to load all Calypso quote names. They appear in the Addresses list.

You can search specific quote names using the Names Like field, and click **Refresh** to update the list of Calypso quote names.

» Select a Calypso quote name from the Addresses list. The selected address appears in the Quote Address field.

Clicking **Load for Filter** will load all quotes matching the Names Like field into the Quote Address field.

Enter the corresponding address from the quote file in the Feed Address field, and any multiplicative or additive factor.

Enter the instance names from the feed source corresponding to the Calypso instance names (Bid, Ask, High, Last, Open, Close, Low, and Date).

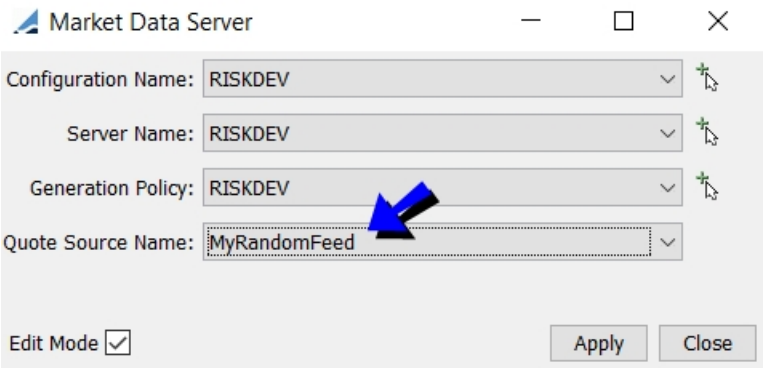
[NOTE: The quote is saved with today's date]

» Click **Add** to save the mapping.

5.4 Subscribing to Real-Time Quotes

You can subscribe to real-time quotes using the Market Data Server.

You need to define a Market Data Server based on the random feed that you have setup.



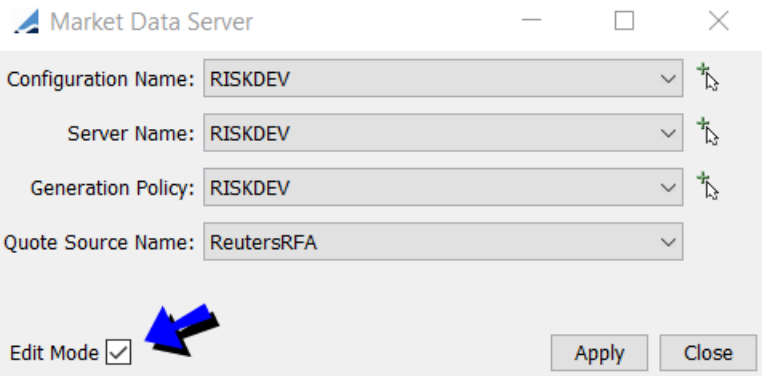
Sample market data server

You can then select the Market Data Server in the User Defaults attribute "Market Data Server Config", and start the corresponding Risk Server to subscribe to the random quotes.

6. Configuring a Market Data Server

From the Calypso Navigator, navigate to **Configuration > Market Data > Market Data Server** to configure a Market Data Server.

Check the "Edit Mode" box to create or edit a configuration.



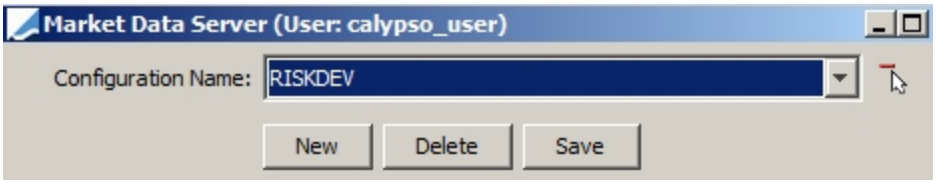
Market Data Server Configuration - Edit Mode

You can now create the various components of the Market Data Server configuration as described below.

Then click **Apply** when you are done to save your modifications.

6.1 Configuration Name

To start a new configuration, click . You can also select an existing configuration and modify as needed.



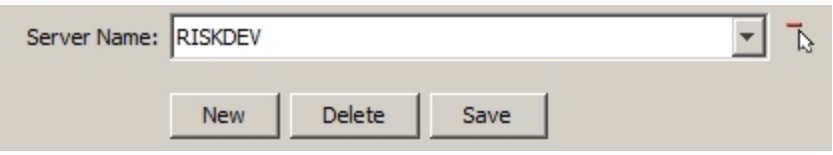
Set Configuration Name

- Click **New**. You will be prompted to enter a name for the configuration.

  By default, the configuration name should be a Risk Server name. It will be needed when starting the Risk Server.
- Then click **Save**.

6.2 Server Configuration

Click to display the server details.



Set Server Name

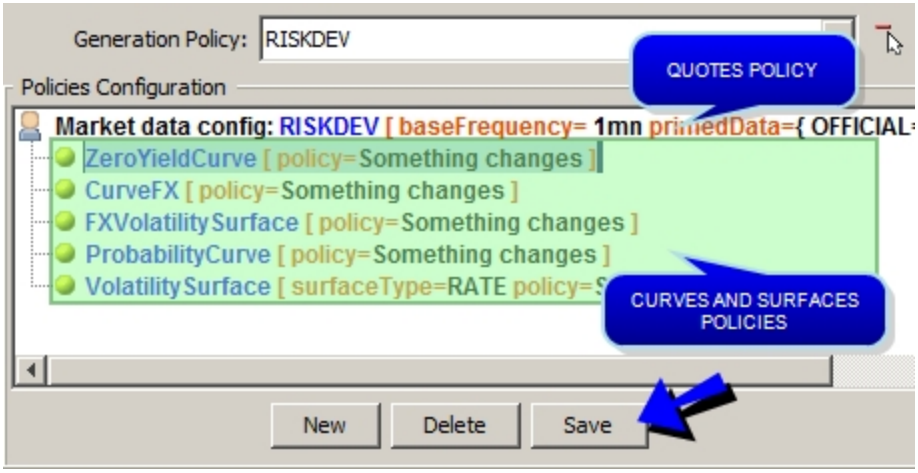
- Click **New**. You will be prompted to enter a server name.
- Click **Save**.

6.3 Generation Policy

You then need to configure which market data are distributed in real-time by the market data server, and how.

By default, ALL quotes are distributed in real-time by the market data server, whether they are coming from a live-feed source, or saved manually in the system. For curves and surfaces however, you need to configure a generation policy for each type of data. If you do not specify a generation policy, the corresponding market data will not be regenerated and distributed in real-time, the market data server will load the market data from the database.

Click to display the generation policy details.



Define Generation Policy

- Click **New**. You will be prompted to enter a name for the policy configuration.
- To add a generation policy for a type of curve of surface, right-click the "Market data config" label, and choose "Add/Update Policy".

  ▶ See Adding a Generation Policy for details.
- You can enforce market data consistency, and set the update frequency for the quotes - It defaults to 1 minute. Right-click the "Market data config" label, and choose "Set options".

  ▶ See Setting Options for details.

- (Optional) - You can define primed market data that will be pre-loaded in the Market Data Server without having to wait for a client application to request them. Right-click the "Market data config" label, and choose "Set primed data".

  ▶ See Setting Primed Market Data for details.

- (Optional) - You can set a list of pricing environment that should not be updated in real-time. Right-click the "Market data config" label, and choose "Set non-realtime PE".

  ▶ See Setting Non Real-Time Pricing Environments for details.

- Click **Save** if you make any change to save the generation policy.

6.3.1 Adding a Generation Policy

Right-click the "Market data config" label, and choose "Add/Update Policy". It brings up the "Add/Update policy" dialog.

Add/Update Policy

Step 1 - Select the type of market data for which you want to define a generation policy.

By default, the generation policy applies to all curves or surfaces of the selected type, but you can restrict the scope using the selection crtieria.

Step 2 - Select the generation policy:

- "Something changes" - If anything changes on the market data (definition or quotes), the market data server regenerates and distributes the market data.
- "Quote change only" - The market data server regenerates and distributes the market data only if the underlying quotes change.
- "Underlying change only" - The market data server regenerates and distributes the market data only if the underlying instruments have been modified.

You can also enter a frequency multiplier to override the base frequency for the current market data. For example, if you set the frequency multiplier to 10, and the base frequency is 1 minute, the current market data will be updated every 10 minutes.

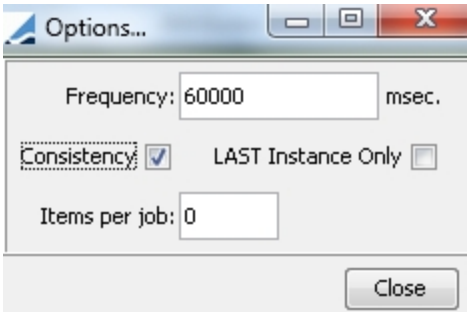
Step 3 - Click **Add Item** to add the policy to the policy configuration.

You can also click **Replace** when you are updating an existing policy.

Make sure to click **Save** in the Generation Policy area to save the policy configuration.

6.3.2 Setting Options

Right-click the "Market data config" label, and choose "Set options". It brings up the "Options" dialog.



Set Options

» Enter the options as needed - They are described below.

» Make sure to click **Save** in the Generation Policy area to save the policy configuration.

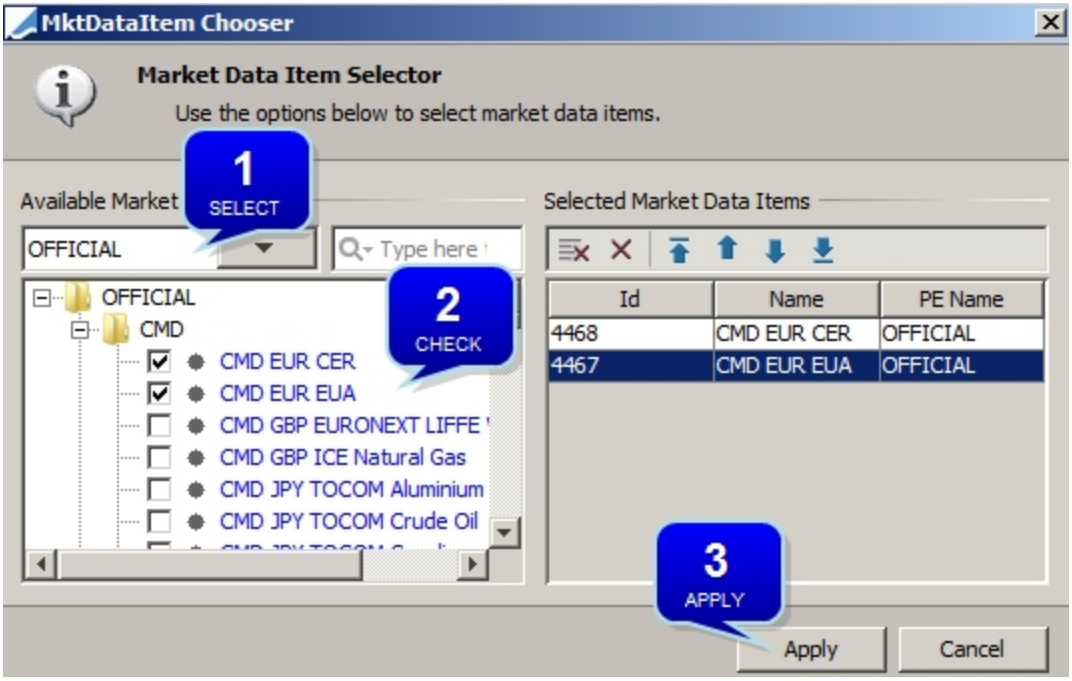
Fields	Description
Frequency	Enter the update frequency in milliseconds.
Consistency	Check “Consistency” to update related market data when the current market data is updated. For example, when checked for probability curves, a probability curve will be updated if the

Fields	Description
	underlying riskless curve is updated. **[NOTE: It is strongly recommended to check the Consistency checkbox in order to enforce market data consistency]**
LAST Instance Only	If checked, this option will have the effect of ignoring all feed quote updates except the ones used for the “LAST” market data instance (i.e. BID and ASK quotes). Technical note: This “filtering” only applies to quotes received from a live-feed source and not to quotes saved into the system. If a quote is saved into the system (manually, or through the SAVE_QUOTES scheduled task), or if a curve or surface is modified, the market data server will pick up this change and make it available to all of relevant subscribers regardless of the market data instance being used. The INSTANCE_TYPE pricing parameter impacts this option. When the instance type is CLOSE and "Last Instance Only" is checked, then there will be no subscription to real-time updates. If "Last Instance Only" is not checked, then real-time updates proceed for any value of INSTANCE_TYPE.
Items per job	If you are using a dispatcher configuration to distribute the load of regenerating the market data to multiple processors, you need to specify the number of items per processor. The number of items per job is the number of curves and surfaces that will be regenerated by a given processor. Even if the same base curve is needed to regenerate all the curves and surfaces, multiple jobs will be created based on this setting.

6.3.3 Setting Primed Market Data

Primed market data are pre-loaded in the Market Data Server without having to wait for a client application to request them, and are therefore readily available.

Right-click the "Market data config" label, and choose "Set primed data". It brings up the "MktDataItem Chooser" dialog.

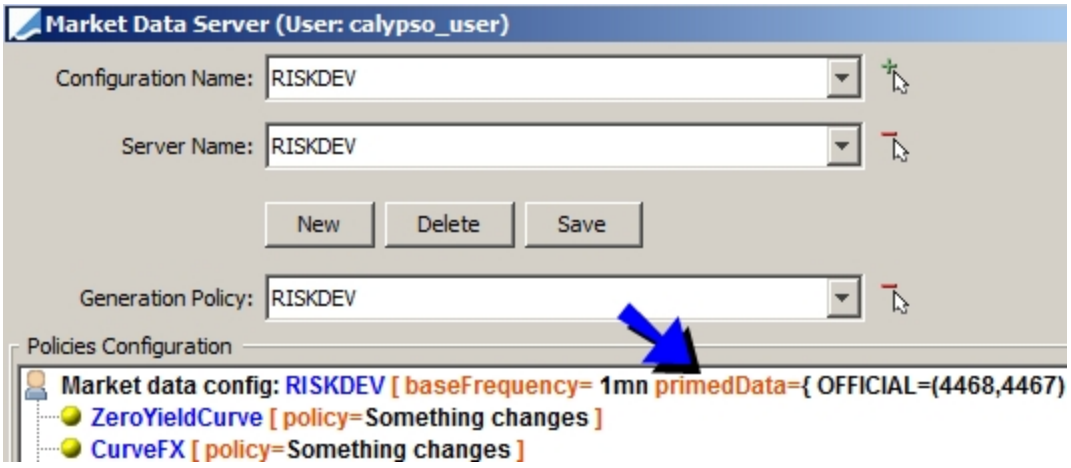


Set Primed Data

Step 1 - Select a pricing environment.

Step 2 - Click **Apply**.

The primed data are displayed in the policy configuration.



Check the market data that you want to prime.

Step 3 - Make sure to click **Save** to save the policy configuration.

6.3.4 Setting Non Real-Time Pricing Environments

[NOTE: This option is only available if the environment property MDS_SET_NON_REALTIME_PE is set to "true"]

Right-click the "Market data config" label, and choose "Set non-realtime PE".

You will be prompted to select a list of pricing environments.

These pricing environments will not be updated in real-time by the Market Data Server. This only applies to Trade windows and the Trade Blotter.

6.4 Quote Source Name

Select the live-feed source from the Quote Source Name drop-down menu.

- See Configuring a Live-Feed Source for details on setting up a feed source.

What's Next?

- You need to start the Market Data Server in order to distribute real-time updates.

7. Starting a Market Data Server

A Market Data Server is started as part of a Risk Server using "<calypso home>/startRiskserver.bat" on Windows platforms, or "<calypso home>/startRiskserver.sh" on *nix platforms.

Example (this is a one-line command):

```
"%JBOSS_HOME%\bin\standalone.bat" -b localhost -c standalone-riskserver.xml -Denv=LAPTOP_REL14 -
Djboss.server.base.dir="%JBOSS_HOME%\standalone-riskserver" -Djboss.node.name=standalone-riskserver
-Dorg.jboss.as.logging.per-deployment=false -Dcalypso.console.appender=true -
Djboss.socket.binding.port-offset=200 -Dcalypso.risk.config=RISKDEV %*
```

Note that the Risk Server name (RISKDEV in this example) is provided for the argument "-Dcalypso.risk.config" - It starts a Calculation Server, a Presentation Server, and a Market Data Server of the SAME NAME.

You can also start individual servers as needed.

- Please refer to the *Calypso Installation Guide* for details.

What's Next?

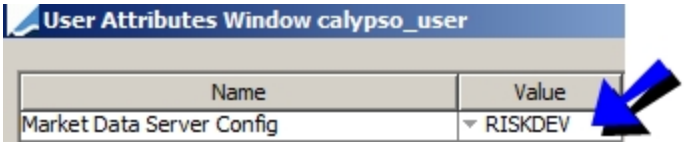
- You are now ready to use the Market Data Server.

8. Using the Market Data Server - Trade Window

8.1 Marke Data Server Activation

On the Client side, each user must activate subscriptions to receive real-time updates from the Market Data Server.

From the Calypso Navigator, navigate to **Configuration > User Access Control> User Defaults**.



User Defaults attributes - Select Market Data Server

- Click **Attributes** to bring up the Attributes window.
- Select a market data server configuration from the attribute "Market Data Server Config", and click **Apply**.
- Click **Save** to save the User Defaults.

  The activation is a one time operation.

8.2 Market Data in a Trade Window

Bring up a Trade window, and display the Pricing area.

When you are using the Market Data Server, the pricing area of the trade window shows the following features, provided the menu item **Pricing Env > Real Time.Change** is checked.

Trade Window using Market Data Server

- The green checkmark indicates that everything is running without any issue.

  It turns yellow if there is an issue - In this case, you can click the checkmark to show error details.

  It turns red if the Market Data Server stops running - In this case:
  - Contact your administrator to restart the Market Data Server
  - Click the down arrow and choose "Reconnect"

- The unlocked icon indicates that you want to receive real-time updates.

  You can click the unlocked icon to suspend real-time updates temporarily - The lock icon will appear instead.

  In turn, you can click the lock icon to resume real-time updates.
- The down arrow brings up a popup menu with additional functions - They are described below
- The market data appears with a yellow background when it has been updated.

8.2.1 Forcing Market Data Update

At any time, you can click the down arrow and choose "Force Generate" to regenerate the market data with the latest quotes. This can be done in between consecutive real-time updates, or when you have temporarily suspended real-time updates.

8.2.2 Viewind Market Data

You can double-click a market data to view its details, it will open the Market Data Manager.

▶ See Market Data Manager for more details.

If real-time updates have been temporarily suspended, the market data definition window is displayed instead. You can choose **Pricing Env > Market Data Manager** to open the Market Data Manager.

When the Market Data Server is locked, you can modify the market data in either window, and apply the modifications to the trade. Modifications only apply to the current trade.

8.2.3 Viewing Quotes that are not Updated

You can click the down arrow and choose "Show Unsubscribe Feed Quotes" to display quotes that are not updated in real-time because they are not available from the live-feed source.

8.2.4 Selecting another Market Data Server

You can click the down arrow and choose "Select Market Data Server" to select another Market Data Server.

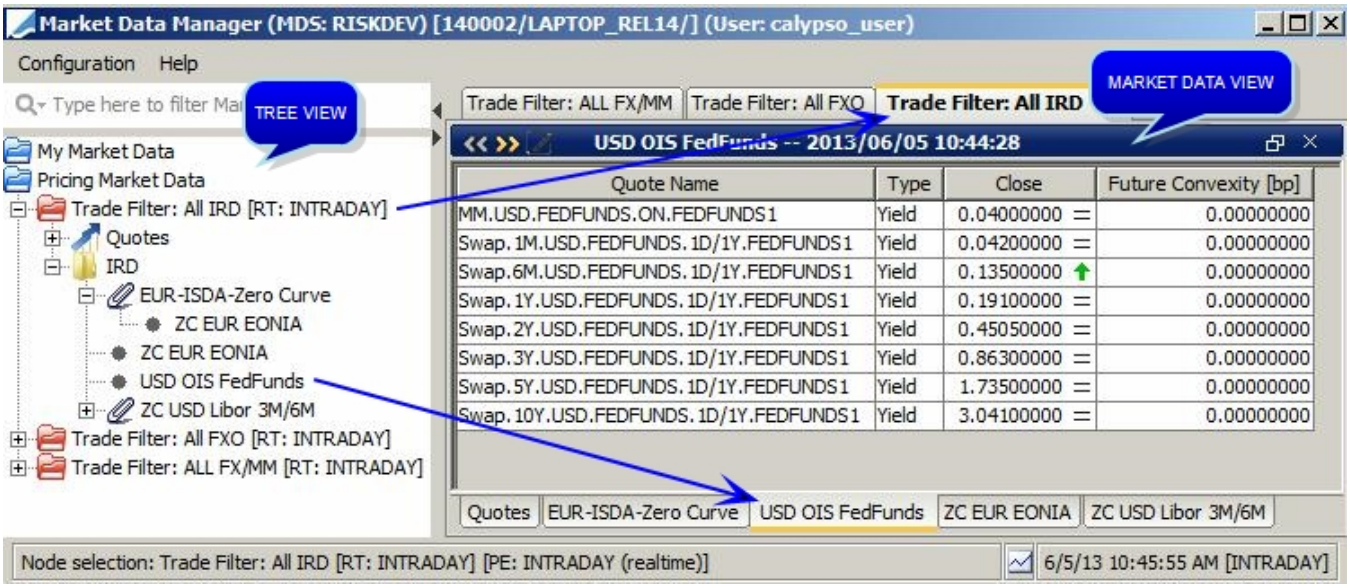
9. Market Data Manager

The Market Data Manager offers a consolidated view of market data when opened from any environment, i.e. Trade Blotter, Calypso Workstation, Trade windows, etc. Market Data can be edited from this window without altering the pricing environment, and can be applied "locally"to a personal trading environment. Edited market data can be used to analyze risk and positions on-the-fly.

The Market Data Manager can pull real-time quotes from live feed sources provided a Market Data Server is running.

▶ See Configuring a Market Data Server for details.

You can open the Market Data Manager from any environment by choosing **Pricing Env > Market Data Manager**.



You can open multiple Market Data Managers from multiple windows (Trade Blotter, Pricing Sheet, Trade worksheet, etc.). Each Market Data Manager will have its own node in the Tree view under "Pricing Market Data" that displays all the market data used in the corresponding window. When you double-click a given market data, a panel is displayed on the right-hand side for the corresponding node and market data that shows the market data details.

You can add market data under "My Market Data".

The various functions of the Market Data Manager are described below.

9.1 Tree View Functions

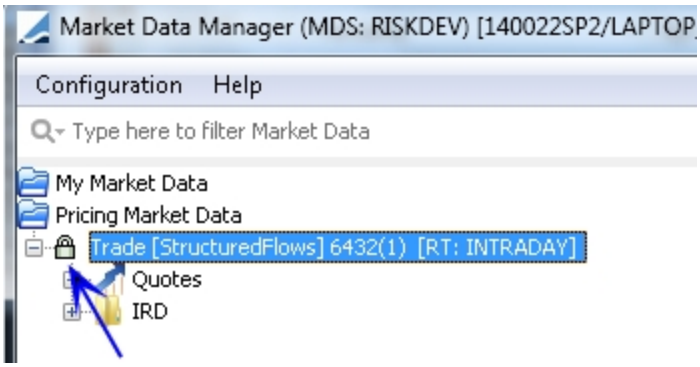
9.1.1 Displaying Market Data

You can double-click a node to display all the corresponding market data in the Market Data View - It opens a panel for the node, and within this panel, it opens a panel for each market data. It is limited to 10 market data panels.

You can also double-click market data individually to display them in the Market Data View.

9.1.2 Locking Real-Time Updates

You can right-click a node (trade, trade filter, etc.) and choose "Lock Market Data" to prevent real-time updates.



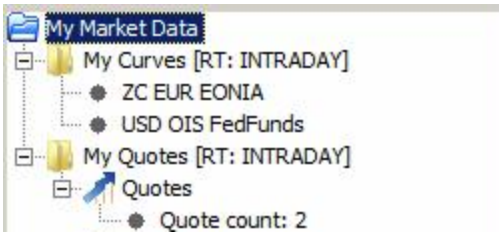
In this case, you can edit the quotes in the Market Data View.

▶ See Updating Quotes for details.

9.1.3 Creating a Custom Set of Market Data

The Market Data Manager allow users to monitor a custom set of market data under "My Market Data". Market data can be added from a pricing environment, or from other nodes already open in the Market Data Manager.

A specified market data set will be saved to the window and opened with each instance. Removing a market data set will permanently remove the set from the Market Data Manager window.



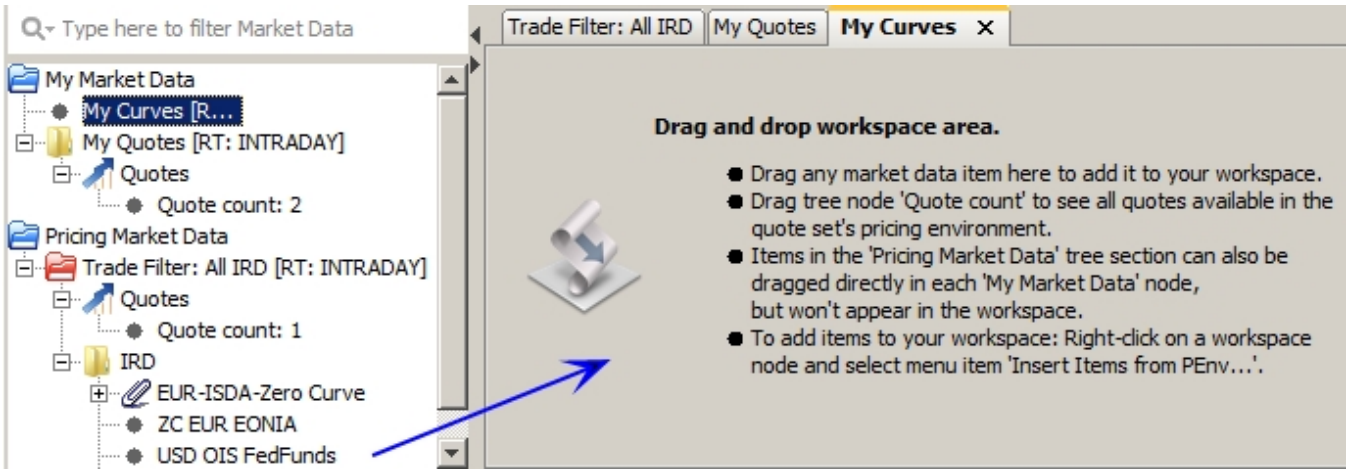
Sample "My Market Data" node

To add market data, you first need to create a workspace. Right-click the "My Market Data" label, and choose "Add Market Data Set". You will be prompted to enter a workspace name, and select a pricing environment.

Once you have added a workspace, you have the following options to add market data.

Option 1 - Drag and drop market data from other nodes.

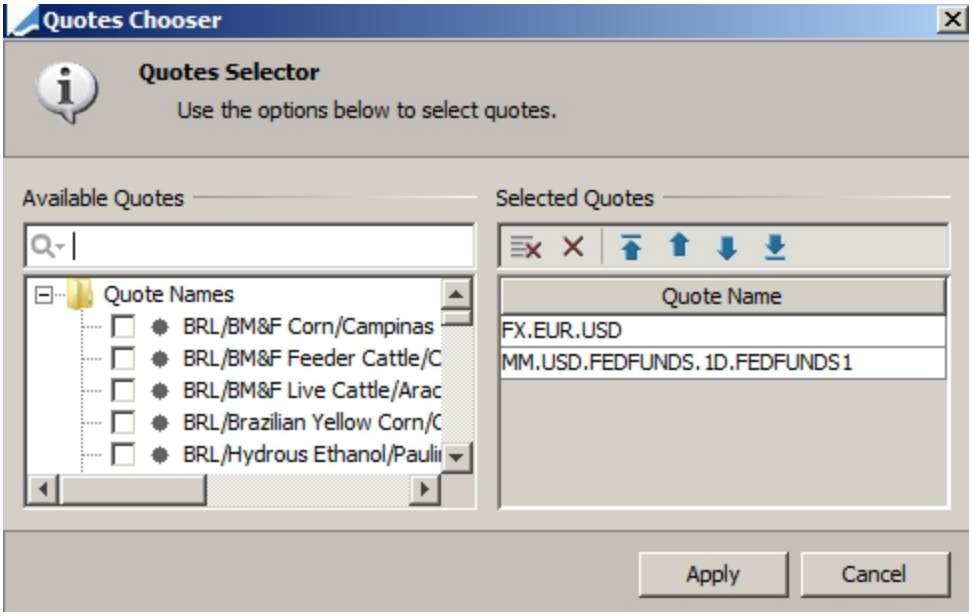
Double-click the workspace so that it creates a panel on the right-hand side.



» Drag a market data from another node, and drop it into the panel of your workspace on the right-hand side.

Option 2 - Right-click the workspace and choose "Add Quotes View". You will be prompted to enter a quotes view name.

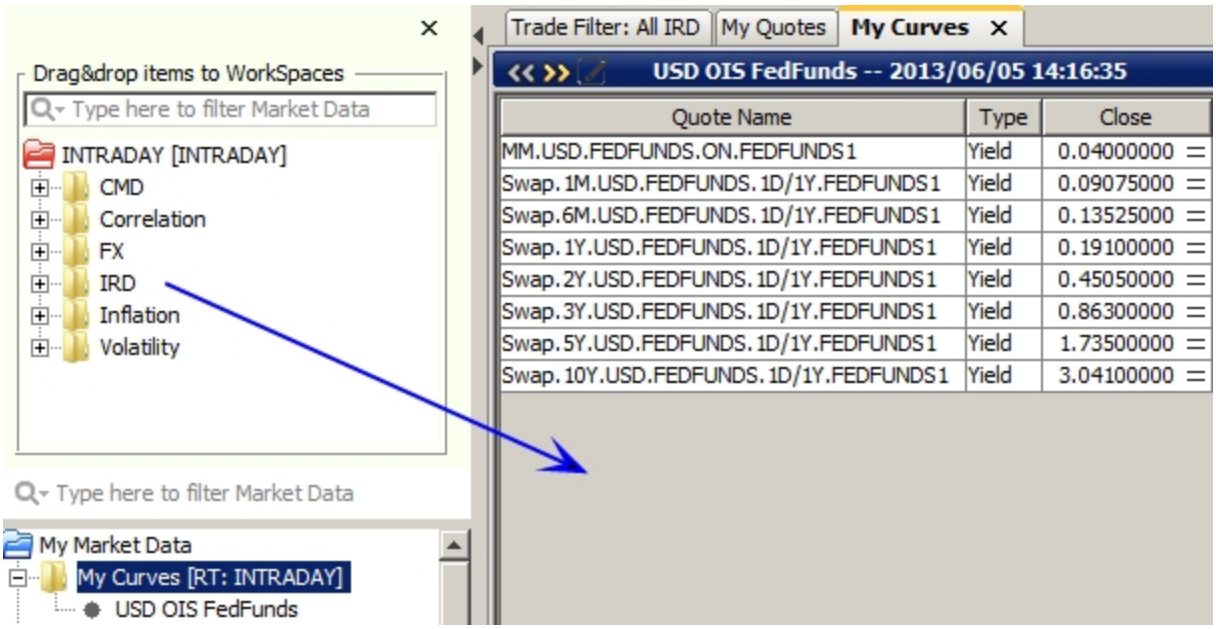
The Quotes Selector will be displayed so that yo can select which quotes you want to add.



» Check the quotes that you want to add in the Available Quotes area, then click **Apply**.

Option 3 - Right-click the workspace and choose "Insert Items from PEnv". You will be prompted to select a pricing environment.

The market data of the pricing environment will be loaded. You can then drag and drop items into the panel of your workspace as described in Option 1.



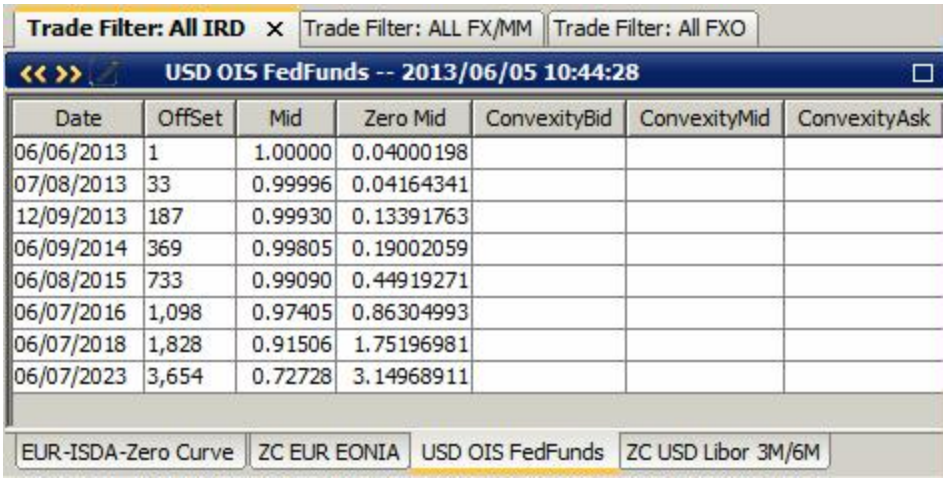
9.2 Market Data View Functions

9.2.1 Navigating Market Data Details

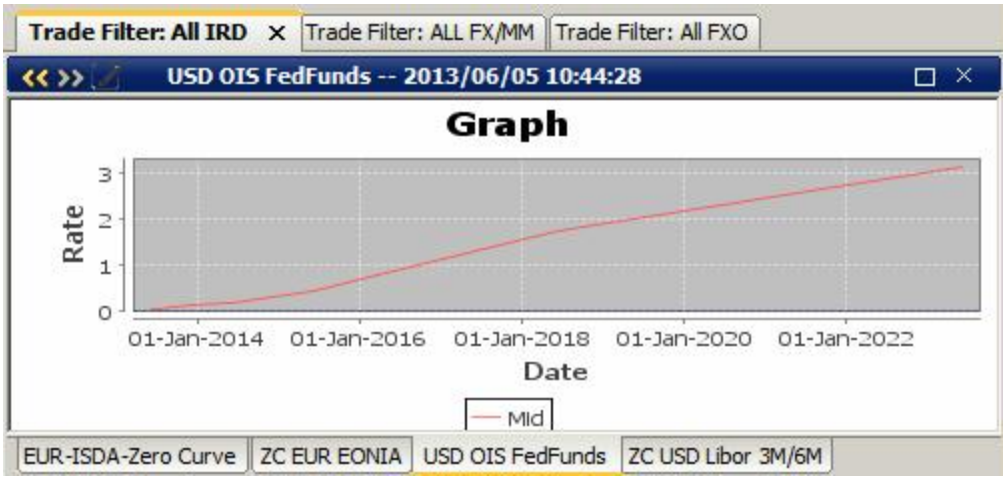
You can use the yellow arrows << and >> to navigate the various details of a given market data.

By default, the underlying and quotes are displayed.

You can also display the points.

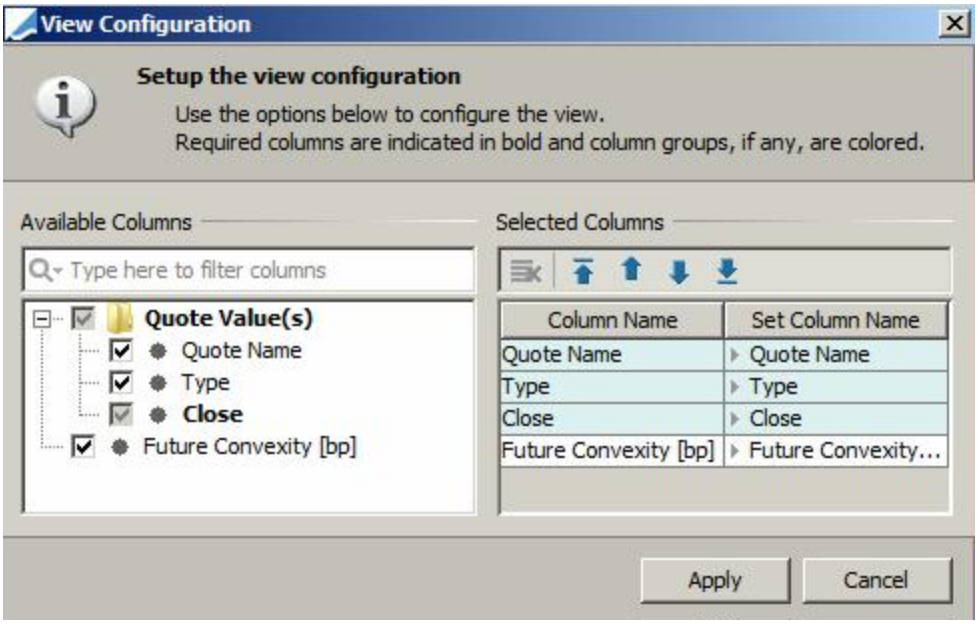


Then you can display the graph.



9.2.2 Configuring Columns

You can choose > **Configure Columns** to select the columns to be displayed.



- Check the columns that you want to display in the Available Columns area.
- You can then arrange them as needed in the Selected Columns area.
- Then click **Apply**.

You can choose > **Save Configure Columns** to save your column configuration.

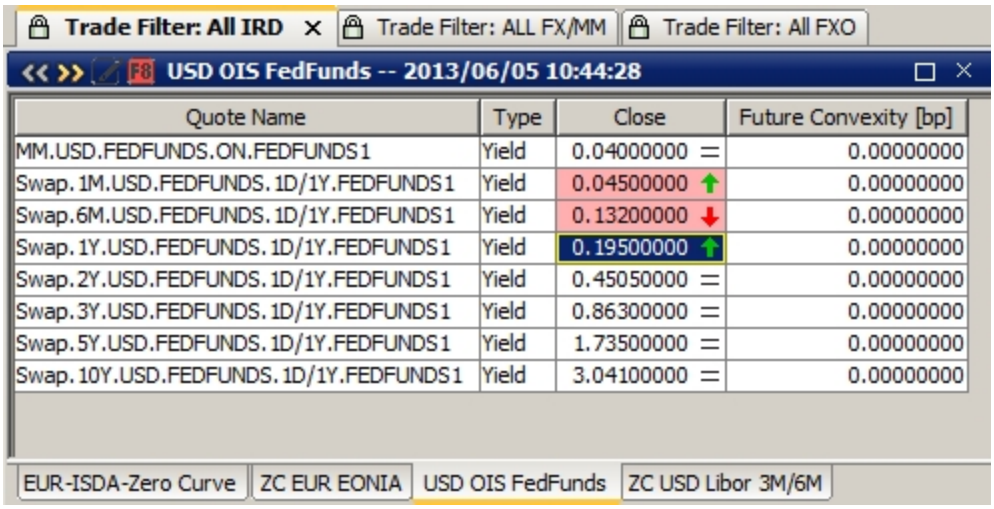
9.2.3 Updating Quotes

If the window from which the Market Data Manager has been open, the market data are updated in real-time, and are not editable. An up or down indicator appears next to the updated quotes.

You can modify the look & feel of the up or down indicator using **Configuration > Quote Update Display**.

You can change the fading time of the quote updates using the User Settings property "MarketDataManagerFadeTime" - Fading time in milliseconds. Default is 200 (**Configuration > User Access Control > User Settings** under <Uncategorized>).

If you lock the market data for a given node, a lock icon appears next to the node name, and you can edit the quotes.



» Edit the quotes as needed.

The quote is displayed with a pink background, and an up or down indicator appears next to the quote.

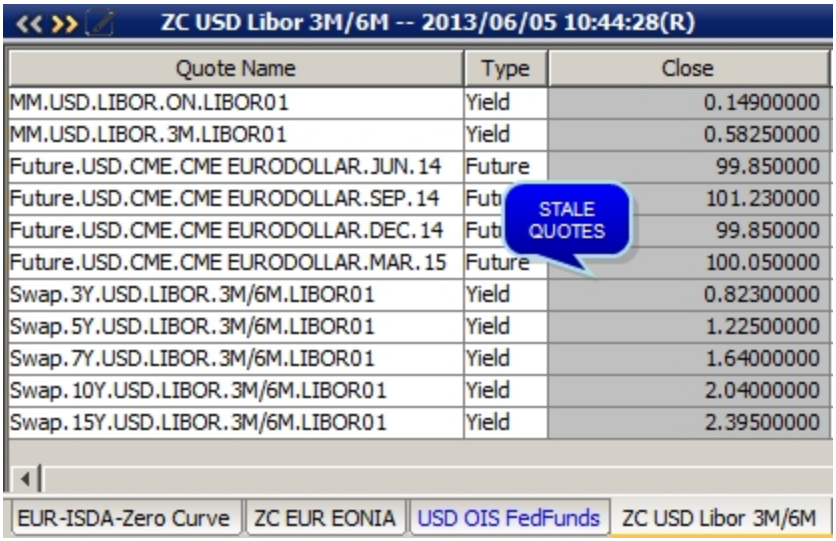
Three asterisks appear next to the node and the market data in the Tree View.

» You can click **F8** to apply the changes to the corresponding window for on-the-fly pricing.

You can also right-click the node and choose "Apply All Changes" or "Undo All Changes" to apply all the changes in the node at once.

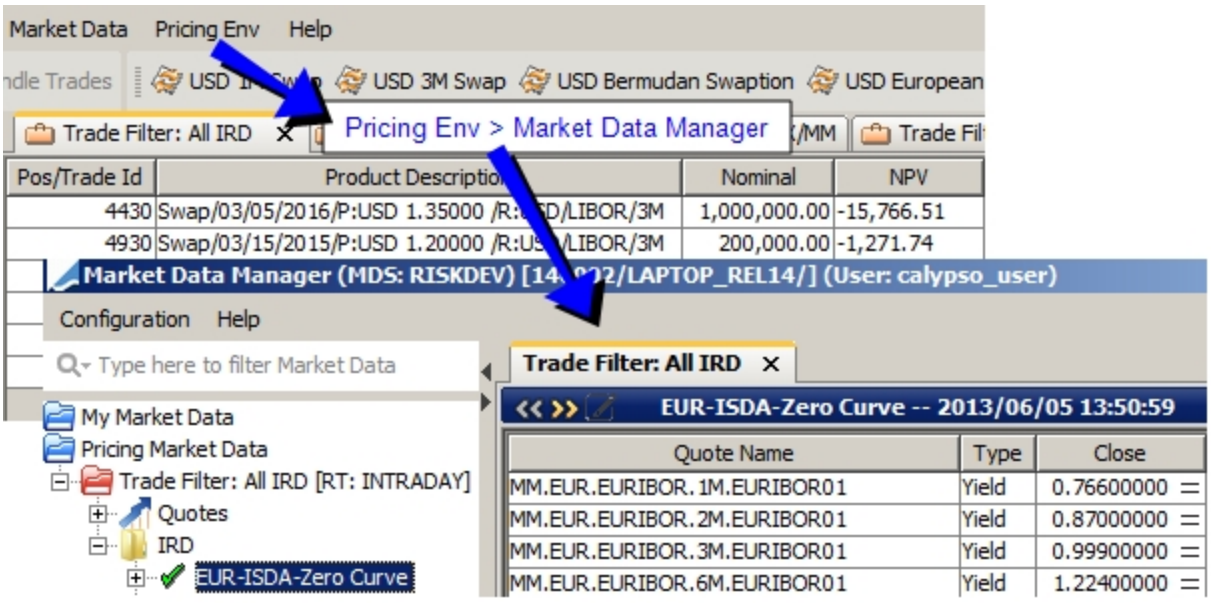
[NOTE: This does not save the quotes to the pricing environment - If you reload the pricing environment, these changes will be overridden]

Quotes that have not been updated since the market data was saved are displayed with a gray background.



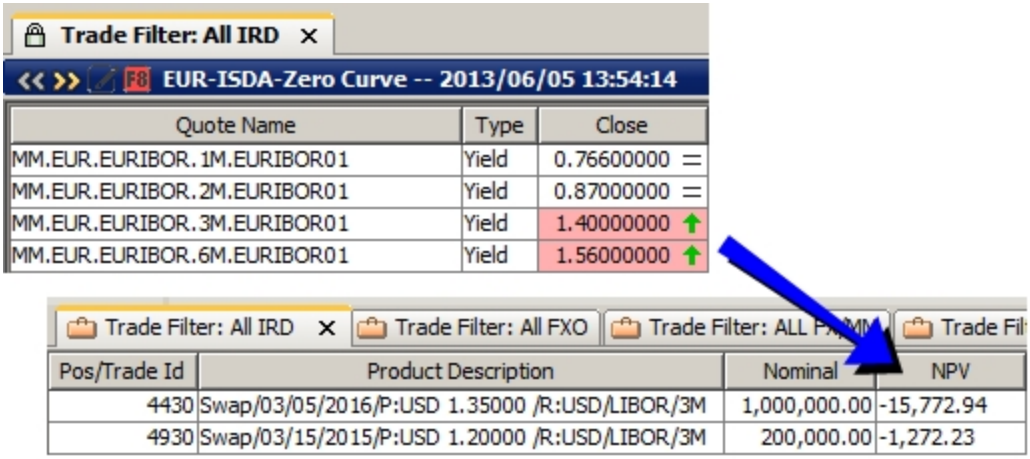
9.3 Sample Usage

From the Trade Blotter: Open the Market Data Manager. All the market data used by the trades in the selected blotter are displayed.

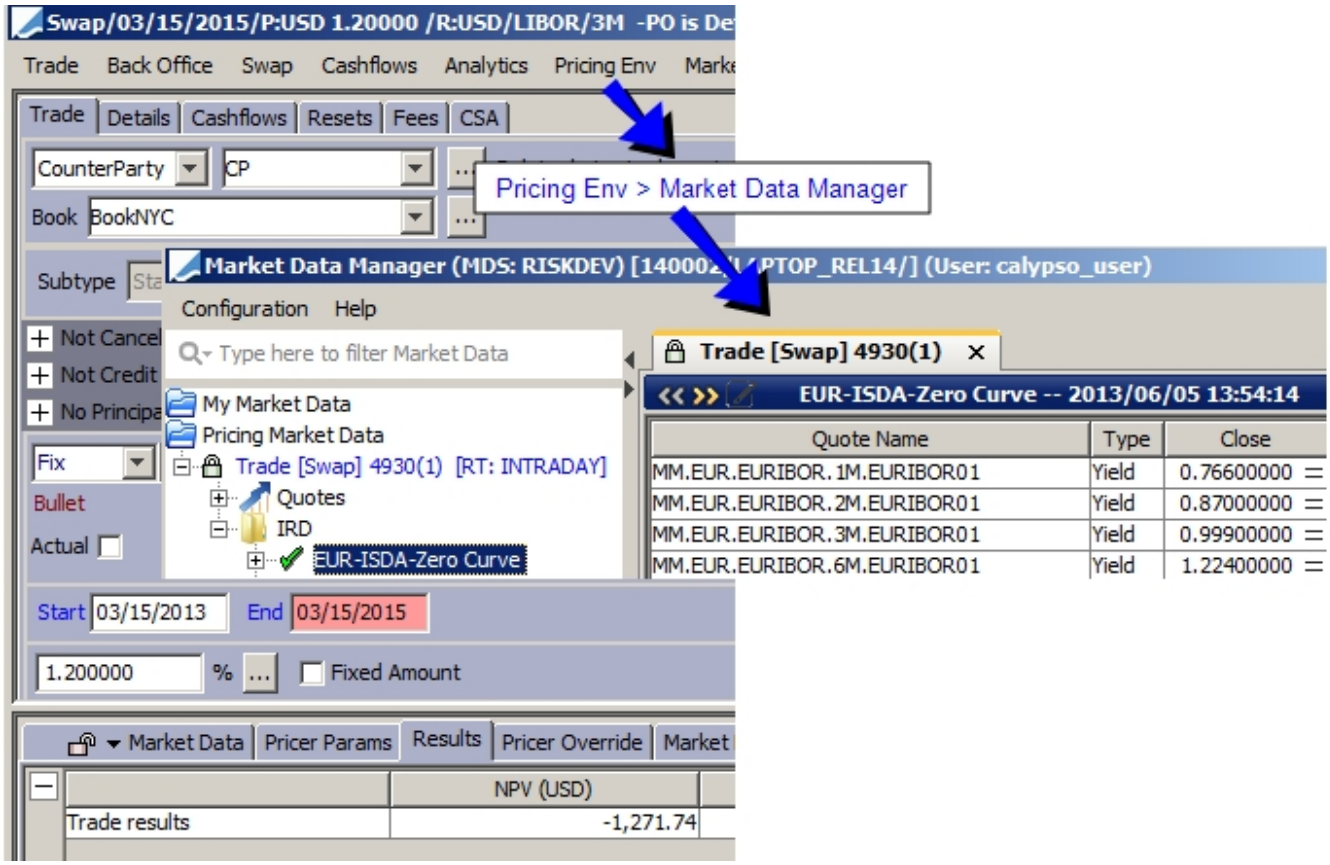


You can lock the market data, modify the quotes, and apply the changes.

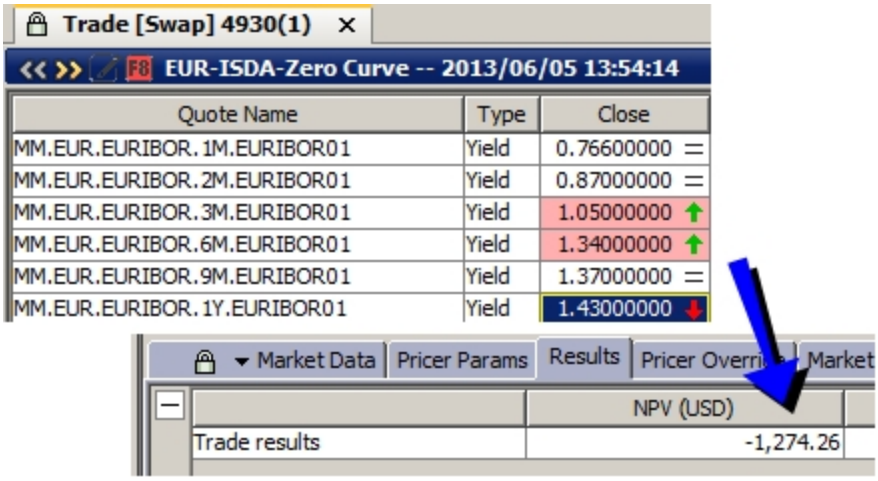
When you price the blotter, the NPV is adjusted accordingly.



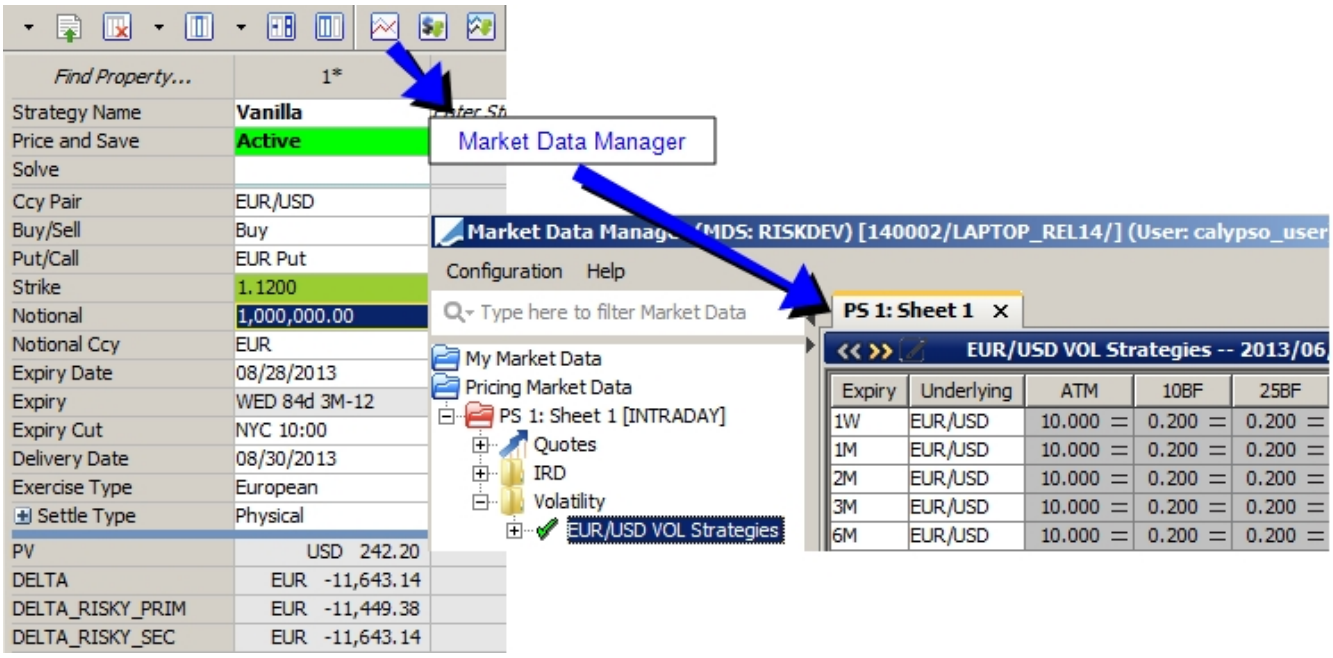
From a Trade window:



Modify the quotes, and reprice the trade.



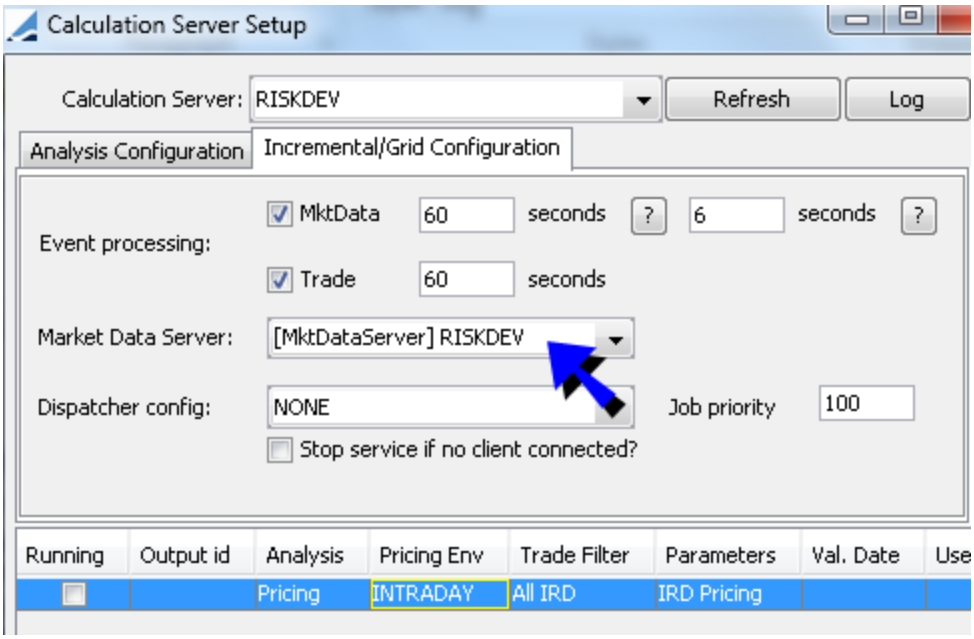
From the Pricing Sheet: Click the Market Data Manager icon.



Modify the quotes, and reprice the trade.

10. Using the Market Data Server - Intra-day Risk

Market Data Server items may be used by the Risk Servers to compute risk results in real-time. From the Calypso Navigator, navigate to **Configuration > Reporting & Risk > Calculation Server** (menu action `risk.service.RiskOnDemandSetupFrame`).



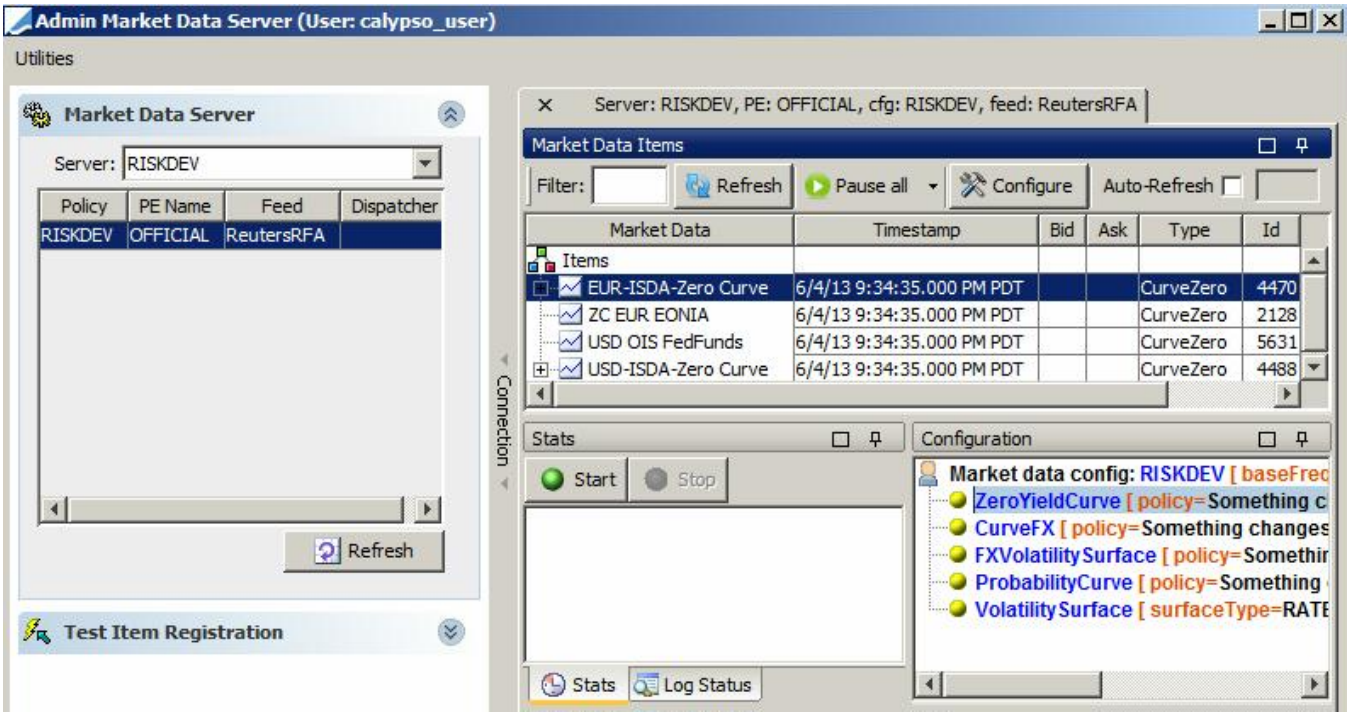
Calculation Server using Market Data Server

» Select a Market Data Server configuration from the Market Data Serer field.

▶ Refer to Calypso Workstation documentation for complete details about running intraday risk.

11. Monitoring Market Data Servers

From the Calypso Navigator, navigate to **Utilities > Maintenance > Monitoring > Admin Market Data Server** to monitor Market Data Servers.



Admin Market Data Server

The various panels of the Admin Market Data Server are described below.

11.1 Market Data Server Panel

You can select a Market Data Server from the Server field, and double-click the Market Data Server to load its details in the panels on the right-hand side.

You can select multiple Market Data Servers. A panel will open on the right-hand side for each Market Data Server.

You can click **Refresh** to reload the Market Data Severs.

11.2 Market Data Items Panel

The Market Data Items panel displays all the market data items of the pricing environment associated with the Market Data Server.

Column Configuration

You can click **Configure** to configure the columns.

The Ref# column shows the number of client applications that are subscribing to that market data item.

Displaying Quotes

You can right-click a market data and choose "Show/Hide Curve Quotes" to display/hide the quote details.

Market Data	Ref#	Type	Id	Close
Items				
EUR-ISDA-Zero Curve	1	CurveZero	4470	
ZC EUR EONIA	1	CurveZero	2128	
ZC EUR EONIA	1	CurveZero	2128	
USD OIS FedFunds	1	CurveZero	5631	
MM.USD.FEDFUNDS.ON.FEDFUNDS1	1	Quotes [Yield]		= 0.04000000
Swap.1M.USD.FEDFUNDS.1D/1Y.FEDFUNDS1	1	Quotes [Yield]		= 0.09075000
Swap.6M.USD.FEDFUNDS.1D/1Y.FEDFUNDS1	1	Quotes [Yield]		= 0.13525000
Swap.1Y.USD.FEDFUNDS.1D/1Y.FEDFUNDS1	1	Quotes [Yield]		= 0.19100000
Swap.2Y.USD.FEDFUNDS.1D/1Y.FEDFUNDS1	1	Quotes [Yield]		= 0.45050000
Swap.3Y.USD.FEDFUNDS.1D/1Y.FEDFUNDS1	1	Quotes [Yield]		= 0.86300000
Swap.5Y.USD.FEDFUNDS.1D/1Y.FEDFUNDS1	1	Quotes [Yield]		= 1.73500000
Swap.10Y.USD.FEDFUNDS.1D/1Y.FEDFUNDS1	1	Quotes [Yield]		= 3.04100000

Market Data Quotes

Pausing / Starting Real-Time Updates Locally

You can choose **Pause All > Local** to pause real-time updates for all market data in the current pricing environment.

If you want to re-activate market data updates, click **Restart all**.

You can also pause / start real-time updates at the market data level for the current pricing environment.

Right-click a market data and choose "Local Pause/Restart Publishing" to pause / restart real-time updates.

Pausing / Starting Real-Time Updates Globally

You can choose **Pause All > Global** to pause real-time updates for all market data of all pricing environments that subscribe to the Market Data Server.

If you want to re-activate market data updates, click **Restart all**.

You can also pause / start real-time updates at the market data level for all pricing environments.

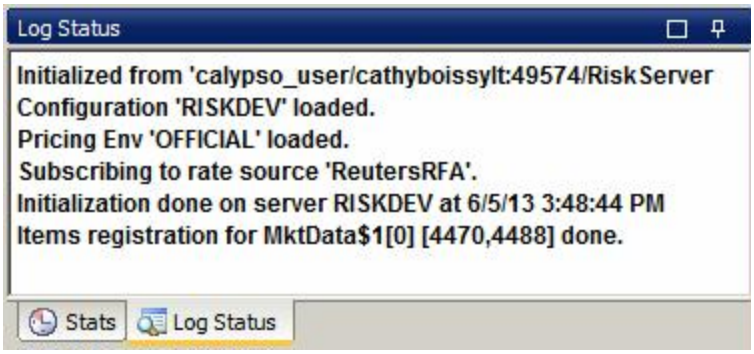
Right-click a market data and choose "Global Pause/Restart Publishing" to pause / restart real-time updates.

Note that the paused timestamp may be slightly different between pricing environments, as the pause will be executed on the currently generated curve for each pricing environment.

If a client application connects to a pricing environment that was not previously subscribing to this Market Data Server,the Market Data Server will automatically load the market data from the database, not the live market data.

11.3 Log Status Panel

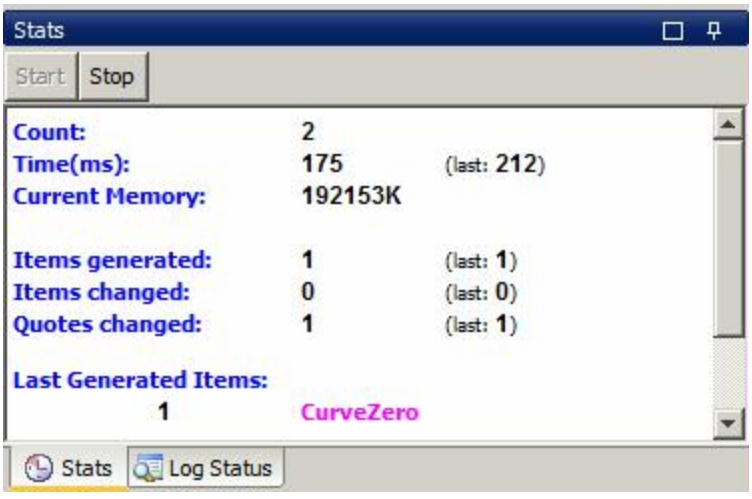
The Log Status panel displays initialization details and exception details.



Log Status

11.4 Stats Panel

The Stats panel shows statistics about market data updates.



Statistics

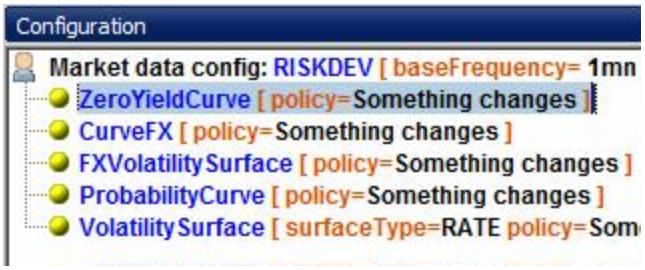
» Click **Start/Stop** to start/stop the statistics.

The left column displays the average to date statistics. The right column displays the statistics from the last policy generation.

Statistics	Description
Count	Number of updates.
Time	Average time in milliseconds to process an update.
Items generated	Number of generated market data.
Items changed	Number of modified market data.
Quotes changed	Number of modified quotes,

11.5 Configuration Panel

The Configuration panel displays the details of the Market Data Server generation policy.



Generation Policy Details