Nasdaq Calypso

All Curves

Version 18

Revision 5.0

April 2025

Approved

Document History

Revision	Published	Summary of Changes
1.0	February 2024	First revision for version 18.
2.0	May 2024	Updates for monthly release. Added SwapEFP curve underlying.
3.0	October 2024	Updates for monthly release. Added BondEFP curve underlying.
4.0	November 2024	Updates for monthly release. Added info about Priority for interest rate cures.
5.0	April 2025	Updates for monthly release. Enhanced FRA underlying for round-trip pricing.

This document describes how to configure curves.

Market Data Audit

Market data changes are not audited by default. To audit changes to market data, add the market data types you wish to audit to the domain "classAuditMode".

Market data types are defined in the domain "marketDataType". For example, CurveFX, CurveZero, VolatilitySurface3D, etc.

Saving a Curve as a Blob

For curve windows that include the "Save Non Blob" checkbox, the checkbox is selected by default. When selected, curves are saved both as blobs and in database tables. When the checkbox is cleared, curves are saved only as blobs. Therefore, when the checkbox is not selected, clearing blobs will require users to regenerate curves since they aren't saved in the database. Calypso recommends leaving this checkbox selected by default.

Table of Contents

1. Commodity Curve

You can build a Commodity Forward Curve from underlying instruments, or from an interest rate curve and a convenience yield curve.

- Commodity curve from underlying instruments

- Commodity curve from convenience yield

- Pricer configuration

1.1 Commodity Curve from Underlying Instruments

From the Calypso Navigator, navigate to **Market Data > Commodity Curves > Forward Curve** (`marketdata.CurveCommodityWindow`).

Commodity Curve Quick Reference

Configuration Requirements

- Commodity Product – Define the commodity as a product in the system. From the Calypso Navigator, navigate to **Configuration > Commodities > Commodities**.

Curve Underlying Instruments

You can use the commodity curve underlying instruments, such as Future Commodity, Commodity Spot, Time-Spread Commodity Spread, Commodity Swap, Commodity Forward Points in building the commodity curve. From the Calypso Navigator, navigate to **Configuration > Market Data > Curve Underlyings**, or in the curve application's Underlyings panel, click **New/Edit Underlying**.

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, LAST, or OPEN).

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

4. Definition Panel — Select the following to define the curve: currency, delivery tenor, units of measure, commodity product, interpolator is not mandatory, "Generate from instruments" should be checked, generation algorithm, "CurveCommodity" curve type, holiday calendar, Pricing Env.

5. Underlyings Panel — Select the underlying instruments.

6. Quotes Panel — Enter quotes manually, use quotes from the quote set, or use real-time quotes.

7. Points Panel — Generate the points.

8. Save the curve - You will be prompted to enter a curve name - The curve is identified by its name throughout the system.

Pricer Configuration

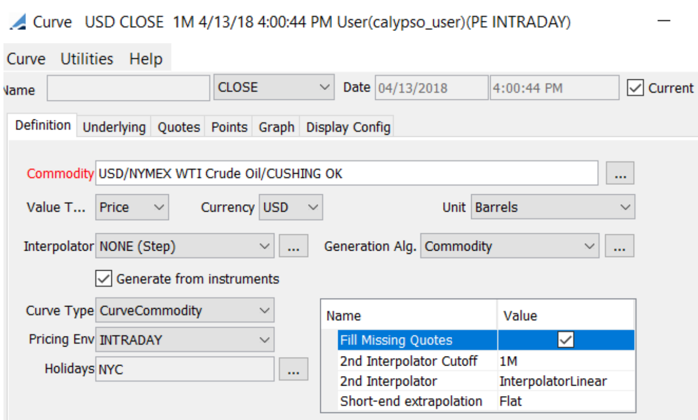
A commodity curve is associated with a pricing environment under the Commodity panel in the pricer configuration.

1.1.1 Definition Panel

Click **New** to start a new curve.

Select the following to define the curve: currency, delivery tenor, units of measure, commodity product (click **...** to select the commodity product), interpolator is not mandatory, “Generate from instruments” should be checked, generation algorithm, “CurveCommodity” curve type, holiday calendar, Pricing Env, Value Type should be Price.

When defining a commodity curve for freight, select WS for the Value Type to indicate Worldscale.



The following generation algorithms are available:

- Commodity

  It generates future commodity prices.

  "2nd Interpolator" and "2nd Interpolator Cutoff" - You can define a second interpolator in addition to the primary interpolator defined in the Definition panel that is applied from the 2nd Interpolator Cutoff tenor/maturity to interpolate prices in the curve.

  “Short-end extrapolation” controls the short end extrapolation, with values Flat, Linear or Loglinear:

  – Flat extrapolates before the first maturity: If the first quote is 2.01, any price before the first maturity date is going to be 2.01

  – Linear extrapolates linearly before the first maturity, taking into account the slope between the first and the second maturity. The extrapolation is done in ACT/365.

  - Loglinear extrapolates loglinearly before the first maturity. This ensures that the extrapolated price will stay positive.
- Commodity Spread All Points

  This is a Spread Curve generator which generates output based on the sum of the underlyings of the base curve and the underlyings of the spread curve. It is expected that the underlyings on each curve have the same date structure, so that underlyings with the same date are added together to generate the output for that date. Unit conversion is supported for this generator, so the physical units of the base curve and the spread curve can be different, as long as a commodity conversion factor is provided.
- Convenience Yield

  This is a forward curve generator that implies forward commodity prices from a spot commodity price, an interest rate curve in the commodity reference currency, and a commodity convenience yield curve. This last curve is also referred to as a "Cost of Carry" curve and can be thought of as an interest rate in terms of the commodity. So just as we can calculate forward FX rates using an FX spot rate and 2 zero curves we can calculate forward commodity prices using a commodity spot rate, a zero curve and a commodity convenience yield curve. Once the convenience yield curve is built, it is specified in a commodity forward curve using this generator, with the end result being a non-derived commodity forward curve.
- Commodity NG

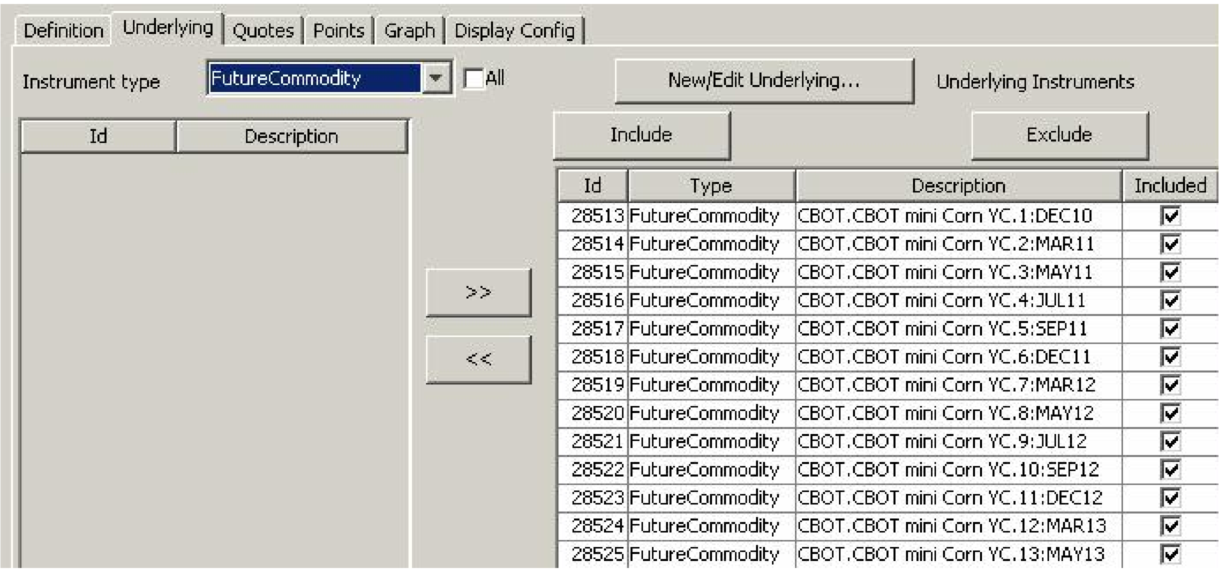
  This is a curve generator used only with the Commodity Forward curve underlying. When the generator is set to Commodity NG, the only curve underlyings available are Commodity Forward. Once the underlyings are selected for the curve, the date range represented by each forward term is displayed relative to the trade date. This generator is used for the natural gas market.

  Note: This generator needs to be added manually to the *CurveCommodity.gen* domain value.

The outputs of the curve will be in the units defined in the curve definition panel regardless of the units of the underlying instruments being used. In this case, you will need to define a conversion factor between the units of the underlying instruments, and the units of the curve definition under Configuration > Commodities > Commodity Conversion from the Calypso Navigator]

1.1.2 Underlying Panel

Click the Underlying tab. Select the underlying instruments to use in the curve.



» Select the instrument type, and the panel below displays the list of available instruments. The panel is blank if you have not set up any instruments. Click **New/Edit Underlying** to create new instruments.

» Select instruments and click **>>** to add them to the instrument list in the right panel.

» When constructing a forward curve for freight, you must use futures with quote type of WS (for Worldscale). Curves built from futures which are in units of WS generate output in terms of WS. These numbers will be converted to USD/MTonnes through the swap and future pricers by multiplying the factor from the curve by the annual worldscale rate/100.

» For the CommoditySwap generator, you need to select a future commodity as the last underlying in order to determine the last point of the averaging period, and this underlying should be set as "not included".

» When using Commodity Spreads underlyings (for either generator), you must select the underlyings as follows:

- Future Calendar Spread - Price differential between two consecutive futures - The underlying immediately preceding the first future calendar spread must be a future commodity.

  So you should have FutureCommodity, CommoditySpread (FutureCalendar), CommoditySpread (FutureCalendar), etc.

- Swap Calendar Spread - Price differential between two consecutive monthly swaps - The underlying immediately preceding the first swap calendar spread must be a commodity swap.

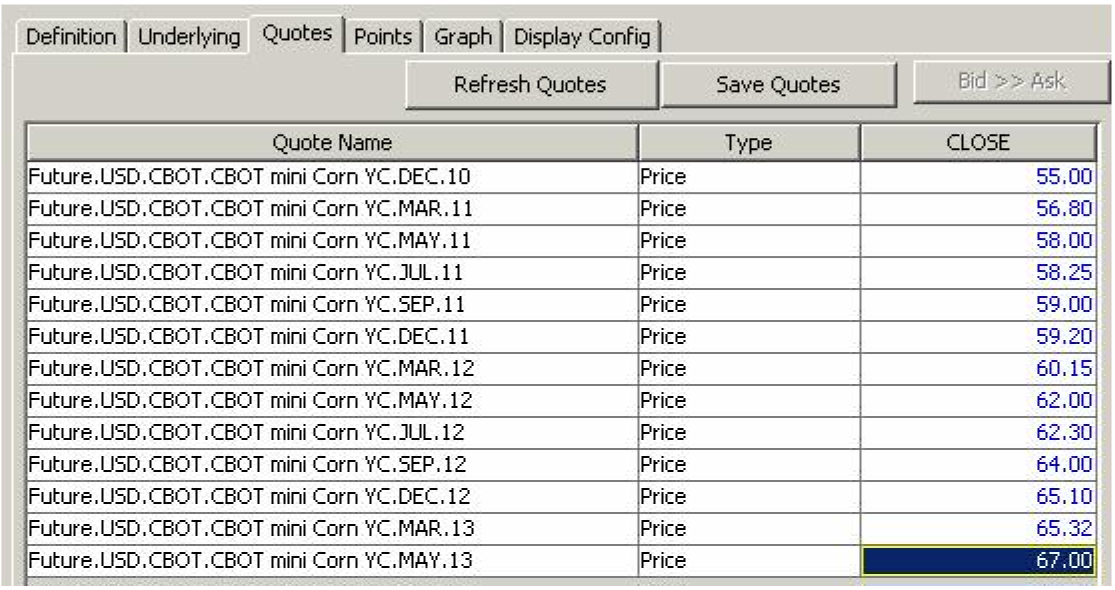
  So you should have CommoditySwap, CommoditySpread (SwapCalendar), CommoditySpread (SwapCalendar), etc.

[NOTE: It is not recommended to use underlying commodity swaps for the Commodity generator because it will cause rounding errors]

1.1.3 Quotes Panel

Click the Quotes tab. You can enter quotes and Save Quotes to the quote set associated with the selected pricing environment.

The quotes may be automatically populated if you are running a real-time feed, or they may be populated from the quote set associated with the selected pricing environment.



Quote Name	Type	CLOSE
Future.USD.CBOT.CBOT mini Corn YC.DEC.10	Price	55.00
Future.USD.CBOT.CBOT mini Corn YC.MAR.11	Price	56.80
Future.USD.CBOT.CBOT mini Corn YC.MAY.11	Price	58.00
Future.USD.CBOT.CBOT mini Corn YC.JUL.11	Price	58.25
Future.USD.CBOT.CBOT mini Corn YC.SEP.11	Price	59.00
Future.USD.CBOT.CBOT mini Corn YC.DEC.11	Price	59.20
Future.USD.CBOT.CBOT mini Corn YC.MAR.12	Price	60.15
Future.USD.CBOT.CBOT mini Corn YC.MAY.12	Price	62.00
Future.USD.CBOT.CBOT mini Corn YC.JUL.12	Price	62.30
Future.USD.CBOT.CBOT mini Corn YC.SEP.12	Price	64.00
Future.USD.CBOT.CBOT mini Corn YC.DEC.12	Price	65.10
Future.USD.CBOT.CBOT mini Corn YC.MAR.13	Price	65.32
Future.USD.CBOT.CBOT mini Corn YC.MAY.13	Price	67.00

Note: Commodity forward curves will fail to roll if quotes have rolled off the end of the curve, or at any point in the curve.

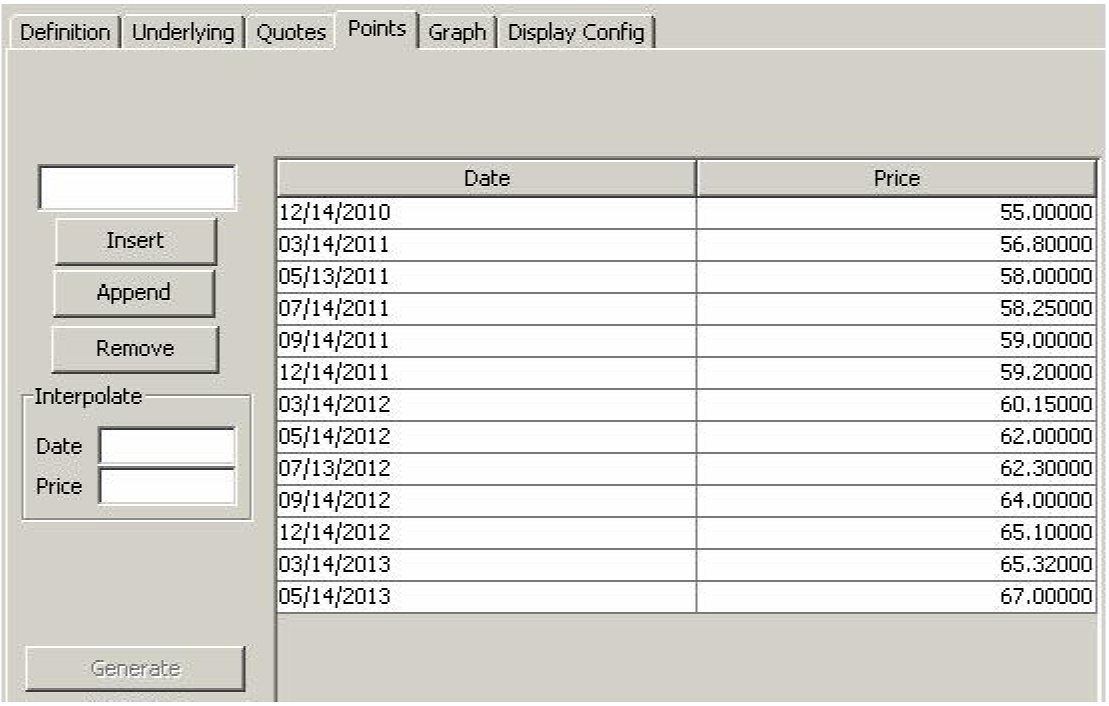
Relevant quotes for curve underlying instruments need to be input and curves generated at the start of the day.

For example, assume that the current month is April and a commodity forward curve has underlying instruments for April and May, expiring at the end of each month. Once the current date is in May, the curve will no longer reference the quote for the April instrument. Instead, it will expect to find quotes for the May and June instruments. The June instrument has not been used up to now, so if the user does not ensure that this quote is populated in the system, the curve will fail to roll.

Prior to version 15, the curve would not reference the June instrument until the user updated it to do so. So, the curve would roll without error, but it would lose the far end points as the forward months rolled off.

1.1.4 Points Panel

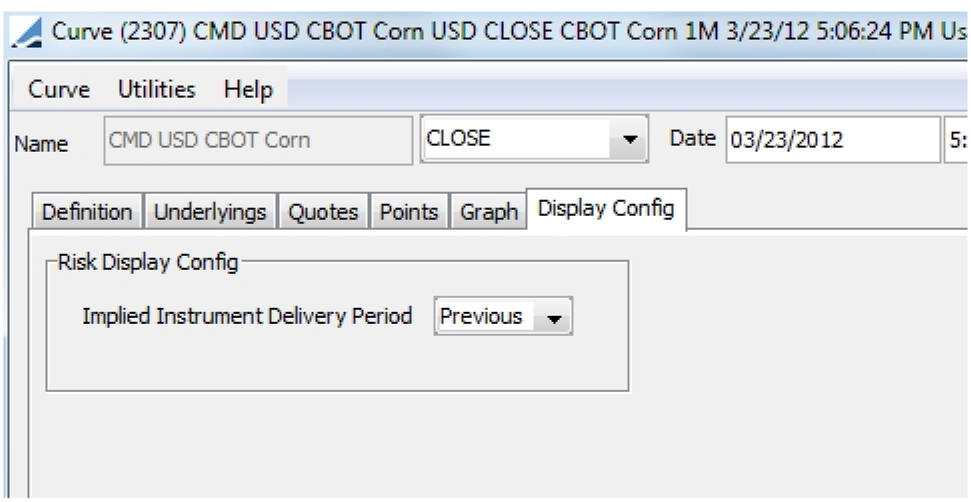
Click the Points tab. Click **Generate** to generate the points.



You can select the Graph panel to view the curve in graphical mode.

1.1.5 Display Config Panel

This panel is relevant for the CommoditySwap curve generator. It controls how the output points are named, either using the month that the output point falls in or the preceding month. Select the preceding month when a date rule is used to move the output point dates to the first of the month instead of the default behavior of falling on the last day of the month.



1.1.6 Save Curve

Click **Save** at the bottom of the curve window. Enter a name for the curve, and click **OK**.

1.2 Commodity Curve from Convenience Yield Curve

1.2.1 ConvenienceYield generation algorithm

From the Calypso Navigator, navigate to **Market Data > Commodity Curves > Forward Curve** (`marketdata.CurveCommodityWindow`).

Commodity Curve Convenience Yield Quick Reference

Configuration Requirements

- Commodity Product – define the commodity as a product in the system. From the Calypso Navigator, navigate to **Configuration > Commodities > Commodities**.
- Zero yield curve - Define a zero yield curve that will be used to build the curve - See Zero Yield Curve for details.
- Convenience yield curve - Define a convenience yield curve that will be used to build the curve - See Convenience Yield Curve for details.

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, LAST, or OPEN).

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

4. Definition Panel - Select the following to define the curve: currency, delivery tenor, units of measure, commodity product, interpolator is not mandatory, “Generate from instruments” should NOT be checked, “ConvenienceYield” generation algorithm, “CurveCommodity” curve type, holiday calendar, Pricing Env.

5. Offsets Panel - Select the tenors and dates for which you want to generate points.

6. Points Panel - Generate the points.

7. Save the curve - You will be prompted to enter a curve name - The curve is identified by its name throughout the system.

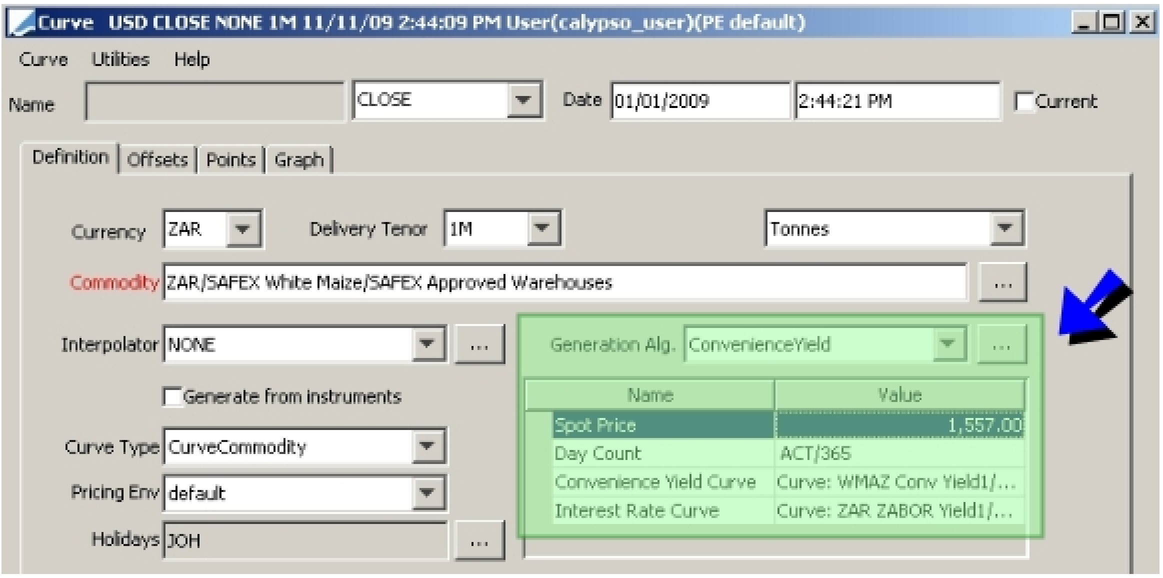
Pricer Configuration

A commodity curve is associated with a pricing environment under the Commodity panel in the pricer configuration.

1.2.1.1 Definition Panel

Click **New** to start a new curve.

Select the following to define the curve: currency, delivery tenor, units of measure, commodity product (click ... to select the commodity product), interpolator is not mandatory, “Generate from instruments” should NOT be checked, “ConvenienceYield” generation algorithm, “CurveCommodity” curve type, holiday calendar, Pricing Env.

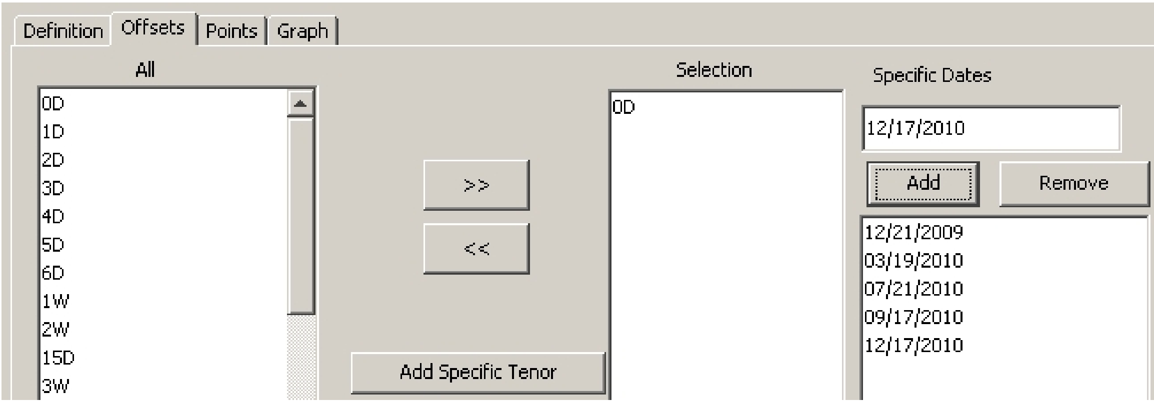


When you select the ConvenienceYield generation algorithm, the following parameters are required:

Parameters	Description
Spot Price	Spot price of the selected commodity product. It is retrieved from the selected pricing environment if available, or you can enter it.
Day Count	Daycount used to convert rates to discount factors.
Convenience Yield Curve	Select a convenience yield curve to build the forward curve - It must be in the quoting currency of the selected commodity product.
Interest Rate Curve	Select an interest rate curve - It must be in the quoting currency of the selected commodity product.

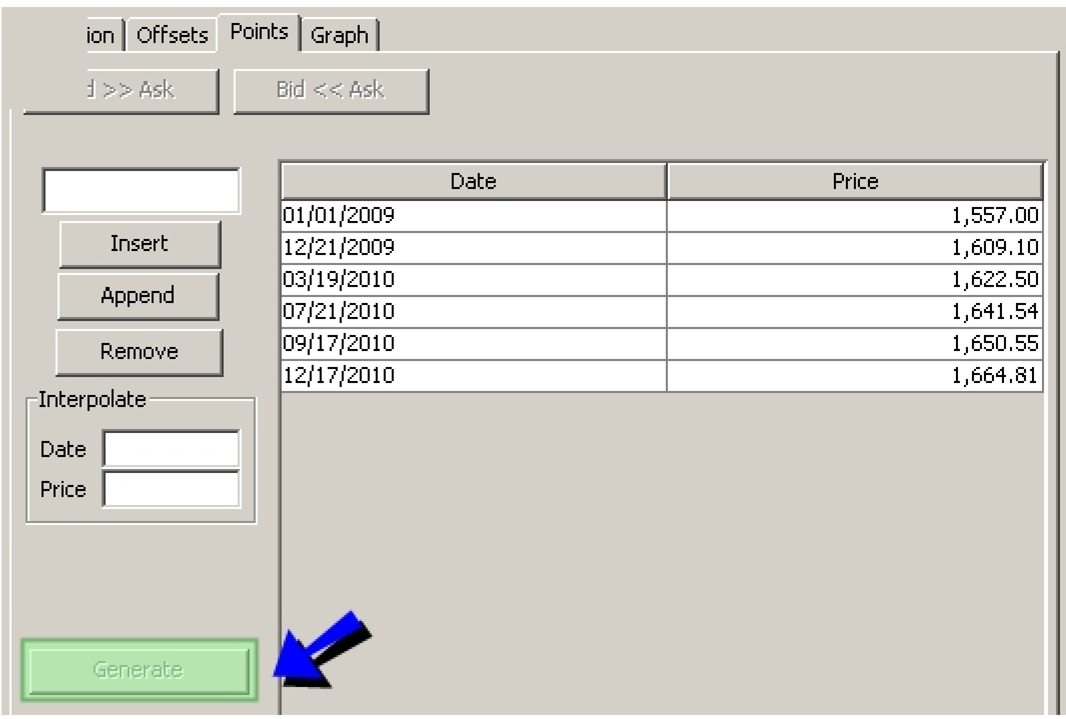
1.2.1.2 Offsets Panel

Click the Offsets tab, and select the dates to generate forward prices.



1.2.1.3 Points Panel

Click the Points tab, and click **Generate**.



Forward prices are determined by taking the spot price and multiplying by the ratio of the discount factors from the interest rate curve to the discount factors from the convenience yield curve.

Fwd Price = Spot Price * (df2/df1), where df1 is the interest rate discount factor from the curve date to the forward date, and df2 is the discount factor from the convenience yield curve from the curve date to the forward date.

You can select the Graph panel to view the curve in graphical mode.

1.2.1.4 Save Curve

Click **Save** at the bottom of the curve window. Enter a name for the curve, and click **OK**.

1.2.2 ConvenienceYieldDerived generation algorithm

From the Calypso Navigator, navigate to **Market Data > Commodity Curves > Forward Curve** (`marketdata.CurveCommodityWindow`).

Commodity Curve Convenience Yield Derived Quick Reference

Configuration Requirements

- Commodity Product – define the commodity as a product in the system. From the Calypso Navigator, navigate to **Configuration > Commodities > Commodities**.
- Zero yield curve - Define a zero yield curve that will be used to build the curve - See Zero Yield Curve for details.
- Convenience yield curve - Define a convenience yield curve that will be used to build the curve - See Convenience Yield Curve for details.

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, LAST, or OPEN).

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

4. Definition Panel - Select the following to define the curve: value type, currency, units of measure, commodity product (click **...** to select the commodity product), interpolator, “Generate from instruments” should be checked, “ConvenienceYieldDerived” generation algorithm, “CurveCommodity” curve type, holiday calendar, Pricing Env.

5. Underlyings Panel — Select the underlying instruments.

6. Quotes Panel — Enter quotes manually, use quotes from the quote set, or use real-time quotes.

7. Points Panel — Generate the points.

8. Save the curve - You will be prompted to enter a curve name - The curve is identified by its name throughout the system.

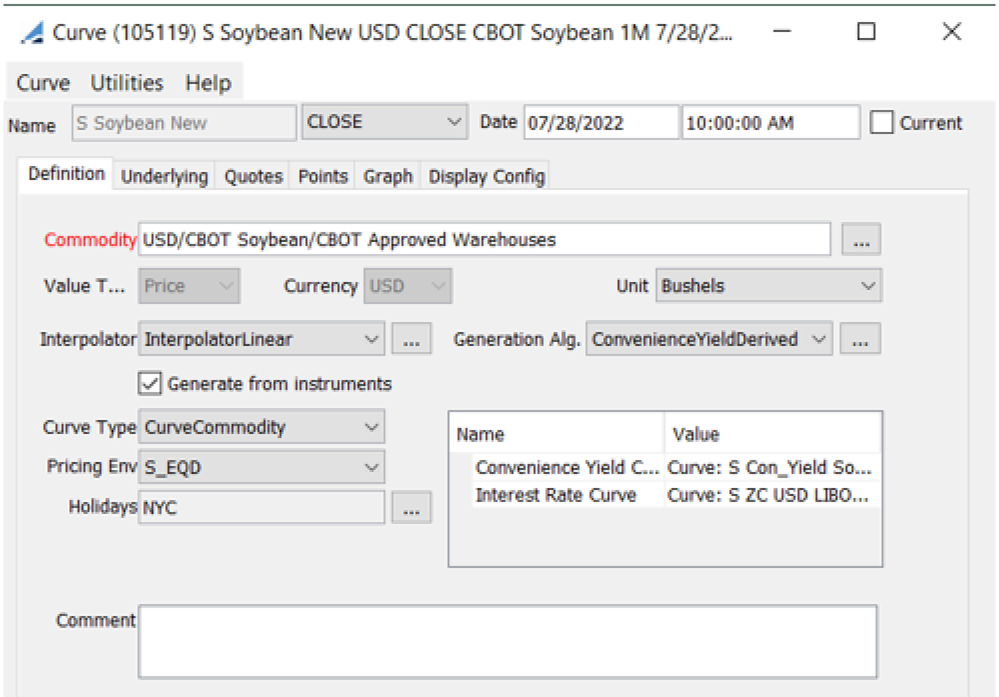
Pricer Configuration

A commodity curve is associated with a pricing environment under the Commodity panel in the pricer configuration.

1.2.2.1 Definition Panel

Click **New** to start a new curve.

Select the following to define the curve: value type, currency, units of measure, commodity product (click **...** to select the commodity product), interpolator, “Generate from instruments” should be checked, “ConvenienceYieldDerived” generation algorithm, “CurveCommodity” curve type, holiday calendar, Pricing Env.

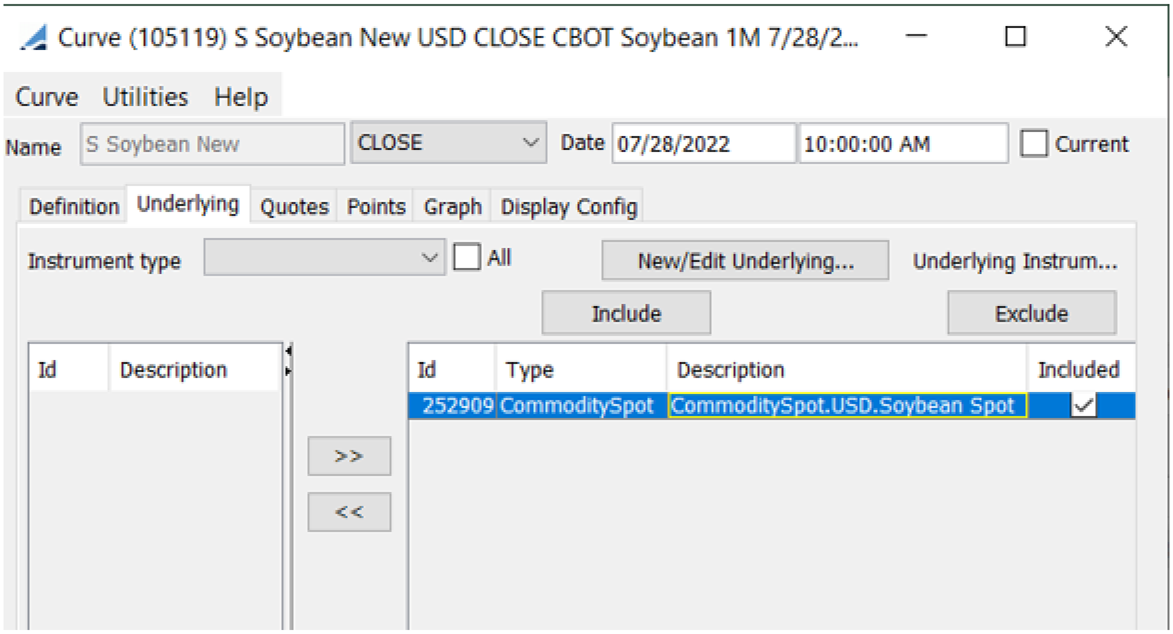


When you select the ConvenienceYieldDerived generation algorithm, the following parameters are required:

Parameters	Description
Convenience Yield Curve	Select a convenience yield curve to build the forward curve - It must be in the quoting currency of the selected commodity product.
Interest Rate Curve	Select an interest rate curve - It must be in the quoting currency of the selected commodity product.

1.2.2.2 Underlying Panel

Click the Underlying tab. Select the underlying instruments to use in the curve.



» Select the instrument type, and the panel below displays the list of available instruments. The panel is blank if you have not set up any instruments. Click **New/Edit Underlying** to create new instruments.

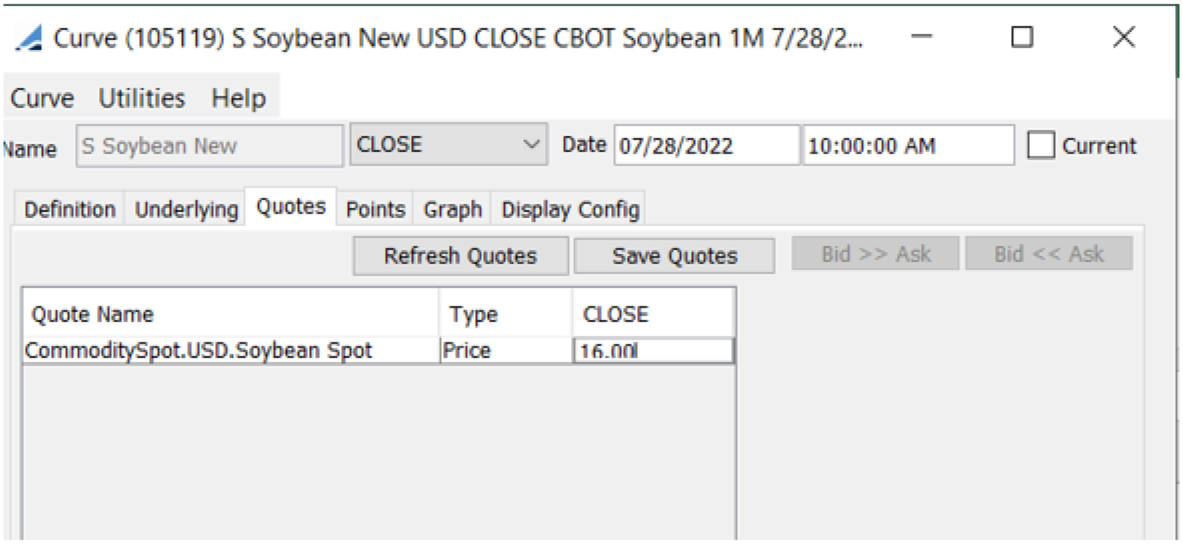
» Select instruments and click **>>** to add them to the instrument list in the right panel.

» While constructing Forward Curve using ConvenienceYieldDerived generator, Commodity Spot needs to be selected.

1.2.2.3 Quotes Panel

Click the Quotes tab. You can enter quotes and Save Quotes to the quote set associated with the selected pricing environment.

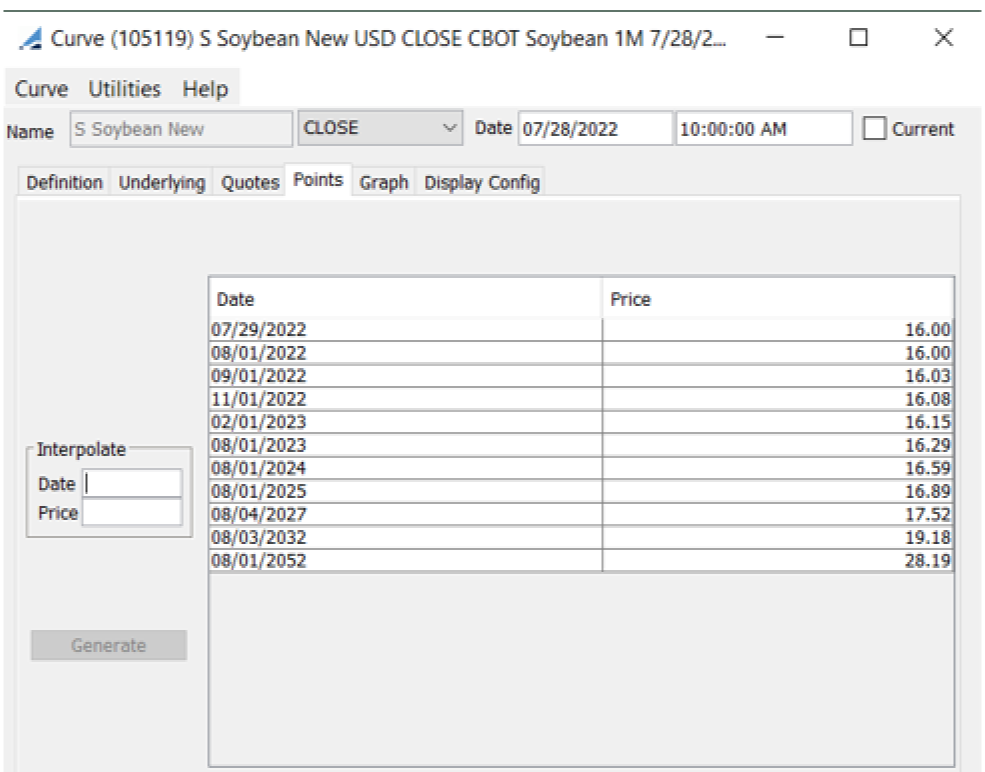
The quotes may be automatically populated if you are running a real-time feed, or they may be populated from the quote set associated with the selected pricing environment.



Relevant quotes for curve underlying instruments need to be input and curves generated at the start of the day.

1.2.2.4 Points Panel

Click the Points tab. Click **Generate** to generate the points.



Forward prices are determined by taking the spot price and multiplying by the ratio of the discount factors from the interest rate curve to the discount factors from the convenience yield curve.

Fwd Price = Spot Price * (df2/df1), where df1 is the interest rate discount factor from the curve date to the forward date, and df2 is the discount factor from the convenience yield curve from the curve date to the forward date.

You can select the Graph panel to view the curve in graphical mode.

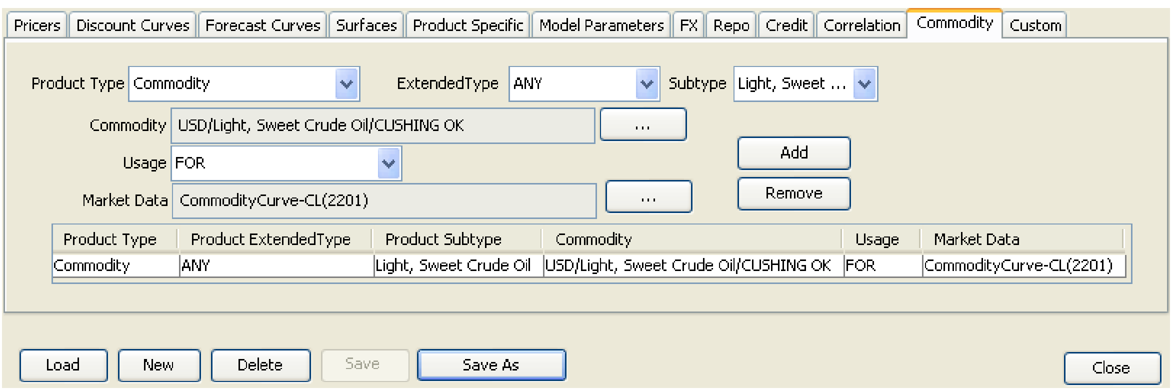
1.2.2.5 Save Curve

Click **Save** at the bottom of the curve window. Enter a name for the curve, and click **OK**.

1.3 Pricer Configuration

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**, and click **Load** to select a pricer configuration.

Click the Commodity tab.



- Select the product type or ANY, extended type or ANY, and subtype or ANY.
- Click **...** to select the commodity product. Usage is set to FOR.
- Click **...** to select the curve next to the Market Data field.
- Click **Add** to add the curve to the list.
- Click **Save** to save the pricer configuration.

2. Commodity Spread Curve

From the Calypso Navigator, navigate to **Market Data > Commodity Curves > Spread Curve** (menu action `marketdata.CurveCommoditySpreadWindow`).

Commodity Spread Curve Quick Reference

Configuration Requirements

- Commodity Product – define the commodity as a product in the system. From the Calypso Navigator, navigate to **Configuration > Commodities > Commodities**.

Curve Underlying Instruments

The curve generator available is *CommoditySpread*. The curve underlyings available for this generator are *CommodityFwdPoint*, *FutureCommodity* and *CommoditySpot*.

Note: The *CommoditySpreadAllInPoints* and *MonthlyAsianSwapSpread* generators have been deprecated. Both generators are available in cases where they are already in use.

Base Curve

The base curve should be a forward curve.

▶ See Commodity Forward Curve for details.

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, LAST, or OPEN).

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

4. Definition Panel — Select the following to define the curve: currency, delivery tenor, units of measure, commodity product, interpolator is not mandatory, "Generate from instruments" should be checked, generator, holiday calendar, Pricing Env, base curve.

5. Underlyings Panel — Select the underlying instruments.

6. Quotes Panel — Enter quotes manually, use quotes from the quote set, or use real-time quotes.

7. Points Panel — Click **Generate** to generate the points.

8. Click **Save**, enter a name for the curve, and click **OK**.

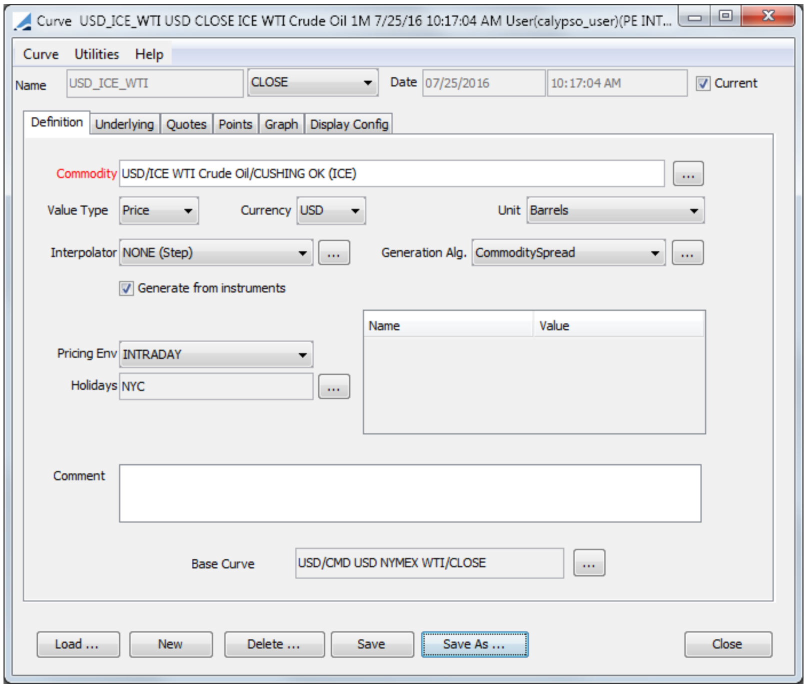
Pricer Configuration

A commodity spread curve is associated with a pricing environment under the Commodity panel of the pricer configuration.

2.1 Definition Panel

Click **New** to start a new curve.

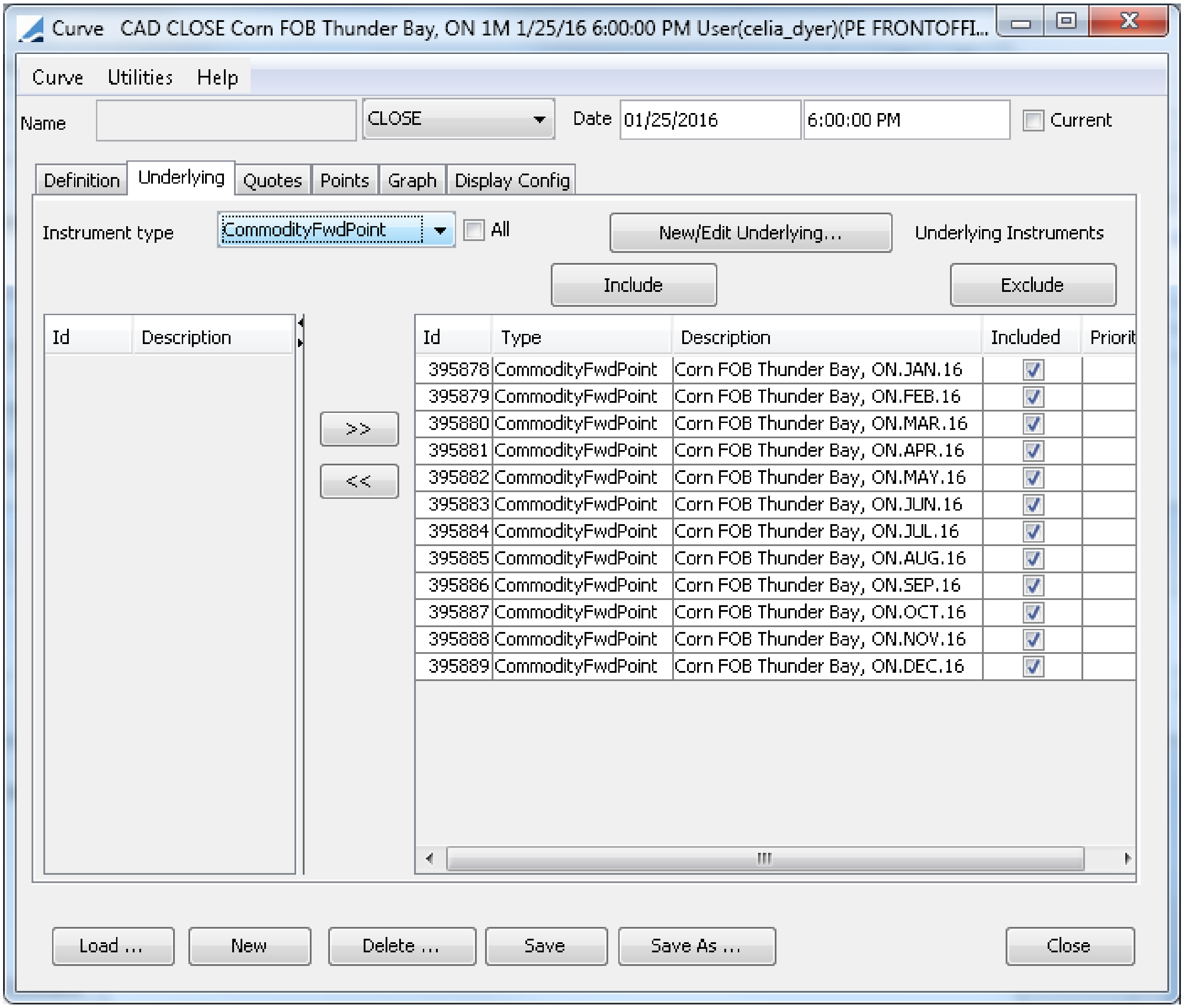
Select the following to define the curve: currency, delivery tenor, units of measure, commodity product, interpolator is not required, "Generate from instruments" should be checked, generation algorithm, holiday calendar, Pricing Env, base curve.



Select the Commodity Spread generation algorithm. The generator will get a price from the base curve and display it in the Spread column in the Points panel. The Price column shows the sum.

2.2 Underlying Panel

Click the Underlying tab. Select the underlying instruments to use in the curve.

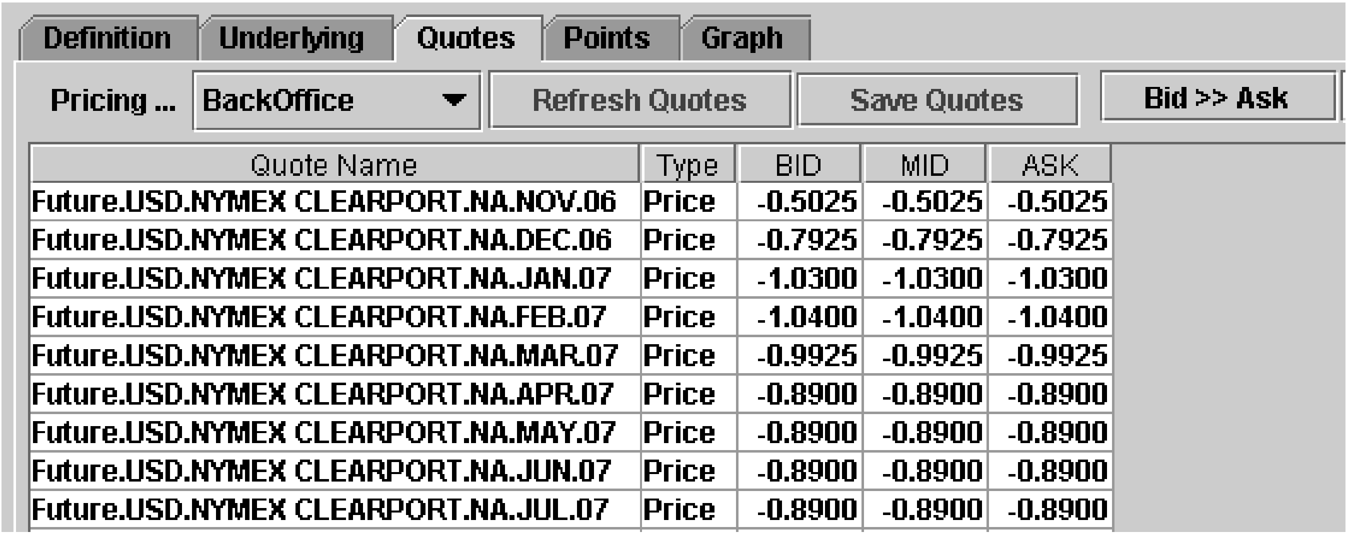


- Select the instrument type, and the panel below displays the list of available instruments. The panel is blank if you have not set up any instruments. Click **New/Edit Underlying** to create new instruments.
- Select instruments and click >> to add them to the instrument list in the right panel.

2.3 Quotes Panel

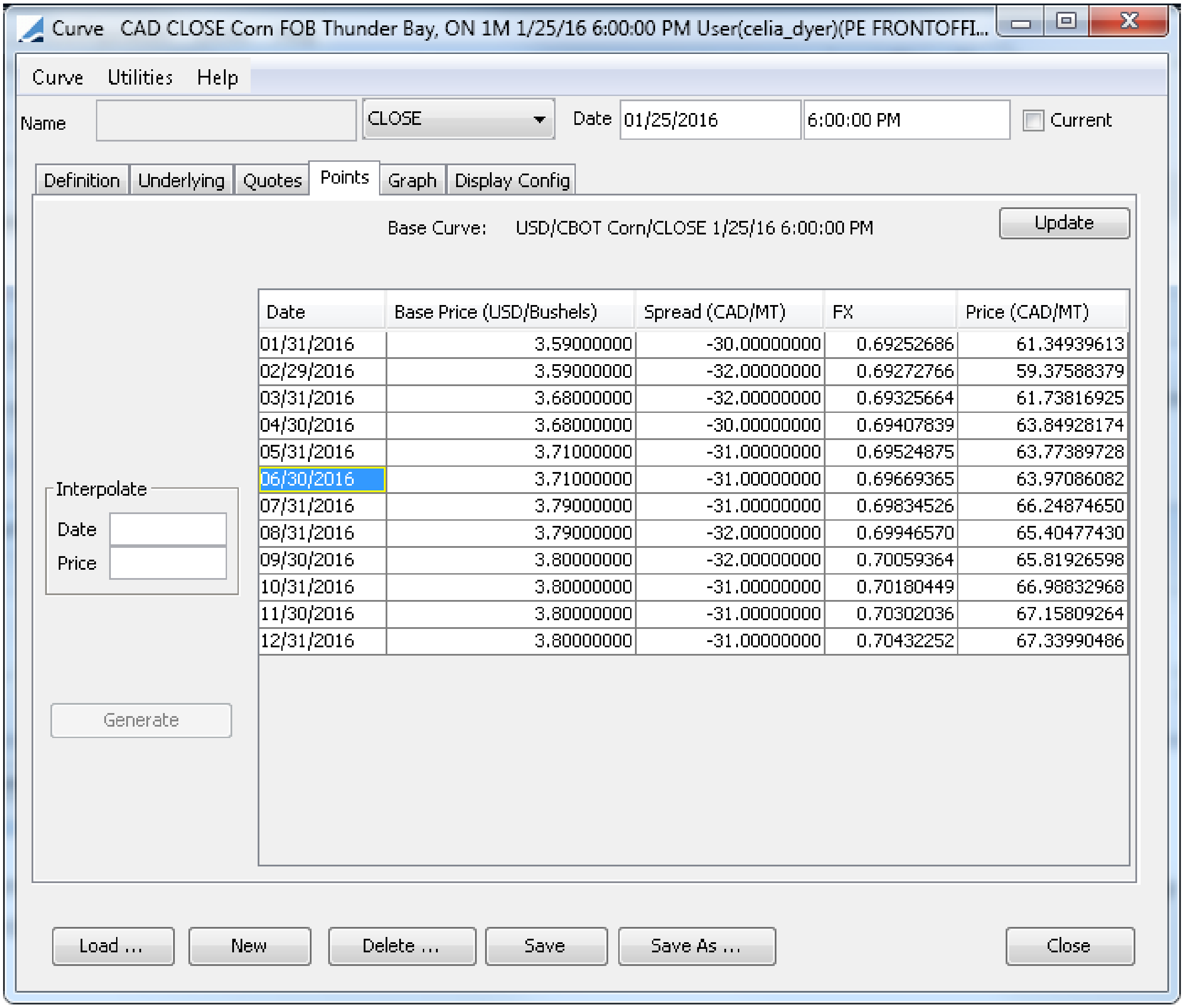
Click the Quotes tab. You can enter quotes and **Save Quotes** to the quote set associated with the selected pricing environment.

The quotes may be automatically populated if you are running a real-time feed, or they may be populated from the quote set associated with the selected pricing environment.



2.4 Points Panel

Click the Points tab. Click **Generate** to generate the points.



- The curve underlyings will be used to generate forward point dates using similar logic to the commodity forward curve. The quote prices make up the base prices in the Points panel.
- For each point date, the generator gets a price from the base curve and display it in the *Spread* column. The Price column shows the sum of the Base Price and the Spread.
- The spread curve and the base curve may have different price currencies and different price units. The spread is converted to the spread curve unit using the commodity conversion factor setup for the commodity of the spread curve.
- The spread is converted to the spread curve currency using the spot FX rate adjusted for the forward point date.

- The Points panel shows the point date which comes from the curve underlyings in the same way as for the commodity generator of the commodity forward curve.
- The Base Price is the price on the base curve on the point date. This price is in the currency and unit of the base curve.
- The Spread is the price on of the underlying quote in the currency and unit of the underlying.
- The final Price is the base price plus the spread. With the base price converted to the currency and unit of the spread curve.

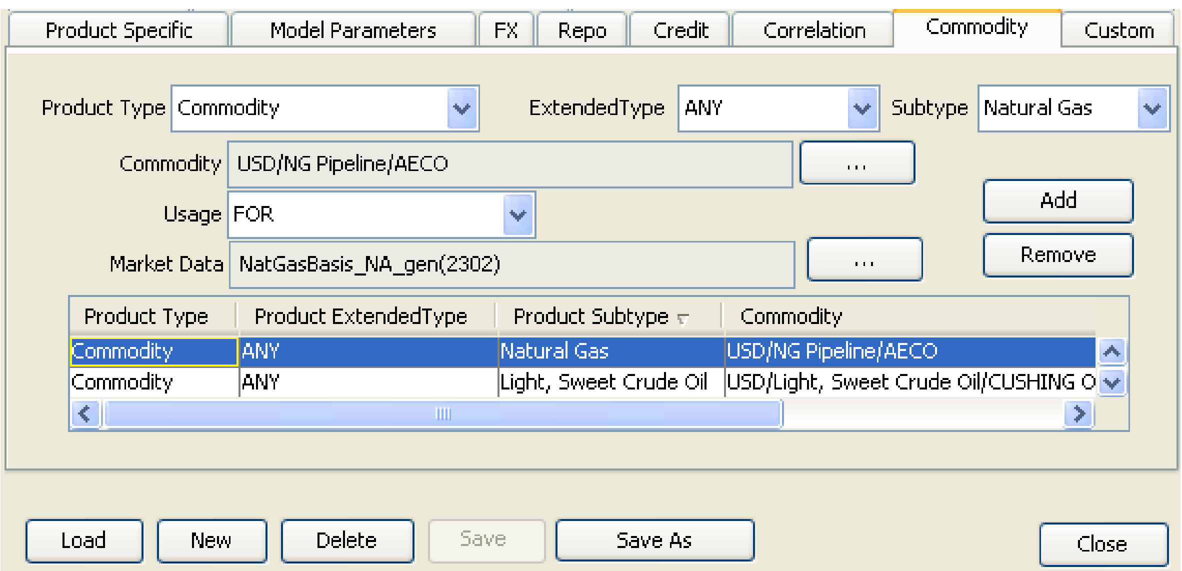
2.5 Save Curve

Click **Save** in the bottom of the curve window. Enter a name for the curve, and click **OK**.

2.6 Pricer Configuration

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

- Click **Load**, select the pricer configuration name, and click **OK**.
- Click the Commodity tab to bring it to the front.



- Select the product type or ANY, extended type or ANY, and subtype or ANY.
- Click **...** to select the commodity product.
- Select the usage (for example, forecast).
- Click **...** to select the commodity spread curve.
- Click **Add** to add the curve to the list.
- Click **Save** to save the pricer configuration.

3. Convenience Yield Curve

Convenience yield curves are used to build commodity forward curves - They are not used directly for pricing. You can only create a convenience yield curve from offsets.

From the Calypso Navigator, navigate to **Market Data > Commodity Curves > Convenience Yield Curve** to create a curve.

Convenience Yield Curve Quick Reference

Configuration Requirements

- Commodity Product – define the commodity as a product in the system. From the Calypso Navigator, navigate to **Configuration > Commodities > Commodities**.

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, LAST, or OPEN).

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

4. Definition Panel - Select the following to define the curve: currency, commodity product, interpolator, timezone, and holiday calendar.

5. Offsets Panel - Select the tenors and dates for which you want to generate points.

6. Points Panel - Generate the points.

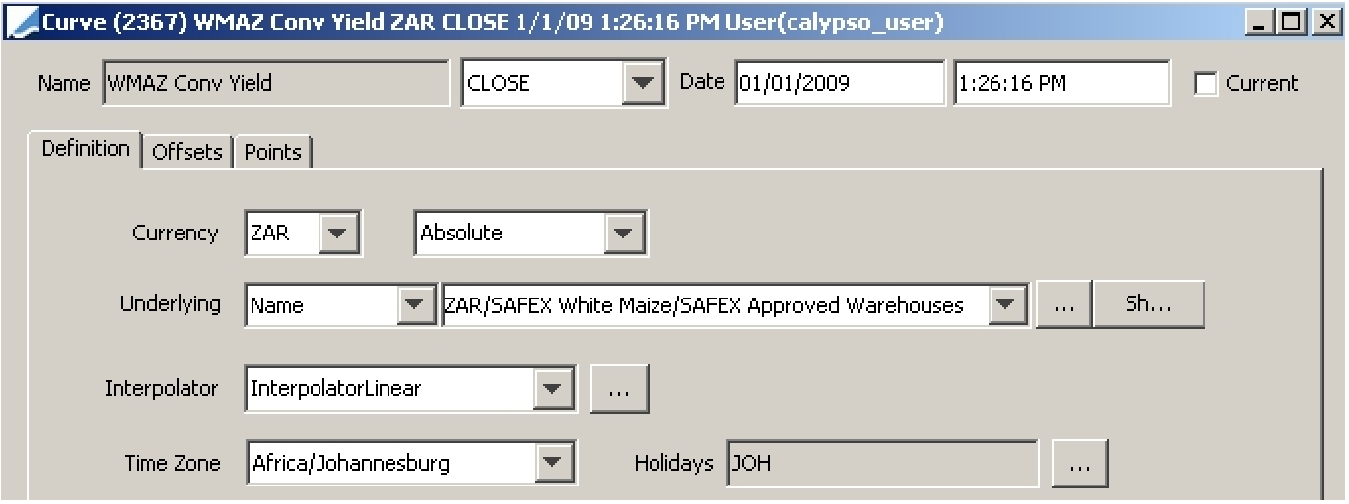
7. Save the curve - You will be prompted to enter a curve name - The curve is identified by its name throughout the system.

Pricer Configuration

There is no need to associate a convenience yield curve with a pricer configuration. You can only select a convenience yield curve when building a commodity curve.

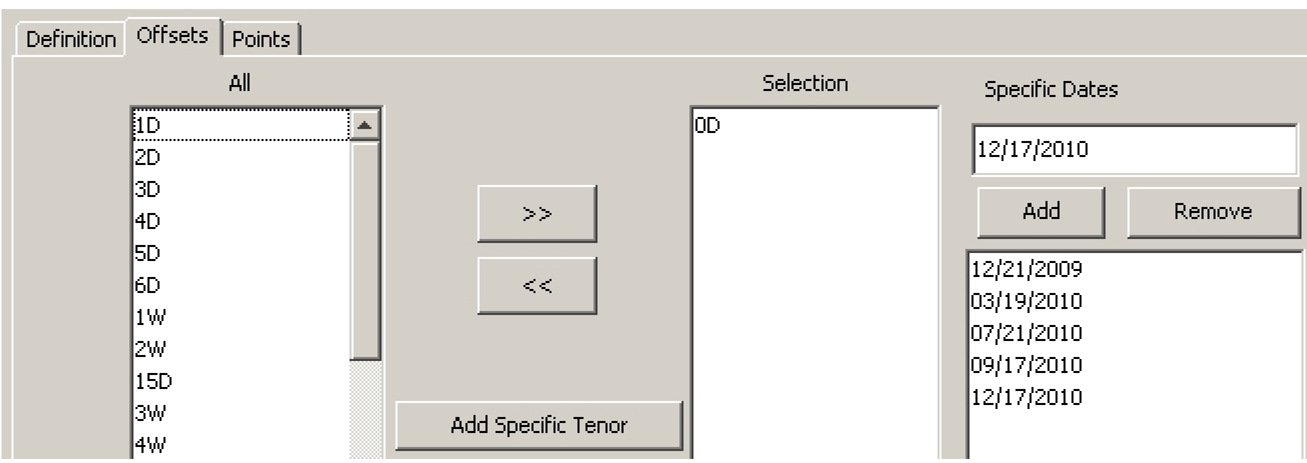
3.1 Definition Panel

Select the following to define the curve: currency, commodity product, interpolator, timezone, and holiday calendar.



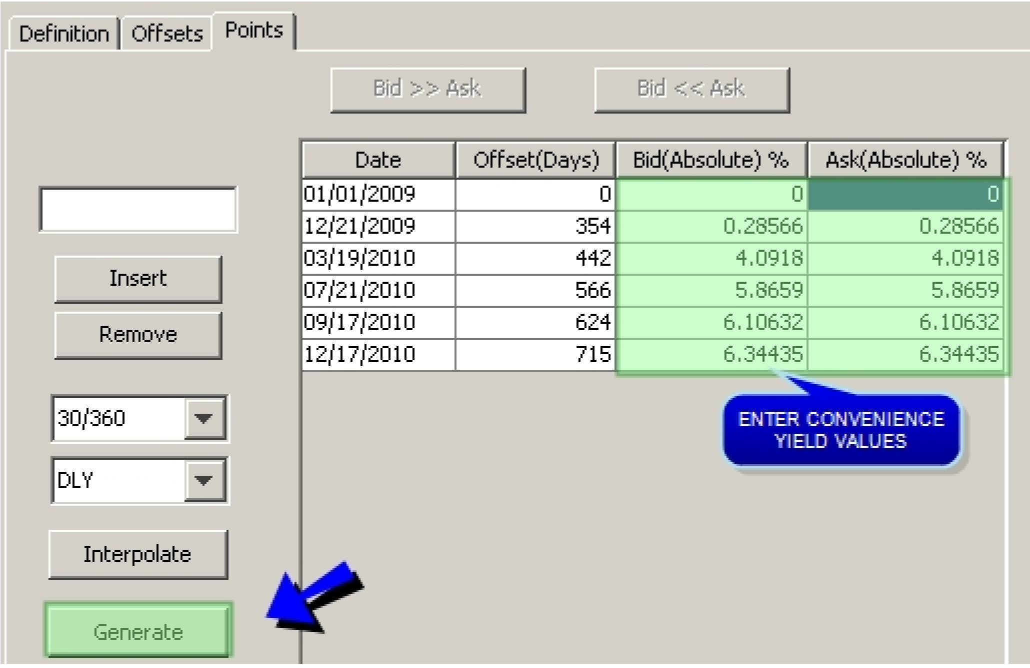
3.2 Offsets Panel

Click the Offsets tab, and elect the tenors and dates for which you want to generate points.



3.3 Points Panel

Click the Points tab, and click Generate to generate the points.



» Enter the convenience yield values in percentages.

3.4 Save Curve

Click **Save** at the bottom of the curve window. Enter a name for the curve, and click **OK**.

4. Precious Metal Curve

From the Calypso Navigator, navigate to **Market Data > Commodity Curves > Precious Metal Curve** (menu action `marketdata.CurveZeroPreciousMetalWindow`).

Precious Metal Curves Quick Reference

Configuration Requirements

- Currency – The precious metal should be defined as a currency in the system. From the Calypso Navigator, navigate to **Configuration > Definitions > Currency Definitions**.
- Currency Pair – Set up a currency pair for the precious metal and interest currency also in the Currency Definitions.
- Reference Index – The precious metal requires a reference index. From the Calypso Navigator, navigate to **Configuration > Interest Rates > Rate Index Definitions**.

Curve Underlying Instruments

The curve requires Contango (FX Forward) and Swap underlying instruments. From the Calypso Navigator, navigate to **Configuration > Market Data > Curve Underlyings**, or in the curve application's Underlyings panel, click **New/Edit Underlying**.

Interest Rate Curve

The precious metal curve requires an underlying interest rate curve. From the Calypso Navigator, navigate to **Market Data > Interest Rate > Curves > Zero yield Curve**.

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, for example).

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

4. Definition Panel — select the following to define the curve: currency, reference index, tenor, "Generate from instruments" should be checked, holiday calendar, interpolator, "PreciousMetal" generation algorithm, "CurveZeroPreciousMetal" curve type, Pricing Env, underlying interest curve.

5. Underlyings Panel — select the underlying instruments.

6. Quotes Panel — enter quotes manually, use quotes from the quote set, or use real-time quotes.

7. Points Panel — click **Generate** to generate the points.

8. Click **Save**, enter a name for the curve, and click **OK**.

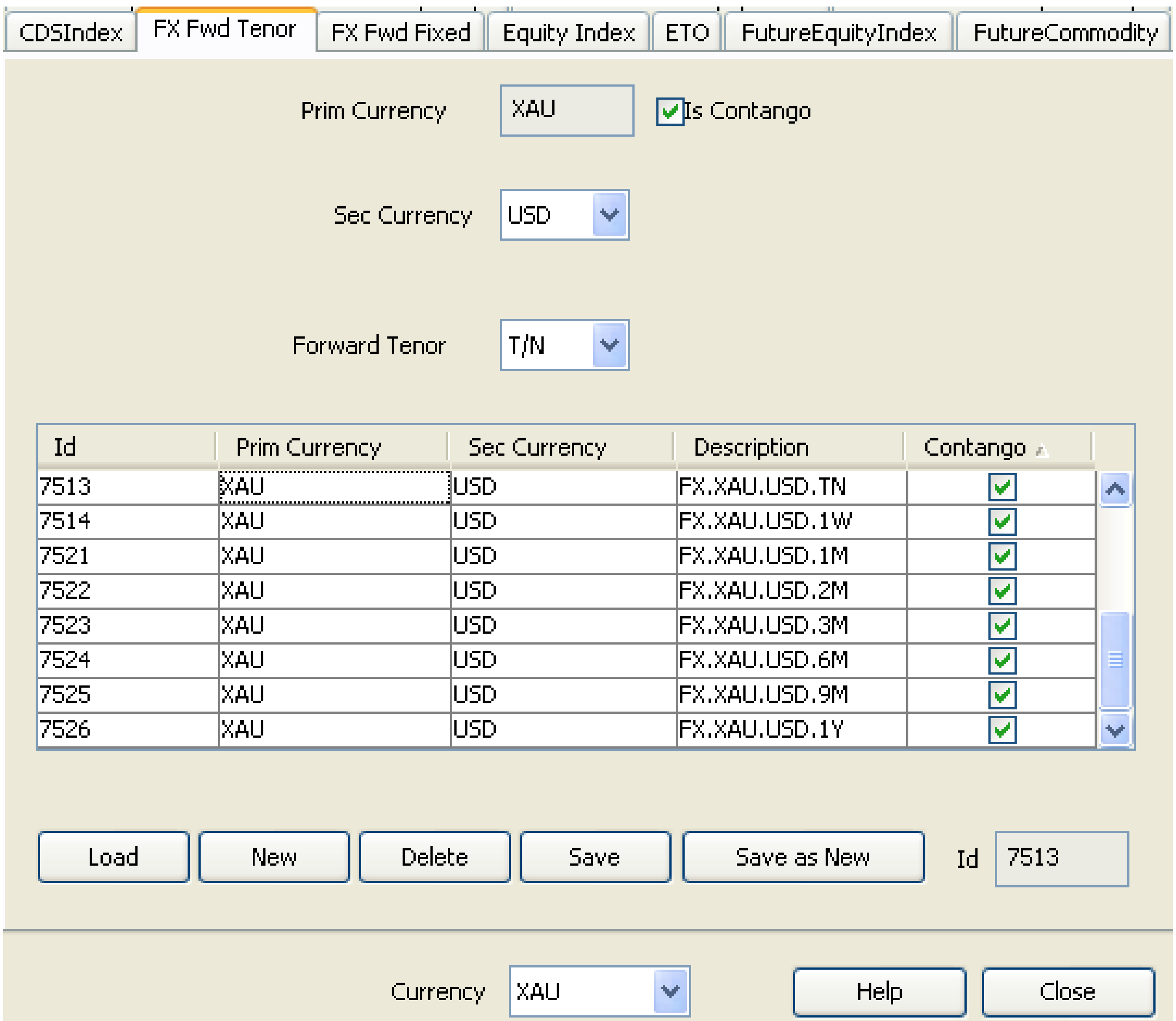
Pricer Configuration

Assign a precious metal curve to a pricing environment in the Discount Curves or Forecast Curves panel in the pricer configuration. From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

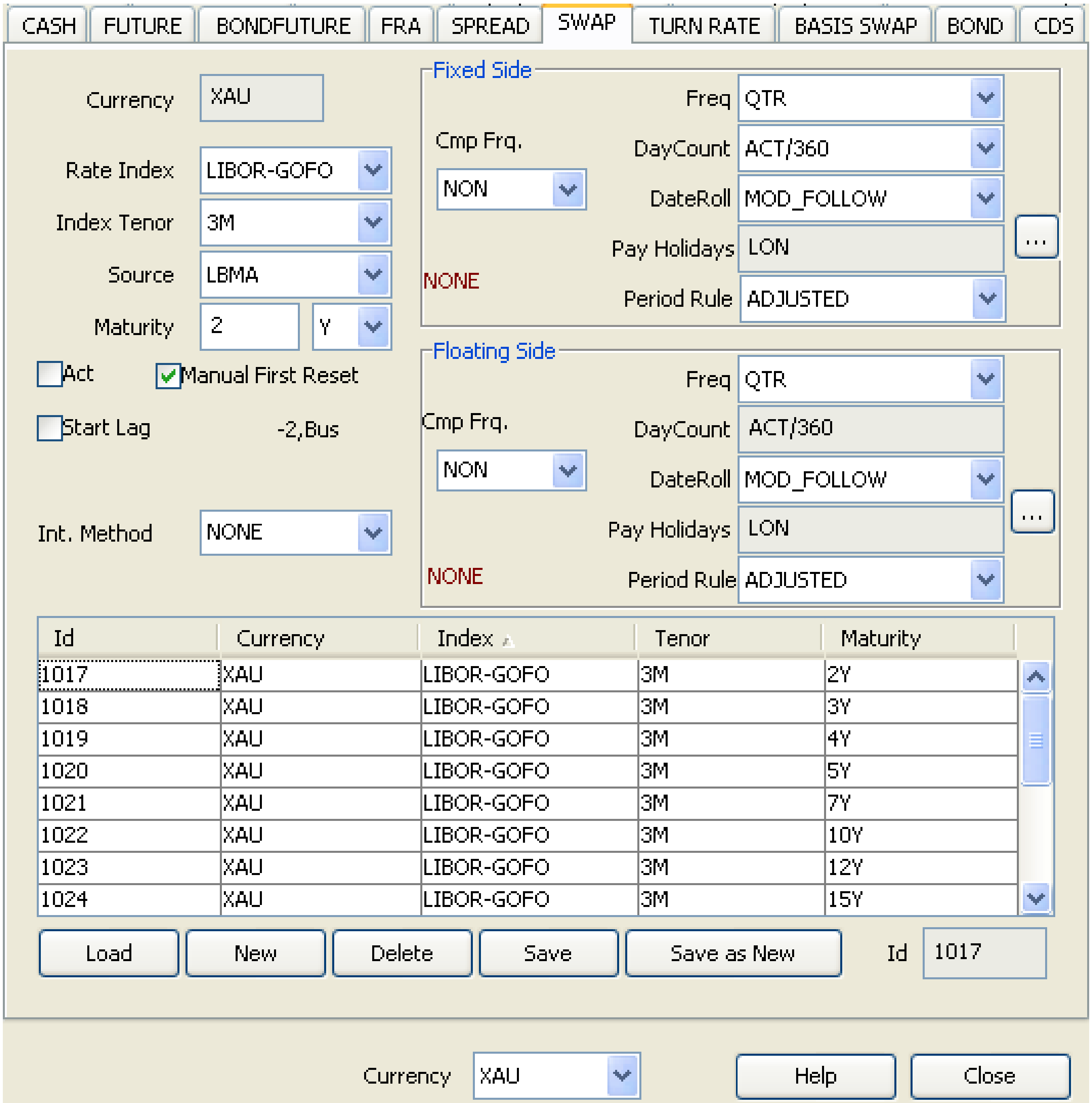
4.1 Creating Curve Underlyings

You can set up underlying instruments before creating the curve, or while you are creating the curve. From the Calypso Navigator, navigate to **Configuration > Market Data > Curve Underlyings**, or in the curve application's Underlying panel, click **New/Edit Underlying**.

In the Curve Underlying Window, create a list of Contango instruments (tenors from TN, 1W, 1M, to 1Y).



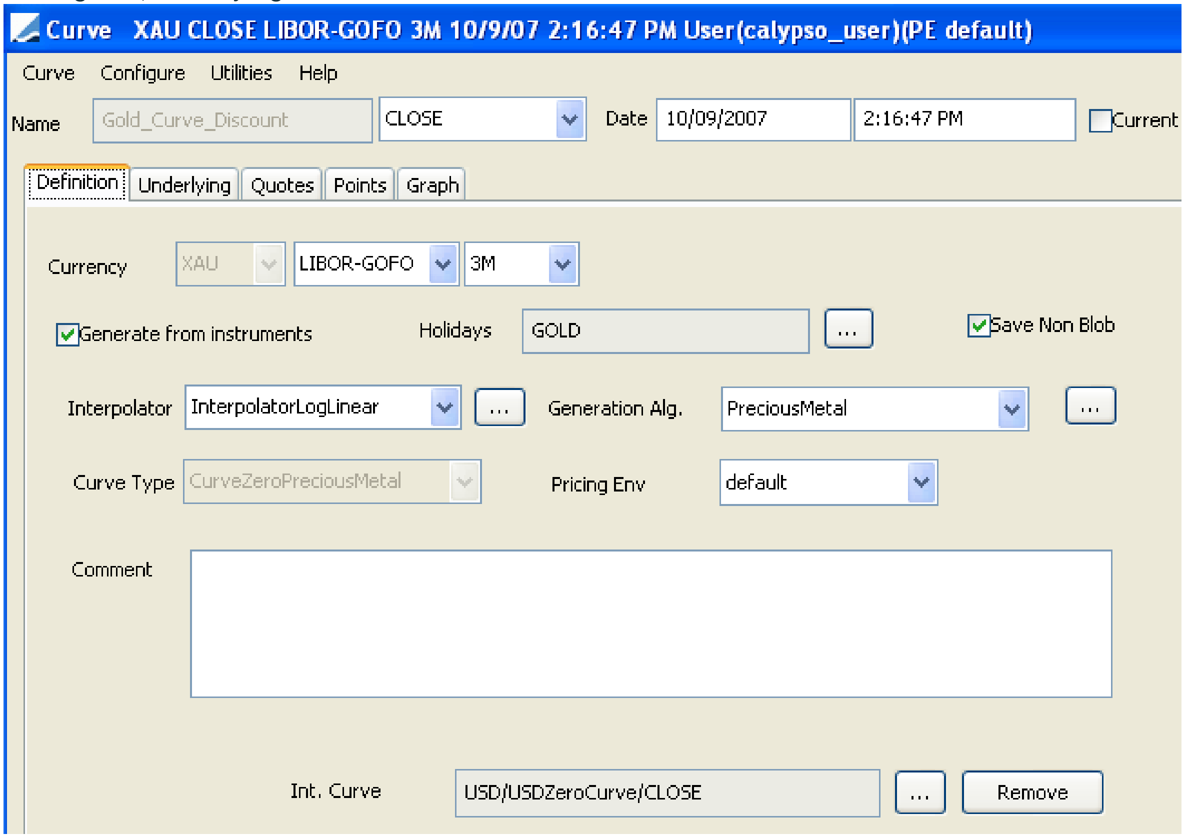
In the Curve Underlying Window, create a list of swaps (tenors from 2Y, 3Y, to 15Y) to model Lease Rate Swap.



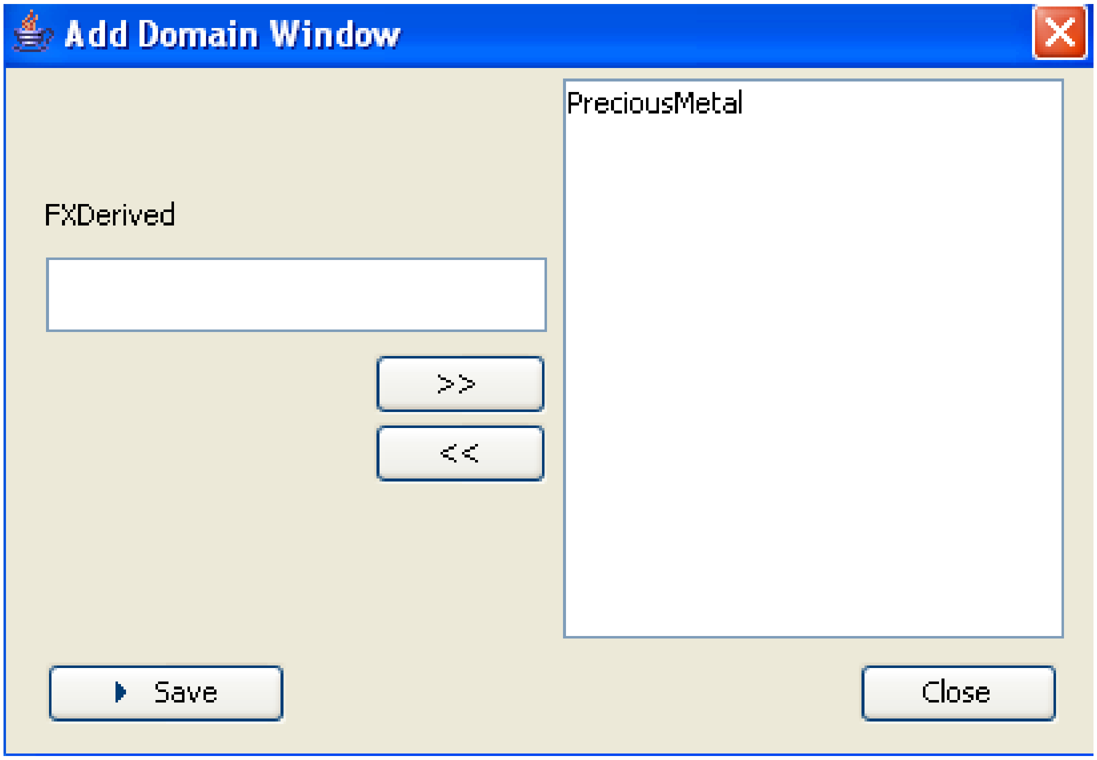
4.2 Creating a Curve

Click **New** to start a new curve.

Select the following to define the curve: currency, reference index, tenor, “Generate from instruments” should be checked, holiday calendar, interpolator, “PreciousMetal” generation algorithm, “CurveZeroPreciousMetal” curve type, Pricing Env, underlying interest curve.



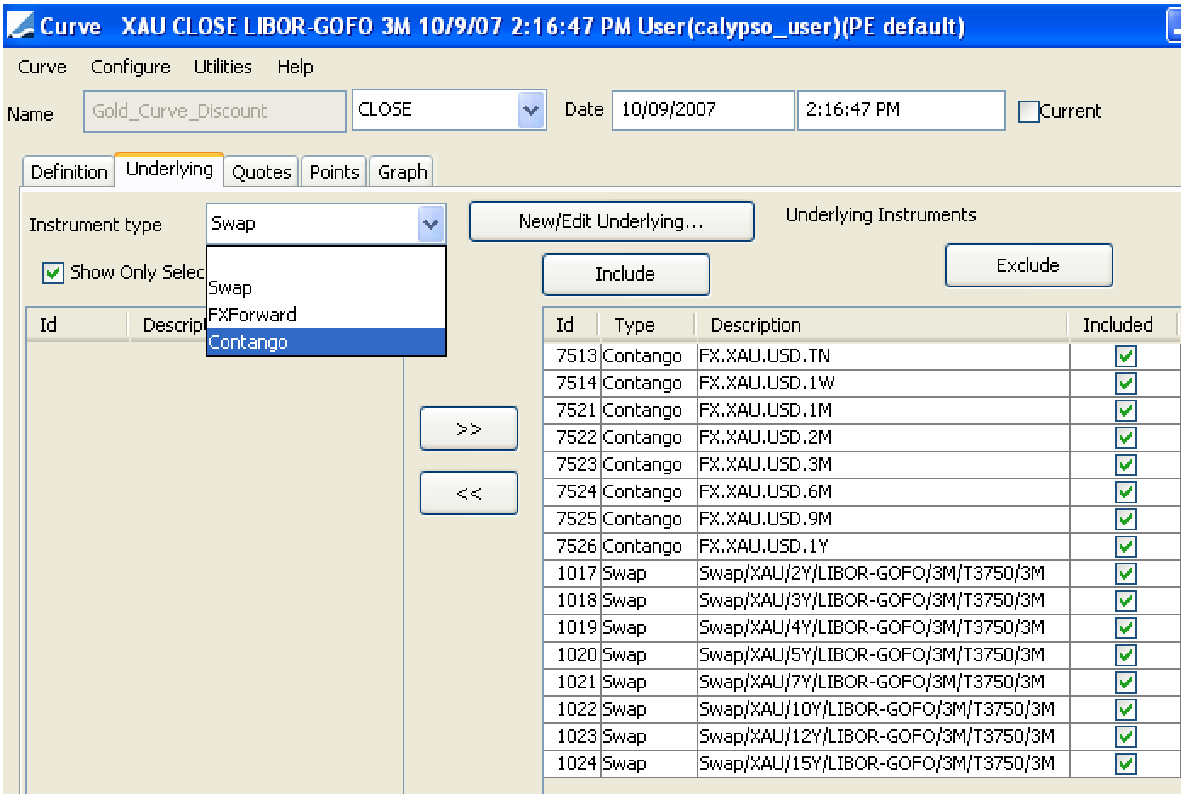
» Click ... to add the “PreciousMetal” generator:



- Enter the generator name in the text field.
- Click **>>** to add the generator name to the panel on the right.
- Click **Save** to add it to the generation algorithm list.

4.2.1 Underlying Panel

Click the Underlying tab. Select the underlying instruments to use in the curve.



» Select the instrument type, and the panel below displays the list of available instruments. The panel is blank if you have not set up any instruments. Click **New/Edit Underlying** to create new instruments.

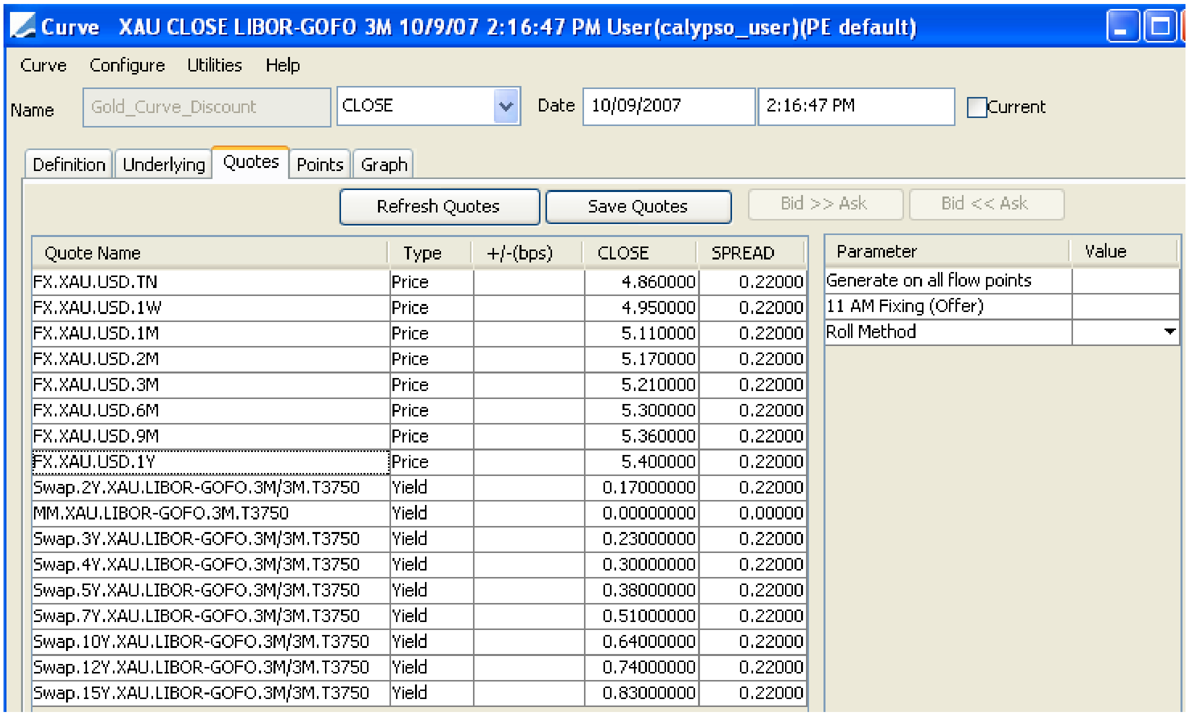
» Select instruments and click **>>** to add them to the instrument list in the right panel.

4.2.2 Quotes Panel

Click the Quotes tab.

You can enter quotes and **Save Quotes** to the quote set associated with the selected pricing environment.

The quotes may be automatically populated if you are running a real-time feed, or they may be populated from the quote set associated with the selected pricing environment.



You can create one of the following types of curves:

» Discount Curve — this curve is created by default.

  In computation, Contangos use Close while Swaps use (Close - 0.5*Spread)

» Forecast Curve — set the parameter “11 AM Fixing (Offer)” to “true” to create the forecast curve.

  In computation, Contangos use (Close + 0.5*Spread) while Swaps use Close.

You can set the following parameters in the Quotes panel when you use the PreciousMetal generator.

Parameter	Description	Default Value
Generate on all flow points	Set to “‘true” to generate curve points at each flow date of multi-period instruments, such as swaps.	false
11 AM Fixing (Offer)	By default, the precious metal generator creates a discount curve. Set this parameter to “true” to create a forecast curve.	false
Roll Method	You can select the roll method. For example, you create a curve instance on T0. On T1 you price a trade. • Roll Points — Curve points are rolled forward when pricing. The points are the same on T1 as on T0. • Regenerate — Curve points are regenerated when rolled. The points are regenerated on T1 using quotes from T0.	Roll Points

4.2.3 Points Panel

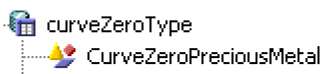
Click the Points tab. Click **Generate** to generate the points.

4.2.4 Save Curve

Click **Save** in the bottom of the curve window. Enter a name for the curve, and click **OK**.

4.3 Pricer Configuration

[NOTE: you must have CurveZeroPreciousMetal defined in the curveZeroType domain in order to assign the curves in the pricer configuration. From the Calypso Navigator, navigate to Configuration > System > Domain Values]

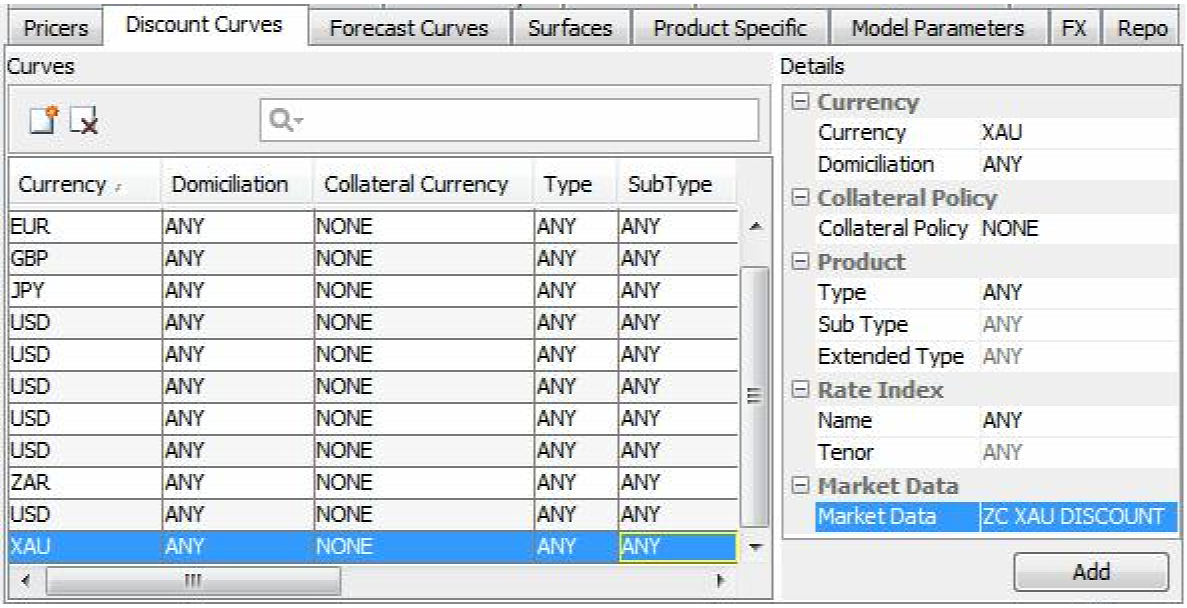


From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

Click **Load**, select the pricer configuration name, and click **OK**.

4.3.1 Discount Curve

- Add the Precious Metal discount curve in the Discount Curves panel.
- Click the Discount Curves tab to bring it to the front.



» Select the currency, and set the index to ANY.

» Click **...** to select the curve.

» Click **Add** to add the curve to the list.

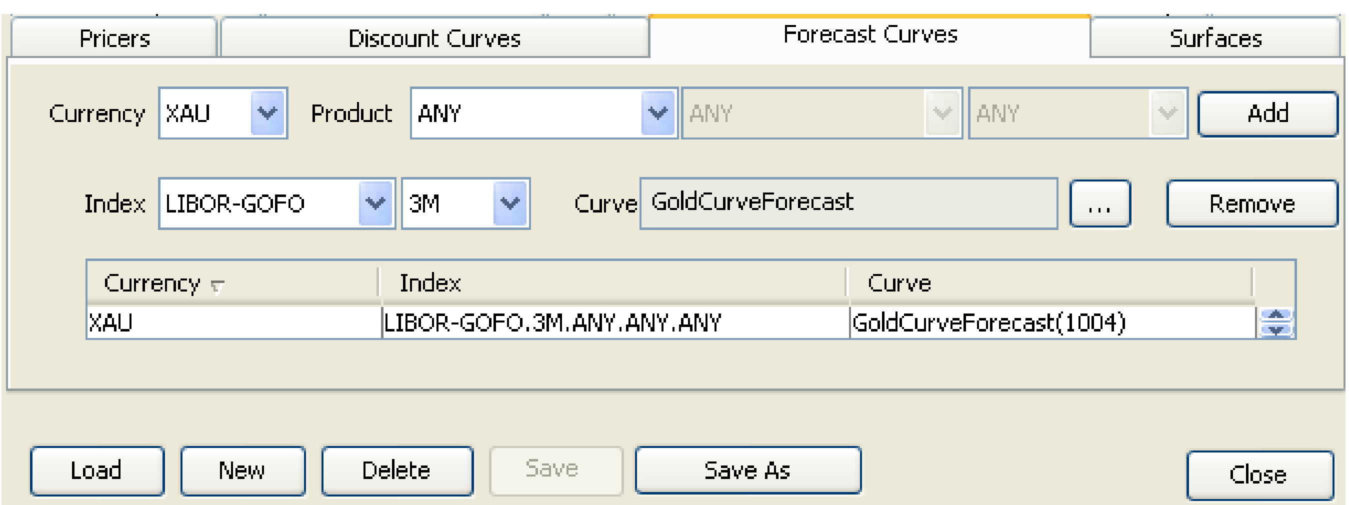
» Click **Save** to save the pricer configuration.

4.3.2 Forecast Curve

Add the Precious Metal forecast curve in the Forecast Curves panel.

[NOTE: It is assumed that a USD discount curve is already set up and added to the pricing environment]

» Click the Forecast Curves tab to bring it to the front.



» Select the currency, product type or ANY, index, tenor.

» Click **...** to select the curve.

» Click **Add** to add the curve to the list.

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

4.4 Analytics

This section details the construction methodology for the Gold Interest Rate curve based on the instruments TNContango, Contangos and LeaseRateSwaps.

Sample Inputs

Day	Rate	Rate	B/O Spread
Tom	TNContango	4.8600%	0.220%
1W	Contango	4.9500%	0.220%
1M	Contango	5.1100%	0.220%
2M	Contango	5.1700%	0.220%
3M	Contango	5.2100%	0.220%
6M	Contango	5.3000%	0.220%
9M	Contango	5.3600%	0.220%
12M	Contango	5.4000%	0.220%
2Y	Swap	0.1700%	0.220%
3Y	Swap	0.2300%	0.220%
4Y	Swap	0.3000%	0.220%
5Y	Swap	0.3800%	0.220%
7Y	Swap	0.5100%	0.220%
10Y	Swap	0.6400%	0.220%
12Y	Swap	0.7400%	0.220%
15Y	Swap	0.8300%	0.220%

All pillar points are out of Spot (except for Tom, which is 1 business day after today)

Resultant Discount Function

Day	Date	XAUdf(Date)
Tom	16/05/2006	0.999995035
Spot	17/05/2006	0.99999007
1W	24/05/2006	0.999969014
1M	19/06/2006	1.000016894
2M	17/07/2006	1.000057263
3M	17/08/2006	1.000090958
6M	17/11/2006	1.000130688
9M	19/02/2007	1.000112803
12M	17/05/2007	1.000029282
2Y	19/05/2008	0.99876875
3Y	18/05/2009	0.996337319
4Y	17/05/2010	0.992297114
5Y	17/05/2011	0.986351393
7Y	17/05/2013	0.971836196
10Y	17/05/2016	0.947210631
12Y	17/05/2018	0.925305343
15Y	17/05/2021	0.894708799

Note the possibility of having negative interest rates.

Notations

Today: Today

Tom: The next Business Day after Today

Spot: Two Business Days after Today

Date: Some Date

USDdf(Date): The zero coupon USD discount function from Today to Date

XAUdf(Date): The zero coupon XAU discount function from Today to Date

The object is to show how to construct *XAUdf(Date)* for a set of Pillar Dates.

Days(Date1,Date2): Number of Calendar Days from Date1 to Date2

Gold(Date):The Forward Price of Gold at Date.

For instance *Gold(Spot)* is just the Spot price of Gold.

We have the following relationship between Gold(Date), XAUdf(Date) and USDdf(Date):

$$Gold(Date) = Gold(Spot) \times \frac{XAUdf(Date)}{USDdf(Date)} \times \frac{USDdf(Spot)}{XAUdf(Spot)}$$

4.4.1 Discount Curve out to Spot based on TNContango

The Discount Curve for Tom and Spot is based on the one input TNContango.

TNContango: The contango from Tom to Spot.

This defines the relationship between the Tom price of Gold and the Spot price of Gold:

$$Gold(Spot) = Gold(Tom) \times \left(1 + TNContango \times \frac{Days(Tom, Spot)}{360}\right)$$

This relationship is used to back-out a Rate called the TNRate, which is then used as the fixed Gold Rate from both Today to Tom, and from Tom to Spot.

TNRate: XAU in XAU Rate from Tom to Spot

So TNRate is defined from the XAUdf() as:

$$XAUdf(Spot) = XAUdf(Tom) \times \frac{1}{1 + TNRate \times \frac{Days(Tom, Spot)}{360}}$$

So solving for TNRate using the TNContango definition and the relationship between Gold(Tom) and Gold(Spot) we have:

$$TNRate = \left(\frac{USDdf(Tom)}{USDdf(Spot) \times \left(1 + TNContango \times \frac{Days(Tom, Spot)}{360}\right)} - 1 \right) \times \frac{360}{Days(Tom, Spot)}$$

The TNRate is now used to calculate both discount factors for Tom and Spot.

$$XAUdf(Tom) = \frac{1}{1 + TNRate \times \frac{Days(Today, Tom)}{360}}$$

$$XAUdf(Spotdate) = XAUdf(Tom) \times \frac{1}{1 + TNRate \times \frac{Days(Tom, Spot)}{360}}$$

4.4.2 Discount Curve based on Contangos

Gold Contangos are rates used by the Market to define the Gold Forward Curve.

Contango(Date): The XAU Contango from Spot to Date

This defines the relationship between the Spot price of Gold and any Forward Price as:

$$Gold(Date) = Gold(Spot) \times \left(1 + Contango(Date) \times \frac{Days(Spot, Date)}{360}\right)$$

Using the general relationship between Gold(Spot) and Gold(Date) above we have immediately:

$$XAUdf(Date) = XAUdf(Spot) \times \frac{USDdf(Date)}{USDdf(Spot)} \times \left(1 + Contango(Date) \times \frac{Days(Spot, Date)}{360}\right)$$

4.4.3 Discount Curve based on Lease Rate Swaps

The gold swap is a market instrument for trading gold interest rate exposure. The standard Gold Lease Rate Swap is Quarterly – Quarterly, with quarterly coupons paid in gold on an Actual 360 day basis

Swap(i): The quoted (Offer) fixed rate for a swap with maturity i Quarters

BidOffer(i): The Bid/Offer on the traded i Quarters Swap

Date(i): the date of the ith Quarter swap date, Date(0)=Spot

days(i)=Date(i)-Date(i-1)

XAUdf(i)=XAUdf(Date(i))

(e.g. Swap(12) refers to the 3 year swap rate, XAUdf(12) is the 3 year Discount Factor)

Assume we have the XAU discount curve built out to n Quarters based on some other XAU Rates inputs (i.e. Gold Contangos). So for the nth Quarter from the definition of Swaps we have:

$$Mid(n) = \frac{XAUdf(Spot) - XAUdf(n)}{\sum_{i=1}^{n} XAUdf(i) \times \frac{days(i)}{360}}$$

We also have a Mid(i) for each quoted Lease Rate Swap, as

Mid(i)=Swap(i) – BidOffer(i)/2

For all remaining Quarters we interpolate the Mid(i), so if Mid(m) and Mid(n) are known, and m<i<n, then we linearly interpolate on the quarters like:

$$Mid(i) = Mid(m) + \frac{Date(n) - Date(i)}{Date(m) - Date(n)} \times (Mid(n) - Mid(m))$$

So we can assume we have a Mid(i) for each quarter. Then given that we now have a strip of Mid(i), i=1,2,..., the XAU discount curve is backed out iteratively so that

$$XAUdf(n) = \frac{XAUdf(Spot) - Mid(n) \times \sum_{i=1}^{n-1} XAUdf(i) \times \frac{days(i)}{360}}{1 + Mid(n) \times \frac{days(n)}{360}}$$

4.4.4 Appendices

Appendix A - XAU in XAU Definition

The XAU in XAU is a ACT/360 Simple Rate. Let

XXRate(Date) : the XAU in XAU ACT/360 Rate from Spot to Date

Then it follows that given XAUdf(Spot) we can construct the XAUdf(Date) as:

$$XAUdf(Date) = \frac{XAUdf(Spot)}{1 + XXRate(Date) \times \frac{Days(Spot, Date)}{360}}$$

Appendix B - XAU in USD Definition

It is sometimes simpler when depositing Gold to earn an interest payment payable in USD (rather than say XAU). The interest payment is referenced off the current Spot Price of Gold.

XURate(Date): The XAU in USD Rate from Spot to Date

For instance, if the deposit is 1oz of Gold, to be redeemed at Date, then the USD Interest payable at Date would be:

$$Gold(Spot) \times XURate(Date) \times \frac{Days(Date)}{360}$$

That is, XURate(Date) represents the simple ACT/360 interest payable in USD on 1oz of Gold where the USD Notional is Gold(Spot) Dollars. From arbitrage considerations, it must be equivalent to receive either a XAU in USD interest payment or XAU in XAU Interest payment, hence we have the following equivalence

$$Gold(Spot) \times XURate(Date) = Gold(Date) \times XXRate(Date)$$

That is, a XAU in USD payment must be the same as a XAU in XAU payment converted to USD at the forward Date.

To construct the XAUdf(Date) from the XURate(Date) we can either solve the above equation, or more simply note that 1oz received at Spot, must be equivalent to the present value of 1oz received at Date plus the present value of XAU in USD interest paid on that 1oz. That is:

$$XAUdf(Spot) = XAUdf(Date) + XURate(Date) \times \frac{Days(Date)}{360} \times USDdf(Date)$$

So it follows that given we have XAUdf(Spot) then we can construct XAUdf(Date) for any given XURate(Date) as:

$$XAUdf(Date) = XAUdf(Spot) - XURate(Date) \times \frac{Days(Date)}{360} \times USDdf(Date)$$

Appendix C - XAU in USD and Contango Relationship

We have the following equivalence. We can either invest 1oz of Gold to some Date and receive XAU in USD Interest, and then convert the 1oz at that Date to USD, or convert our 1oz at Spot and earn Libor out to Date. Let

LIBOR(Date): The ACT/360 Simple USD Rate from Spotdate to Date

Then the above equivalence is

$$Gold(Spot) \times XURate(Date) \times \frac{Days(Spot, Date)}{360} + Gold(Date) = Gold(Spot) \times \left(1 + LIBOR(Date) \times \frac{Days(Spot, Date)}{360}\right)$$

Rewriting Gold(Date) in terms of Contango(Date) and dividing by Gold(Spot) gives the relationship:

$$Contango(Date) = LIBOR(Date) - XURate(Date)$$

5. Credit Ratings

From the Calypso Navigator, navigate to **Market Data > Credit Curves > Credit Ratings** (menu action `refdata.CreditRatingWindow`).

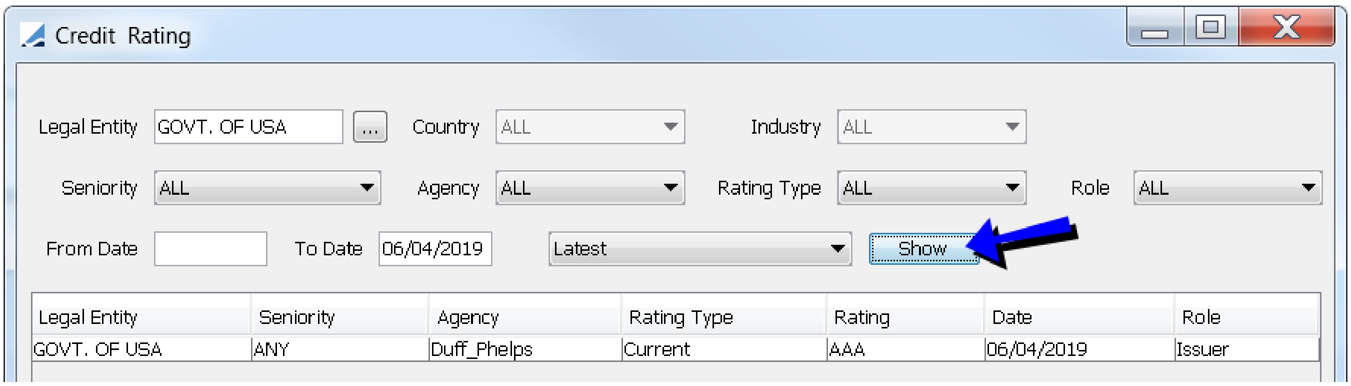
The Credit Rating window allows setting credit ratings for legal entities in their various roles.

You can use a credit rating to specify a fallback curve for legal / reference entities that do not have liquid CDS trades.

▶ See Probability Curve for more details.

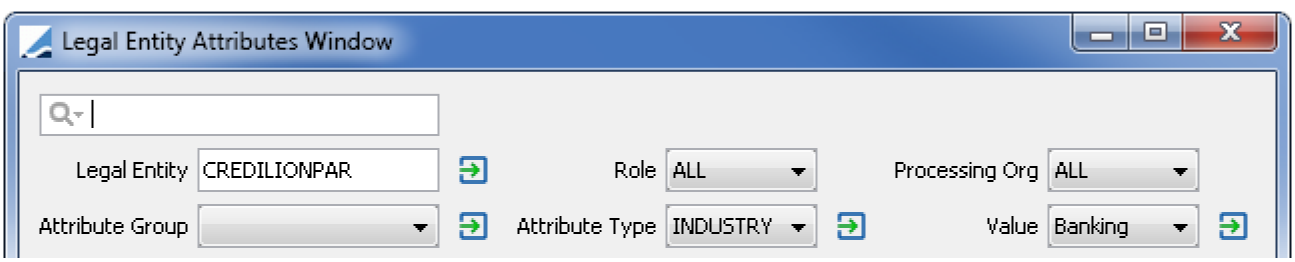
5.1 Displaying Existing Credit Ratings

Enter search criteria and click **Show** to display existing credit ratings.



» You can display credit ratings for ALL legal entities if you leave the Legal Entity field empty.

» The industry corresponds to the legal entity attribute INDUSTRY. You can define a list of industries in the domain 'leAttributeType.INDUSTRY'. Note that attributes and domain values are case sensitive.

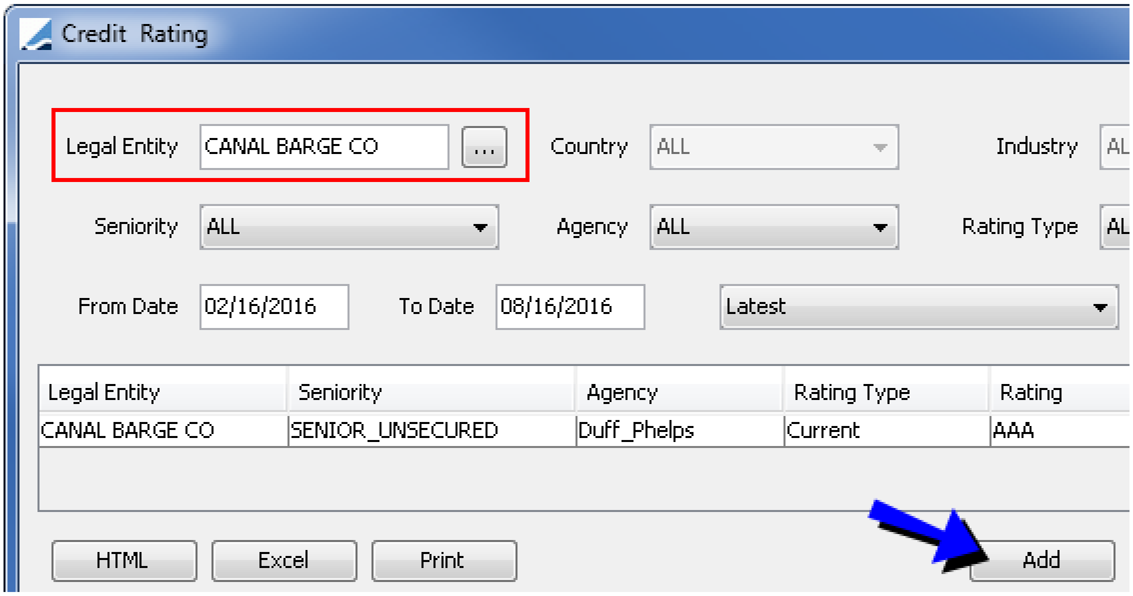


» The field adjacent to the **Show** button allows you to select:

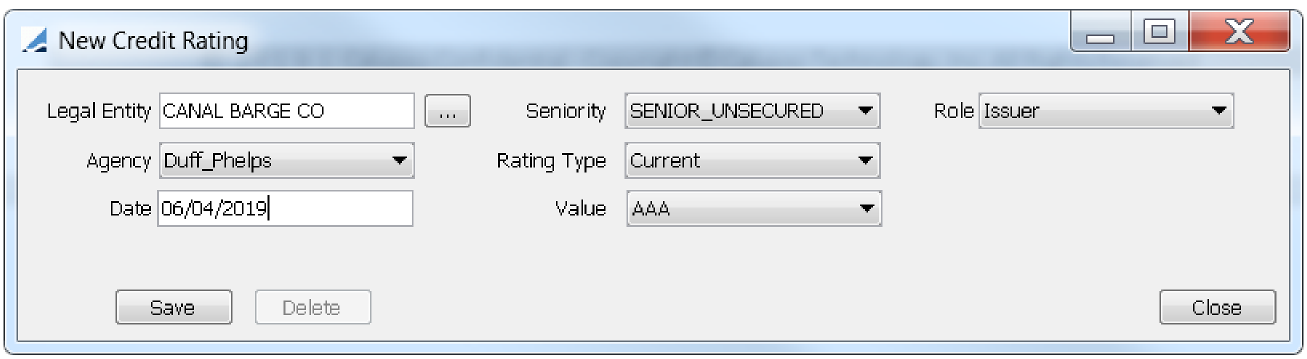
- Latest: Displays the latest credit ratings for your selection criteria. For example, if two ratings have been defined during the selected period, for the same criteria, it will only show the most recent one.
- History: Displays all ratings that satisfy the selection criteria.
- Ratings created for this day: Displays ratings defined on the To Date only.

5.2 Adding a New Credit Rating

Select a legal entity, and click **Add** to add a credit rating.



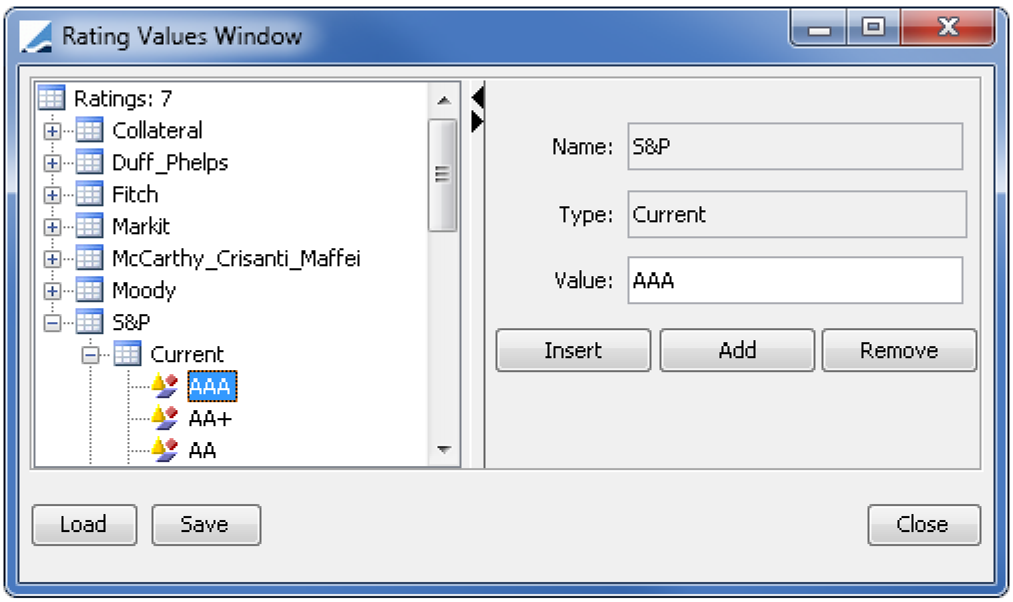
It brings up the New Credit Rating window.



- Select the fields described below, then click **Save**.
- Note that if the Authorization mode is enabled, an authorized user must approve your entry. Click **Show Pending Modifications** in the Credit Rating window to display any pending credit ratings for the selected legal entity.

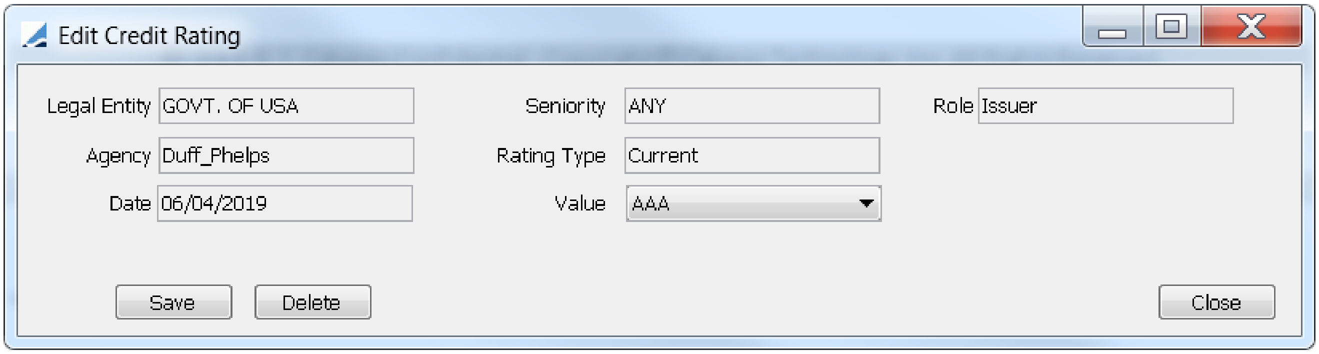
Fields Details

Field	Description
Legal Entity	Click **...** to select a legal entity. By default, you can select issuers but you can change the role as needed.

Field	Description
Seniority	Select a seniority level, or ANY.
Role	Select the role for this rating. The available roles are those specified in the Legal Entity window. A legal entity may have multiple and different credit ratings for different roles. For example, the same legal entity could have different credit ratings as a CounterParty, as an Issuer, and as a Guarantor.
Agency	Select a rating agency. Rating agencies are defined in the 'ratingAgency' domain.
Rating Type	Select the type of rating: Current or Outlook. Rating types are defined in the 'creditRatingType' domain.
Date	Enter the rating effective date.
Value	Select a rating value. Rating values are defined using **Configuration > System > Rating Values** per rating agency and rating type.  » Select a node Agency / Type from the Ratings tree. It will appear on the right-hand side. Enter a value and click **Add**.

5.3 Modifying a Credit Rating

Load existing credit ratings and double-click a rating to modify it. It brings up the Edit Credit Rating window.



» Modify the value and click **Save**.

» Note that if the Authorization mode is enabled, an authorized user must approve your entry. Click **Show Pending Modifications** in the Credit Rating window to display any pending credit ratings for the selected legal entity.

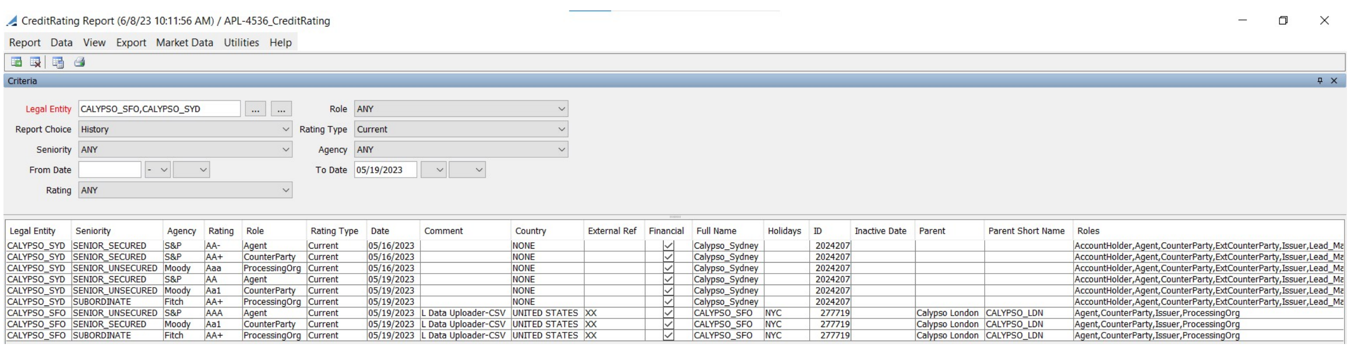
5.4 Credit Rating Report

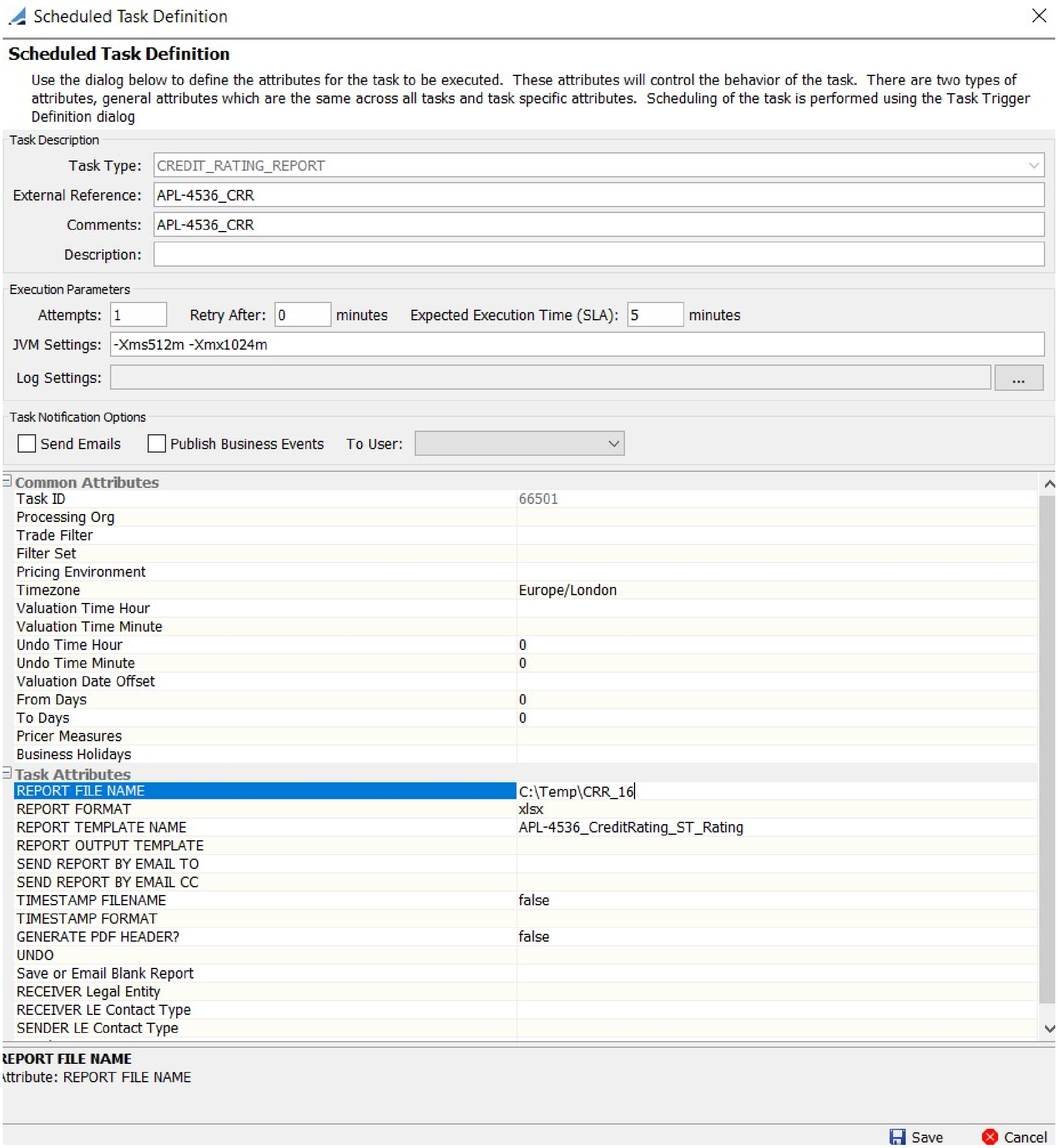
From the Calypso Navigator, create a menu item for (menu action `reporting.ReportWindow$CreditRating`) or the scheduled task `CREDIT_RATING_REPORT` to run the report.

The Credit Rating report allows viewing credit ratings for legal entities in their various roles from all rating agencies.

Credit ratings can be entered from the Legal Entity window.

Enter search criteria and click [icon] to display existing credit ratings. The search criteria are described below.





Criteria Details

Field	Description
Legal Entity	Select a legal entity, or leave empty for all.
Report Choice	Select Latest, History and Ratings created for this date.
Seniority	Select Seniority as needed. The Seniority values are defined under domain 'securityCode.DebtSeniority'.
Rating	Select ANY, BBB+, AAA to sort rating criteria.
Role	Select ALL, Agent, Counterparty and Issuer.
Rating Type	Select the Rating Type as needed. The Rating Type values are defined under domain 'creditRatingType'.
Agency	Select the rating agency as needed. The values are defined under domain 'ratingAgency'.
From Date	Enter the rating start date. This field is available for Report Choice 'Latest and History'.
To Date	Enter the rating end date. This field is available for Report Choice 'Latest and History'.
Date	Enter the rating effective date as needed. This field is available only when Report Choice is 'Ratings created for this date.

6. CDS Basis Adjustment Curve

CDS Basis Adjustment curves are used in the pricing of Index, Index Tranche, and Nth Loss Basket products.

The adjustment is performed on the Curve Points that are stored in a probability curve. Each Curve Point holds a survival probability as of the Curve Point's date t. Call this P (t). Then an adjusted curve is created by copying the original curve, using the same dates t, and for each date changing P (t) to Padj (t), where Padj (t) = exp(-ht)*P(t).

The factor h is the basis adjustment which adjusts the probability curves so that the BE_Rate is equal to the Quoted value of the Index. It is the same for all curves in the index.

From the Calypso Navigator, navigate to **Market Data > Credit Curves > Basis Adjustment** (menu action `marketdata.CurveCDSBasisAdjustmentWindow`).

CDS Basis Adjustment Curve Quick Reference

Configuration

Define the reference entity basket using **Configuration > Credit Derivatives > Reference Entity Basket** from the Calypso Navigator.

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, LAST, or OPEN).

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

4. Definition Panel — Select the following to define the curve: currency, click **...** to select the reference entity basket, "Generate from instruments" should be checked, CDSBasisAdjustment generation algorithm, interpolator, Pricing Env.

5. Underlyings Panel — Select the underlying instruments.

6. Quotes Panel — Enter quotes manually, use quotes from the quote set, or use real-time quotes.

7. Points Panel — Click **Generate** to generate the points. You can modify the rates.

8. Click **Save**, enter a name for the curve, and click **OK**.

Pricer Configuration

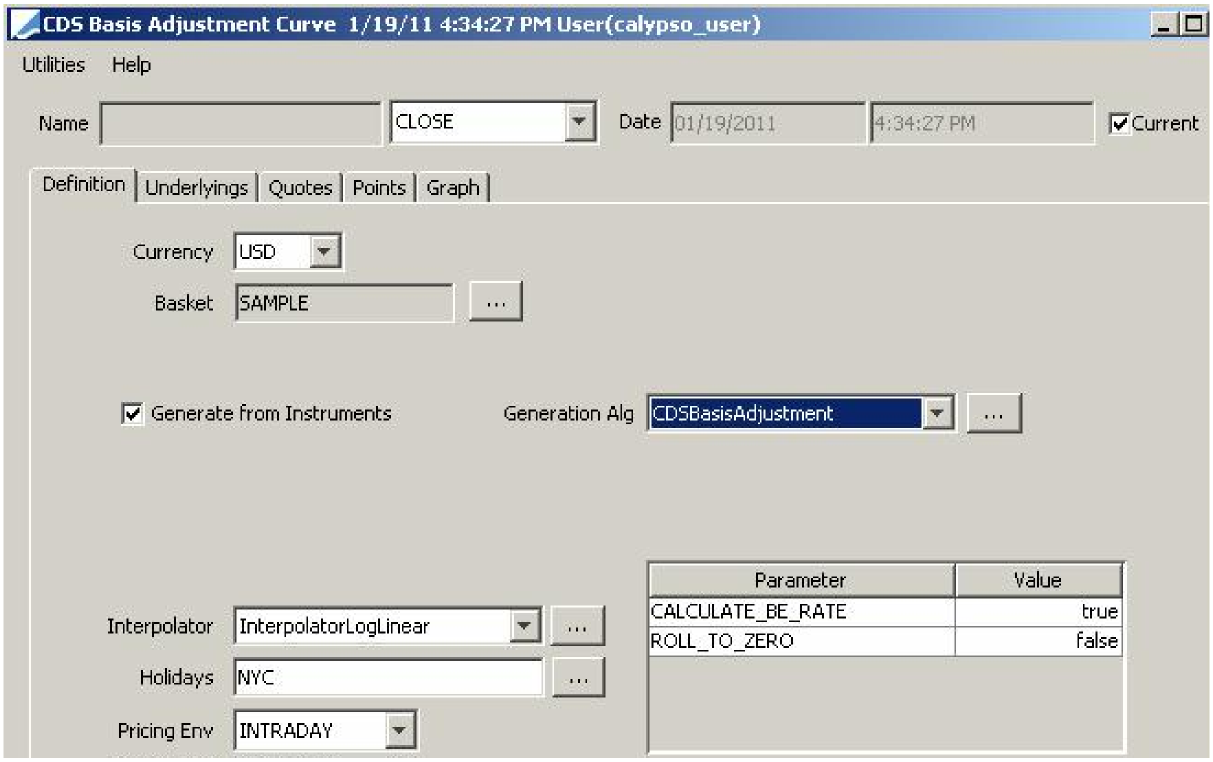
Assign the CDS basis adjustment curve in the Credit panel for the CDS_BASIS_ADJ usage.

6.1 Creating a Curve

6.1.1 Definition Panel

Click **New** to start a new curve.

Select the following to define the curve: currency, click **...** to select the reference entity basket, “Generate from instruments” should be checked, CDSBasisAdjustment generation algorithm, interpolator, Pricing Env.

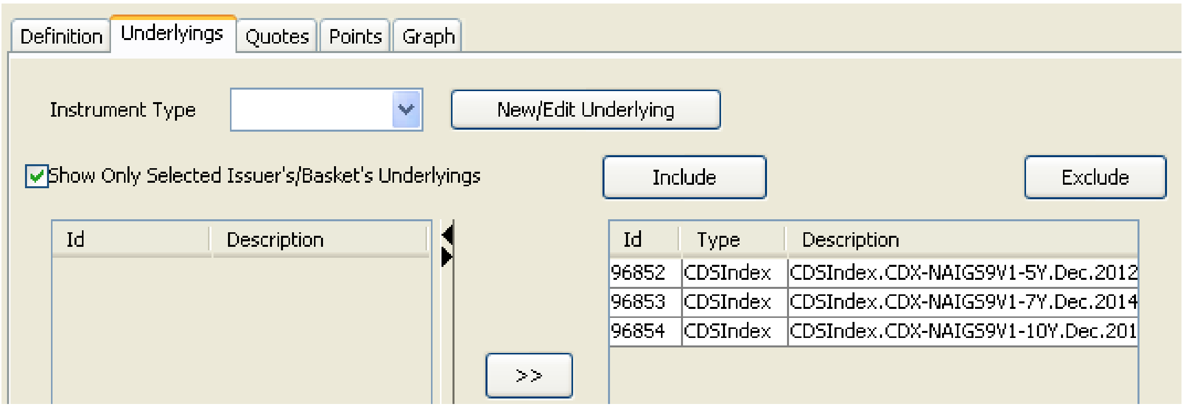


You can set the following parameter when you select the CDSBasisAdjustment generator.

Parameter	Description
CALCULATE_BE_RATE	If set to true, then the break-even rate is calculated and displayed for each point on the curve in the Points panel. Default is true.
ROLL_TO_ZERO	If true, the adjustments on a rolled curve will be set to zero. This means that the pricer will not apply any basis adjustment to probability curves when the basis adjustment curve is rolled (stale). Defaults is false.

6.1.2 Underlying Panel

Click the Underlyings tab. Select the underlying instruments to use in the curve.

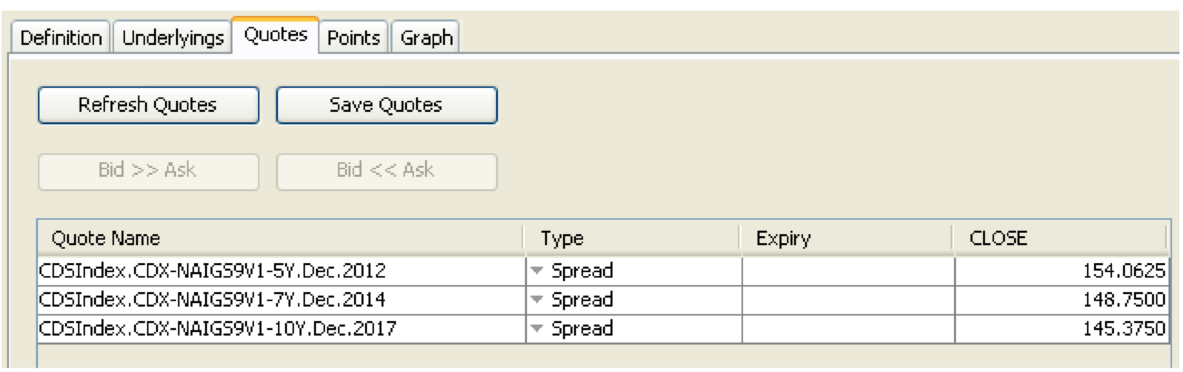


- The basket's underlyings are automatically displayed.
- Click **New/Edit Underlying** to create new instruments.
- Select instruments and click **>>** to add them to the instrument list in the right panel.

6.1.3 Quotes Panel

Click the Quotes tab. You can enter quotes and Save Quotes to the quote set associated with the selected pricing environment.

The quotes may be automatically populated if you are running a real-time feed, or they may be populated from the quote set associated with the selected pricing environment.



6.1.4 Points Panel

Click the Points tab. Click **Generate** to view the generated rates.

You can select the Graph panel to view the curve in graphical mode.

6.1.5 Save Curve

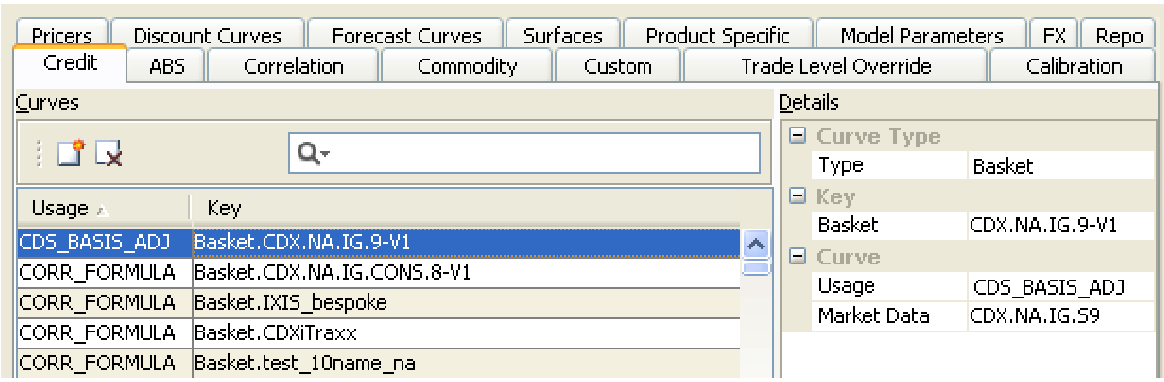
Click **Save** in the bottom of the curve window. Enter a name for the curve, and click **OK**.

6.2 Pricer Configuration

Following is an example of how to assign the curves in the Pricer Configuration.

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**, and click **Load** to select a pricer configuration.

Click the Credit tab.



- Select type "Basket", and select a basket from the Basket field.
- Select usage CDS_BASIS_ADJ, and select a basis adjustment curve from the Market Data field.
- Click **Add** to add the curve to the list.
- Click **Save** to save the pricer configuration.

7. Default Curve

From the Calypso Navigator, navigate to **Market Data > Credit Curves > Default Curve** (menu action `marketdata.CurveDefaultWindow`).

A default curve is used to apply assumptions regarding how many and when will a percentage of borrowers default on their loan obligations.

Default curves are used for pricing ABS bonds in the context of the Intex integration.

▶ Refer to the Calypso Intex Integration User Guide for complete details.

8. Prepayment Curve

A prepayment curve is used to apply assumptions regarding early return of principal because of borrowers paying down the bond collateral (mortgage or home equity loans) ahead of the mandated scheduled amortization. Specifying a prepayment provides an analysis basis for assessing risk.

Prepayment curves can be assigned to a fixed income product (MBS, ABS, etc.) by mapping it to a pricing environment.

Prepayment curves are used for pricing bonds in the context of the Intex integration.

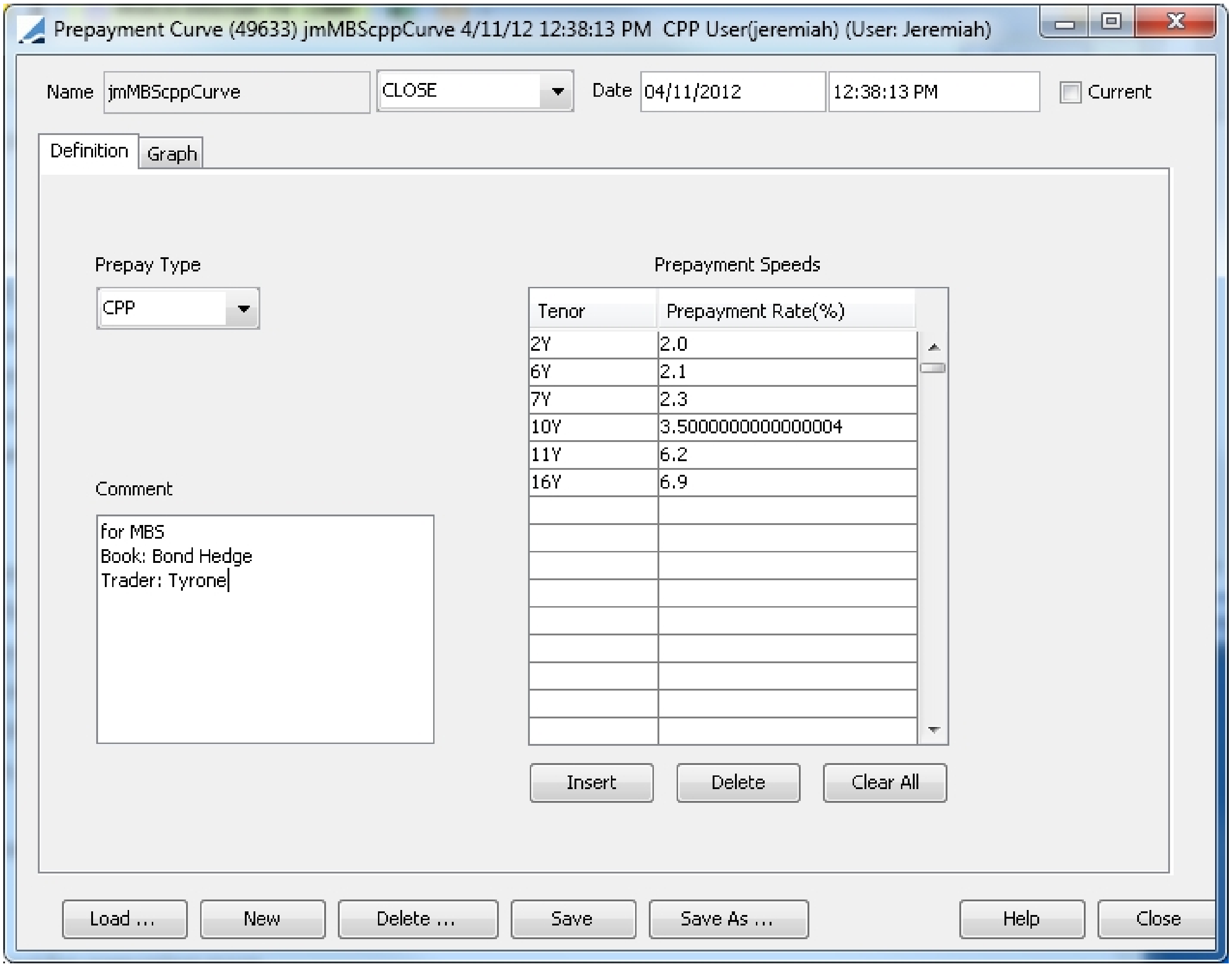
▶ Refer to the Calypso Intex Integration User Guide for complete details.

8.1 Prepay Types

Field	Description
PSA	Public Securities Association model. Assumes a gradual rise in payments that peaks after 30 months. Standard increase is 0.2% per month with an indicator of 100%.
CPR	Conditional Prepayment Rate model. Rate is equal to the proportion of the principal of the pool assumed to be paid off prematurely each period. Expressed as a percentage. Calculated as annualized monthly prepayment rate / pool balance at the beginning of the month. $CPR = 1-(1-SMM)^{12}$ Example: A pool of mortgages with a CPR of 8% would indicate that for each period, 8% of the pool's outstanding principal will be paid.
SMM	Single Monthly Mortality factor. Calculated as monthly prepayments / pool balance at the beginning of the month.
CPP	Constant Percent Prepayment. Estimates cashflows from annualized prepayments based on the average 12 month life of a mortgage. Does not calculate compounding interest. The SMM factor is multiplied by 12 to obtain the CPP.
CPB	Constant Prepayment on the Balloon. A pattern of prepayments assuming CPR until a reset date and a balloon payment on loans after.
ABS	Asset Backed Securities prepayment rate. Used primarily in automobile deals. Calculated as monthly income / original balance.
HEP	Home Equity Prepayment Model. Assumes home equity loans become seasoned after 10 months. Assumes even increases in payment per month, beginning at 2% in the first month, and leveling at 20% in the 10th month.
MHP	Manufactured Housing Prepayment model. Assumes a schedule of a ramping schedule in the first 24 months. Begins at 3.7% with .01% increments and levels off at 6% in the 24th month.

8.2 Prepayment Curve Window

You can define a curve in the Prepayment Curve window. From the Calypso Navigator, navigate to **Market Data > Credit Curves > Prepayment Curve**.



Prepayment Curve Window

Prepayment curve speeds are defined by securities organizations. Models can be defined by selecting a type, tenor and prepayment speed. Each defined curve will be assigned an individual system ID which will be displayed at the top of the window.

» Specify Prepay type from the drop down.

» Specify tenor and rate in the Prepayment Speeds table.You can use the buttons to insert, delete, or clear the table.

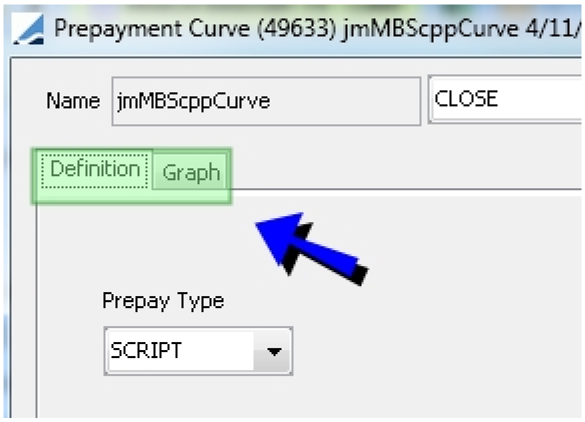
» Enter an optional free form comment.

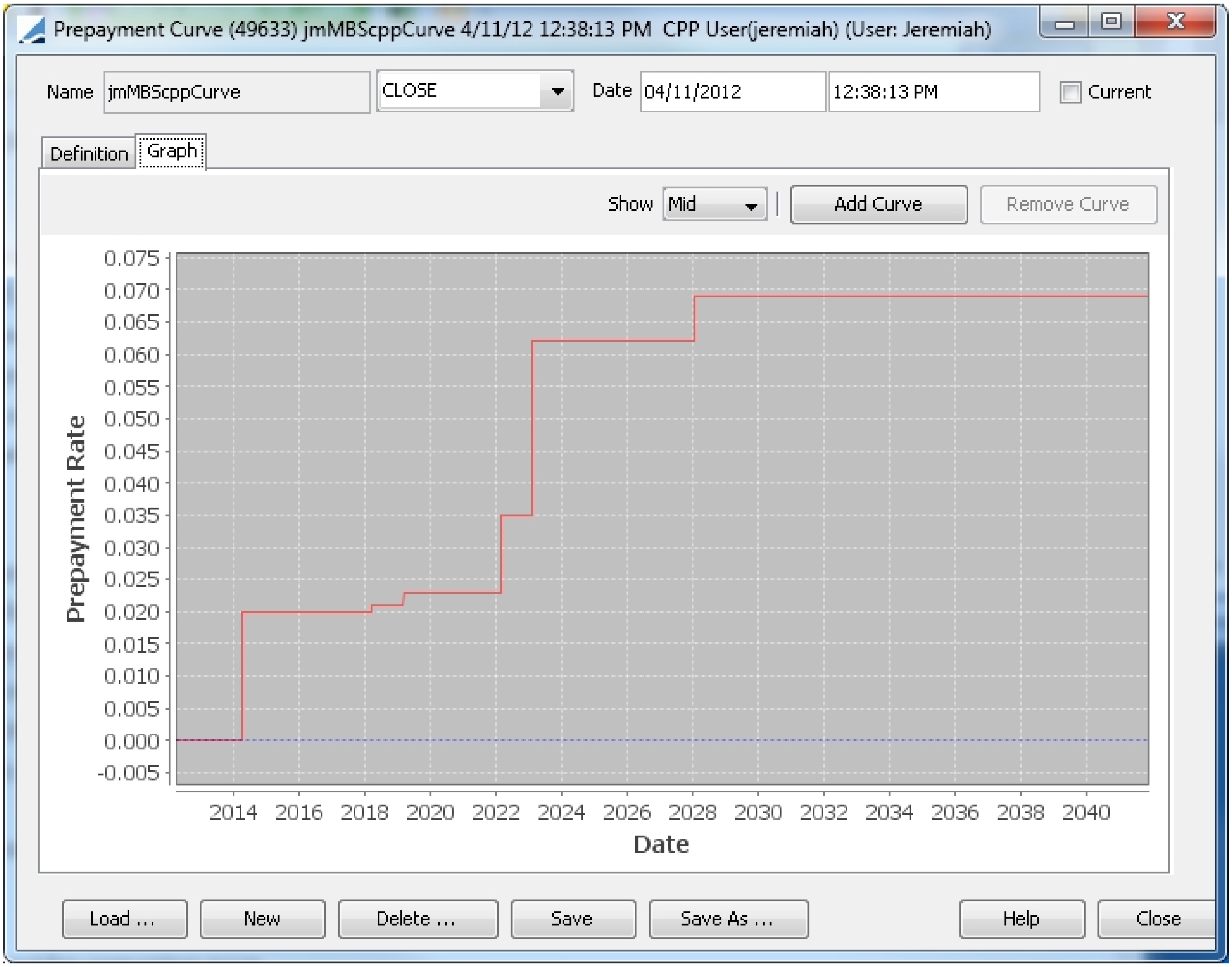
» Click Save and name your curve.

You can load existing curves and modify the values. Click Save after making changes.

8.3 Curve Graph

Toggle between the tabs in the curve window to view a graphical display of your defined curve.




Prepayment Curve (49633) jmMBScppCurve 4/11/12 12:38:13 PM CPP User(jeremiah) (User: Jeremiah)
Name
jmMBScppCurve
CLOSE
Date
04/11/2012
12:38:13 PM
Current
Definition
Graph
Show
Mid
Add Curve
Remove Curve
0.075
0.070
0.065
0.060
0.055
0.050
0.045
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
-0.005
Prepayment Rate
2014
2016
2018
2020
2022
2024
2026
2028
2030
2032
2034
2036
2038
2040
Date
Load ...
New
Delete ...
Save
Save As ...
Help
Close

9. Probability Curve

From the Calypso Navigator, navigate to **Market Data > Credit Curves > Probability Curve** (menu action `marketdata.CurveProbabilityWindow`) or **Market Data > Credit Curves > Credit Market Data** (menu action `marketdata.CreditCurveBlotter`).

This topic describes how to create a derived probability curve from underlying instruments, and from a base curve and spreads:

- Underlying instruments
- Probability curve from underlying instruments
- Probability curve from a base curve and spreads
- Attributes panel configuration
- Pricer configuration
- Probability Curve with Fixed Coupon CDS Underlying

▶ Refer to the Credit Derivatives Analytics Guide for information about the interpolation methods and generation algorithm.

Probability Curve Quick Reference

Configuration Requirements

- Issuer Definition – From the Calypso Navigator, navigate to **Configuration > Legal Dat > Entities**.
- Riskless Curve – From the Calypso Navigator, navigate to **Market Data > Interest Rate Curves > Zero Yield Curves** - The riskless curve should already be registered with the pricing environment.
- Quotes for the underlying instruments in the curve.

Curve Underlying Instruments

You can use either CDS or bond underlying instruments in building probability curves. From the Calypso Navigator, navigate to **Configuration > Market Data > Curve Underlyings**, or in the curve application's Underlying panel, click New/Edit Underlying.

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, LAST, or OPEN).

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

4. Definition Panel — Select the following to define the curve: currency, issuer (or basket),

seniority, ticker (optional), “Generate from Instruments” should be checked, “Probability” generation algorithm, riskless curve (zero curve), enter the recovery rate, interpolator, holiday calendar.

5. Underlyings Panel — Select the underlying instruments.

6. Quotes Panel — Enter quotes manually, use quotes from the quote set.

7. Points Panel — Click **Generate** to generate the points.

8. Click **Save**, enter a name for the curve, and click **OK**.

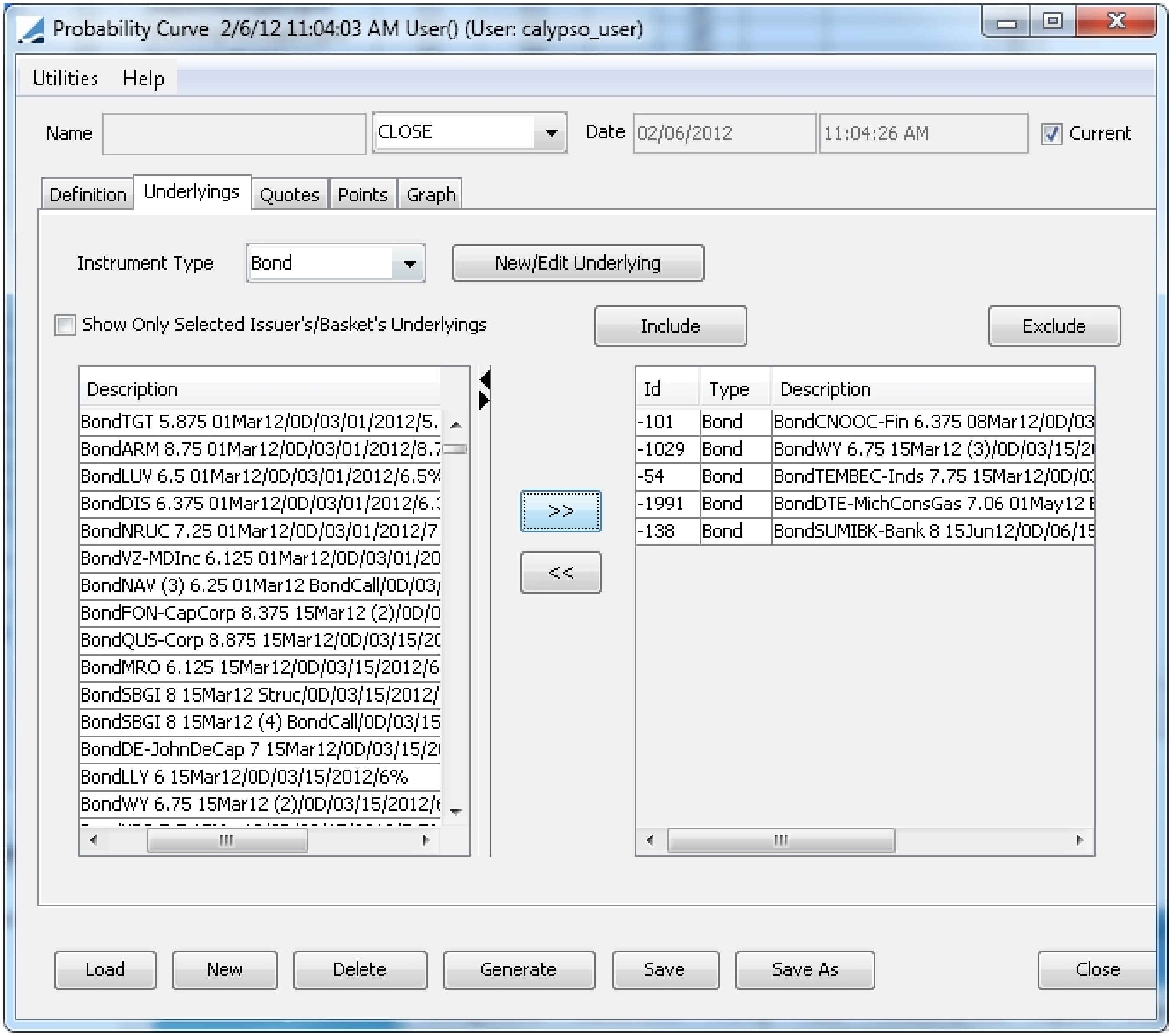
Pricer Configuration

Probability curves are associated with a pricing environment under the Credit panel of the pricer configuration for the PROB usage. From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

9.1 Creating Underlying Instruments

You can set up underlying instruments before creating the curve, or when you create the curve. From the Calypso Navigator, navigate to **Configuration > Market Data > Curve Underlyings**, or in the curve window's Underlyings tab, click **New/Edit Underlying**.

In this example, bonds are used as the underlyings.

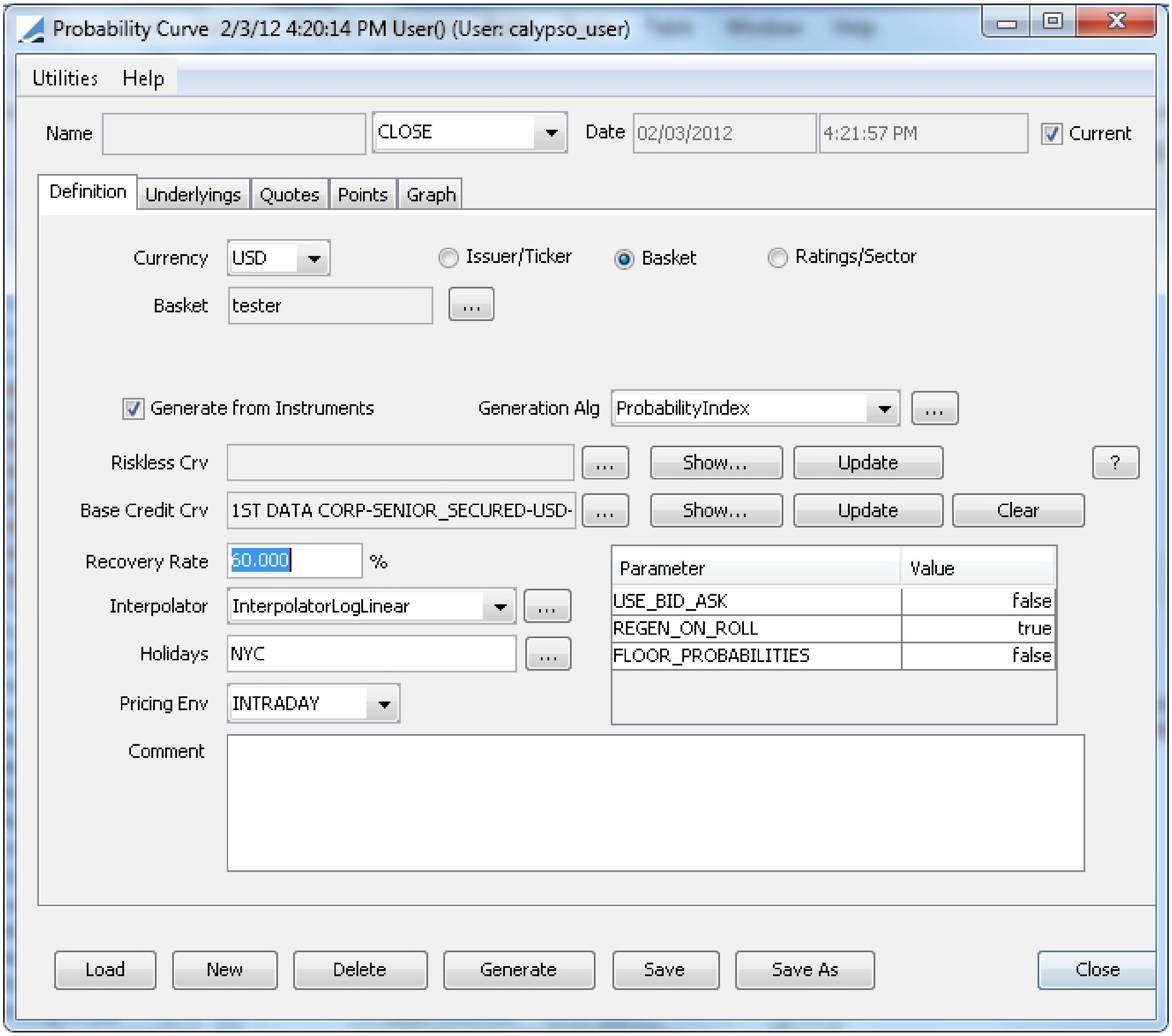


9.2 Generating Probability Curve from Underlying Instruments

Click **New** to start a new curve.

9.2.1 Definition Panel

Select the following to define the curve: currency, issuer (or basket or ratings), seniority, ticker (optional), “Generate from Instruments” should be checked, “Probability” generation algorithm, riskless curve (zero curve), enter the recovery rate, interpolator, holiday calendar.



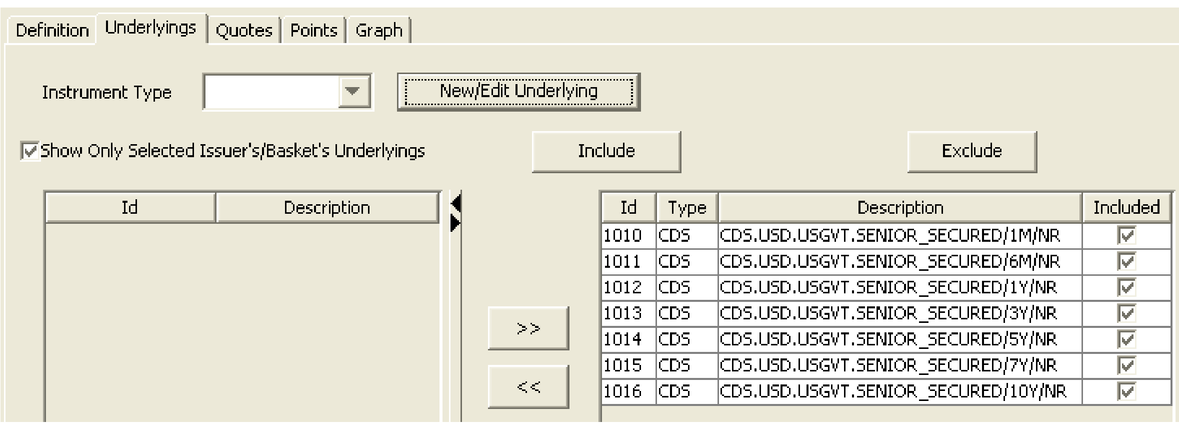
When you select the Probability generator, you can set the following parameters.

Parameter	Description
USE_BID_ASK	This flag indicates that the Bid/Ask will be used to price the trade. So if the curve is saved with Bid/Ask, the Buy Protection will be valued with the Bid and the Sell Protection will be valued with Ask. This is to ensure that the trades are marked conservatively.
REGEN_ON_ROLL	Set this parameter to true if the curves are to be generated when the roll is done. In general, all the spreads don't move on a Daily basis. Even if the spreads don't move, the survival probabilities will be different due to: 1. Zero curve will have moved.

Parameter	Description
	2. Time effect. This feature allows you to value your books correctly without generating the curves unless the spreads change.
FLOOR_PROBABILITIES	If this flag is set to true, then the probabilities that fail to generate when this flag is false will be floored at 0.00%.
CALCULATE_DURATION	When set to true, duration points are computed for each survival probability. The risky duration is the sum of the premium cashflow periods multiplied by the associated risky discount factor: the product of the risk-free discount factor and probability that the premium cashflow will be paid. For trades without a schedule of principal paydowns this is equal to the RiskyPV01 divided by the current notional amount.

9.2.2 Underlyings Panel

Select the Underlyings tab, and choose underlying instruments.



» Select the instrument type to display the list of available instruments. If no instrument appears, click **New/Edit Underlying** to create new instruments.

» Select instruments and click **>>** to add them to the instrument list in the right panel.

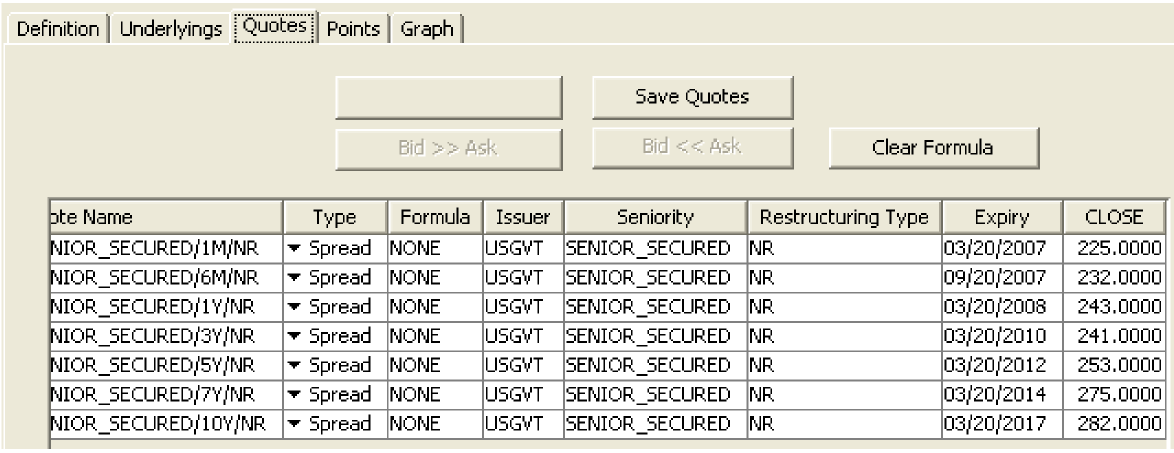
NOTE: When using Bonds as underlying for generating a probability curve, APPLY_INSTR_SPRD pricing parameter must be set to "false" in the pricing environment.

9.2.3 Quotes Panel

Select the Quotes tab. You can enter and save quotes to the quote set associated with the selected pricing environment.

The quotes may be automatically populated if you are running a real-time feed, or they may be populated from the quote set associated with the selected pricing environment.

NOTE: The ProbabilityIndex generator only supports CleanPrice quotes.

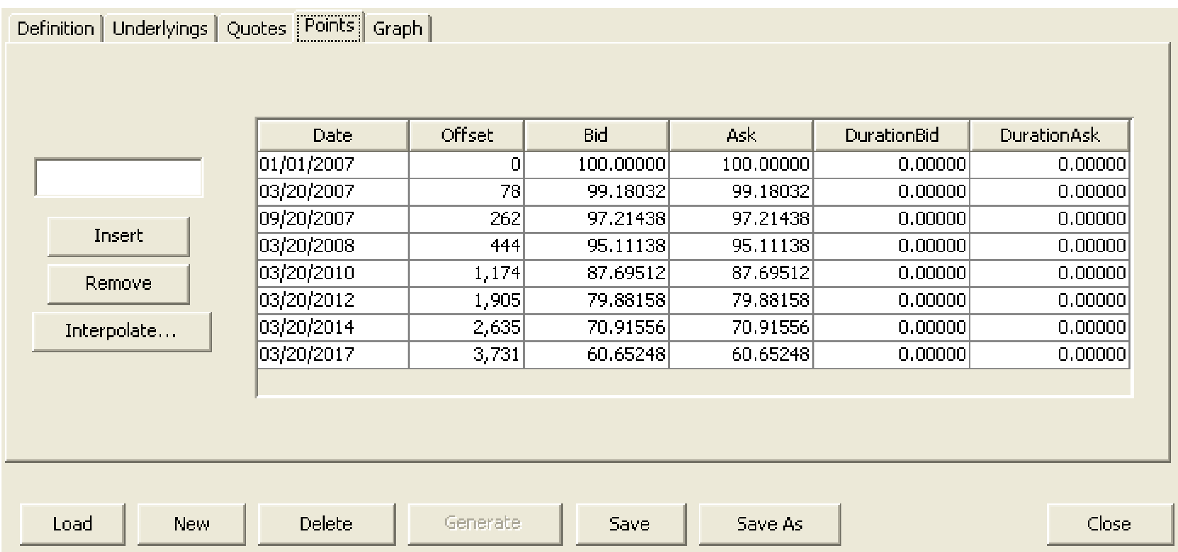


ote Name	Type	Formula	Issuer	Seniority	Restructuring Type	Expiry	CLOSE
NIOR_SECURED/1M/NR	Spread	NONE	USGVT	SENIOR_SECURED	NR	03/20/2007	225.0000
NIOR_SECURED/6M/NR	Spread	NONE	USGVT	SENIOR_SECURED	NR	09/20/2007	232.0000
NIOR_SECURED/1Y/NR	Spread	NONE	USGVT	SENIOR_SECURED	NR	03/20/2008	243.0000
NIOR_SECURED/3Y/NR	Spread	NONE	USGVT	SENIOR_SECURED	NR	03/20/2010	241.0000
NIOR_SECURED/5Y/NR	Spread	NONE	USGVT	SENIOR_SECURED	NR	03/20/2012	253.0000
NIOR_SECURED/7Y/NR	Spread	NONE	USGVT	SENIOR_SECURED	NR	03/20/2014	275.0000
NIOR_SECURED/10Y/NR	Spread	NONE	USGVT	SENIOR_SECURED	NR	03/20/2017	282.0000

9.2.4 Points Panel

Select the Points tab. Click **Generate** to generate the curve points.

The curve points are survival probabilities; 99 means there is a 99% chance that the entity will not default.



Date	Offset	Bid	Ask	DurationBid	DurationAsk
01/01/2007	0	100.00000	100.00000	0.00000	0.00000
03/20/2007	78	99.18032	99.18032	0.00000	0.00000
09/20/2007	262	97.21438	97.21438	0.00000	0.00000
03/20/2008	444	95.11138	95.11138	0.00000	0.00000
03/20/2010	1,174	87.69512	87.69512	0.00000	0.00000
03/20/2012	1,905	79.88158	79.88158	0.00000	0.00000
03/20/2014	2,635	70.91556	70.91556	0.00000	0.00000
03/20/2017	3,731	60.65248	60.65248	0.00000	0.00000

'DurationBid' and 'DurationAsk' are computed when the generator parameter CALCULATE_DURATION is set to true.

Example:

Date	Offset	Bid	Ask	DurationBid	DurationAsk
01/01/2007	0	100.00000	100.00000	0.00000	0.00000
03/20/2007	78	99.18032	99.18032	0.21416	0.21416
09/20/2007	262	97.21438	97.21438	0.70380	0.70380
03/20/2008	444	95.11138	95.11138	1.17015	1.17015
03/20/2010	1,174	87.69512	87.69512	2.88024	2.88024
03/20/2012	1,905	79.88158	79.88158	4.34277	4.34277
03/20/2014	2,635	70.91556	70.91556	5.57816	5.57816
03/20/2017	3,731	60.65248	60.65248	7.07135	7.07135

9.2.5 Save Curve

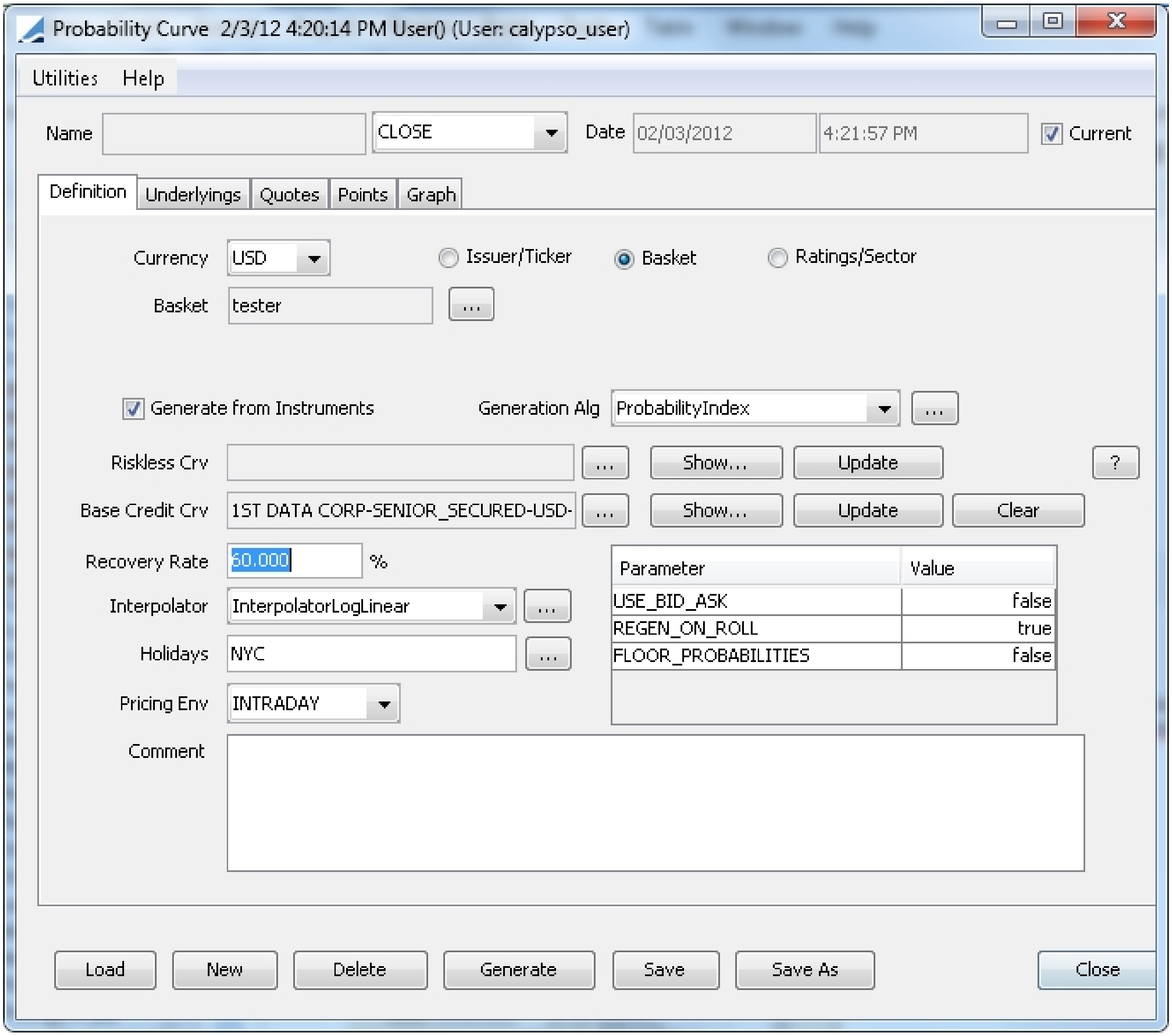
Click **Save** in the bottom of the curve window. Enter a name for the curve, and click **OK**.

9.3 Generating Probability Curves from Base Curve and Spreads

Click **New** to start a new curve.

9.3.1 Definition Panel

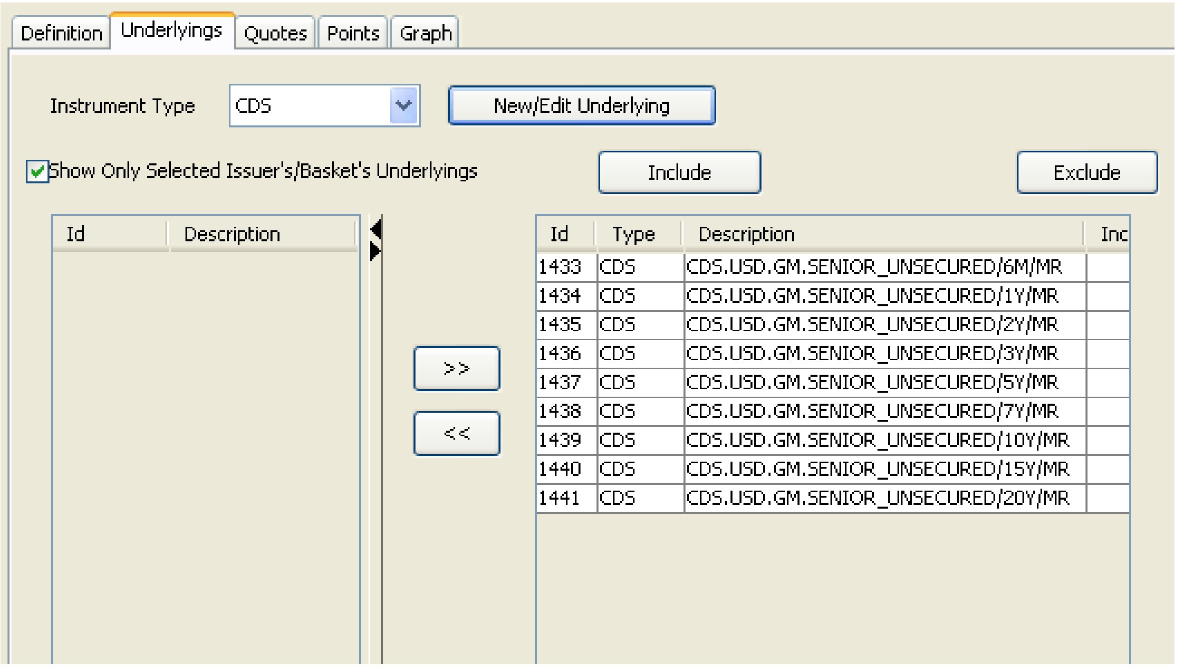
Define the curve details.



» Click ... next to the 'Base Credit Crv' field to select the base curve.

9.3.2 Underlyings Panel

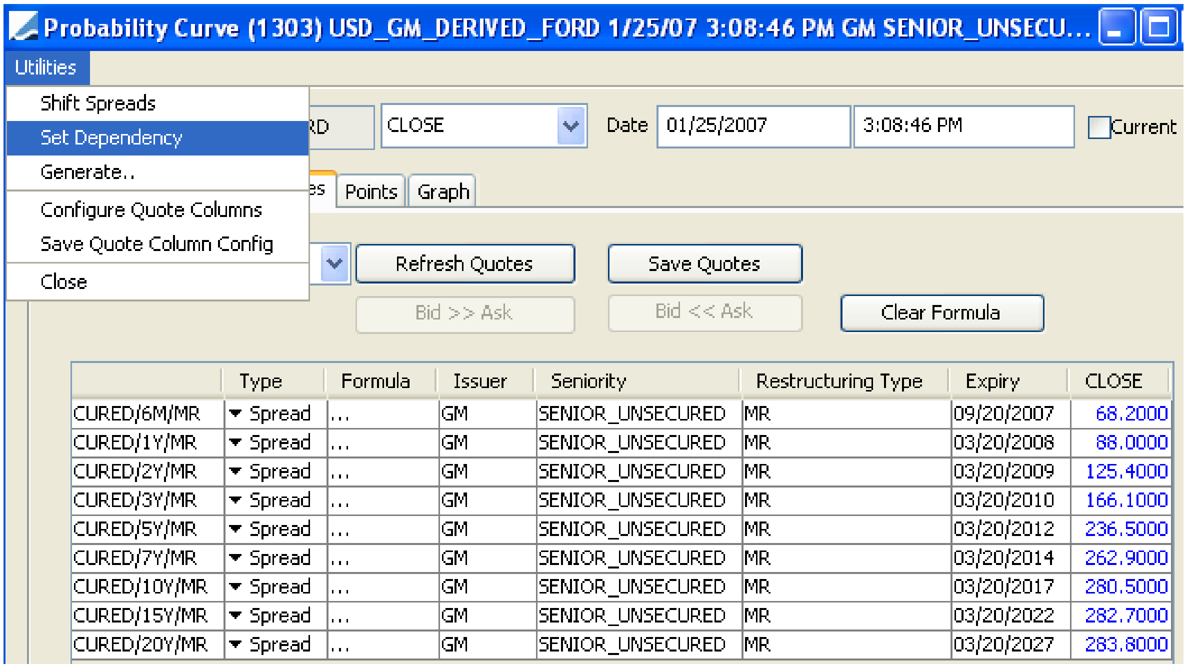
Select the Underlyings tab. Select the underlying instruments for the derived curve.



- Select the instrument type to display the list of available instruments. If no instrument appears, click **New/Edit Underlying** to create new instruments.
- Select instruments and click **>>** to add them to the instrument list in the right panel.

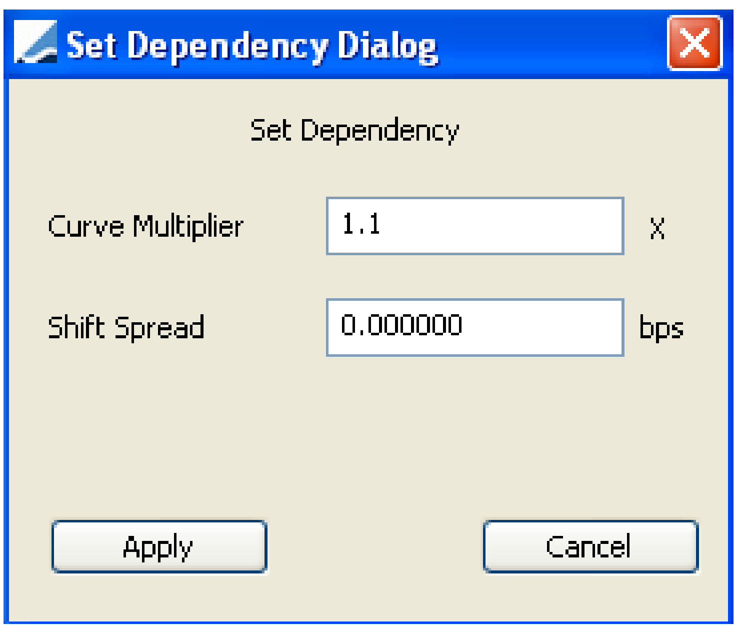
9.3.3 Quotes Panel

Select the Quotes tab.



Derived quotes are calculated from the base curve and dependency formula. Choose **Utilities > Set Dependency** to set the dependency formula.

» Set the spread over the base curve for all of the underlying instruments. Choose **Utilities > Set Dependency**.



» Enter the multiplier and/or the spread.

» Click **Apply** to calculate the quotes for the derived curve.

9.3.4 Curve Points

Select the Points tab.

» Click **Generate** at the bottom of the curve window to generate the curve points.

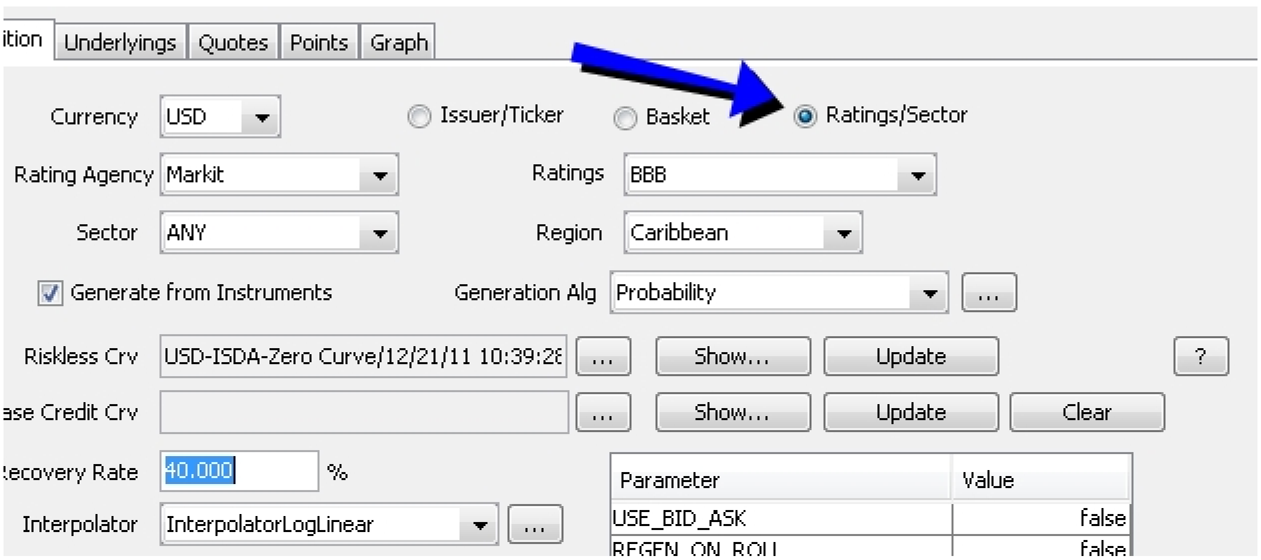
» Click **Save** in the bottom of the curve window. Enter a name for the curve, and click **OK**.

9.4 Generating Fallback Probability Curves

You can generate a probability curve for reference entities that do not have liquid CDS trades associated with them. To assess counterparty credit risk or capture CDS trades, generate a proxy curve and map it to the appropriate curve based on rating, sector / rating, or region / rating. It is assumed that you have completed the Markit process before specifying curves.

Although a fallback probability curve can be assigned to any agency, the system will only use the curve of a sole active agency defined by the user. To switch an active agency in the system, modify the "creditRatingSource" domain value by moving the desired source to the top of the list.

To generate these curves, navigate to **Configuration > Market Data > Probability Curve** from the Calypso Navigator.



» Select Ratings/Sector as the type of curve.

» Select Rating Agency and Ratings from the drop down menus. If you do not see agencies or ratings appear in the drop down, add them to your domain values. Ratings agencies are added under the domain name "creditRatingSource" and can only be added if they exist under domain name "ratingAgency".

» Select Sector and Region from the drop down menu. If you do not see sectors or regions appear in the drop down, add them to your domain values.

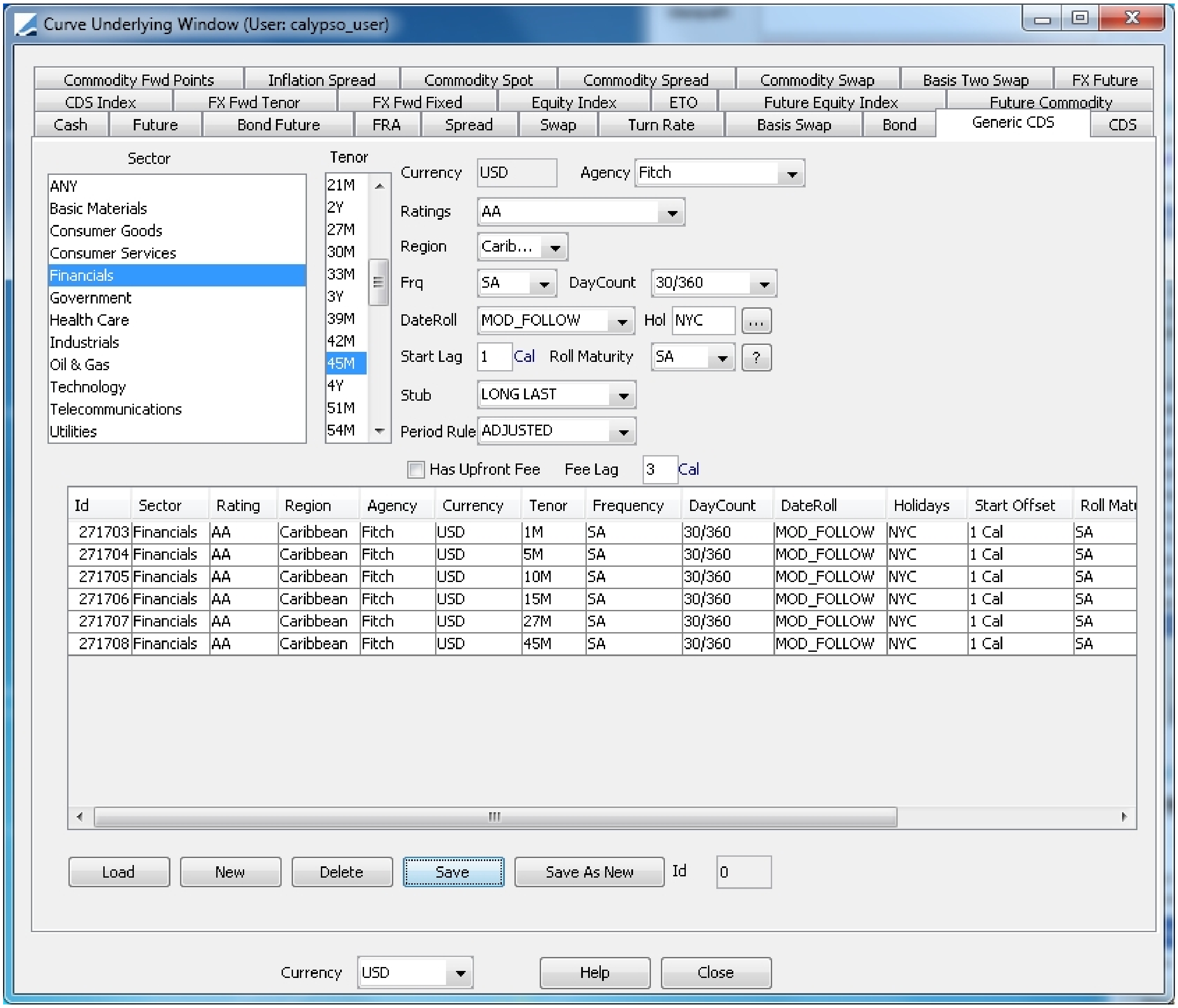
» Select a riskless curve type, recovery rate, holidays and pricing environment.

On the Underlying panel, select two choices:

For issuer, choose "bond" or "CDS Index" for your underlyings.

For sector, choose "GenericCDS" for your underlyings.

In the Underlyings panel, select the appropriate tab and choose your sector, rating and tenors.



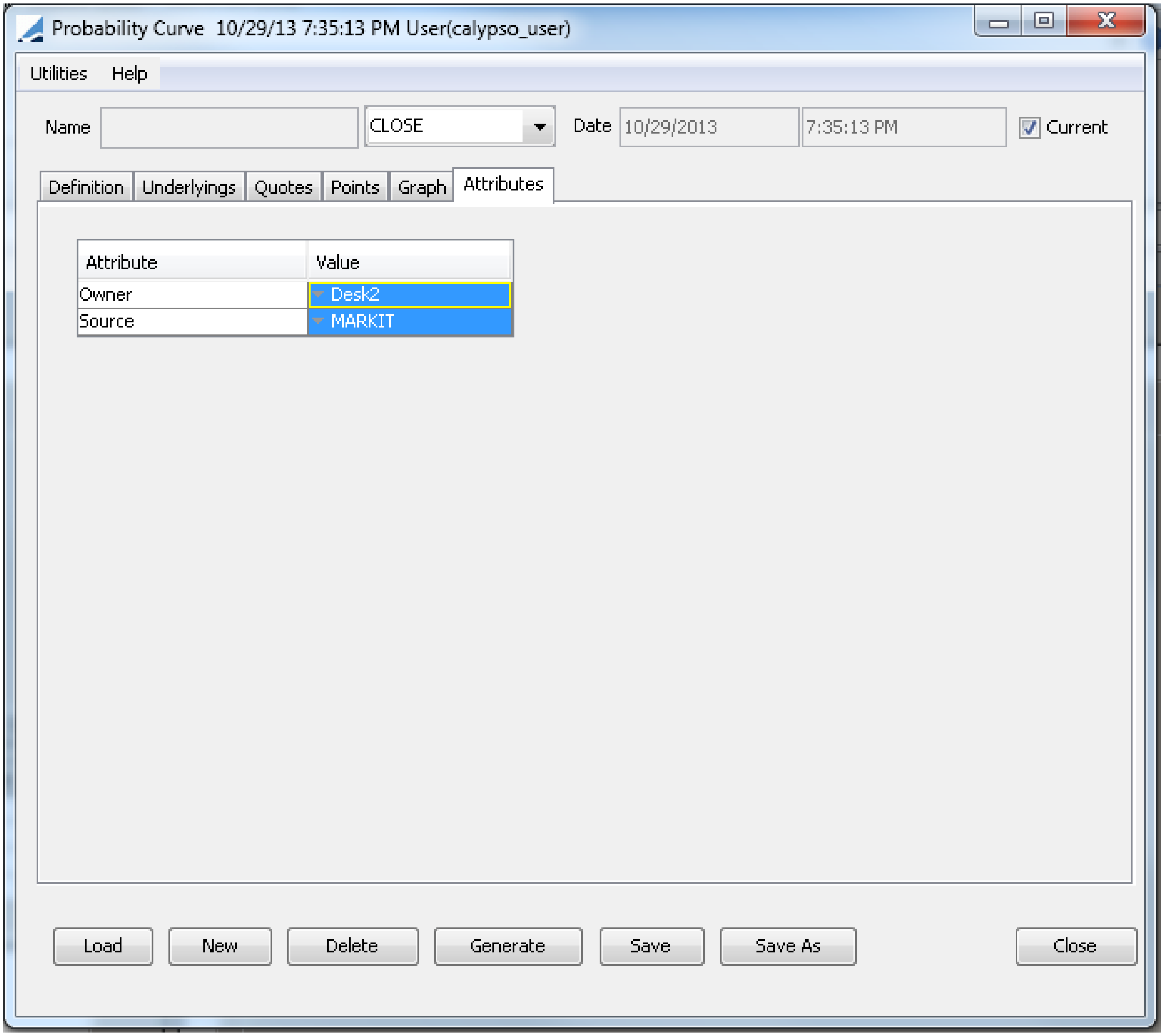
The fallback curve will have to be assigned in the Pricer Configuration after saving.

» Click **Save** and name your curve, then click **OK**.

▶ See "Credit Ratings" for more details.

9.5 Attributes Panel Configuration

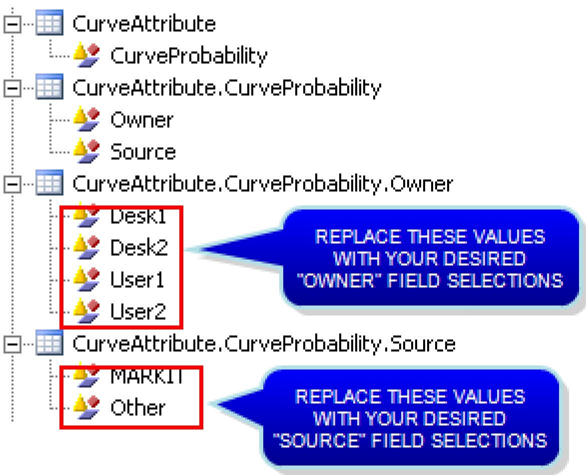
The Attributes panel will only be displayed if the necessary domain names and values are configured.



You can select values for the fields, "Owner" and "Source".

These fields are stored in the database table MARKET_DATA_KEYWORD. They are currently for information purposes only.

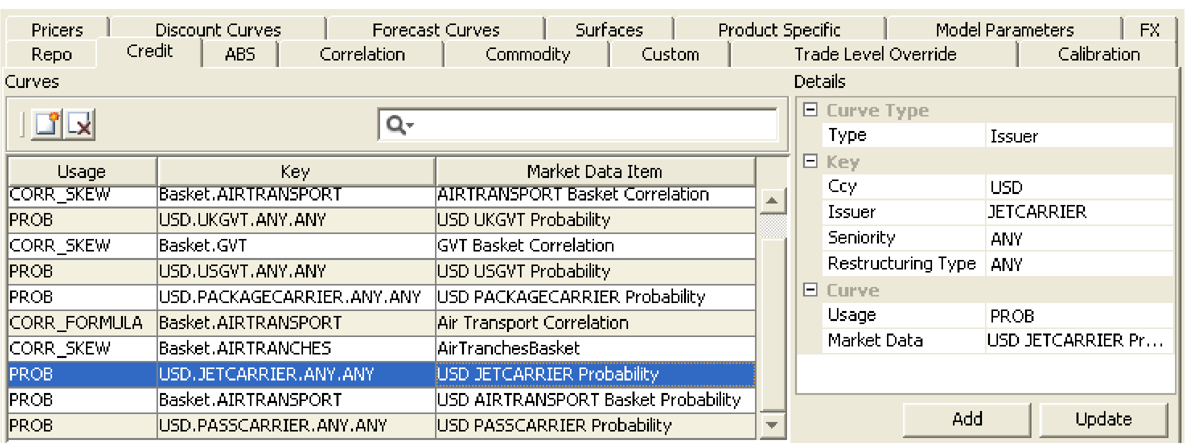
You need to configure the following domain names and values:



9.6 Pricer Configuration

From the Calypso Navigator, navigate to **Market Data > Pricer Environment > Pricer Configuration**.

Load a pricer configuration and select the Credit panel.



» Click to add market data.

» In the Details area, select the type of association you want to perform: Basket, Issuer, or Ticker. Then select the corresponding key for the selected type.

For Basket, select a basket or ANY.

For Issuer, select a currency, an issuer, a seniority or ANY, and a restructuring type or ANY.

For Ticker, select a ticker – A ticker is a combination of currency, issuer, seniority and reference obligation – You can create tickers from the Credit Market Data window.

For CreditRating, select a currency, product type, product sub-type, agency and rating or ANY. You need to set the default rating agency in the domain creditRatingSource.

» Set the credit rating attributes order in the domain PCCreditRatingLEAttributesOrder – For example: RED_REGION, RED_SECTOR.

» Select a currency or ANY, a product type, a product or ANY, a product subtype or any, and a rating or ANY.

» Select "PROB" for the Usage, and select a probability curve from the Market Data field.

» Click **Add**.

» Click **Save** to save the changes.

9.7 Probability Curve with Fixed Coupon CDS Underlying

For a probability curve with fixed coupon CDS underlyings, the curve window should be set up this way:

- Use the curve generator "Probability."
- Place the fixed coupon spread, in basis points, in the "Fixed Coupon" generator parameter in order to make the Fixed Coupon CDS available as a choice on the underlyings tab.
- The user should manually choose the Spread quote type, since the default type is Yield.
- The "riskless" curve on the curve definition tab should be the discount curve, such as the OIS curve, used for full valuation of the CDS with the probability curve.
- The "ISDA" discount curve must be configured in the pricing environment so the generator can pick it up. There is no field to specify the ISDA curve in the window, so it must be in the environment.

To price a CDS trade: Assign the generated curve to the CDS issuer in the pricing environment. Assign the riskless curve as the discount curve for the CDS. The CDS pricers do NOT use the CSA lookup, as there is no CSA agreement yet on CDS trades.

10. Recovery Curve

From the Calypso Navigator, navigate to **Market Data > Credit Curves > Recovery Curve** (menu action `marketdata.CurveRecoveryWindow`).

A recovery curve is used to project recovery rates at given dates for Credit Derivatives and ABS Bonds.

If the pricing environment does not contain a recovery curve, the system will use the recovery rate specified on the probability curve to price CRD trades.

Recovery Curve Quick Reference

Configuration Requirements

Issuer Definition – From the Calypso Navigator, navigate to **Configuration > Legal Data > Entities**.

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, LAST, or OPEN).

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

4. Definition Panel — Select the following to define the curve: currency, issuer/ticker or basket, interpolator, holiday calendar, Pricing Env.

5. Offsets Panel — Select tenors.

6. Points Panel — Click **Generate** to generate the points, and enter the recovery rates.

7. Click **Save**, enter a name for the curve, and click **OK**.

Pricer Configuration

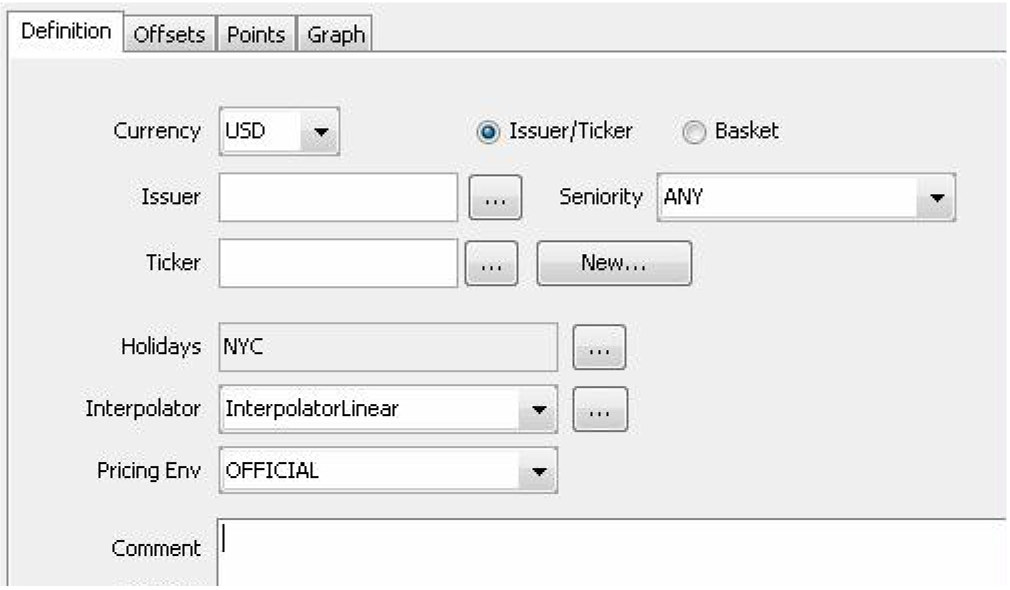
Recovery curves are associated with a pricing environment under the Credit panel of the pricer configuration for the REC usage to price Credit Derivatives, and under the ABS panel of the pricer configuration to price ABS Bonds.

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

10.1 Definition Panel

Click **New** to start a new curve.

Select the following to define the curve: currency, issuer/ticker or basket, interpolator, and holiday calendar.

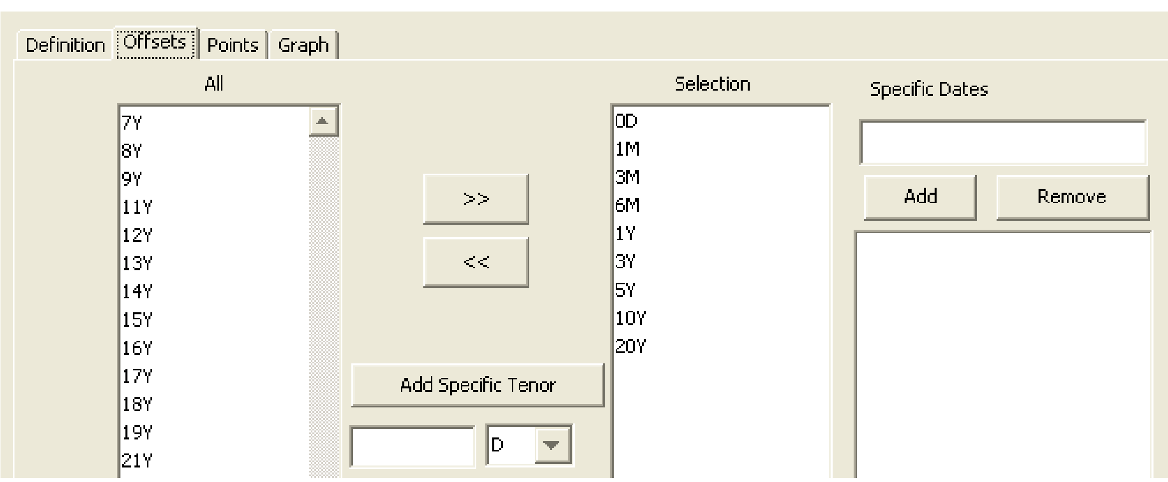


» If you click Issuer/Ticker, select an issuer and a seniority, or select a ticker. You can click **New** to create a new ticker. A ticker is a combination of currency, issuer, seniority and reference obligation.

» If you click Basket, select a reference entity basket.

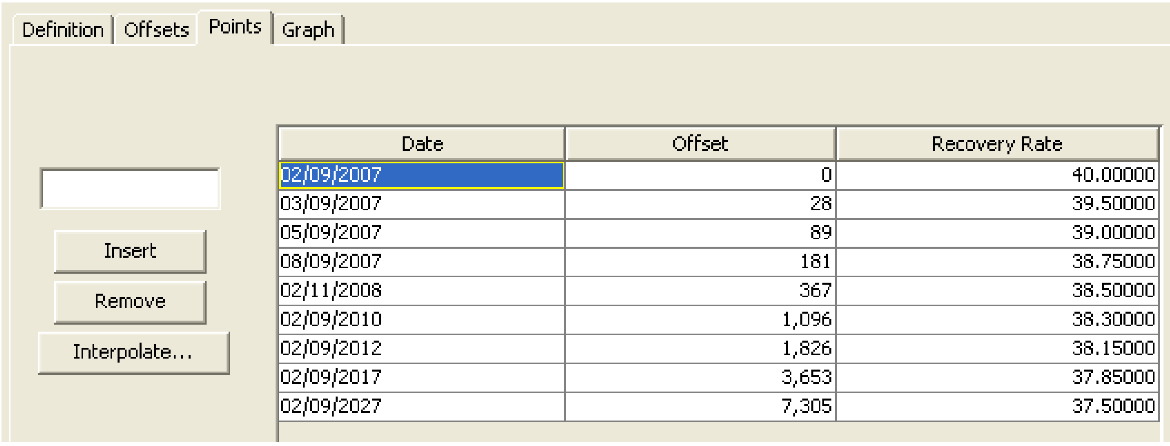
10.2 Offset Panel

Select the Offsets panel to select tenors.



10.3 Points Panel

Select the Points panel and click **Generate** to generate the curve points.



Date	Offset	Recovery Rate
02/09/2007	0	40.00000
03/09/2007	28	39.50000
05/09/2007	89	39.00000
08/09/2007	181	38.75000
02/11/2008	367	38.50000
02/09/2010	1,096	38.30000
02/09/2012	1,826	38.15000
02/09/2017	3,653	37.85000
02/09/2027	7,305	37.50000

» Enter recovery rates for each point.

10.4 Save Curve

Click **Save** in the bottom of the curve window. Enter a name for the curve, and click **OK**.

10.5 Pricer Configuration

A recovery curve can be used to price credit derivatives as well as ABS bonds.

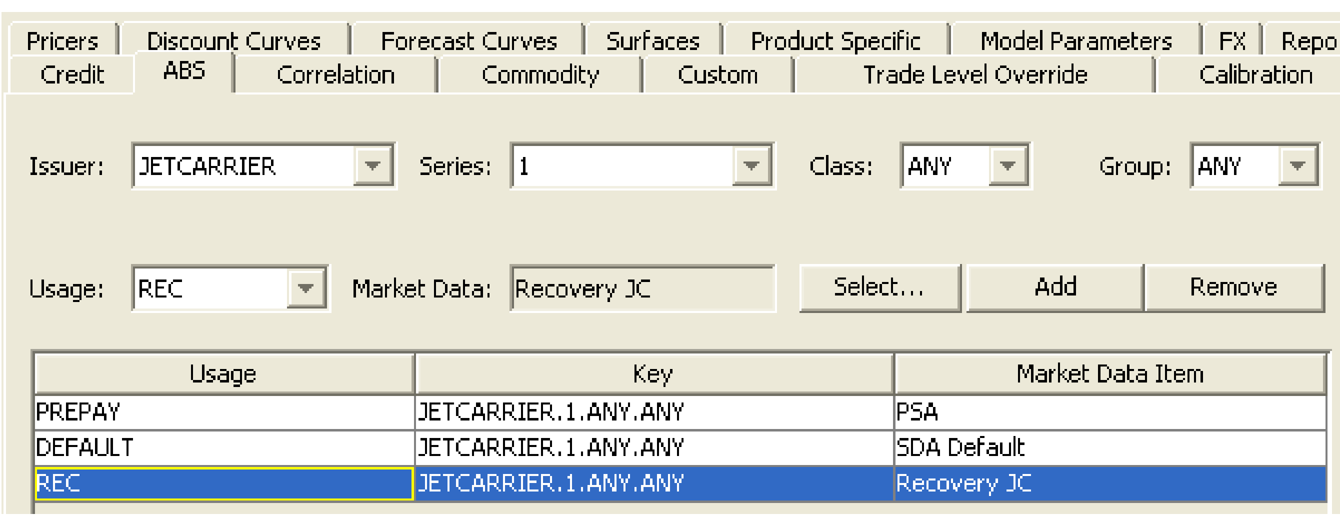
10.5.1 ABS Bonds

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

Load a pricer configuration and select the ABS panel.

Note that the ABS panel will only appear in the Pricer Configuration if you have installed the Intex module.

▶ Refer to the Calypso Intex Integration User Guide for details.



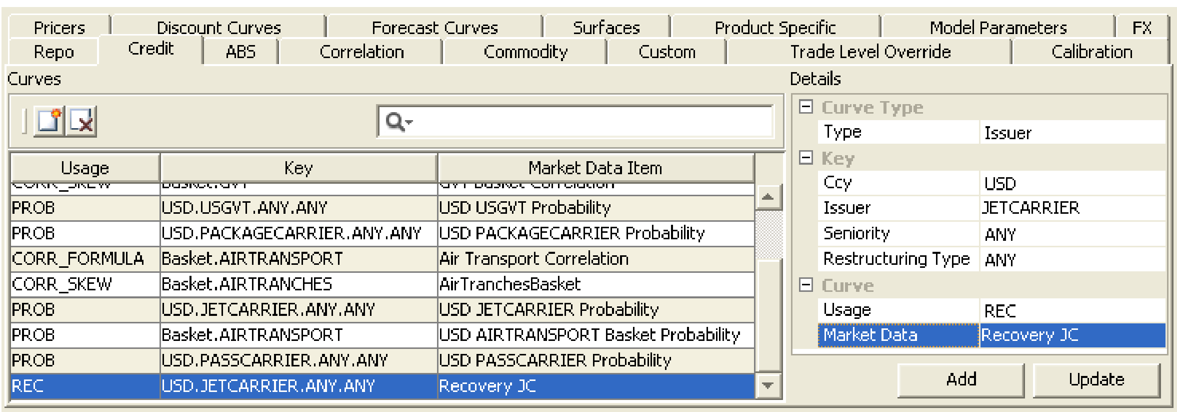
Usage	Key	Market Data Item
PREPAY	JETCARRIER.1.ANY.ANY	PSA
DEFAULT	JETCARRIER.1.ANY.ANY	SDA Default
REC	JETCARRIER.1.ANY.ANY	Recovery JC

- Select an issuer and a series, then select a class or ANY, and a group of collaterals or ANY. You can only select an issuer and a series if an ABS bond exists in the system for which the issuer and series are populated.
- Select the REC usage, and click **Select** to select an actual curve.
- Click **Add** to add the selected curve for the selected usage.
- Then click **Save** to save the pricer configuration.

10.5.2 Credit Derivatives

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

Load a pricer configuration and select the Credit panel.



- Click to add market data.
- In the Details area, select the type of association you want to perform: Basket, Issuer, or Ticker. Then select the corresponding key for the selected type.

  For Basket, select a basket or ANY.

  For Issuer, select a currency, an issuer, a seniority or ANY, and a restructuring type or ANY.

  For Ticker, select a ticker – A ticker is a combination of currency, issuer, seniority and reference obligation – You can create tickers from the Credit Market Data window.

  For CreditRating, you need to set the default rating agency in the domain creditRatingSource.
- Set the credit rating attributes order in the domain PCCreditRatingLEAttributesOrder – For example: RED_REGION, RED_SECTOR.
- Select a currency or ANY, a product type, a product or ANY, a product subtype or any, and a rating.
- Select the REC usage, and select a recovery curve from the Market Data field.
- Then click **Add**.
- Click **Save** to save the changes.

11. Risky Curve

From the Calypso Navigator, navigate to **Market Data > Credit Curves > Risky Curve** (menu action `marketdata.CurveRiskyWindow`).

A risky curve is one that provides risky discount factors. For example, for an issuer FORD, you can create a risky curve that is based on a risk-free curve plus the CDS spreads. So each issuer can have its own risky curve.

[NOTE: Calypso pricers use probability curves, not risky curves. However, you may configure risky curves for your custom pricers as applicable]

12. Borrow Curve

Equity Derivatives pricing requires the incorporation of a funding rate into the calculation of a "Forward" value of an underlying. The funding rate will be based on an institution's cost of "borrowing" the security.

The borrow curve adds either a spread to the spread curve, or calculates a borrow rate. In the case of a spread, the spread curve can either be the prevailing discount curve, or in some cases other curves. For example, in the U.S. the borrow curve would be based off of FEDFUNDS.

The logic is that the pricer first looks for a borrow curve based on the underlying product, then based on the currency (general borrow curve), and then if the borrow curve is not found, use the discount curve (meaning that the spread is 0).

In the trade worksheet, you can overwrite the borrow spread used in pricing by entering a spread in the BORROW_SPREAD transient pricing parameter.

The borrow curve functionality is available in equity derivatives options pricing.

From the Calypso Navigator, navigate to **Market Data > Equity Curves > Borrow Curve** (menu action `marketdata.CurveBorrowWindow`).

Borrow Curve Quick Reference

Configuration Requirements

- Equity Product – From the Calypso Navigator, navigate to **Configuration > Equity > Equity**
- Equity Index Product – From the Calypso Navigator, navigate to **Configuration > Equity > Equity Indexes**

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, LAST, or OPEN).

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

4. Definition Panel — Select the following to define the curve: currency, underlying equity or equity index, Spread or Absolute, interpolator, holiday calendar.

5. Offsets Panel — Select the tenors.

6. Points Panel — Click **Generate** to generate the curve points. Enter the spreads or borrow rates.

7. Click **Save**, enter a name for the curve, and click **OK**.

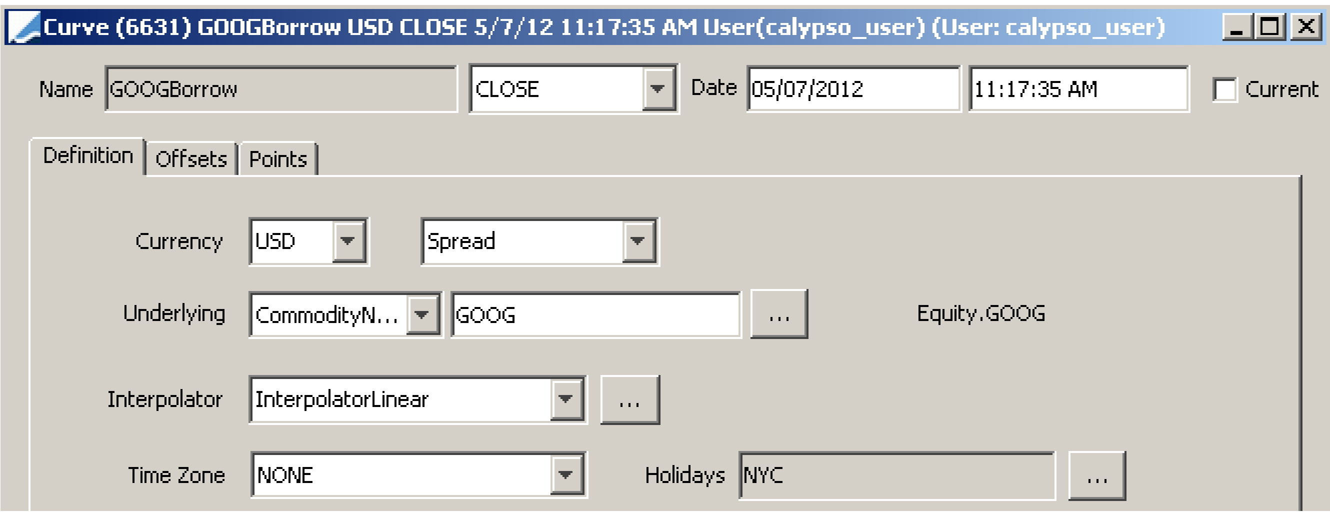
Pricer Configuration

A borrow curve is associated with a pricing environment under the Product Specific panel of the pricer configuration with the BORROW usage.

12.1 Curve Definition Panel

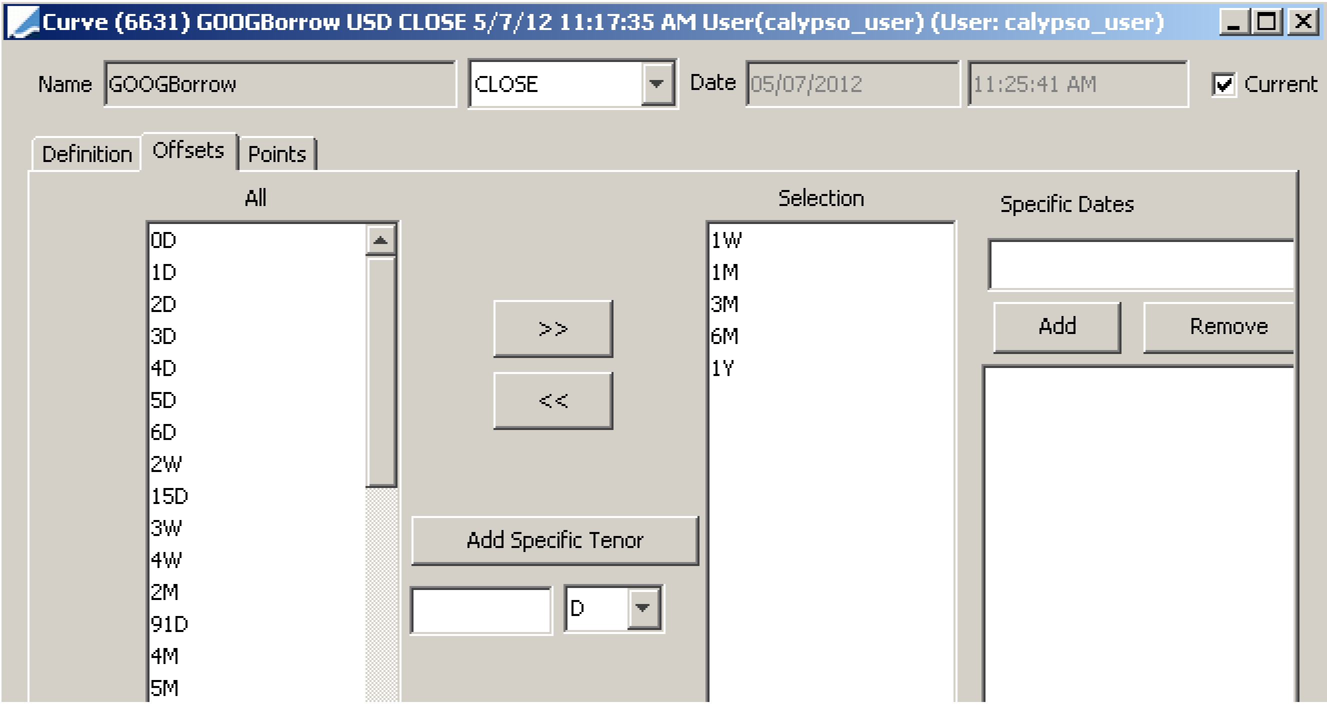
Click **New** to start a new curve.

Select the following to define the curve: currency, underlying equity (or do not select an underlying to create a general borrow curve), borrow curve type (Spread to enter a spread in basis points over the discount curve, or Absolute to enter the borrow rates in percentage), interpolator, holiday calendar.



12.2 Curve Offsets Panel

Click the Offsets tab.

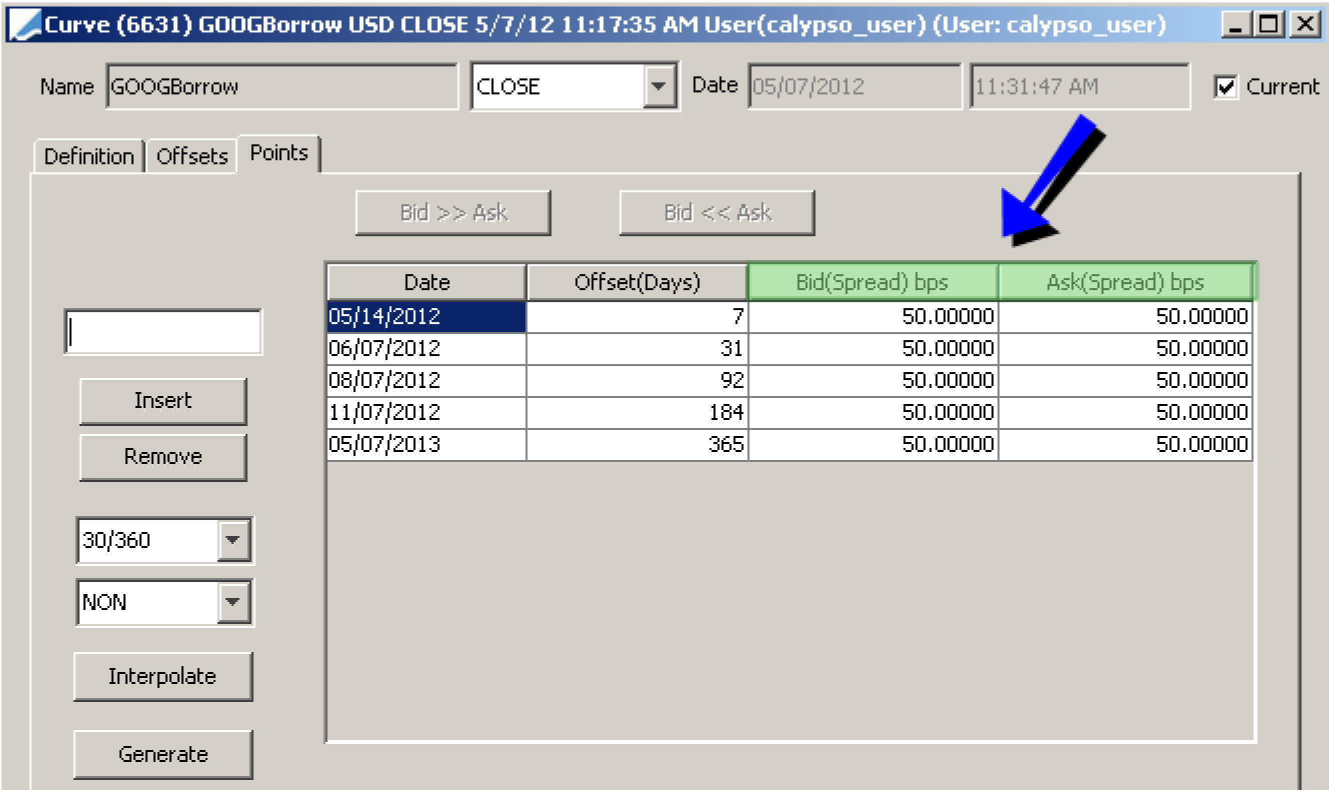


Select the offsets in the left panel, and click **>>** to add them to the Selection panel.

- Specific Tenors — you can add specific tenors to the list. Enter the number, select the type of tenor, and click **Add Specific Tenor**.
- Specific Dates — alternatively, you can enter specific dates for the offsets and click **Add** to list them in the panel below.

12.3 Curve Points Panel

Click the Points tab. Click **Generate** to create the curve points. Enter the spreads or rates.



12.4 Save Curve

Click **Save** in the bottom of the curve window. Enter a name for the curve, and click **OK**.

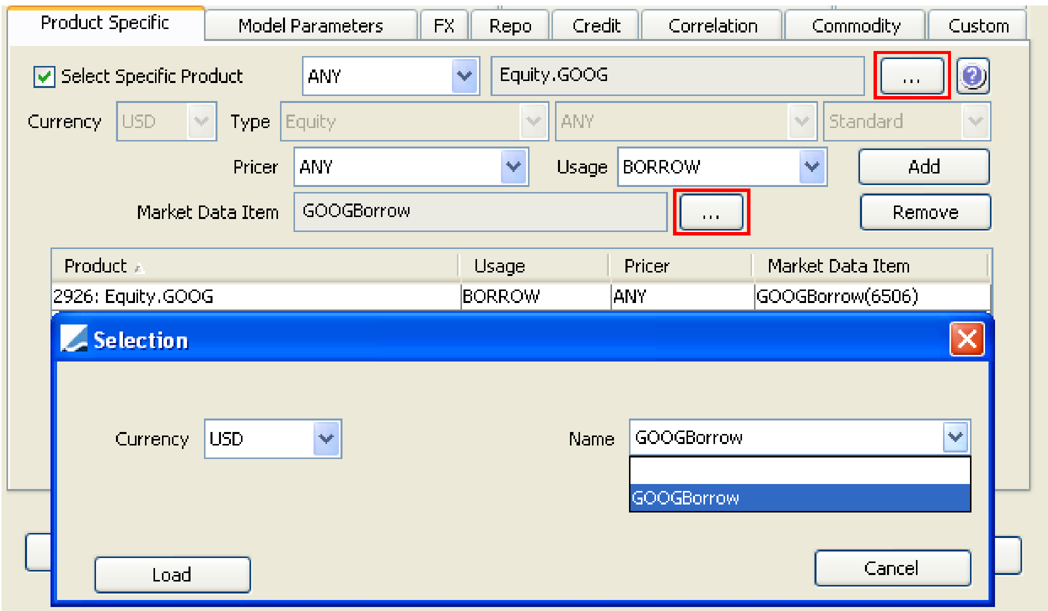
12.5 Pricer Configuration

12.5.1 Assign Specific Product Borrow Curves

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

» Click **Load**, select the pricer configuration name, and click **OK**.

» Click the Product Specific tab.



» Check the "Select Specific Product" checkbox.

» Click **...** to select the equity product.

» Set the usage to BORROW.

» Click **...** to select the borrow curve.

» Click **Add** to add the curve to the list.

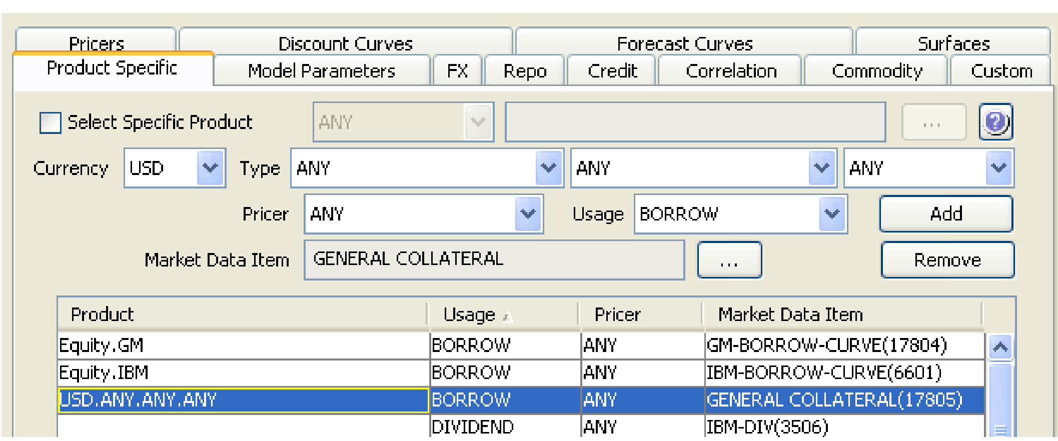
» Click **Save** to save the pricer configuration.

12.5.2 Assign General Borrow Curves

A general borrow curve that does not have an underlying equity can be assigned to a specific currency.

Click **Load**, and select the pricer configuration.

Click the Product Specific tab.



- Select the currency.
- Set the usage to BORROW.
- Click **...** to select the borrow curve.
- Click **Add** to add the curve to the list.
- Click **Save** to save the pricer configuration.

13. Dividend Curve

Dividends are defined as any payment a security will make to its owner. A security's dividend payment will be modeled assuming a discrete or continuous payment model. Stocks typically pay their discrete dividends on a quarterly basis, while the dividends on indices tend to be paid more uniformly.

Dividend Curves show the Forward Value of the Underlying Asset to the Ex-Dividend date. *Ownership is determined by Ex-Dividend date, not by the payment date*.

Regardless of dividend payout method, the projected dividend stream can be represented as series of time and continuously compounded dividend yield pairs. You can model a security using either discrete dividends or continuous dividend yields.

- For the Yield dividend type, you can generate the yields from a zero curve and the equity spot price, or from underlying instruments.
- For the Discrete dividend type, you can generate projected dividends using existing dividends and the projected rate of growth.

The Dividend Curve represents forward prices for equities. Forward prices are what can be traded now for delivery at a future date.

From the Calypso Navigator, navigate to **Market Data > Equity Curves > Dividend Curve** (menu action `marketdata.CurveDividendWindow`) to create a dividend curve.

13.1 Yield Dividend Curve from Offsets

Yield Dividend Curve from Offsets Quick Reference

Configuration Requirements

- Equity Product – From the Calypso Navigator, navigate to **Configuration > Equity > Equity**.
- Spot quote for the equity product.
- Discount Curve should be set up and assigned in the pricer configuration for the equity product's currency.

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, LAST, or OPEN).

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. You can clear the Current checkbox to enter a back-dated curve, and modify the date and time fields.

4. Definition Panel — Select the following to define the curve: equity product, “Yield” dividend type, checkbox Derived” unchecked, interpolator, currency, holiday calendar, Pricing Env.

5. Offset Panel — Select tenors.

6. Points Panel — Enter the spot price of the equity, select the zero curve, borrow curve, and click **Generate** to generate the curve points.

7. Click **Save**, enter a name for the curve, and click **OK**.

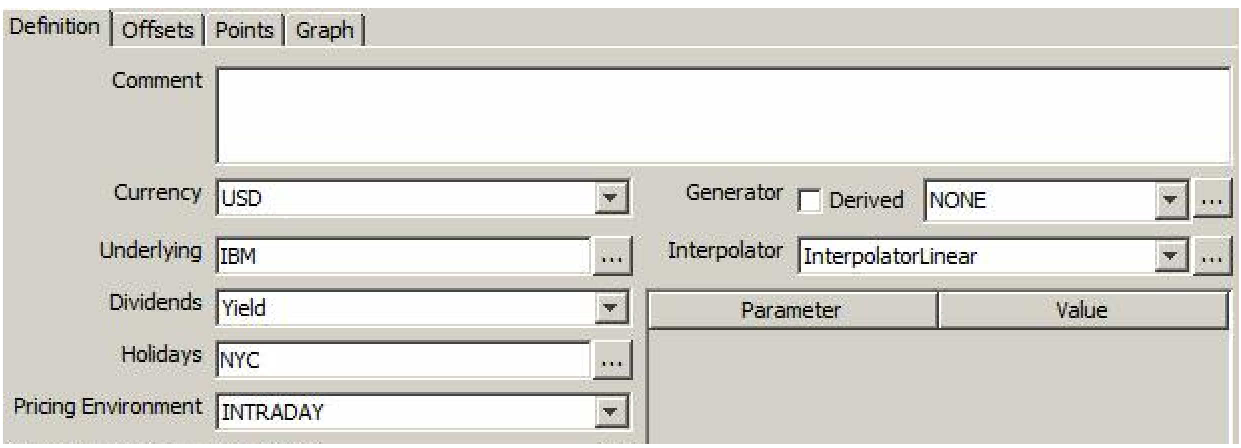
Pricer Configuration

Assign the dividend curve in the Product Specific panel for the Dividend usage. Choose **Market Data > Pricing Environment > Pricer Configuration**.

13.1.1 Definition Panel

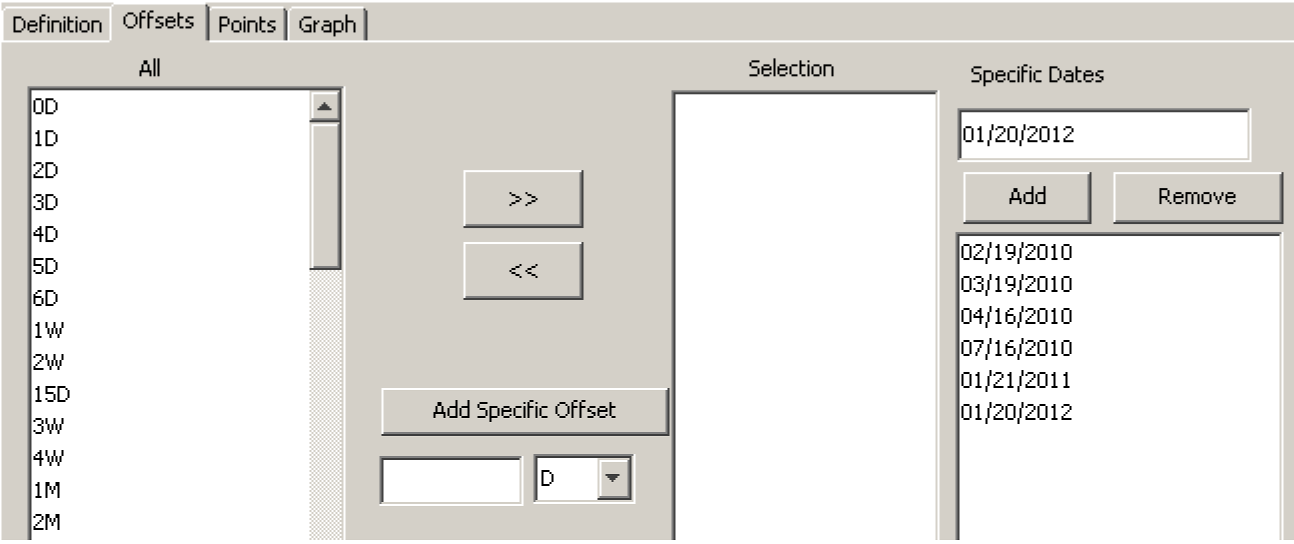
Click **New** to start a new curve.

Select the following to define the curve: underlying, “Yield” dividend type, interpolator, currency, holiday calendar, Pricing Environment.



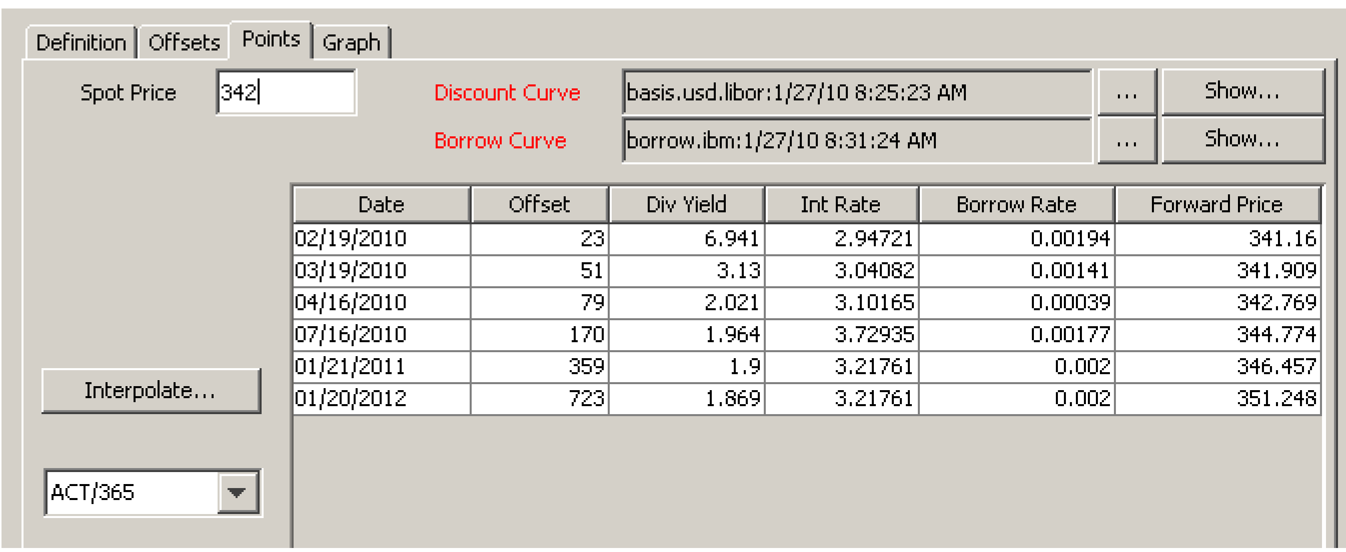
13.1.2 Offsets Panel

On the Offsets tab, select tenors or specific dates.



13.1.3 Points Panel

Select the Points panel.



» Enter the spot price, click **...** next to the Discount Curve field to select a discount curve, and click **...** next to the Borrow Curve field to select a borrow curve. Then click **Generate**.

- Spot Price of the underlying equity - If you select the CLOSE curve instance, then the curve uses the CLOSE quote from the quote set associated with the pricing environment. You can modify the price.
- The system uses the Borrow Rate from the borrow curve to calculate the Forward Price.

13.1.4 Save Curve

Click **Save** in the bottom of the curve window, enter the name for the curve and click **OK**.

13.2 Derived Yield Dividend Curve

Derived Yield Dividend Curve Quick Reference

Configuration Requirements

- Equity Product – From the Calypso Navigator, navigate to **Configuration > Equity > Equity**.
- ETO Equity and ETO equity index underlying instruments - To create ETO underlying instruments, you need to create ETO contracts using **Configuration > Listed Derivatives > Option Contracts** from the Calypso Navigator.

[NOTE: Only European ETO contracts are supported]

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, LAST, or OPEN).

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. You can clear the Current checkbox to enter a back-dated curve, and modify the date and time fields.

4. Definition Panel — Select the following to define the curve: equity product, “Yield” dividend type, checkbox “Derived” checked, interpolator, currency, holiday calendar, Pricing Env.

5. Underlyings Panel — Select underlying ETO instruments.

6. Quotes Panel — Enter quotes for the underlying instruments.

6. Points Panel — Select the daycount convention, and click **Generate** to generate the curve points.

7. Click **Save**, enter a name for the curve, and click **OK**.

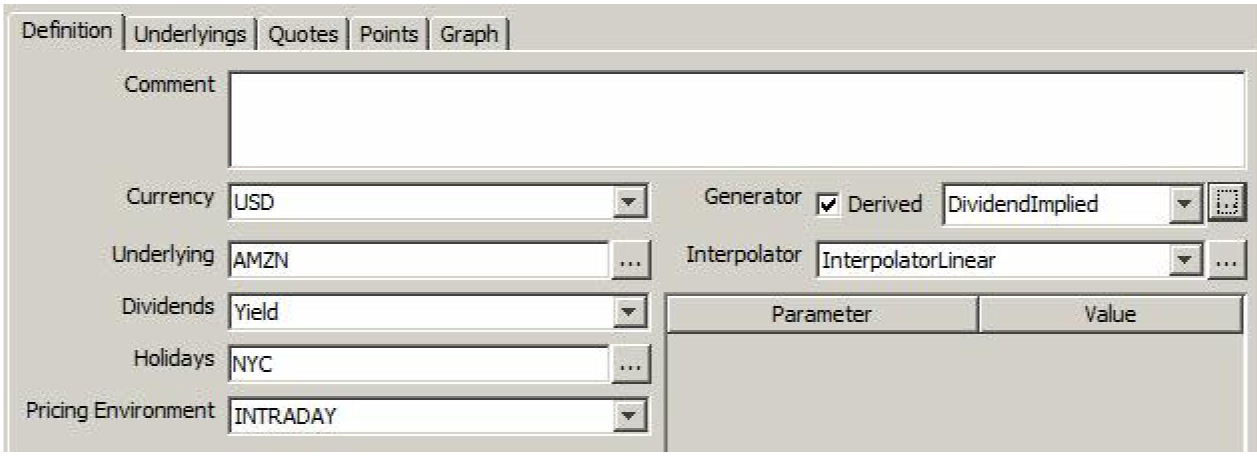
Pricer Configuration

Assign the dividend curve in the Product Specific panel for the Dividend usage. Choose **Market Data > Pricing Environment > Pricer Configuration**.

13.2.1 Definition Panel

Click **New** to start a new curve.

Select the following to define the curve: underlying, “Yield” dividend type, "Derived" checked, generator "DividendImplied", interpolator, currency, holiday calendar, Pricing Environment.

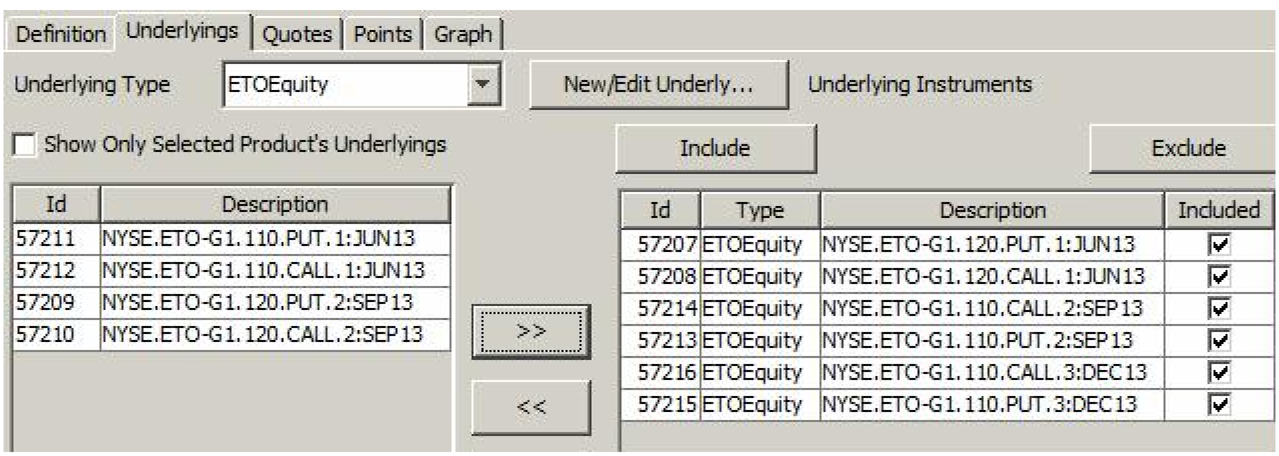


13.2.2 Underlyings Panel

Click the Underlying tab, and select the underlying instruments.

You can select ETO Equity and ETO Equity Index instruments.

[NOTE: Only European ETO contracts are supported]



» Select an instrument type to display the list of available instruments. If none appear, you can click **New/Edit Underlying** to create new instruments.

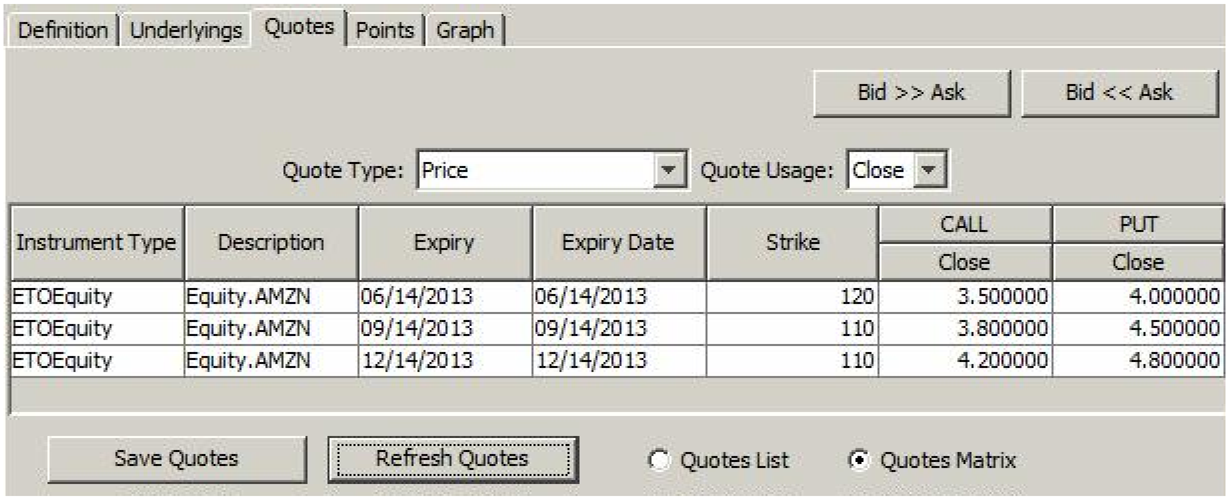
» Select instruments from the list of available instruments on the left-hand side, and click **>>** to add them to the list of selected instruments on the right-hand side.

You can exclude instruments from the curve generation if they are no longer needed.

You can set a priority when multiple instruments have the same maturity date. The highest priority is 0.

13.2.3 Quotes Panel

Click the Quotes tab.

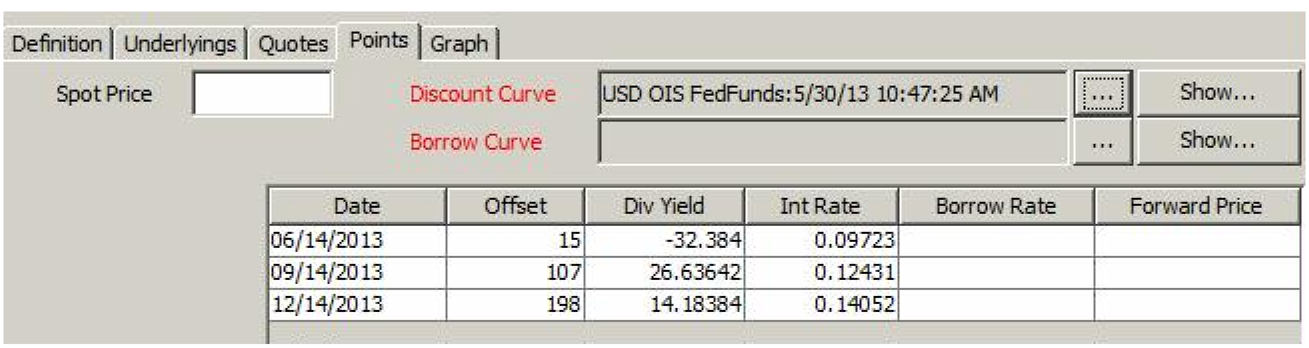


» You can click **Refresh Quotes** to load the quotes from the pricing environment selected in the Definition panel. If your market data server is running, quotes will be updated in real-time.

» You can also enter the quotes manually, and save them to the pricing environment.

13.2.4 Points Panel

Click the Points tab.



» Enter the spot price, click **...** next to the Discount Curve field to select a discount curve, and click **...** next to the Borrow Curve field to select a borrow curve. Then click **Generate**.

– Spot Price of the underlying equity - If you select the CLOSE curve instance, then the curve uses the CLOSE quote from the quote set associated with the pricing environment. You can modify the price.

– The system uses the Borrow Rate from the borrow curve to calculate the Forward Price.

Implied dividends are calibrated from option prices (prices of exchange traded puts & calls using the put-call-parity). The output from this curve has fixed future dates on the horizontal axis and implied dividends derived from Put/Call Prices.

13.2.5 Save Curve

Click **Save** in the bottom of the curve window, enter the name for the curve and click **OK**.

13.3 Discrete Dividend Curve

Discrete Dividend Curve Quick Reference

Configuration Requirements

- Equity Product – From the Calypso Navigator, navigate to **Configuration > Equity > Equity**.

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, LAST, or OPEN).

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. You can clear the Current checkbox to enter a back-dated curve, and modify the date and time fields.

4. Definition Panel — Select the following to define the curve: underlying equity, “Discrete” dividend type, interpolator, currency, holiday calendar, Pricing Env.

5. Dividends Panel — Select a frequency, maturity, and enter a growth rate. Click **Generate**.

6. Points Panel — Select the daycount convention. Click **Generate** to generate the curve points.

7. Click **Save**, enter a name for the curve, and click **OK**.

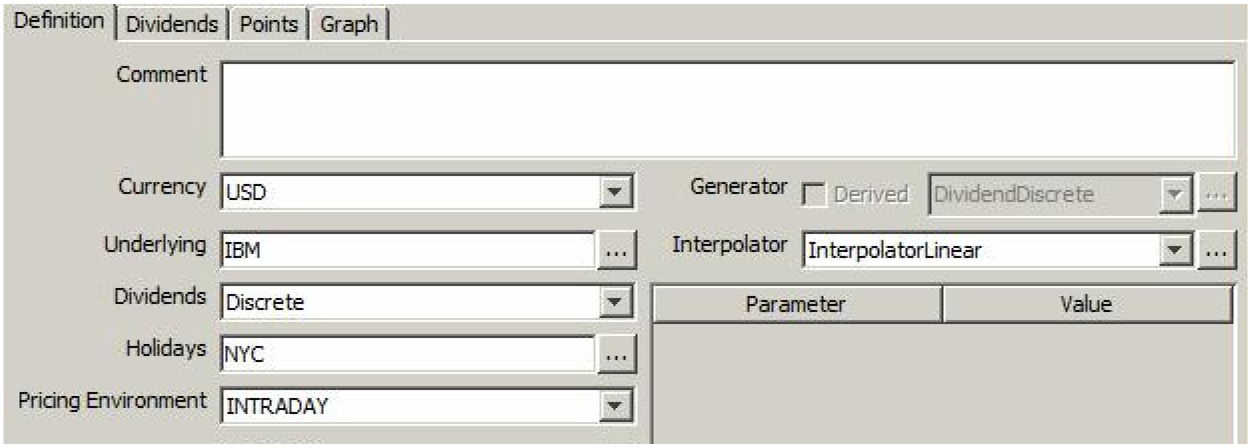
Pricer Configuration

Assign the dividend curve in the Product Specific panel for the Dividend usage. From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

13.3.1 Definition Panel

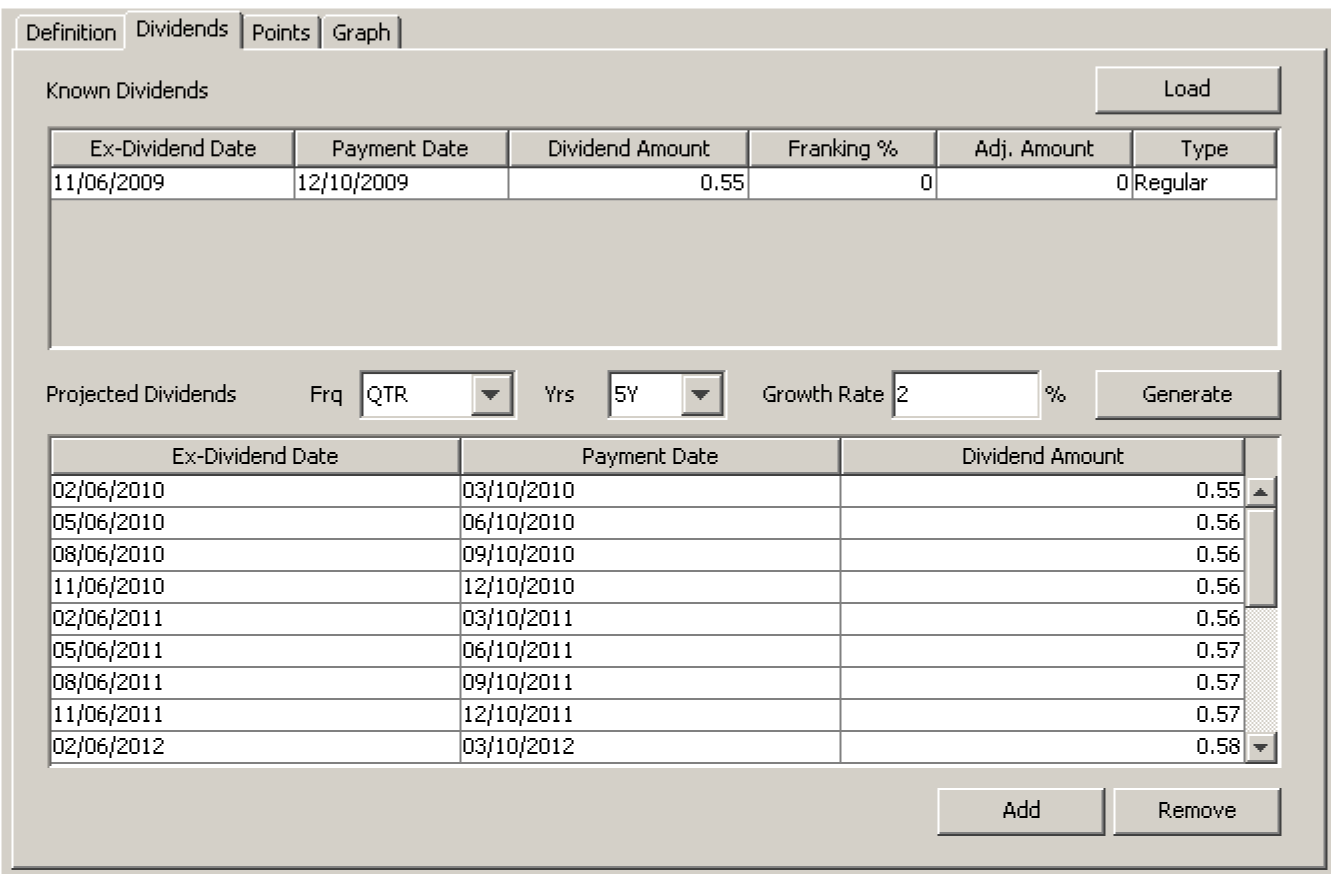
Click **New** to start a new curve.

Select the following to define the curve: equity product, “Discrete” dividend type, interpolator, currency, holiday calendar.



13.3.2 Dividends Panel

Select the Dividends panel.



The known dividends are retrieved from the selected equity product.

The frequency used to generate the projected dividends is initialized with the "Dividend Frequency" on the equity product, if any.

To generate the projected dividends:

» Select a frequency, maturity, and enter a growth rate.

» Click **Generate**.

13.3.3 Points Panel

Select the Points panel. This panel displays:

- Spot Price of the underlying equity.

  For example, if you select the CLOSE curve instance, then the curve uses the CLOSE quote from the quote set associated with the pricing environment.

  You can modify the price.

- Discount Curve from the pricing environment.

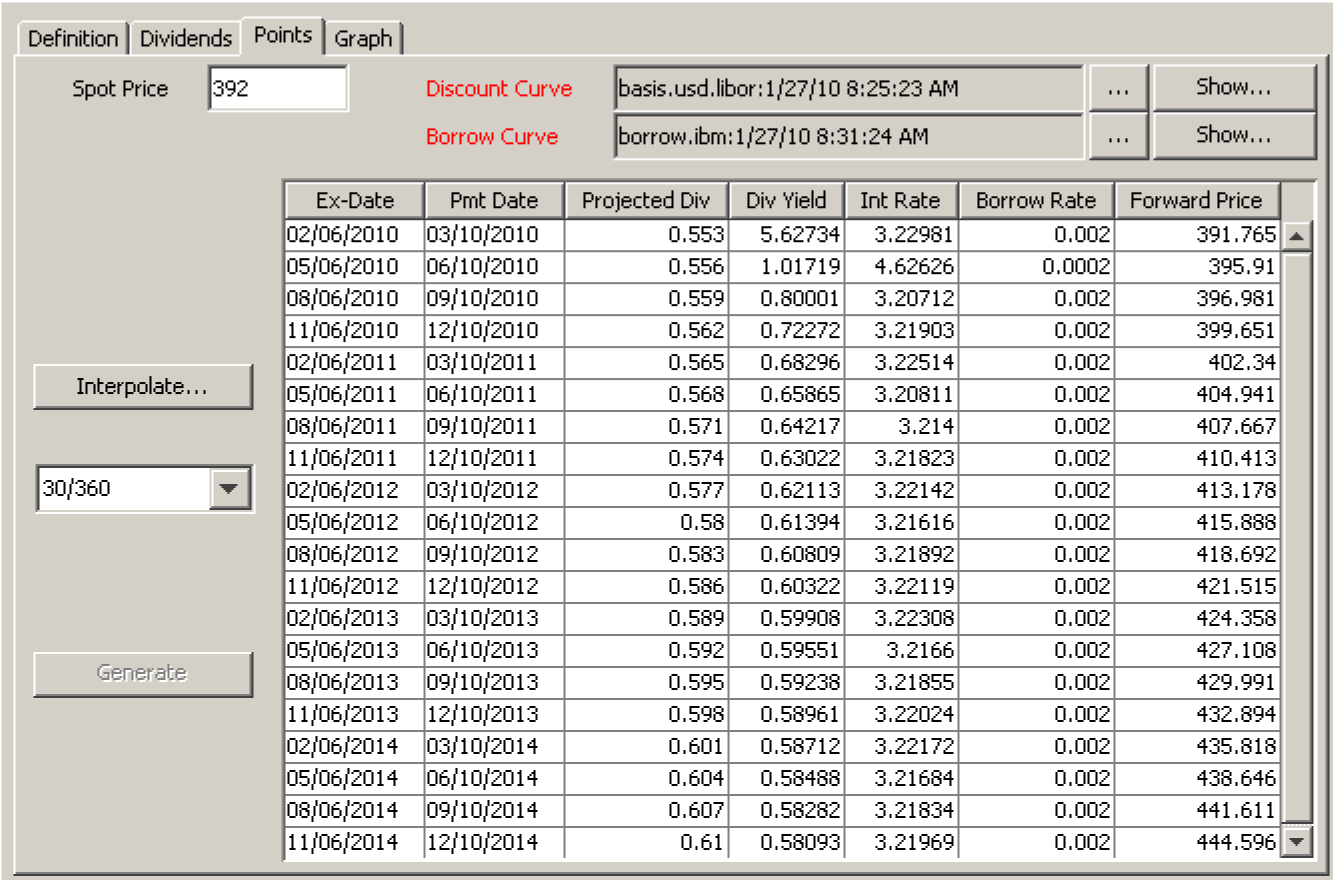
  \- Click **Show** to view or edit the discount curve.

  \- Click **...** to select a different discount curve.

- The Borrow Curve from the pricing environment. Calypso will use the Borrow Rate from the borrow curve in calculating the Forward Price.

  \- Click **Show** to view or edit the borrow curve.

  \- Click **...** to select a different borrow curve.



Ex-Date	Pmt Date	Projected Div	Div Yield	Int Rate	Borrow Rate	Forward Price
02/06/2010	03/10/2010	0.553	5.62734	3.22981	0.002	391.765
05/06/2010	06/10/2010	0.556	1.01719	4.62626	0.0002	395.91
08/06/2010	09/10/2010	0.559	0.80001	3.20712	0.002	396.981
11/06/2010	12/10/2010	0.562	0.72272	3.21903	0.002	399.651
02/06/2011	03/10/2011	0.565	0.68296	3.22514	0.002	402.34
05/06/2011	06/10/2011	0.568	0.65865	3.20811	0.002	404.941
08/06/2011	09/10/2011	0.571	0.64217	3.214	0.002	407.667
11/06/2011	12/10/2011	0.574	0.63022	3.21823	0.002	410.413
02/06/2012	03/10/2012	0.577	0.62113	3.22142	0.002	413.178
05/06/2012	06/10/2012	0.58	0.61394	3.21616	0.002	415.888
08/06/2012	09/10/2012	0.583	0.60809	3.21892	0.002	418.692
11/06/2012	12/10/2012	0.586	0.60322	3.22119	0.002	421.515
02/06/2013	03/10/2013	0.589	0.59908	3.22308	0.002	424.358
05/06/2013	06/10/2013	0.592	0.59551	3.2166	0.002	427.108
08/06/2013	09/10/2013	0.595	0.59238	3.21855	0.002	429.991
11/06/2013	12/10/2013	0.598	0.58961	3.22024	0.002	432.894
02/06/2014	03/10/2014	0.601	0.58712	3.22172	0.002	435.818
05/06/2014	06/10/2014	0.604	0.58488	3.21684	0.002	438.646
08/06/2014	09/10/2014	0.607	0.58282	3.21834	0.002	441.611
11/06/2014	12/10/2014	0.61	0.58093	3.21969	0.002	444.596

- Select the day-count convention.
- Click **Generate** to generate the curve points.

13.3.4 Save Curve

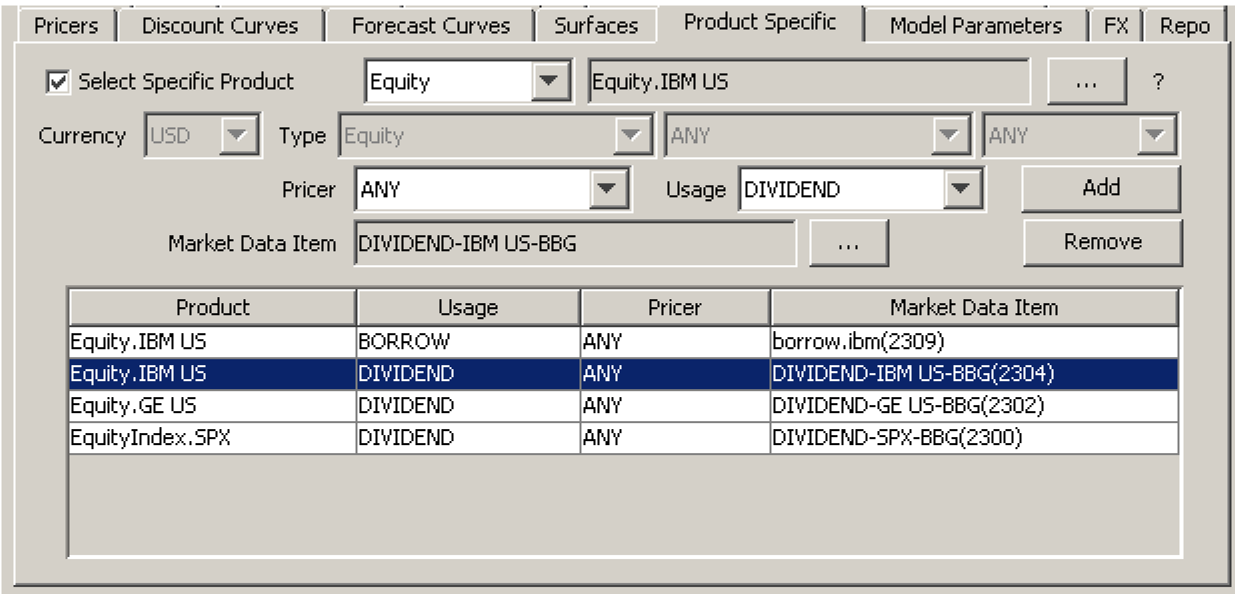
Click **Save** in the bottom of the curve window, enter the name for the curve and click **OK**.

13.4 Pricer Configuration

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

Click **Load**, and select a pricer configuration.

Click the Product Specific tab.



» Select the product and click **...** to select the equity.

» Select the pricer or ANY, and usage (DIVIDEND).

» Click **...** to select the dividend curve.

» Select the curve in the Selection window and click **Load** to display the curve name in the pricer configuration.

» Click **Add** to add the curve to the list.

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

14. Basis Curve

From the Calypso Navigator, navigate to **Market Data > Interest Rate Curves > Basis Curve** (menu action `marketdata.CurveBasisWindow`).

Single currency basis curves can be used for products with two floating indices; cross-currency basis curves can be used for cross-currency products.

For a single currency basis curve, construct the curve using offsets or basis swap underlying instruments. The curve consists of a base forward curve, and a set of spreads over the zero rates of the base forward curve.

For a cross-currency basis curve, construct the curve using cross-currency basis swap underlying instruments. FX Forward underlying instruments can be used to extend the basis curve. The curve consists of a base forward curve in the same currency as the basis curve, a set of spreads over the zero rates of the base forward curve, and a foreign forward curve in a different currency than the base forward curve.

- General curve information
- Creating a basis curve
- Pricer configuration

14.1 General Curve Information

- The name of the curve is set upon saving. It will identify the curve throughout the system.
- The instance of the curve dictates the quote side of the underlying instruments to be used for generating the curve.
  - The CLOSE instance uses CLOSE quotes.
  - The LAST instance uses BID, MID, and ASK quotes.
  - The OPEN instance uses OPEN quotes.
- By default, the curve is saved as of the current date and time. You can clear the Current checkbox and change the curve date as needed.
- You can change the precision of the discount factors using **Utilities > Set Df Precision** - Default is 8.

Setup Requirements

You can mark basis curves as requiring regeneration when their respective base or underlying curve(s) are more up-to-date than the basis curve. The regeneration occurs when pricing.

To enable this feature, set the following environment property:

» Set SET_NEED_GENERATE = Y.

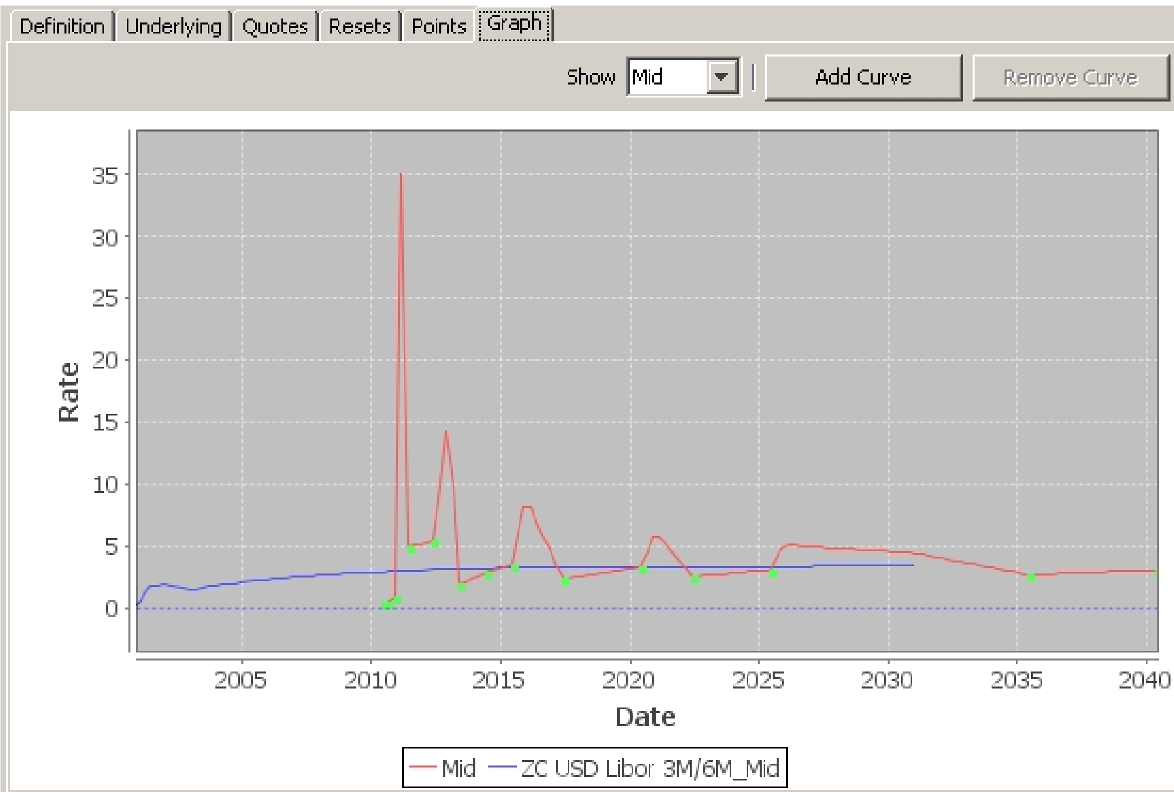
Curve Update

You can use the scheduled task PROP_RATE_1BUSDAY to roll the quotes which are not liquid.

You can use the scheduled task GENERATE_CURVE to regenerate a curve as of the current valuation date.

Graph Panel

Once a curve is generated, you can select the Graph panel to view the curve in graphical form.



14.2 Creating a Basis Curve

Basis Curve Quick Reference

Base Curves

- A base forward curve is required, for example, a zero curve in the currency specified in the basis curve.
- For a cross-currency basis curve, you also need a zero curve in a foreign currency.

Curve Underlying Instruments

You can use the curve underlying instruments such as basis swaps, money market, and FX forwards, etc. in building basis curves.

To define underlying instruments, navigate to **Configuration > Market Data > Curve Underlyings** from the Calypso Navigator, or click **New/Edit Underlying** in the Underlying panel of the Basis Curve window.

Curve Generation

1. Click **New** to start a new curve.

2. Select the curve instance.

3. Definition Panel — Select the following to define the curve: currency, index, tenor, “Generate from instruments” should be checked, interpolator, generation algorithm, curve type set to “CurveBasis”, Pricing Env, Base Fwd Curve, Foreign Fwd Curve.

4. Underlying Panel — Select the underlying instruments.

5. Quotes Panel — Enter / load quotes.

6. Points Panel — Click **Generate** to generate the points.

7. Click **Save**, and enter a curve name.

Pricer Configuration

Assign the basis curve as a discount or forecast curve.

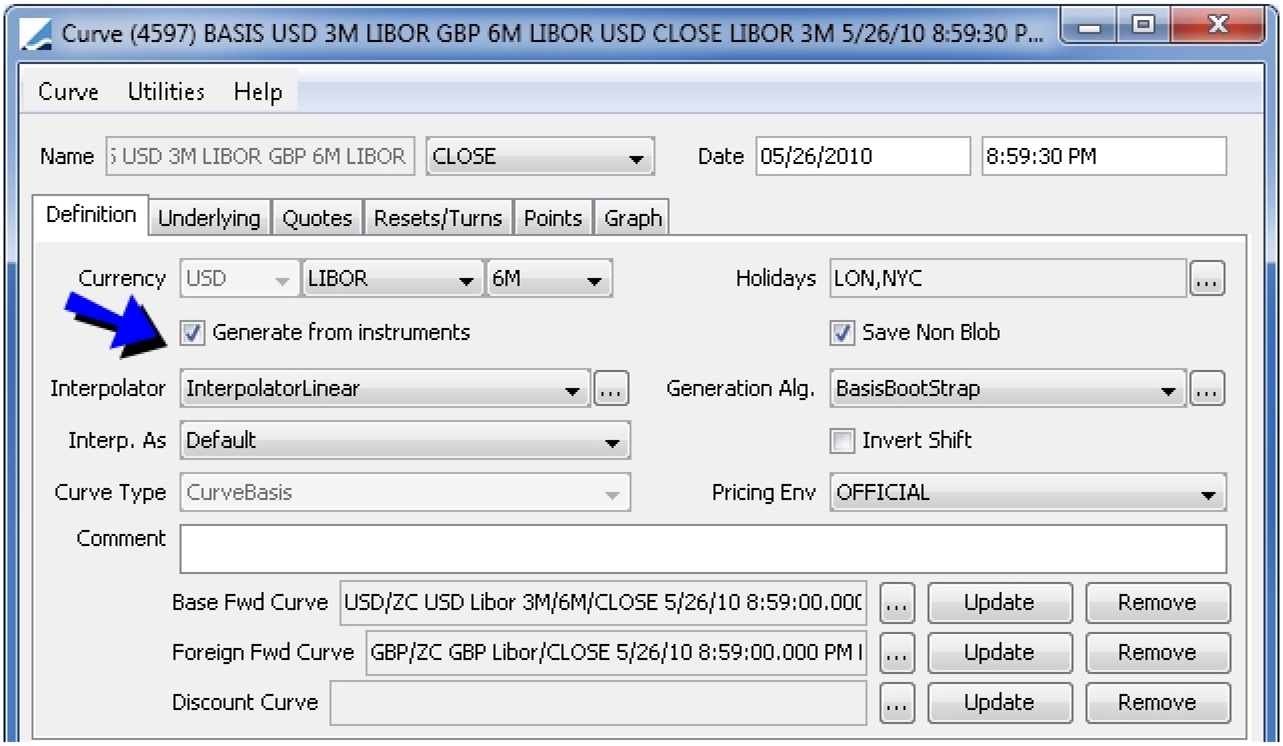
14.2.1 Definition Panel

Click **New** to start a new curve.

Select the following to define the curve: currency, index, tenor, “Generate from instruments” should be checked, interpolator, generation algorithm, curve type set to “CurveBasis”, Pricing Env, Base Fwd Curve, Foreign Fwd Curve (for a cross-currency basis curve).

If "Invert Shift" is checked, the curve will move down when applying a positive shift in ZC or underlying shifts.

▶ For more details on how the "Invert Shift" setting impacts risk calculation, see the "Shift Driver" section of the Calypso Sensitivity documentation.



The following curves are required to build the basis curve:

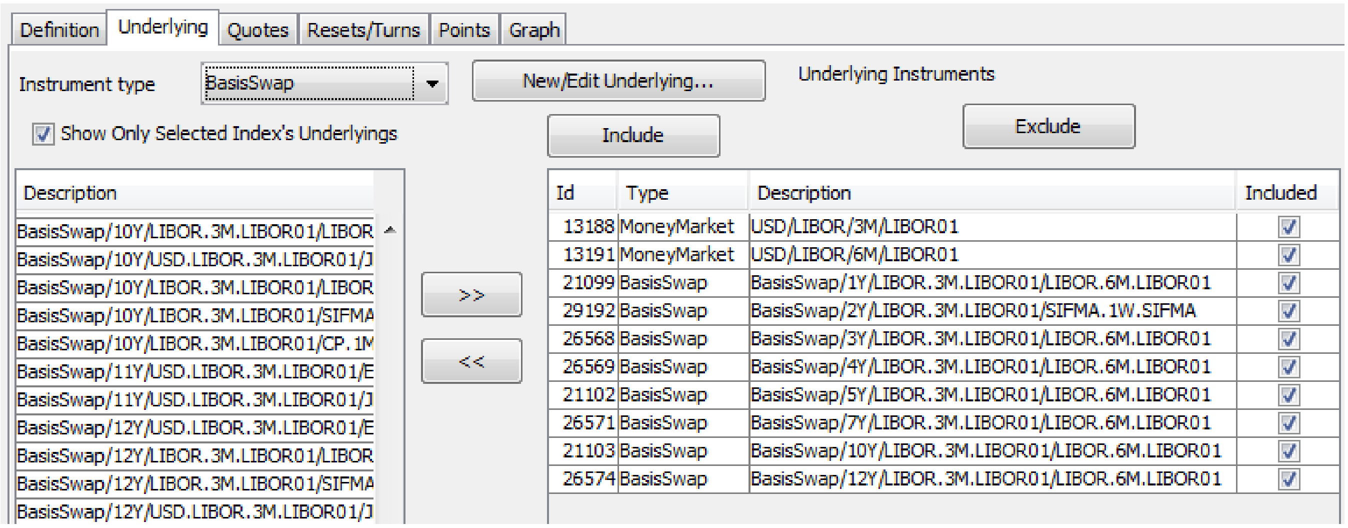
- For a single currency basis curve (the generated basis curve is used to project forward rates on the “basis” leg of the swap):
  - A Base Fwd Curve, used to project forward rates on the “base” leg of the swap
  - Optional - A Discount Curve, used to discount cashflows on both legs of the swap - If the Discount curve is not specified, the Base Fwd Curve is used as the Discount Curve

  The BasisGlobal generator requires a discount curve to generate the basis curve. Once a basis curve is generated using BasisGlobal, basis risk (scenario, sensitivity, simulation) will be calculated independently from the base curve used to generate the points.
- For a cross-currency basis curve (the generated basis curve is used to discount cashflows on the domestic leg of the swap):
  - A Base Fwd Curve in the domestic currency, used to project forward rates on the domestic leg of the swap
  - A Foreign Fwd Curve in the foreign currency, used to project forward rates on the foreign leg of the swap
  - Optional - A Discount Curve in the foreign currency, used to discount cashflows on the foreign leg of the swap - If the Discount Curve is not specified, the Foreign Fwd Curve is used as the Discount curve

The generation algorithms are described in the *Calypso IRD Analytics* guide.

14.2.2 Underlying Panel

Click the Underlying tab, and select the underlying instruments.



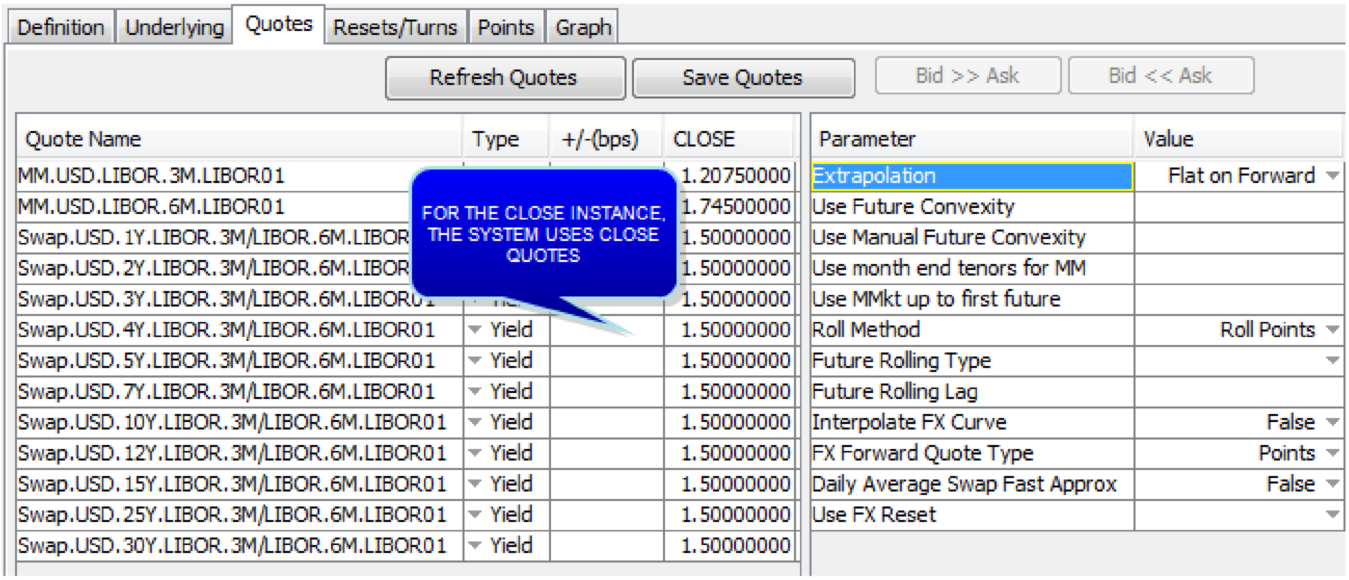
- Select an instrument type to display the list of available instruments. If none appear, you can click **New/Edit Underlying** to create new instruments.
- Select instruments from the list of available instruments on the left-hand side, and click **>>** to add them to the list of selected instruments on the right-hand side.

  You can exclude instruments from the curve generation if they are no longer needed.

  You can set a priority when multiple instruments have the same maturity date. The lowest priority is 0.

14.2.3 Quotes Panel

Click the Quotes tab.



» You can click **Refresh Quotes** to load the quotes from the pricing environment selected in the Definition panel. If your market data server is running, quotes will be updated in real-time.

» You can also enter the quotes manually, and save them to the pricing environment.

Quotes Parameters Details

Parameter	Description
Extrapolation	Select the method to extrapolate points outside of the curve. • Flat on Zero - The last known zero rate is kept constant • Flat on Forward - The last known forward rate is kept constant
Use month end tenors for MM	If set to True, in the curve generation: • If a swap underlying starts on the last business day of a month, we set the END_MONTH period rule on the swap. This is NOT applied if the underlying swap PeriodRule is “Unadjusted” or “Mat Unadjusted.” • If period rule is “Unadjusted,” end month date roll is not used. • If period rule is “Mat Unadjusted,” maturity date is not adjusted, but end month date roll is used to generate other payment dates. Default is False.
Use MMkt up to first future	If set to Y, then money markets after the first available future will be ignored in curve generation. Default is False.
Roll Method	You can select the roll method.

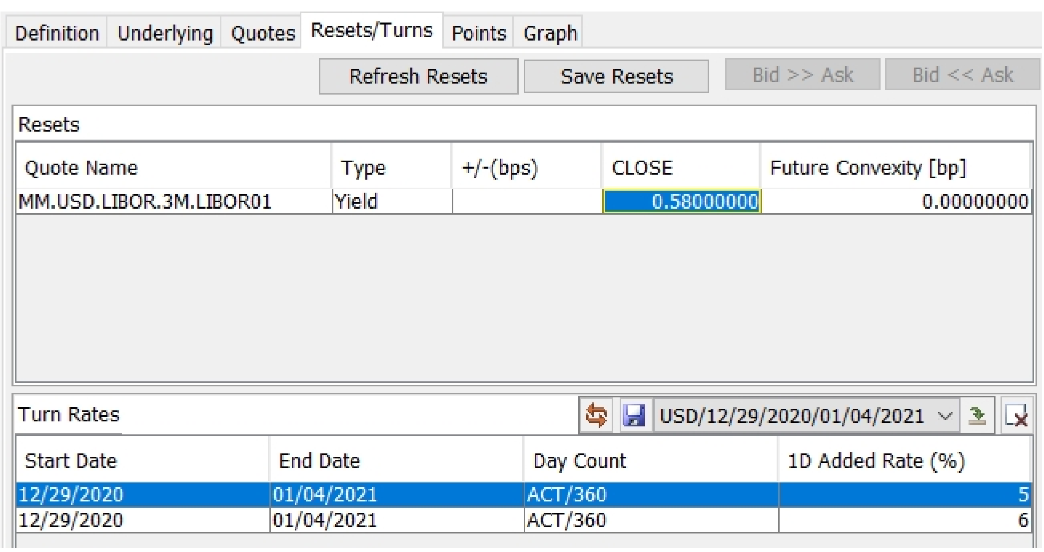
Parameter	Description
	For example, you create a curve instance on T0. On T1 you price a trade. • Roll Forwards - Forward rates are unchanged between any two dates. In particular, when pricing on T1, the discount factor for pricing a cashflow is the same as the discount factor between T1 and T0 when obtained from the T0 curve. • Roll Points - Curve points are rolled forward when pricing. The points are the same on T1 as on T0. • Regenerate - Curve points are regenerated when rolled. The points are regenerated on T1 using quotes from T0.
Interpolate FX Curve	Applies to BasisGlobal. When set to "True", the FX Derived Curve interpolation logic will be applied to the portion of the curve covered by any FX Forward underlyings. Because the Basis Curve does not actually have an FX Curve to reference, this method computes the discount factors for every day covered by the FX Forward underlyings, which usually is no more than a year. Therefore, on the Points tab and chart tab of the curve window, the user will see these points for every day out to the end of the FX Forwards. **[NOTE: In this case, no other Shaping Method parameter will be respected, as the FX curve interpolation is already a short-end shaping method. The Shaping Method parameter will always be regarded as "Basic"]**
FX Forward Quote Type	Select the FX Forward quote type for FX Forward underlyings: • "Points" or Blank, the FX forward quotes must be in the form of FX points. • "All-In Forward", the FX forward quotes must be in the form of All-in forward FX rates.
Daily Average Swap Fast Approx	Applies to BasisGlobal. In order to improve the performance, an approximation has been introduced when generating curves with BasisGlobal that use daily average swap underlyings. This will result in small changes in the generated numbers. You can bypass the approximation by setting the generator parameter "Daily Average Swap Fast Approx" to False.
Use FX Reset	Only available when the generator is BasisGlobal or BasisBootStrap. Indicates whether the Spot Alternative FX reset should be used instead of the FX spot rate. The generator parameter value will be False by default to retain current functionality. When set to True:

Parameter	Description
	• The generator will require an FX reset for the given currency pair whose FX Rate Definition has the “Spot Alternative” checkbox selected. • The Spot Alternative quote name for the FX Reset will appear in the Resets/Turns tab of the curve. • If a Spot Alternative FX reset for the given currency pair is not defined, the generator will throw an error and require the user to define the FX reset before generating the curve. ▶ For more details on Spot Alternative, see Defining FX Rate Fixings in the Calypso *Getting Started* documentation.
Basis Curve Solve For DFs	Only available when the generator is BasisGlobal. When false, it solves for spread and when true, it solves for discount factors (should be used when the basis curve is part of a package with discount curves).

Resets Panel

You can choose **Curve > Show Reset Tab** to display / hide the Resets panel.

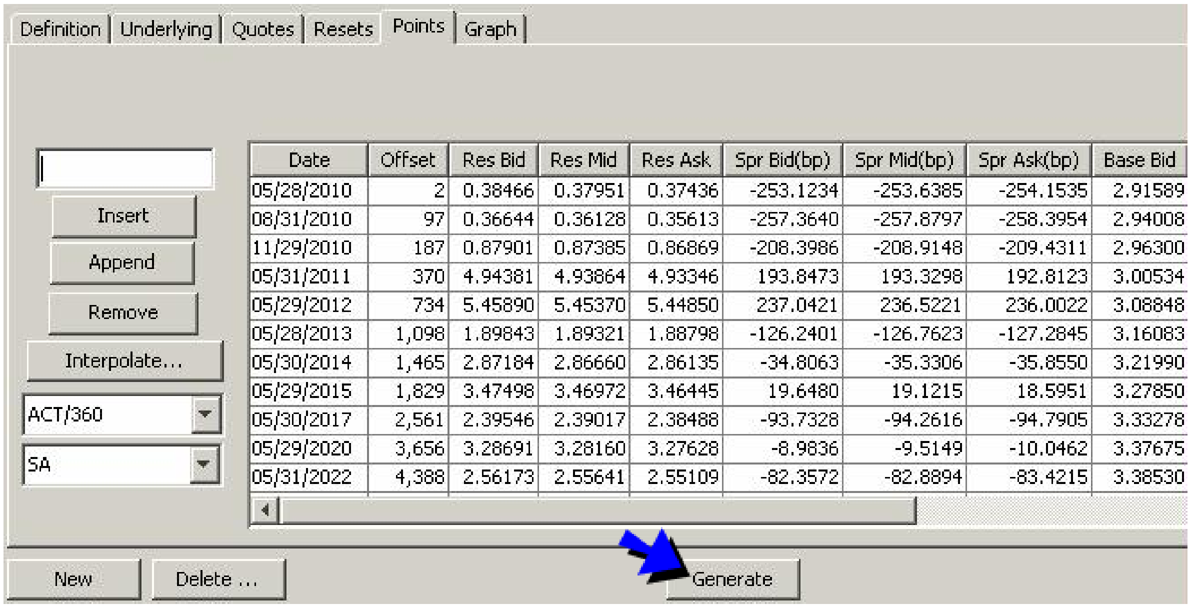
The Resets panel shows manual resets requirements for underlying instruments (cash quotes associated with a given underlying instrument). This applies when "Manual First Reset" is checked in the definition of the underlying instrument.



[NOTE: If you hide the Resets panel, the required cash quotes are displayed in the Underlying panel, along with the quotes of the underlying instruments]

14.2.4 Points Panel

Click the Points tab. Click **Generate** to view the generated spreads.



Date	Offset	Res Bid	Res Mid	Res Ask	Spr Bid(bp)	Spr Mid(bp)	Spr Ask(bp)	Base Bid
05/28/2010	2	0.38466	0.37951	0.37436	-253.1234	-253.6385	-254.1535	2.91589
08/31/2010	97	0.36644	0.36128	0.35613	-257.3640	-257.8797	-258.3954	2.94008
11/29/2010	187	0.87901	0.87385	0.86869	-208.3986	-208.9148	-209.4311	2.96300
05/31/2011	370	4.94381	4.93864	4.93346	193.8473	193.3298	192.8123	3.00534
05/29/2012	734	5.45890	5.45370	5.44850	237.0421	236.5221	236.0022	3.08848
05/28/2013	1,098	1.89843	1.89321	1.88798	-126.2401	-126.7623	-127.2845	3.16083
05/30/2014	1,465	2.87184	2.86660	2.86135	-34.8063	-35.3306	-35.8550	3.21990
05/29/2015	1,829	3.47498	3.46972	3.46445	19.6480	19.1215	18.5951	3.27850
05/30/2017	2,561	2.39546	2.39017	2.38488	-93.7328	-94.2616	-94.7905	3.33278
05/29/2020	3,656	3.28691	3.28160	3.27628	-8.9836	-9.5149	-10.0462	3.37675
05/31/2022	4,388	2.56173	2.55641	2.55109	-82.3572	-82.8894	-83.4215	3.38530

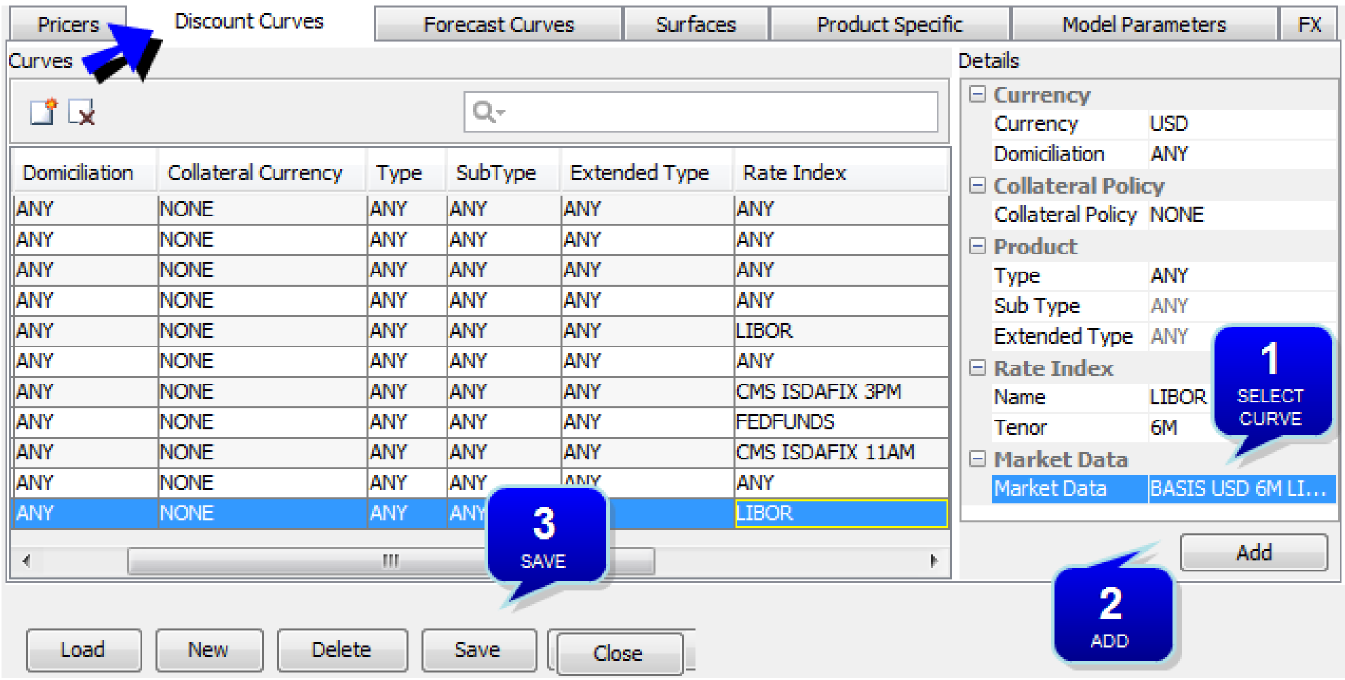
Also, if one of the base curves has been updated, you can click **Update** in the Definition panel to automatically load the updated information, and recalculate the resulting spread rather than having to regenerate the Basis Curve. This may be useful if you update your base curves more frequently than your Basis Curve.

14.3 Pricer Configuration

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**, and click **Load** to select a pricer configuration name.

14.3.1 Discount Curves

Click the "Discount Curves" tab.



» Select a currency, a product or ANY, a subtype or ANY, an index or ANY, a tenor or ANY.

» Click **...** to select a curve.

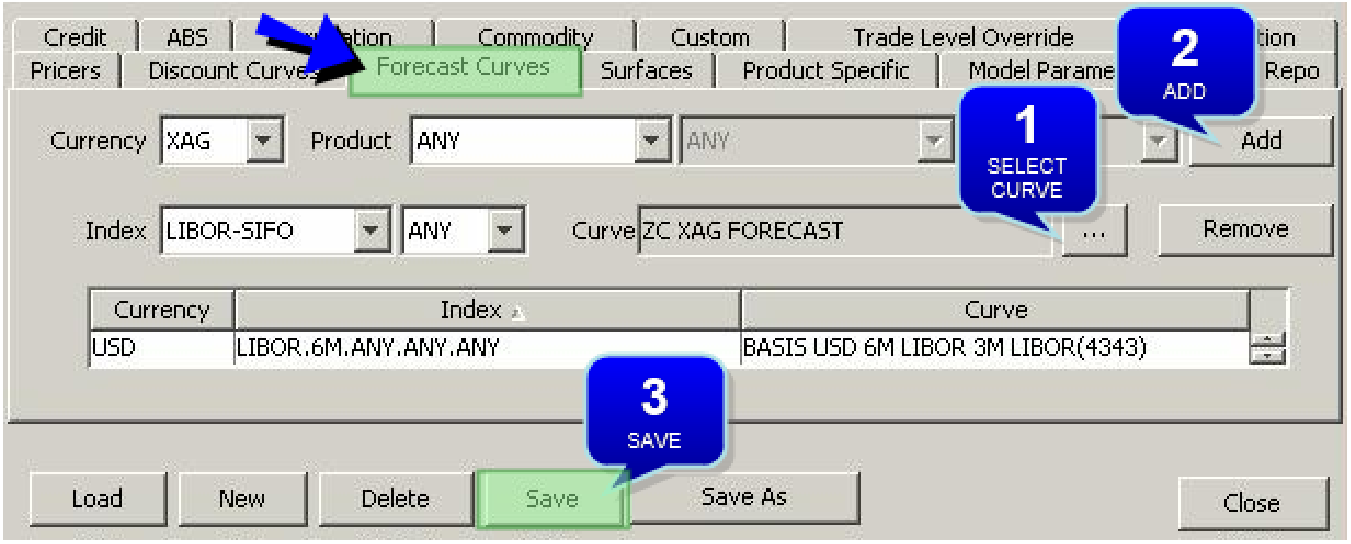
» Click **Add** to add the curve to the pricer configuration.

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

14.3.2 Forecast Curves

Click the Forecast Curves panel.

Assign the Basis Curve in the Forecast Curves panel.



» Select a currency, a product or ANY, a subtype or ANY, an index, a tenor or ANY.

» Click **...** to select the curve.

» Click **Add** to add the curve to the pricer configuration.

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

15. Inflation Curve

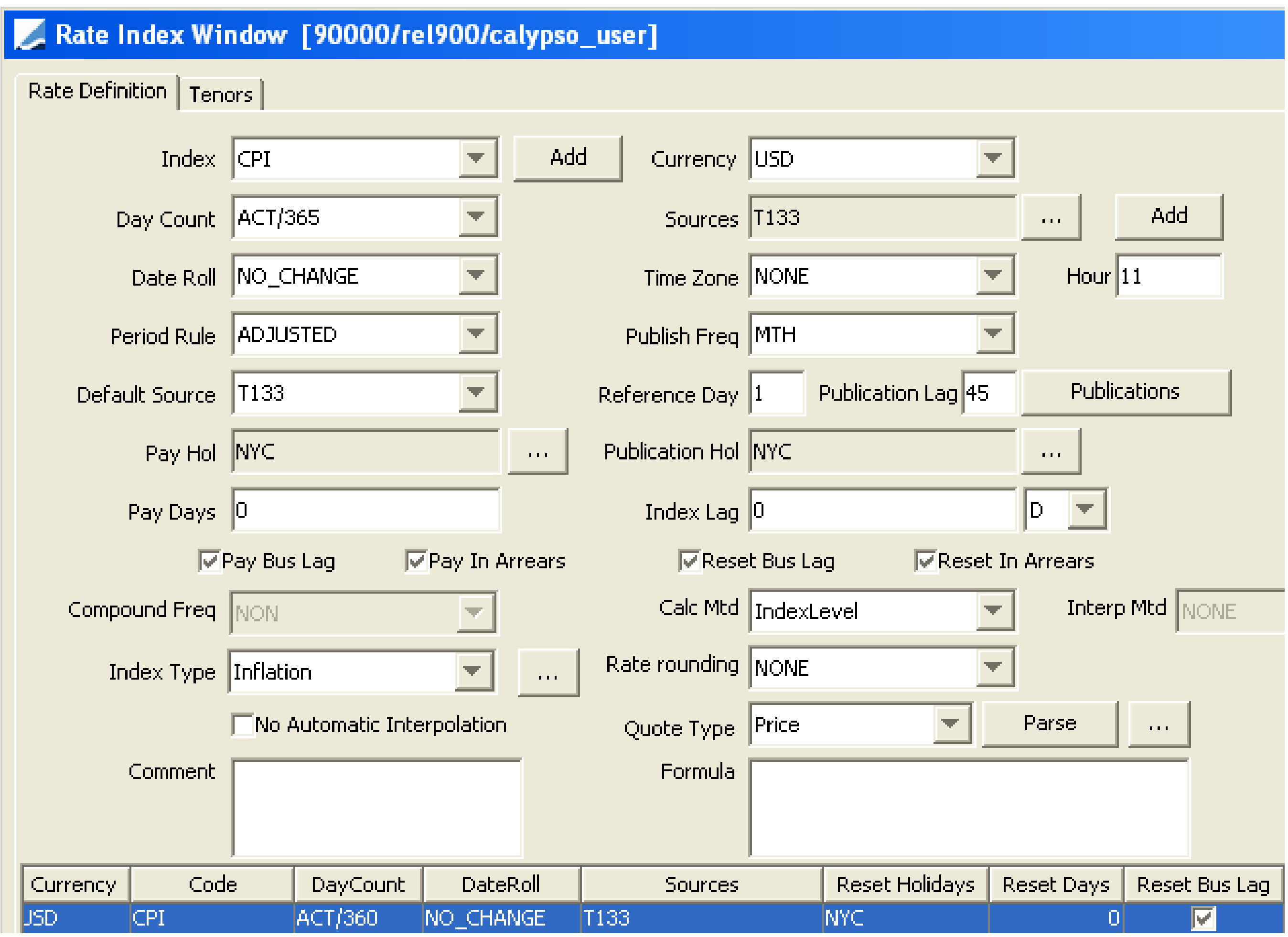
From the Calypso Navigator, navigate to **Market Data > Interest Rate Curves > Inflation Curve** (menu action `marketdata.CurveInflationWindow`).

You can create a derived inflation curve from underlying instruments.

- Inflation index example
- Inflation curve from underlying instruments
- Pricer configuration

15.1 Inflation Index Example

From the Calypso Navigator, navigate to **Configuration > Interest Rates > Rate Index Definitions**.

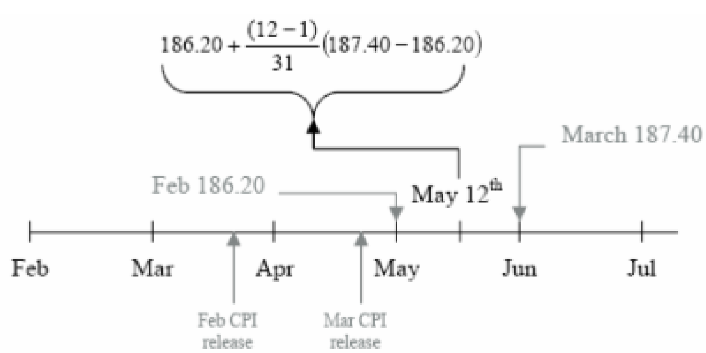


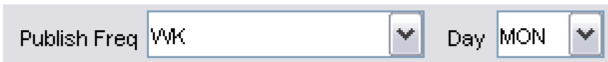
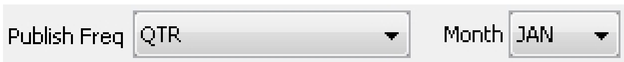
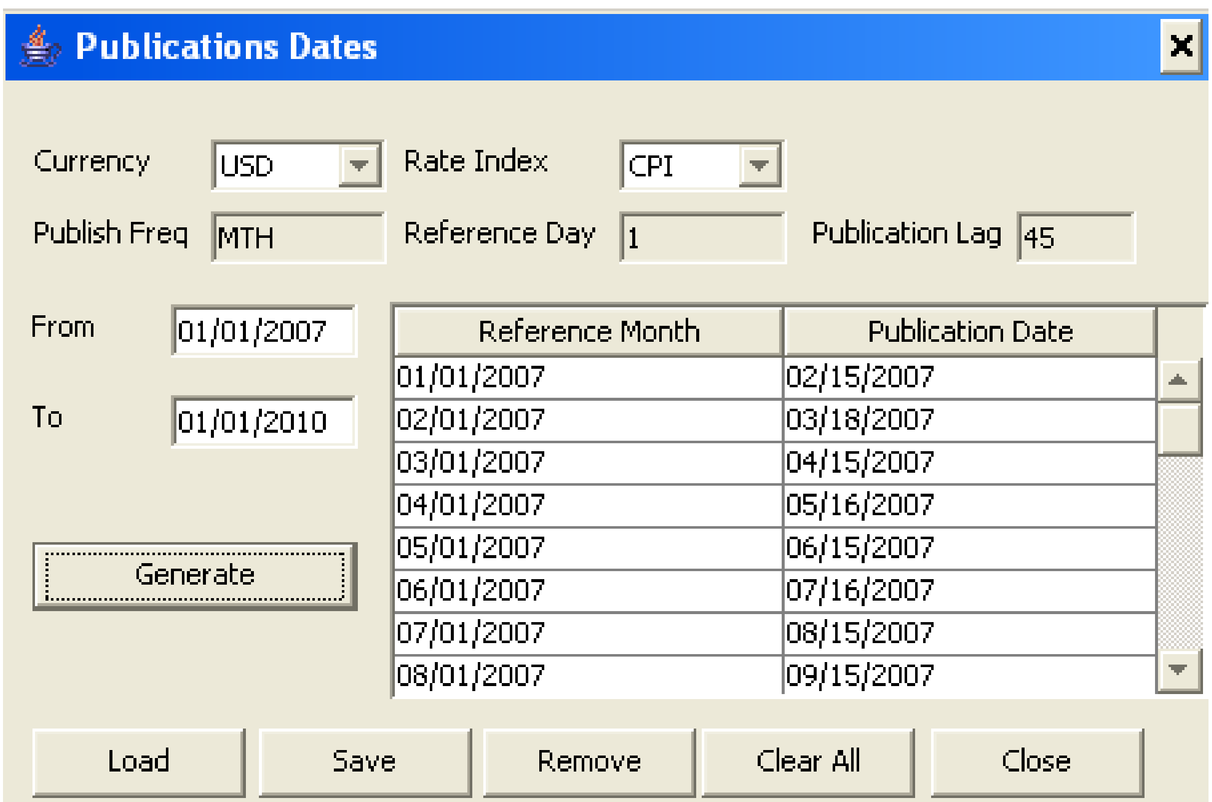
The Rate Definition panel is selected by default.

» Select the rate index from the Index field, and enter its details. Select Inflation from the Index Type field. Fields specific to inflation indices are described below.

» You can click **Add** to add a rate index.

Fields Details

Rate Index	Attributes
Index Type	Select Inflation.
Calc Mtd	Select the calculation method: • IndexLevel - Index levels are not interpolated between publication dates. The same index level is used for the whole period. • Interpolated - Index levels are interpolated between publication dates. Select the interpolation method from the Interp Mtd field.
Interp Mtd	Only appears for the Interpolated calculation method. Select Weighted or NONE. Index levels are interpolated using the following formula: $$I(dd/mm/yy) = I(01/mm/yy) + \frac{dd-1}{DiM}\left[I(01/mm+1/yy) - I(01/mm/yy)\right]$$ where DiM denotes the number of days in the month for all days between the first of January and the first of December. For the days in December we have: $$I(dd/12/yy) = I(01/12/yy) + \frac{dd-1}{DiM}\left[I(01/01/yy+1) - I(01/12/yy)\right]$$ For example, to calculate an interpolated May 12th CPI index level, which has a 3 month lag: 
No Automatic Interpolation	This checkbox is not related to the interpolation method of Inflation rates. When checked, there is no automatic interpolation applied to stub periods, otherwise stub periods are automatically interpolated.
Publish Freq	Select the frequency at which the rate is published. For the weekly frequency, you can select the day of the week the rate is published from the Day

Rate Index	Attributes
	field.
	
	When Inflation is selected for Index Type, the quarterly frequency also allows you to select the month of the year.
	
	For Inflation indices, select a publication frequency, enter a reference day and a publication lag.
	
	The reference day is the day of the month when the inflation is effective, and the publication lag is the time lag between the effective date of an inflation level and its actual publication.
	You can click **Publications** and generate the dates to make any modification if needed. Otherwise the reference day and publication lag are used to determine the publication dates.
	
	» Enter a From and To date and click **Generate**. You can modify the publication dates as needed.
	» Click **Save** when you are done.

Rate Index	Attributes
Index Lag	Enter the index lag, usually 3M.

» Click **Attributes** and set the following attribute. You can click **...** to add the attribute if it does not exist.

Note that the attributes and their values are case sensitive.

IndexCalculator = InflationIndexKerkhof

» Click **Save** to save your changes.

» Then select the Tenors panel to define tenors for the rate index, and click **Save** to save your changes.

You can set the tenor to “0D”.

15.2 Inflation Curve from Underlying Instruments

Inflation Curve from Underlying Instruments Quick Reference

Configuration Requirements

- Rate Index Definition – You need an inflation rate index of type Inflation - From the Calypso Navigator, navigate to **Configuration > Interest Rates > Rate Index Definitions**
- Seasonality Curve - You may need a seasonality curve depending on the Annual Seasonality parameter – From the Calypso Navigator, navigate to **Market Data > Interest Rate Curves > Seasonality Curve**

Curve Underlying Instruments

You can use zero coupon swaps and cash instruments for building the inflation curve with the InflationIndexKerkhof generator.

You can use basis swaps for building the inflation curve with the InflationRealRate generator.

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, LAST, or OPEN). If you select the LAST instance, you can use real-time quotes in the curve. Select a real-time source and the RT checkbox in the bottom of the curve application.

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

4. Definition Panel — Select the following to define the curve: currency, index, holiday calendars, interpolator=InterpolatorFlatForward, generation algorithm, “Generate from Instruments” should be checked, Pricing Env.

5. Underlyings Panel — Select the underlying instruments.

6. Quotes Panel — Enter quotes manually, use quotes from the quote set, or use real-time quotes.

7. Points Panel — Click **Generate** to generate the points.

8. Click **Save**, enter a name for the curve, and click **OK**.

Pricer Configuration

Assign the inflation swap curve as a forecast curve. From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

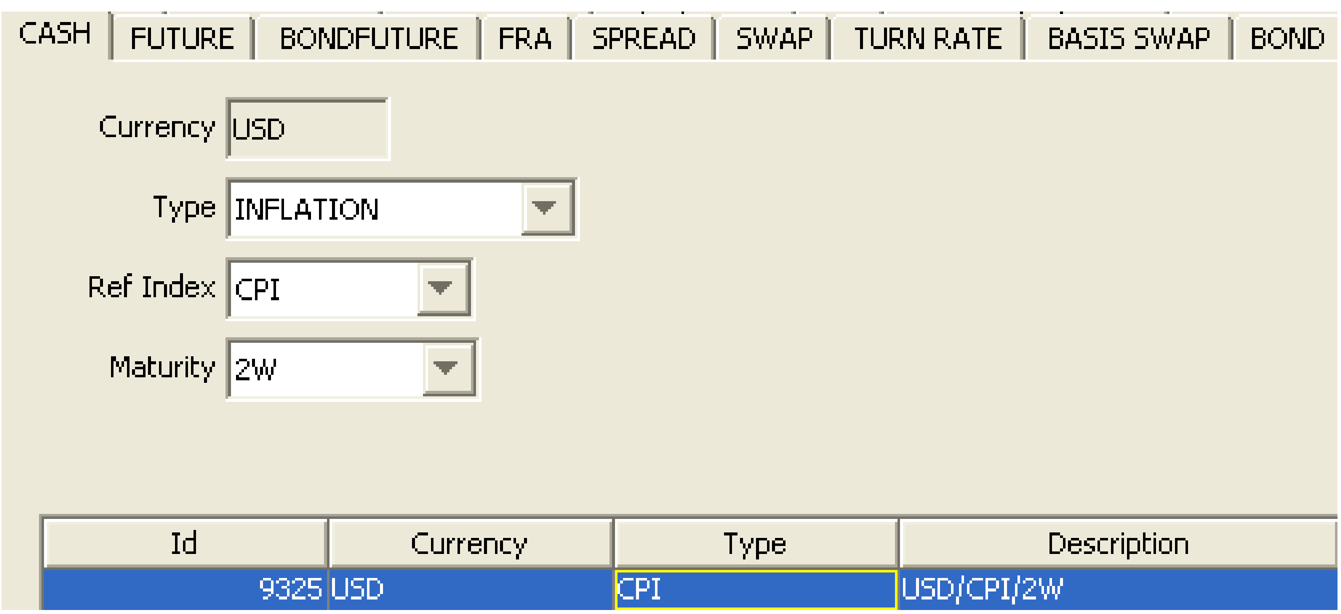
15.2.1 Underlying Instruments

You can set up underlying instruments before creating the curve, or while you are creating the curve.

From the Calypso Navigator, navigate to **Configuration > Market Data > Curve Underlyings**, or in the curve application's Underlying panel, click **New/Edit Underlying**. Set up cash instruments, zero coupon swaps, or inflation spreads.

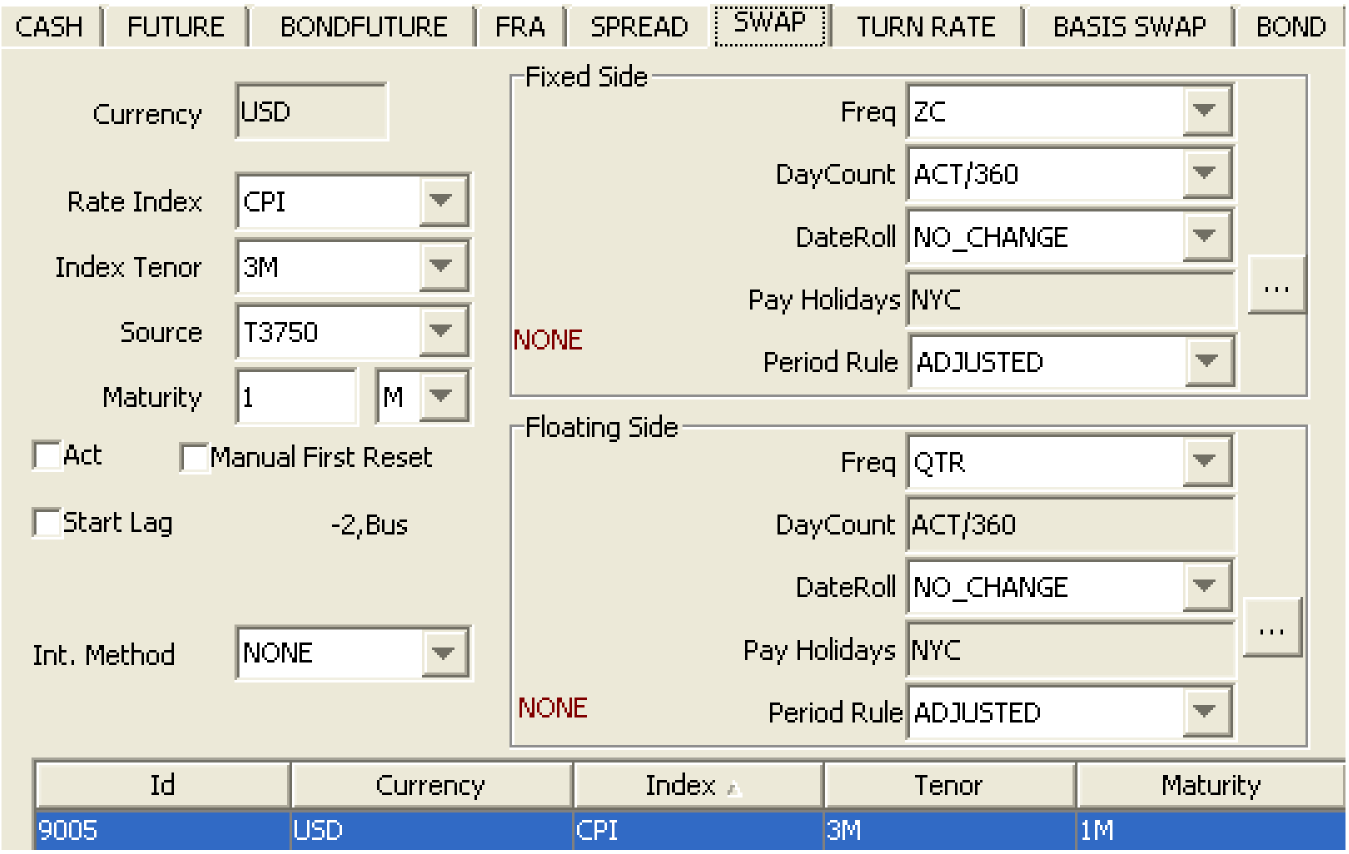
Sample Cash instrument

The quote of a cash instrument is an index level. Using cash instruments in building the curve corresponds to setting up custom index levels.



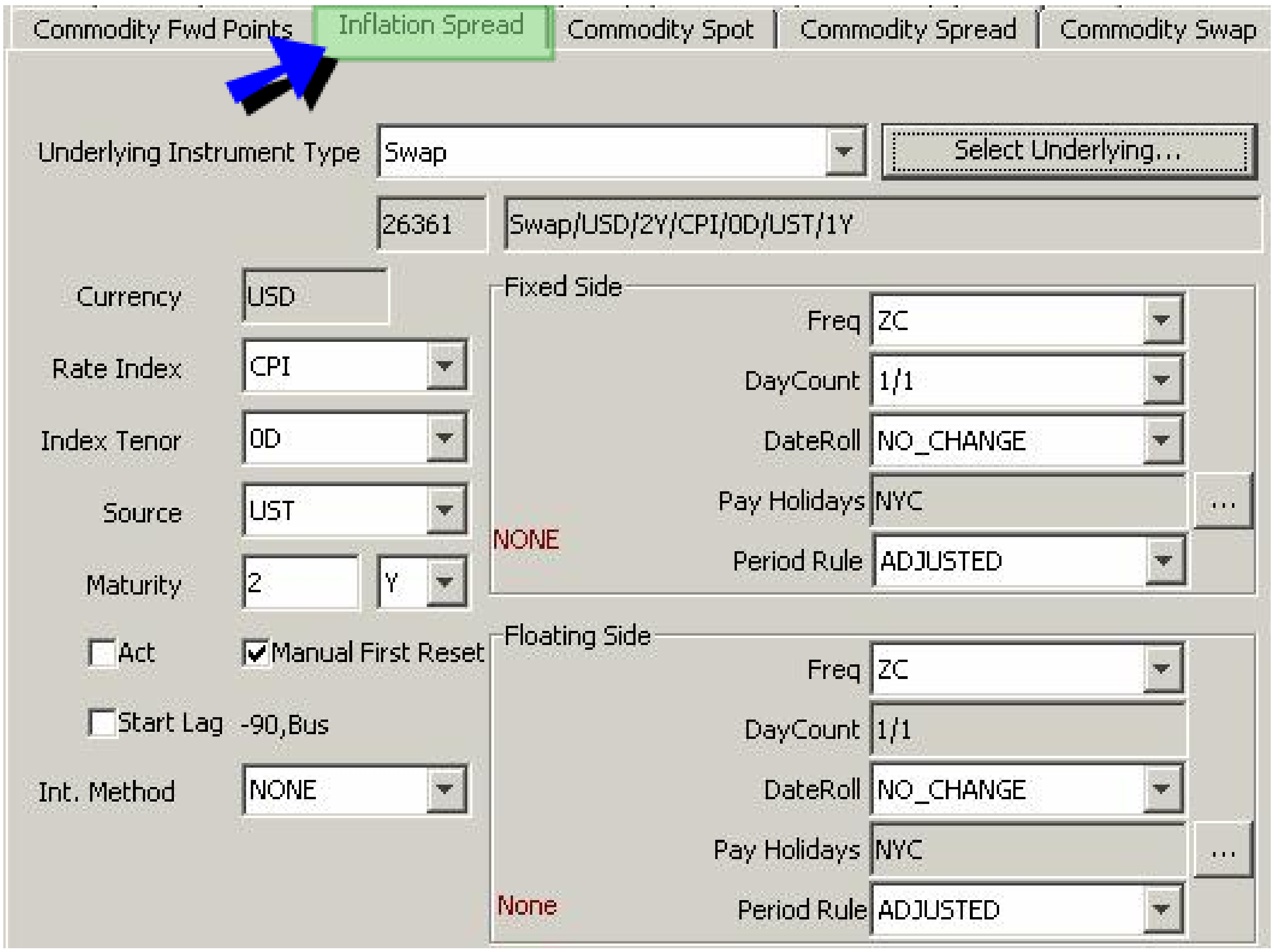
» Make sure to select the INFLATION type.

Sample ZC Swap



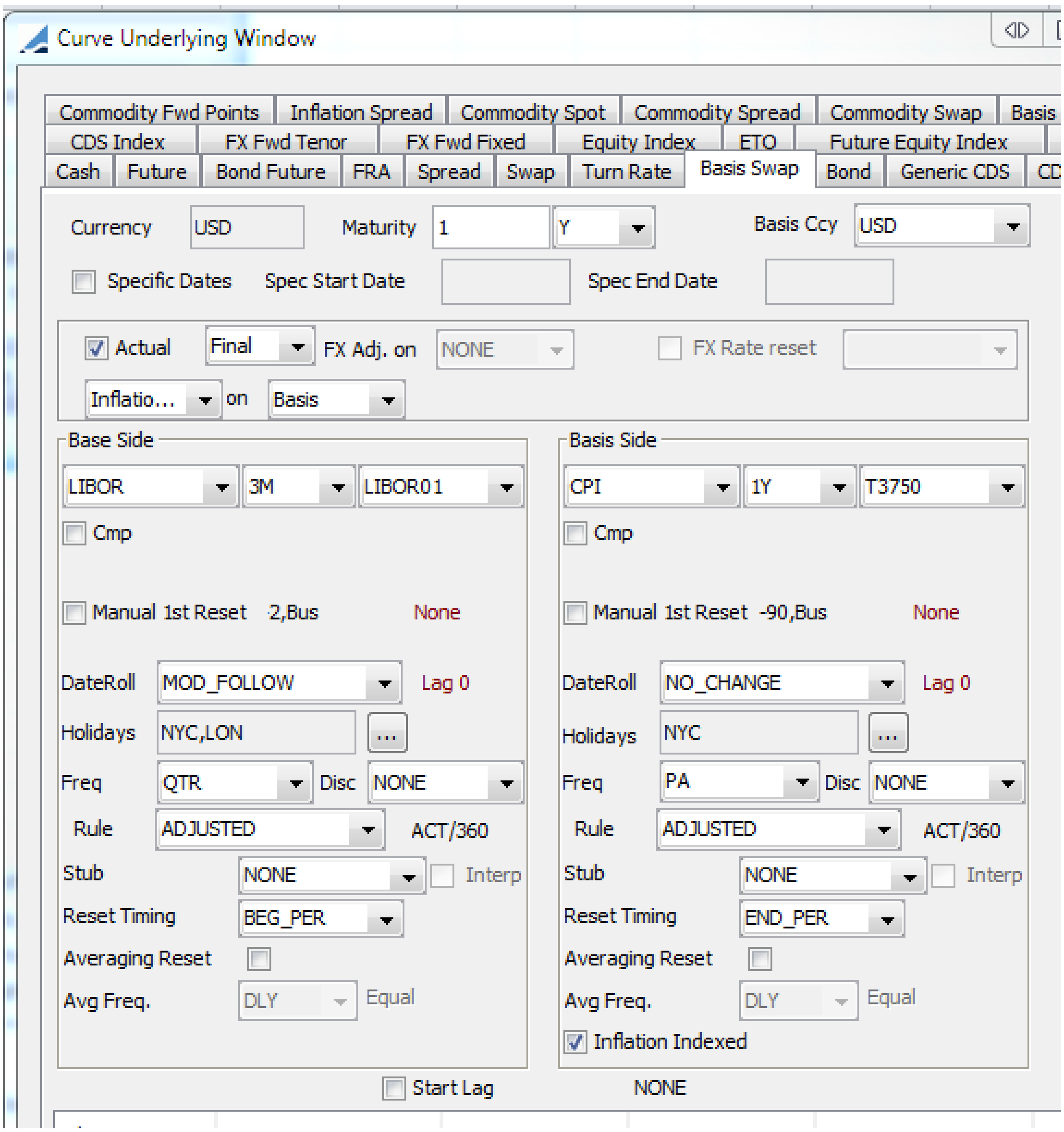
Sample Inflation Spread (Instrument Spread)

This underlying instrument allows selecting a swap, and entering a spread over the swap's quote.

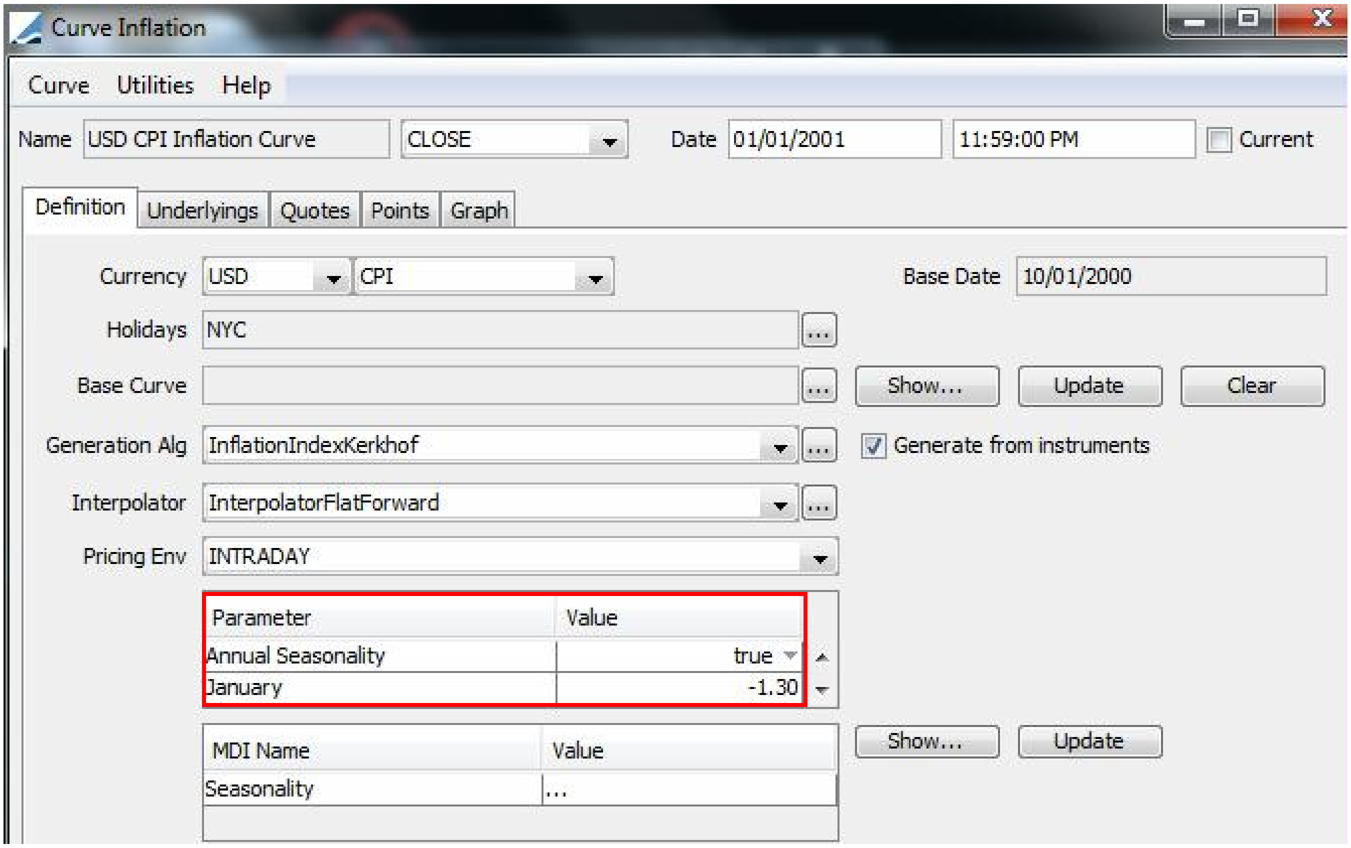


» Click **Select Underlying** to select a swap (defined as an underlying instrument).

Sample Basis Swap for InflationRealRate Generator


Curve Underlying Window
Commodity Fwd Points
Inflation Spread
Commodity Spot
Commodity Spread
Commodity Swap
Basis
CDS Index
FX Fwd Tenor
FX Fwd Fixed
Equity Index
ETO
Future Equity Index
Cash
Future
Bond Future
FRA
Spread
Swap
Turn Rate
Basis Swap
Bond
Generic CDS
Currency
USD
Maturity
1
Y
Basis Ccy
USD
Specific Dates
Spec Start Date
Spec End Date
Actual
Final
FX Adj. on
NONE
FX Rate reset
Inflatio...
on
Basis
Base Side
LIBOR
3M
LIBOR01
Cmp
Manual 1st Reset
2,Bus
None
DateRoll
MOD_FOLLOW
Lag 0
Holidays
NYC,LON
...
Freq
QTR
Disc
NONE
Rule
ADJUSTED
ACT/360
Stub
NONE
Interp
Reset Timing
BEG_PER
Averaging Reset
Avg Freq.
DLY
Equal
Basis Side
CPI
1Y
T3750
Cmp
Manual 1st Reset
-90,Bus
None
DateRoll
NO_CHANGE
Lag 0
Holidays
NYC
...
Freq
PA
Disc
NONE
Rule
ADJUSTED
ACT/360
Stub
NONE
Interp
Reset Timing
END_PER
Averaging Reset
Avg Freq.
DLY
Equal
Inflation Indexed
Start Lag
NONE

15.2.2 Definition Panel



» The base date is the reference month of the closest publication date before the curve date.

You need an inflation quote on that date in the quote set.

[NOTE: Inflation quote values are identified as “Inflation.<currency>.<rate index>” for example, “Inflation.USD.CPI”]

» Select the generation algorithm: InflationIndexKerkhof for inflation swaps, or InflationRealRate for Real Yield Swaps.

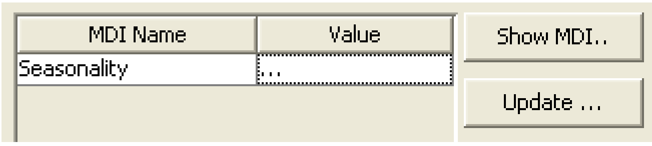
» Select the interpolator: InterpolatorFlatForward.

InflationIndexKerkhof

It allows generating inflation curves using the Kerkhof methodology. It applies additive seasonal adjustments to the index levels.

If you set the parameter "Annual Seasonality" to true, you can manually enter the seasonal adjustments for each month.

If you set the parameter "Annual Seasonality" to false, you can select a seasonality curve.



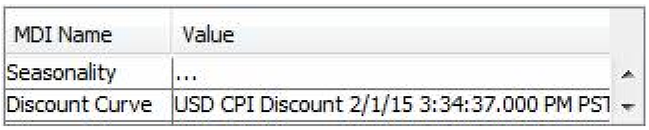
[NOTE: Seasonality adjustments are not currently supported for quarterly inflation indices.]

InflationRealRate

It allows generating inflation curves from nominal rates and real rates using basis swaps as underlying instruments.

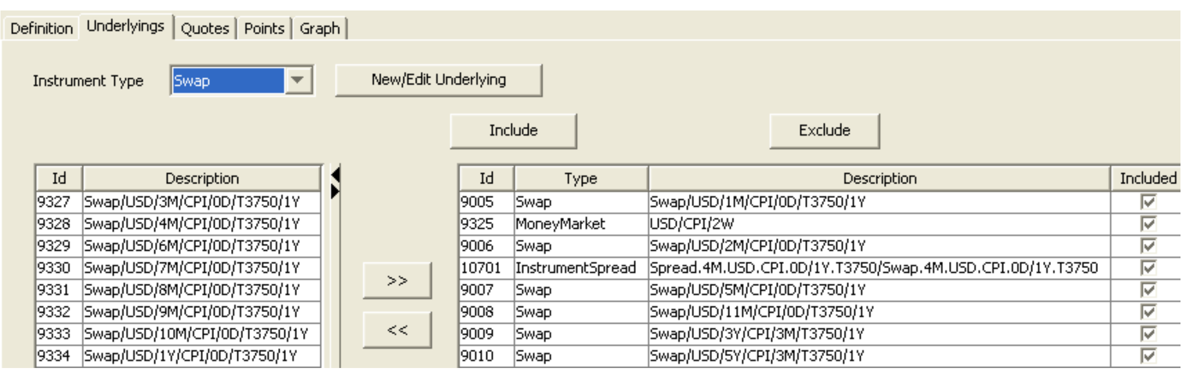
You need to select a discount curve and a forecast curve to price the base leg of the basis swaps.

You can apply additive seasonal adjustments as for the InflationIndexKerkhof generator.



15.2.3 Underlyings Panel

Click the Underlying tab. You can select Swap to add ZC swaps, MoneyMarket to add Cash underlying instruments, and InstrumentSpread to add spreads over swaps.

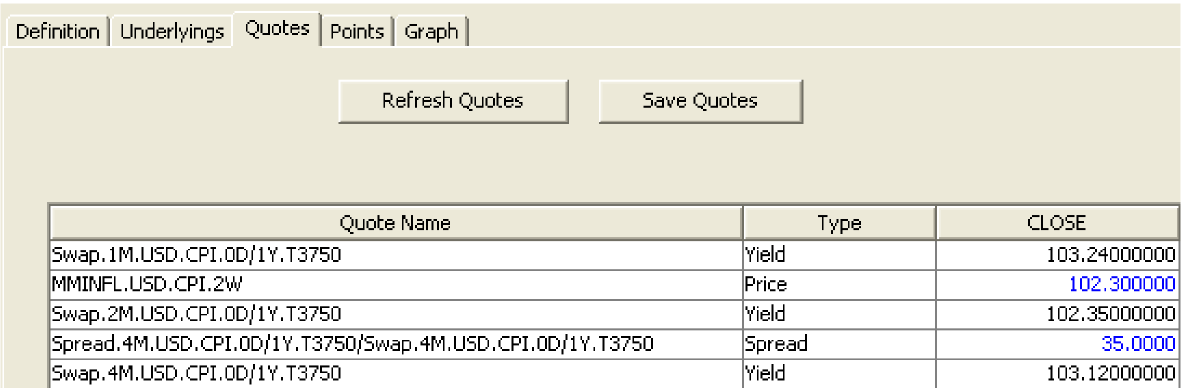


- Select the instrument type, and the left-hand side panel displays the list of available instruments. The panel is blank if you have not set up any instruments. Click **New/Edit Underlying** to create new instruments.
- Select instruments and click **>>** to add them to the instrument list in the right-hand side panel.

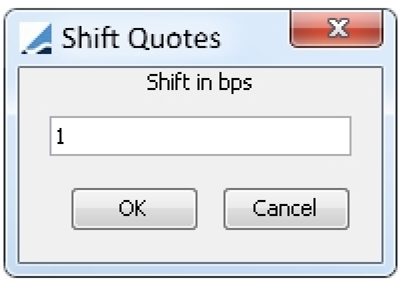
15.2.4 Quotes Panel

Click the Quotes tab. You can enter quotes and save quotes to the quote set associated with the selected pricing environment.

The quotes may be automatically populated if you are running a real-time feed, or they may be populated from the quote set associated with the selected pricing environment (click **Refresh Quotes** to get the latest quotes).



- Cash quotes are index levels, swap quotes are interest rates, and instrument spread quotes are spreads over swap quotes.
- To shift quotes by a specified number of basis points, point to **Utilities > Shift Quotes** in the Curve Inflation window menu. The Shift Quotes window opens.

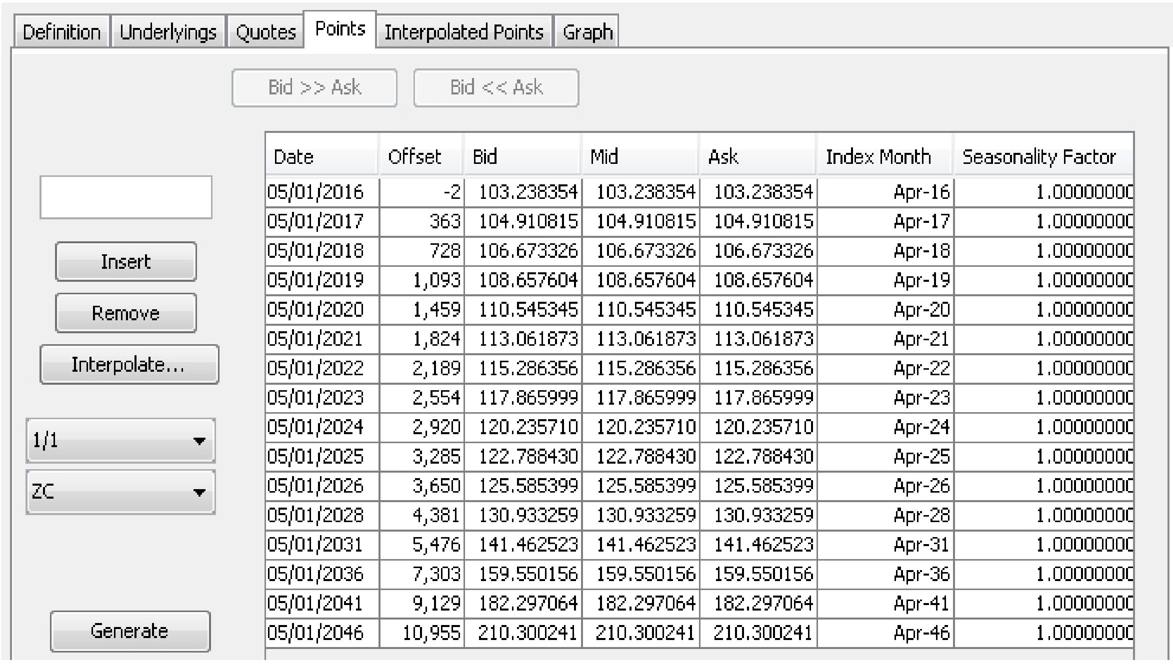


Enter the number of basis points and click **OK**. Quotes on the Quotes tab are shifted by the specified number of basis points.

Shifting by 1 bp will match the value displayed for any given inflation trade as DELTA_01_INFLATION.

15.2.5 Points Panel

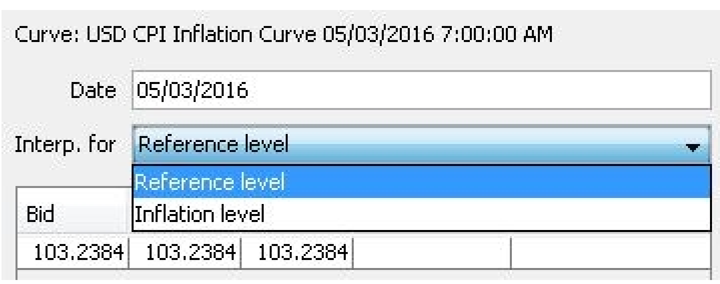
Click the Points tab. Select a daycount convention, a term, and click **Generate** to create the points grid.



Date	Offset	Bid	Mid	Ask	Index Month	Seasonality Factor
05/01/2016	-2	103.238354	103.238354	103.238354	Apr-16	1.00000000
05/01/2017	363	104.910815	104.910815	104.910815	Apr-17	1.00000000
05/01/2018	728	106.673326	106.673326	106.673326	Apr-18	1.00000000
05/01/2019	1,093	108.657604	108.657604	108.657604	Apr-19	1.00000000
05/01/2020	1,459	110.545345	110.545345	110.545345	Apr-20	1.00000000
05/01/2021	1,824	113.061873	113.061873	113.061873	Apr-21	1.00000000
05/01/2022	2,189	115.286356	115.286356	115.286356	Apr-22	1.00000000
05/01/2023	2,554	117.865999	117.865999	117.865999	Apr-23	1.00000000
05/01/2024	2,920	120.235710	120.235710	120.235710	Apr-24	1.00000000
05/01/2025	3,285	122.788430	122.788430	122.788430	Apr-25	1.00000000
05/01/2026	3,650	125.585399	125.585399	125.585399	Apr-26	1.00000000
05/01/2028	4,381	130.933259	130.933259	130.933259	Apr-28	1.00000000
05/01/2031	5,476	141.462523	141.462523	141.462523	Apr-31	1.00000000
05/01/2036	7,303	159.550156	159.550156	159.550156	Apr-36	1.00000000
05/01/2041	9,129	182.297064	182.297064	182.297064	Apr-41	1.00000000
05/01/2046	10,955	210.300241	210.300241	210.300241	Apr-46	1.00000000

» You can manually add dates to the points graph by entering the date in the text field and clicking **Insert**. Highlight a date and click **Remove** to remove it from the points graph.

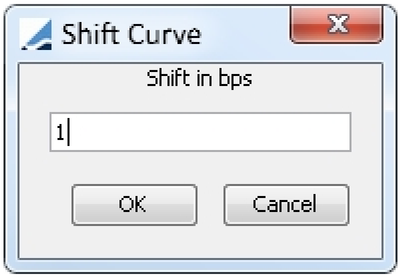
» You can interpolate points for a specific date based on Reference Level or Inflation level. Click **Interpolate** to open the Interpolate window.



Enter the date you want to interpolate and select either Reference Level or Inflation Level from the "Interp. for" list. Results are displayed below.

- Reference Level:Uses the month of inflation (reference date) plus the Index Lag (from the Rate Index Window) to interpolate. Results correspond to those of the same date on the Interpolated Points tab.
- Inflation Level: Uses the actual month of inflation to interpolate.

» To shift points by a specified number of basis points, point to **Utilities > Shift Curve** in the Curve Inflation window menu. The Shift Curve window opens.



Enter the number of basis points and click **OK**. All output forward CPI values on the Points tab and Interpolated Points tab are shifted by the specified number of basis points.

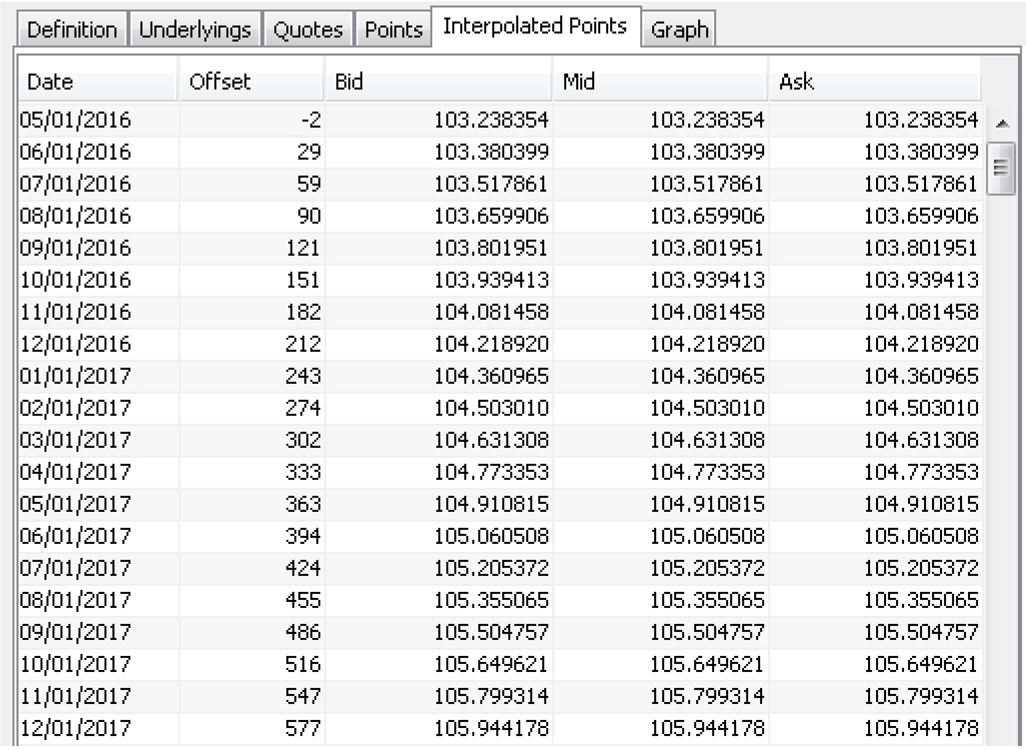
Shifting by 1 bp will match the value displayed for any given inflation trade as PV01_INFLATION.

About Points

- The first point corresponds to the index level on the Base Date.
- For cash points, the index level is the cash quote – Cash quotes are not adjusted with seasonality, they represent custom index levels.
- For swap points, the index level is the base index level adjusted by the swap rate over the period, and adjusted by seasonality if any.
- You can set the index level precision using **Utilities > Set precision**. You will be prompted to enter a number of decimal places. Default is 6. (This also drives decimal precision in the Interpolate window - opened with the Interpolate button - and on the Interpolated Points tab.)

15.2.6 Interpolated Points Panel

In contrast to the Points tab - which shows points generated from the actual curve underlyings - the Interpolated Points tab provides a quick view of interpolated points that fall between those generated by the underlyings. Interpolated points are based on the Publication Frequency of the Inflation Rate Index. Interpolated points are available once the points grid has been generated from the Points tab.

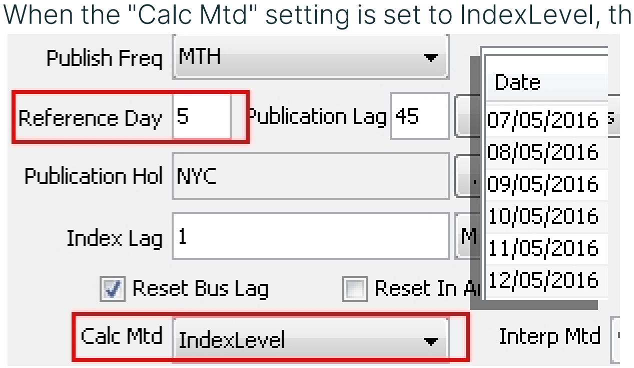


Date	Offset	Bid	Mid	Ask
05/01/2016	-2	103.238354	103.238354	103.238354
06/01/2016	29	103.380399	103.380399	103.380399
07/01/2016	59	103.517861	103.517861	103.517861
08/01/2016	90	103.659906	103.659906	103.659906
09/01/2016	121	103.801951	103.801951	103.801951
10/01/2016	151	103.939413	103.939413	103.939413
11/01/2016	182	104.081458	104.081458	104.081458
12/01/2016	212	104.218920	104.218920	104.218920
01/01/2017	243	104.360965	104.360965	104.360965
02/01/2017	274	104.503010	104.503010	104.503010
03/01/2017	302	104.631308	104.631308	104.631308
04/01/2017	333	104.773353	104.773353	104.773353
05/01/2017	363	104.910815	104.910815	104.910815
06/01/2017	394	105.060508	105.060508	105.060508
07/01/2017	424	105.205372	105.205372	105.205372
08/01/2017	455	105.355065	105.355065	105.355065
09/01/2017	486	105.504757	105.504757	105.504757
10/01/2017	516	105.649621	105.649621	105.649621
11/01/2017	547	105.799314	105.799314	105.799314
12/01/2017	577	105.944178	105.944178	105.944178

Fixing the Day in Anchor Dates

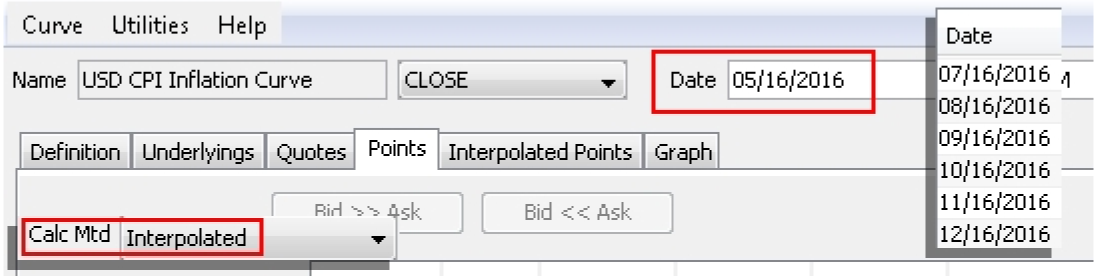
Setting the day for the "anchor" dates in the Date column is done in either of two ways in the Rate Index Window. See "Inflation Index Example" on page 112 above for details on settings mentioned here.

1. When the "Calc Mtd" setting is set to IndexLevel, the Points tab uses the "Reference Day" setting to fix the day.



2. When the "Calc Mtd" setting is set to Interpolated, the Points tab uses the day of the Curve Window Date to fix the

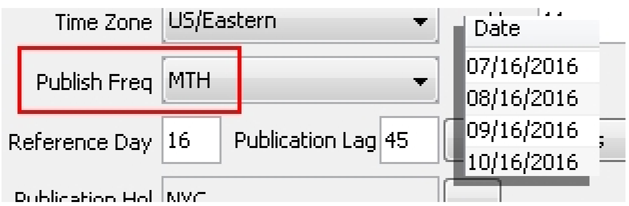
day.



NOTE: When "Calc Mtd" is set to Interpolated, it also fixes the day for dates on the Points tab. When "Calc Mtd" is set to IndexLevel, on the other hand, the day is fixed only in dates on the Interpolated Points tab.

Fixing the Interval for Anchor Dates

To set the interval between interpolated points, make settings for "Publish Freq" in the Rate Index Window. The recommended setting is "MTH." However, "QTR" is also acceptable.



Sample of interpolated points at monthly intervals

15.2.7 Save Curve

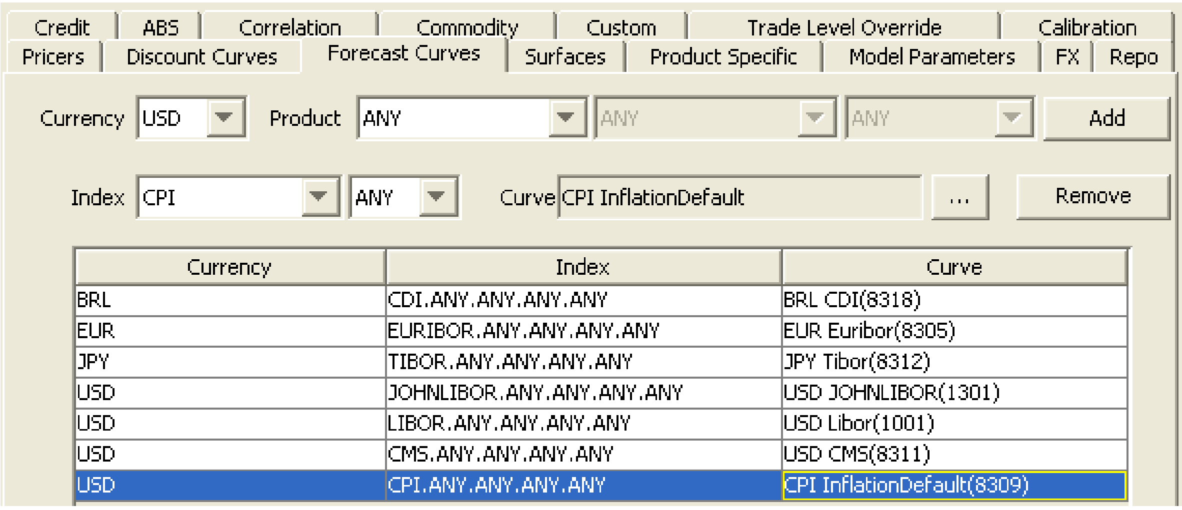
Click **Save** in the bottom of the curve window. Enter a name for the curve, and click **OK**.

15.3 Pricer Configuration

Inflation curves can be used for swaps and bonds.

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

Load a pricer configuration and select the Forecast panel.



- Select the currency, product or ANY, extended type or ANY, subtype or ANY.
- Select the index, tenor or ANY.
- Click **...** to select an inflation curve.
- Then click **Add**.
- Click **Save** to save the changes.

16. Repo Curve

From the Calypso Navigator, navigate to **Market Data > Interest Rate Curves > Repo Curve** (menu action `marketdata.CurveRepoWindow`).

Repo curves are used for computing the price of bond trades that settle after the valuation date. Repo curves are also used to compute the forward price of the cheapest-to-deliver bonds, when trading bond futures.

A repo curve can be a zero curve (see **Market Data > Interest Rate Curves > Zero Curve**) or a repo curve designed as basis points spread over the discount curve.

This topic describes creating the repo curve using the Repo Curve window.

[NOTE: If you want to compute the price of bond trades using today's quotes, regardless of their settlement date, set the pricing parameter IGNORE_FORWARD_PRICE to true]

Repo Curve Quick Reference

Configuration Requirements

- Bond Product – The bond should be defined in the system. From the Calypso Navigator, navigate to **Configuration > Fixed Income > Bond Product Definition**.
- Discount Curve – Should be set up and assigned in the pricer configuration. From the Calypso Navigator, navigate to **Configuration > Interest Rate Curves > Zero Yield Curve**. Assign it in the Discount Curves panel in the pricer configuration.

Curve Generation

1. Click **New** to start a new curve.

2. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

3. Definition Panel — Select the following to define the curve: currency, bond, holiday calendar, interpolator, Pricing Env.

4. Offsets Panel — Select the tenors or dates.

5. Points Panel — Click **Generate** to generate the points. Enter the spreads.

6. Click **Save**, enter a name for the curve, and click **OK**.

Pricer Configuration

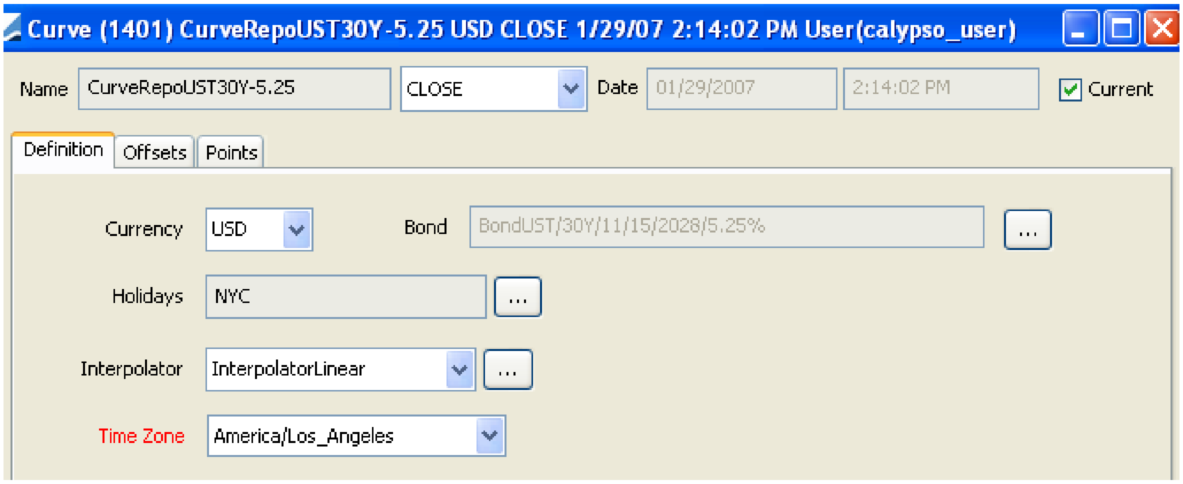
You can associate a repo curve with a pricing environment under the Repo panel of the pricer configuration for the curve type CurveRepo. From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

16.1 Creating a Repo Curve

Click **New** to start a new curve.

16.1.1 Definition Panel

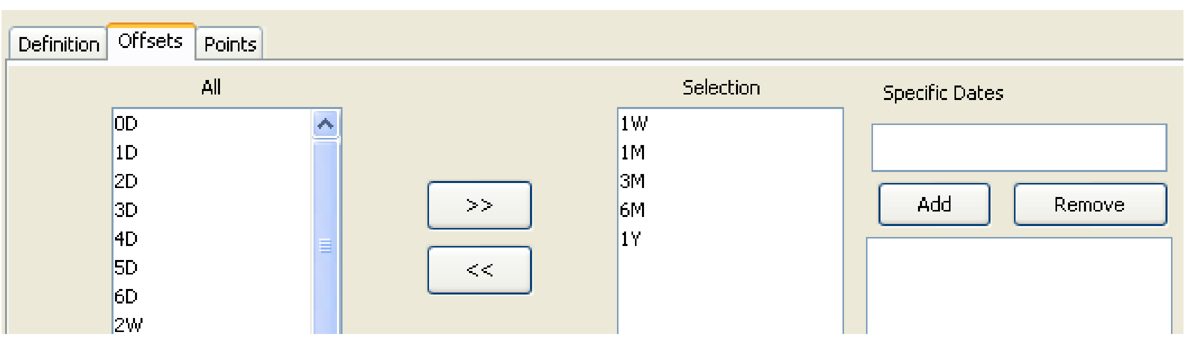
Select the following to define the curve: currency, bond, holiday calendar, interpolator, Pricing Env.



» Click **...** to select the underlying bond.

16.1.2 Offsets Panel

Click the Offsets tab. Select the tenors or dates.



» Select the offsets in the left panel, and click **>>** to add them to the Selection panel.

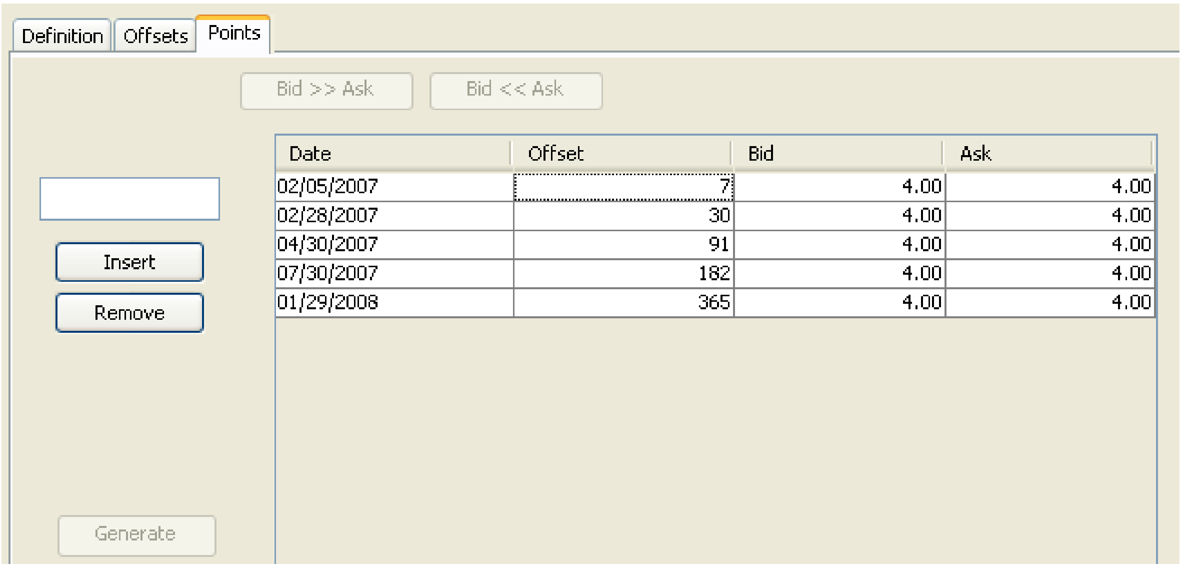
» Specific Tenors — You can add specific tenors to the list. Enter the number, select the type of tenor, and click **Add Specific Tenor**.

» Specific Dates — Alternatively, you can enter specific dates for the offsets and click **Add** to list them in the panel below.

16.1.3 Points Panel

Click the Points tab.

Click **Generate** to generate the curve points, and enter the spreads in basis points.



16.1.4 Save Curve

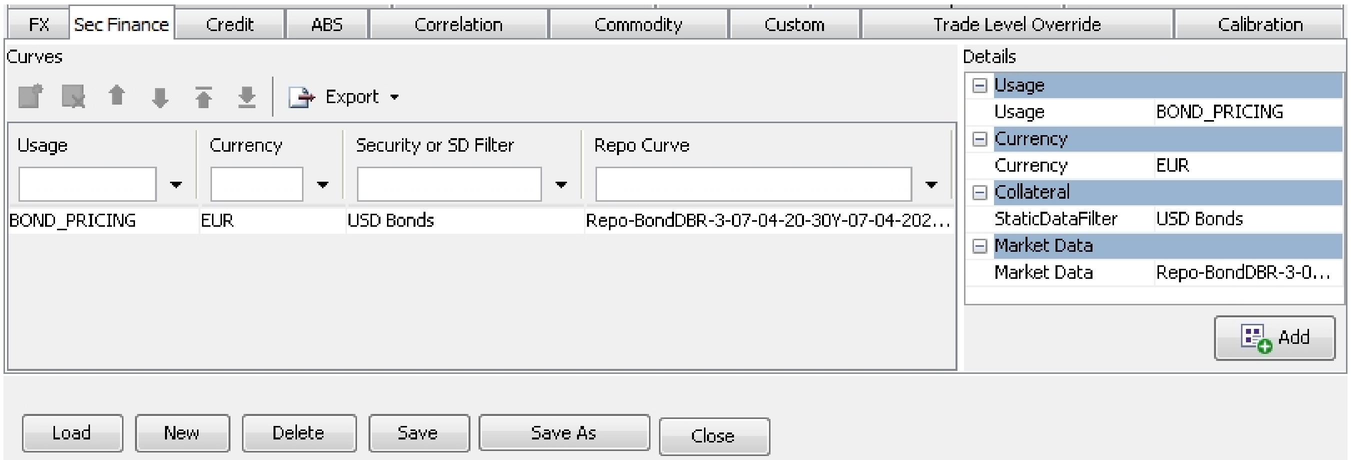
Click **Save** in the bottom of the curve window. Enter a name for the curve, and click **OK**.

16.2 Pricer Configuration

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

Click **Load**, select the pricer configuration name, and click **OK**.

Click the Sec Finance tab.



» Click .

» Select values in the Details area.

– Select the BOND_PRICING usage for pricing bonds with repo curves.

CLOSING_TRADE is not used.

COLLATERAL_GC, COLLATERAL_SP, SL_COLLATERAL_GC and SL_COLLATERAL_SP are only used for the repo / sec lending curve allocation process.

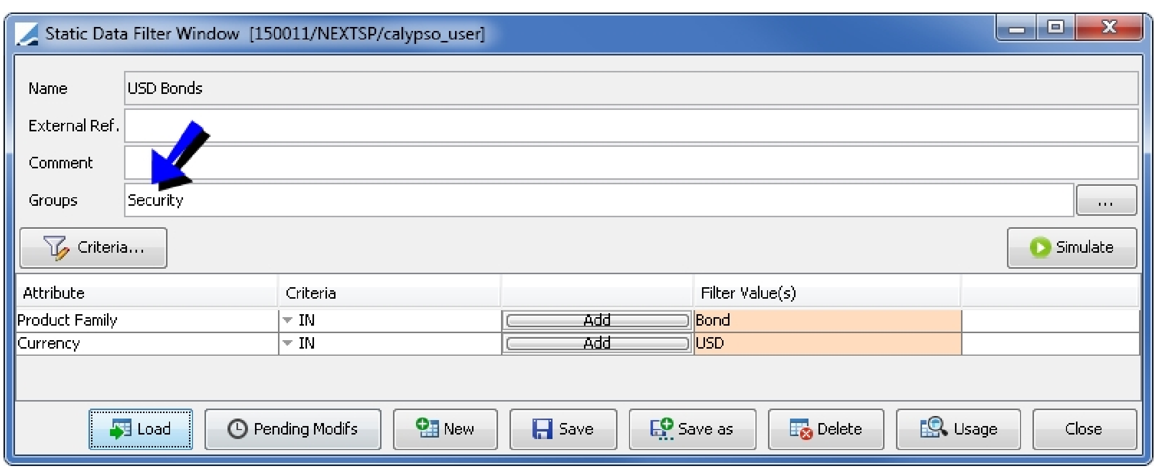
▶ Please refer to Calypso Repo Trading / Calypso Security Lending Trading documentation for details on the repo / sec lending curve allocation process.

SWEEP is only used for the security finance sweeping process.

▶ Please refer to Calypso Repo Trading / Calypso Security Lending Trading documentation for details on the security finance sweeping process.

– Select a currency.

– Select a static data filter. Only static data filters with the "Security" group are available for selection.



– Select a repo curve.

- Click **Add** to add the curve to the list.
- Use ⬆ ⬇ ⤒ ⤓ to order the curves as needed. The system will follow this order and pick up the first applicable curve.
- Click **Save** to save the pricer configuration.

17. Bond Spread Curve

Add a menu item for action `marketdata.CurveBondSpreadWindow`.

Bond spread curves can be used to build a risky curve generated from generic spread curve underlyings over a risk-free/benchmark curve. The curve can be mapped by Rating/Sector to provide risky discount factors for bond pricing.

This topic describes creating the bond spread curve using the Bond Spread Curve window.

Bond Spread Curve Quick Reference

Base Curves

- A base curve is required, for example, a bond benchmark curve.

Curve Underlying Instruments

You can use bond curve underlying instruments in building bond spread curves.

To define underlying instruments, navigate to **Configuration > Market Data > Curve Underlyings** from the Calypso Navigator, or click **New/Edit Underlying** in the Underlying panel of the Bond Spread Curve window.

Curve Generation

1. Click **New** to start a new curve.

2. Select the curve instance.

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

4. Definition Panel — Select the following to define the curve: currency, rating, country, sector, holiday calendar, “Generate from instruments” should be checked, interpolator, generation algorithm set to "BondSpread", Pricing Env, Base Curve.

5. Underlying Panel — Select the underlying instruments.

6. Quotes Panel — Enter / load quotes and calibrate the spreads.

7. Points Panel — Click **Generate** to generate the points.

8. Click **Save**, and enter a curve name.

Pricer Configuration

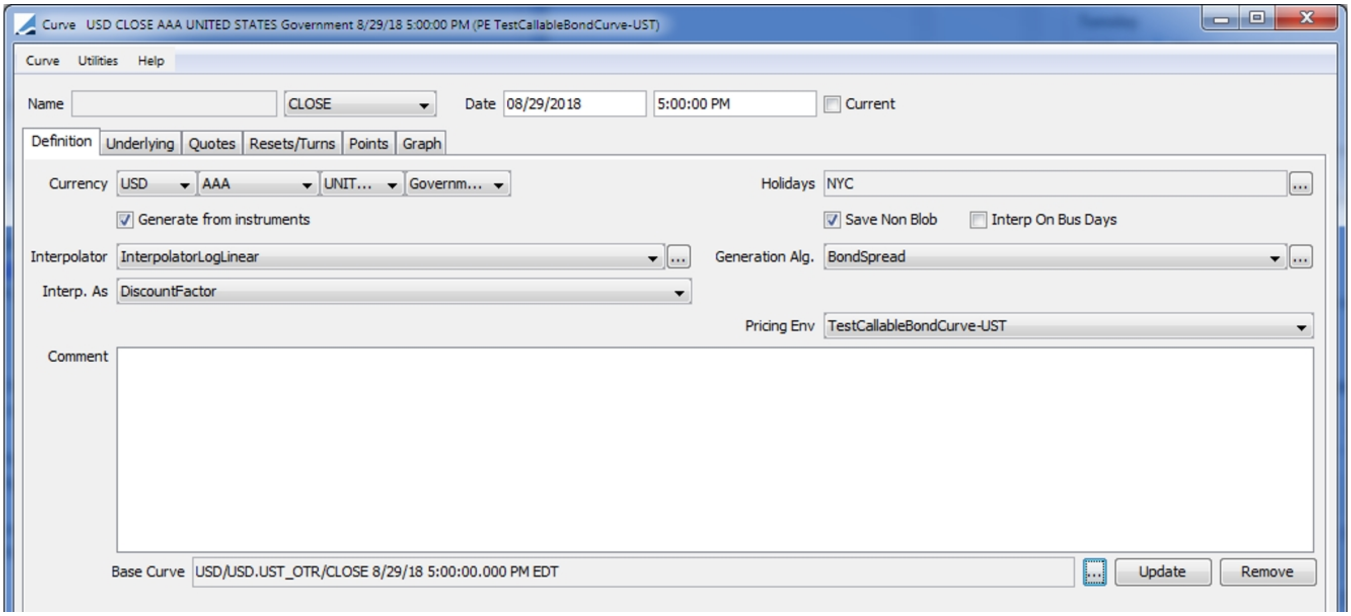
A bond spread curve is associated with a pricing environment under the Credit panel of the pricer configuration.

17.1 Creating a Bond Spread Curve

Click **New** to start a new curve.

17.1.1 Definition Panel

Select the following to define the curve: currency, rating, country, sector, holiday calendar, “Generate from instruments” should be checked, interpolator, generation algorithm set to "BondSpread", Pricing Env, Base Curve.

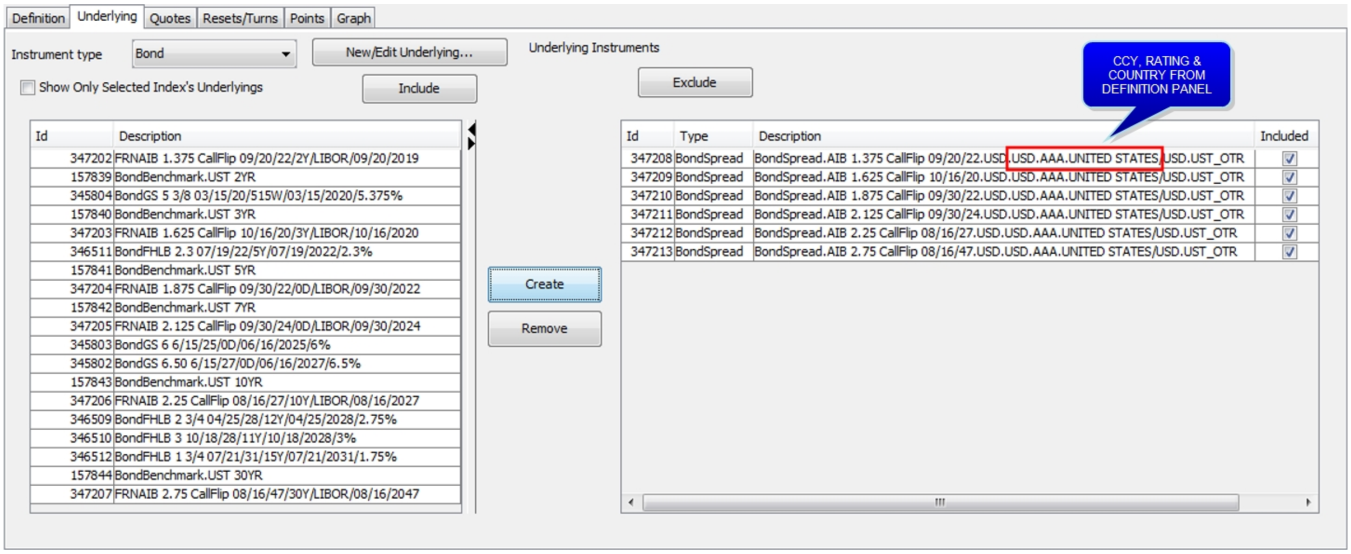


» Click ... next to the "Generation Alg." field and add "BondSpread" to the *CurveBondSpread.gen* domain value.

A base curve is required to build the bond spread curve. This curve will supply the base zero rates to which the spread values will be applied for calculating the all-in zero rates on the bond spread curve. This curve is also the discount curve used in the pricing process to calibrate the spread inputs.

17.1.2 Underlying Panel

Click the Underlying tab, and select the underlying instruments.



» Select "Bond" as the instrument type to display the list of available instruments. If none appear, you can click **New/Edit Underlying** to create new instruments.

» Select instruments from the list of available instruments on the left-hand side, and click **Create**. Underlyings of type "BondSpread" are created with the currency, rating, and country details from the Definition panel appended. They are added to the list of selected instruments on the right-hand side.

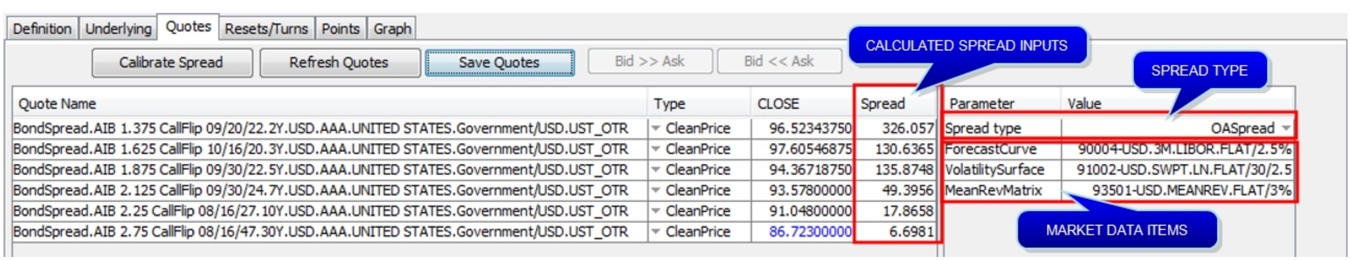
You can exclude instruments from the curve generation if they are no longer needed.

You can set a priority when multiple instruments have the same maturity date. The lowest priority is 0.

17.1.3 Quotes Panel

Click the Quotes tab.

Bond spread quotes may not be market observable. These spread quotes can be generated/calibrated on demand from the curve window and you can choose the spread type to calculate.



» You can click **Refresh Quotes** to load the quotes from the pricing environment selected in the Definition panel. If your market data server is running, quotes will be updated in real-time.

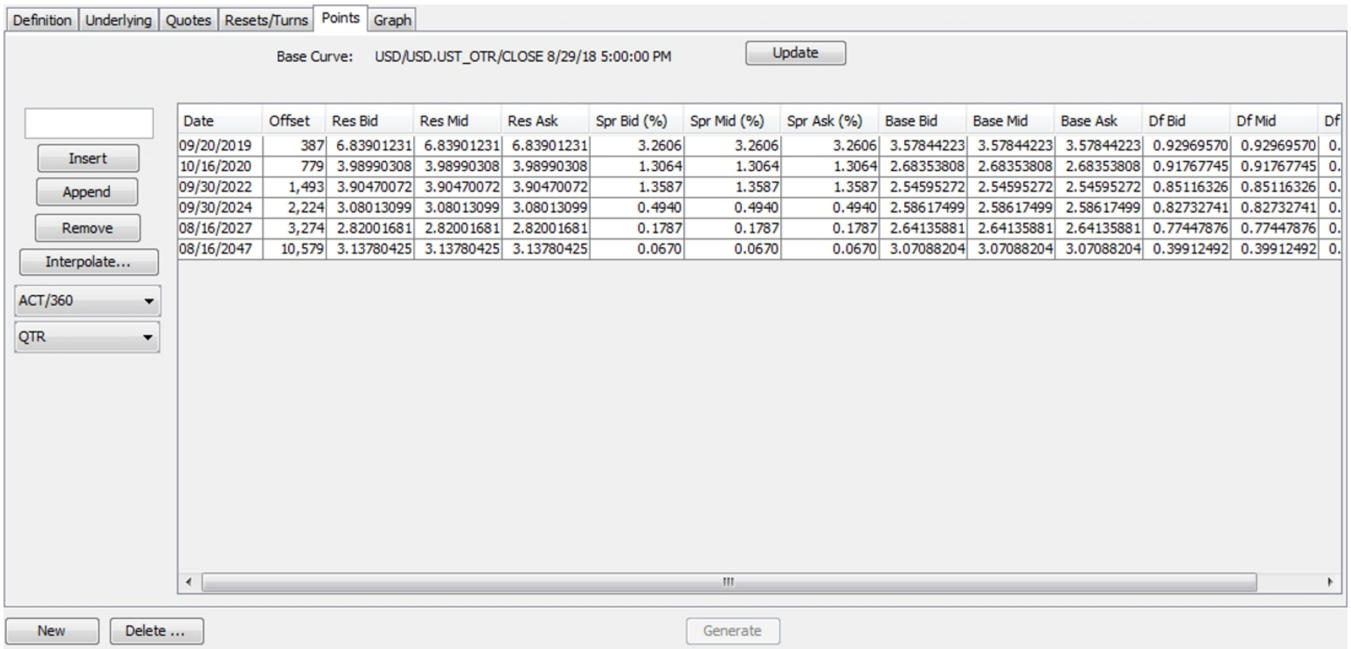
» You can also enter the quotes manually, and save them to the pricing environment.

» Select the spread type to be calibrated. The required market data will be picked up from the pricing environment. You can also manually select these market data items.

» Click **Calibrate Spread** to calculate the spread inputs.

17.1.4 Points Panel

Click the Points tab.



Date	Offset	Res Bid	Res Mid	Res Ask	Spr Bid (%)	Spr Mid (%)	Spr Ask (%)	Base Bid	Base Mid	Base Ask	Df Bid	Df Mid	Df
09/20/2019	387	6.83901231	6.83901231	6.83901231	3.2606	3.2606	3.2606	3.57844223	3.57844223	3.57844223	0.92969570	0.92969570	0.
10/16/2020	779	3.98990308	3.98990308	3.98990308	1.3064	1.3064	1.3064	2.68353808	2.68353808	2.68353808	0.91767745	0.91767745	0.
09/30/2022	1,493	3.90470072	3.90470072	3.90470072	1.3587	1.3587	1.3587	2.54595272	2.54595272	2.54595272	0.85116326	0.85116326	0.
09/30/2024	2,224	3.08013099	3.08013099	3.08013099	0.4940	0.4940	0.4940	2.58617499	2.58617499	2.58617499	0.82732741	0.82732741	0.
08/16/2027	3,274	2.82001681	2.82001681	2.82001681	0.1787	0.1787	0.1787	2.64135881	2.64135881	2.64135881	0.77447876	0.77447876	0.
08/16/2047	10,579	3.13780425	3.13780425	3.13780425	0.0670	0.0670	0.0670	3.07088204	3.07088204	3.07088204	0.39912492	0.39912492	0.

» Click **Generate** to generate the curve points.

17.1.5 Save Curve

Click **Save** in the bottom of the curve window. Enter a name for the curve, and click **OK**.

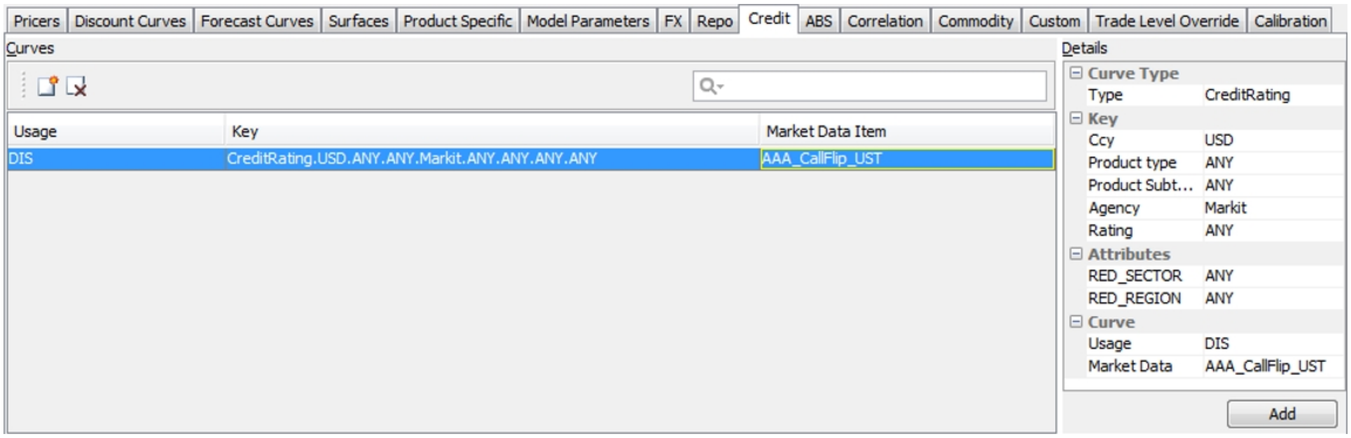
17.2 Pricer Configuration

The Pricer Configuration mapping is similar to associating a risky curve or other credit market data to bonds by CreditRating.

Add "CurveBondSpread" to the domain value creditMktDataUsage.RISKY_DIS.

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**, and click **Load** to select a pricer configuration name.

Select the Credit panel.



» Click to add market data.

» In the Details area, select the curve type "CreditRating", then select the credit rating criteria: currency, product type, product subtype or ANY, rating agency, and rating value or ANY.

» Select the usage, and select a bond spread curve from the Market Data field.

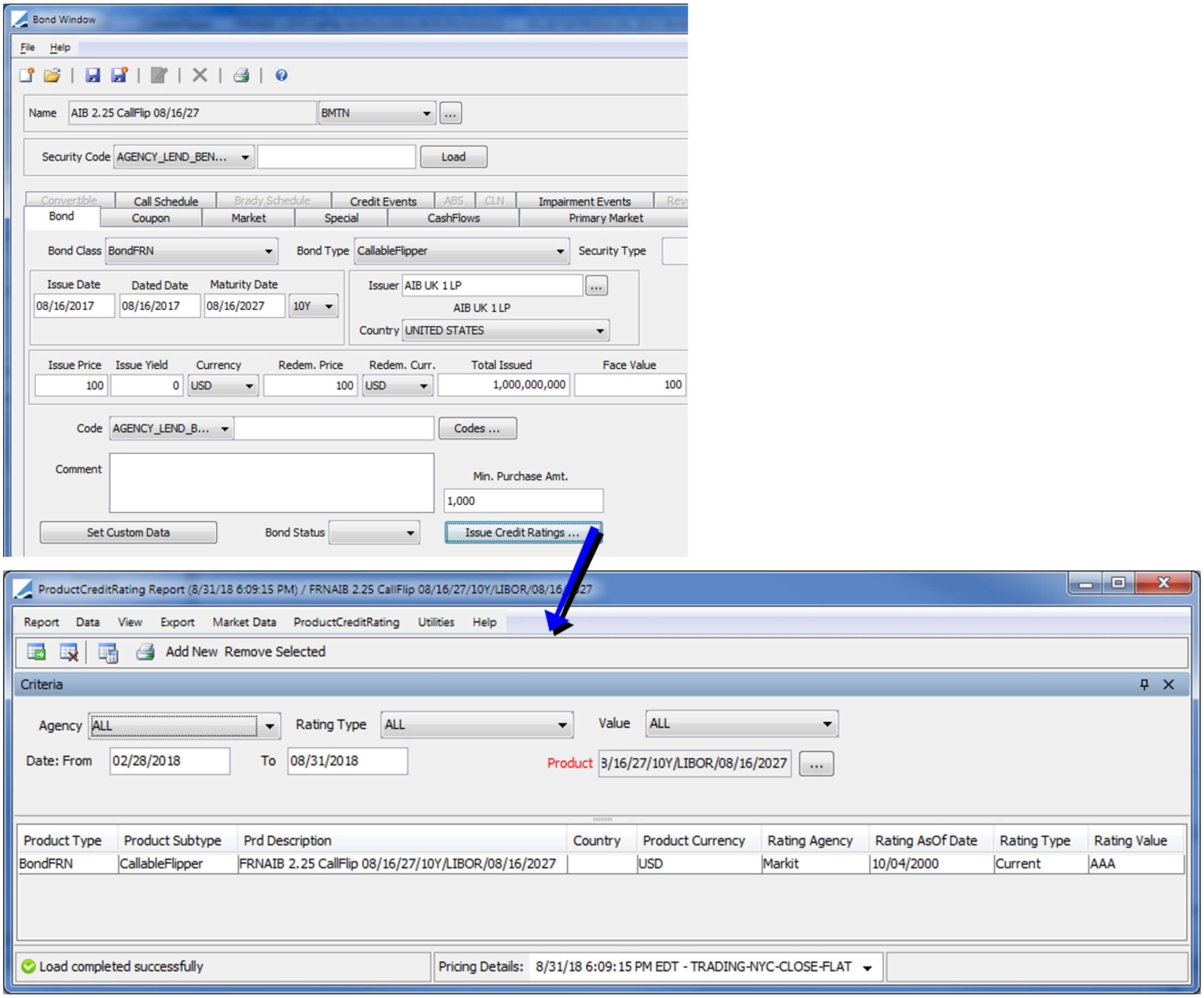
  – If the CurveBondSpread market data type is not available, add it to the *marketDataType* domain value.

  – Most bond pricers will automatically pick up risky curves mapped via the Usage “RISKY_DIS”. For callable bonds using PricerLGMM1FSali, the curve should be mapped via Usage “DIS”.

» Then click **Add**.

» Click **Save** to save the changes.

The rates map to **Issue Credit Ratings** on the bond product definition.


Bond Window
File Help
Name AIB 2.25 CallFlip 08/16/27 BMTN
Security Code AGENCY_LEND_BEN... Load
Convertible Call Schedule Brady Schedule Credit Events ABS CLN Impairment Events
Bond Coupon Market Special CashFlows Primary Market
Bond Class BondFRN Bond Type CallableFlipper Security Type
Issue Date Dated Date Maturity Date
08/16/2017 08/16/2017 08/16/2027 10Y
Issuer AIB UK 1 LP
AIB UK 1 LP
Country UNITED STATES
Issue Price Issue Yield Currency Redem. Price Redem. Curr. Total Issued Face Value
100 0 USD 100 USD 1,000,000,000 100
Code AGENCY_LEND_B... Codes ...
Comment
Min. Purchase Amt.
1,000
Set Custom Data Bond Status Issue Credit Ratings ...
ProductCreditRating Report (8/31/18 6:09:15 PM) / FRNAIB 2.25 CallFlip 08/16/27/10Y/LIBOR/08/16/2027
Report Data View Export Market Data ProductCreditRating Utilities Help
Add New Remove Selected
Criteria
Agency ALL Rating Type ALL Value ALL
Date: From 02/28/2018 To 08/31/2018 Product 3/16/27/10Y/LIBOR/08/16/2027 ...
Product Type Product Subtype Prd Description Country Product Currency Rating Agency Rating AsOf Date Rating Type Rating Value
BondFRN CallableFlipper FRNAIB 2.25 CallFlip 08/16/27/10Y/LIBOR/08/16/2027 USD Markit 10/04/2000 Current AAA
Load completed successfully
Pricing Details: 8/31/18 6:09:15 PM EDT - TRADING-NYC-CLOSE-FLAT

18. Seasonality Curve

From the Calypso Navigator, navigate to **Market Data > Interest Rate Curves > Seasonality Curve** (menu action `marketdata.CurveSeasonalityWindow`).

This topic describes creating seasonality curves to apply seasonal adjustments to inflation curves.

You can only create a simple seasonal curve from offset points.

There is no need to associate the seasonality curve with the pricer configuration.

Seasonality Curve Quick Reference

The seasonality curve is created for a given inflation index – Inflation indices are created using **Configuration > Interest Rates > Rate Index Definitions** from the Calypso Navigator. The index type is Inflation and in the attributes, the attribute IndexCalculator is set to InflationIndexKerkhof.

Curve Generation

1. Click **New** to start a new curve.

2. Select the quote instance to use in the curve generation (CLOSE, LAST, or OPEN). If you select the LAST instance, you can use real-time quotes in the curve. Select a real-time source and the RT checkbox at the bottom of the curve application.

3. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

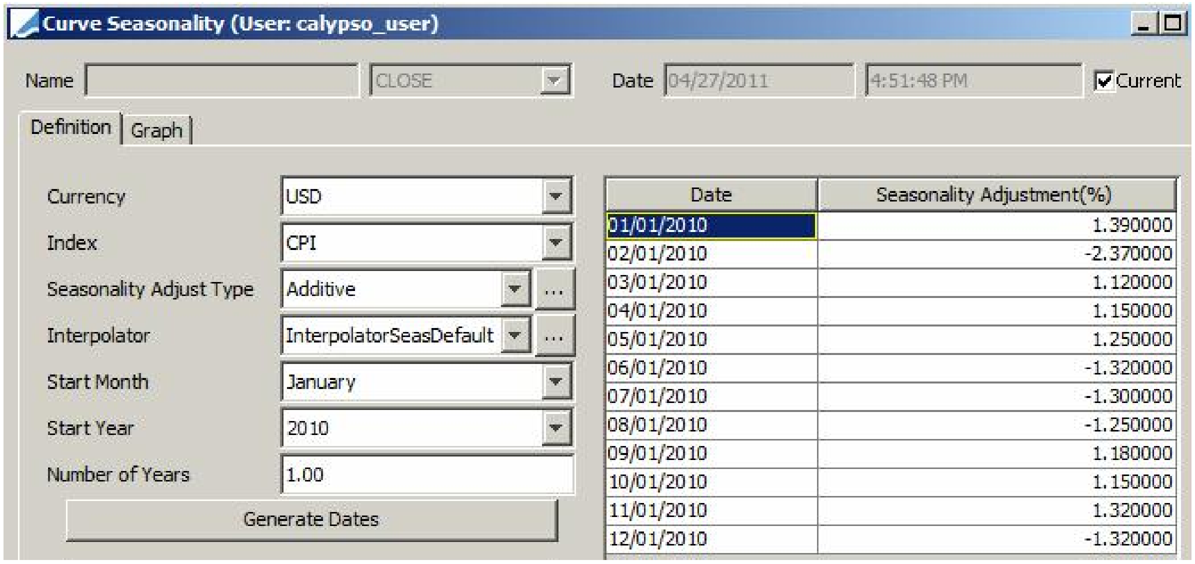
4. Definition Panel — Select the following to define the curve: currency, index, seasonality adjustment type, interpolator, start month, start year, and number of years.

5. Click **Generate Dates** to generate the points, and enter the seasonal adjustments in %.

6. Click **Save**, enter a name for the curve, and click **OK**.

18.1 Creating a Seasonality Curve

18.1.1 Definition Panel



- Select a currency and a rate index.
- Select the seasonality adjustment type: Only Additive is supported.

  Additive – The seasonality adjustments will be added to the index levels of the inflation curve - The sum of all seasonality adjustments over one year should be equal to "0".
- Select the interpolator as needed, “NONE” or “InterpolatorSeasDefault”. The interpolator InterpolatorSeasDefault uses the most recent 12 months of values to re-use for all future dates. So, last value for January is used for all January dates in the future.
- Select a Start Month, a Start Year, and enter a number of years. Then click **Generate Dates** to generate seasonality adjustments dates.
- Enter the seasonality adjustment percentages for each date.

Graph Panel

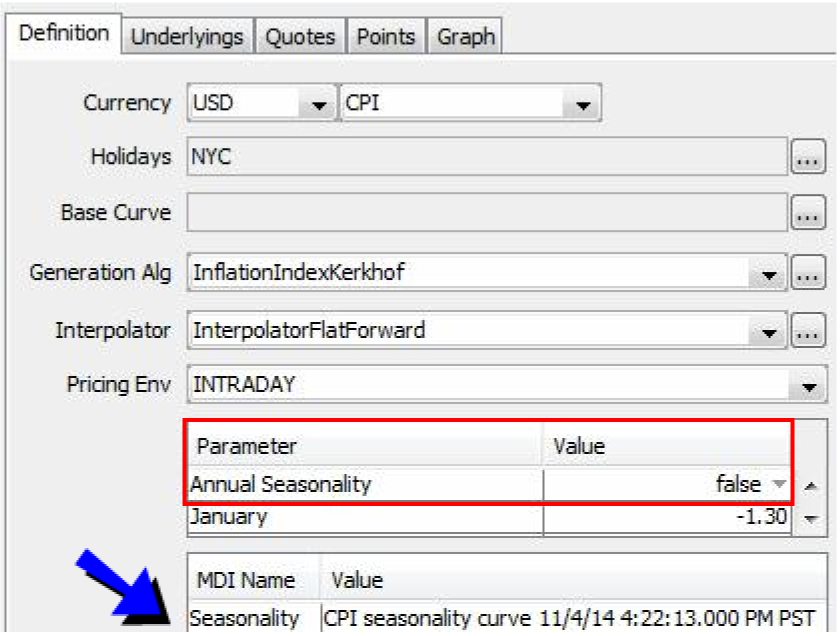
You can view a bar chart in the Graph panel.

18.1.2 Save Curve

Click **Save** at the bottom of the curve window. Enter a name for the curve, and click **OK**.

18.2 Sample Seasonality Curve Usage

A seasonality curve can be associated with an inflation curve if the parameter "Annual Seasonality" is false.


Definition
Underlyings
Quotes
Points
Graph
Currency
USD
CPI
Holidays
NYC
Base Curve
Generation Alg
InflationIndexKerkhof
Interpolator
InterpolatorFlatForward
Pricing Env
INTRADAY
Parameter
Value
Annual Seasonality
false
January
-1.30
MDI Name
Value
Seasonality
CPI seasonality curve 11/4/14 4:22:13.000 PM PST

19. Par Yield Curve

The Par Yield Curve window allows defining the following types of curves:

- Benchmark yield curves
- Yield spread curves
- Pricer configuration

They can be used to price bonds (the convention is to price bonds at a spread to a yield to maturity along a benchmark yield curve that is constructed from some underlying bonds).

From the Calypso Navigator, navigate to **Market Data > Interest Rate Curves > Par Yield Curve** (menu action `marketdata.CurveYieldWindow`).

19.1 Defining a Benchmark Yield Curve

Benchmark Yield Curve Quick Reference

Curve Generation

1. Click **New** to start a new curve.

2. Definition Panel — Select the following to define the curve: currency, Curve Type set to "Benchmark Yield Curve", "Generate from Inst" checked, generator set to "Yield", interpolator, daycount.

3. Underlying panel — Select underlying bonds or benchmarks.

4. Quotes panel — Enter quotes and click **Generate**.

5. Graphs Panel — View the curve in graphical format.

6. Click **Save**, enter a name for the curve, and click **OK**.

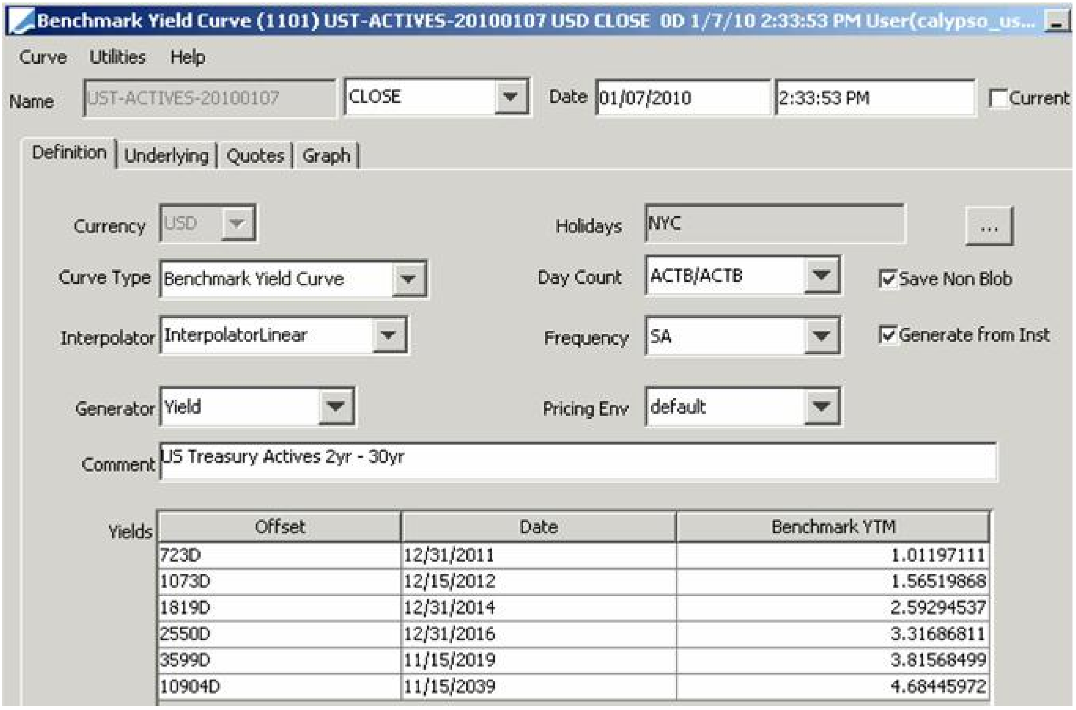
Pricer Configuration

Assign the benchmark yield curve in the Credit panel of the pricer configuration for curve type "CreditRating" and usage "YIELD".

19.1.1 Definition Panel

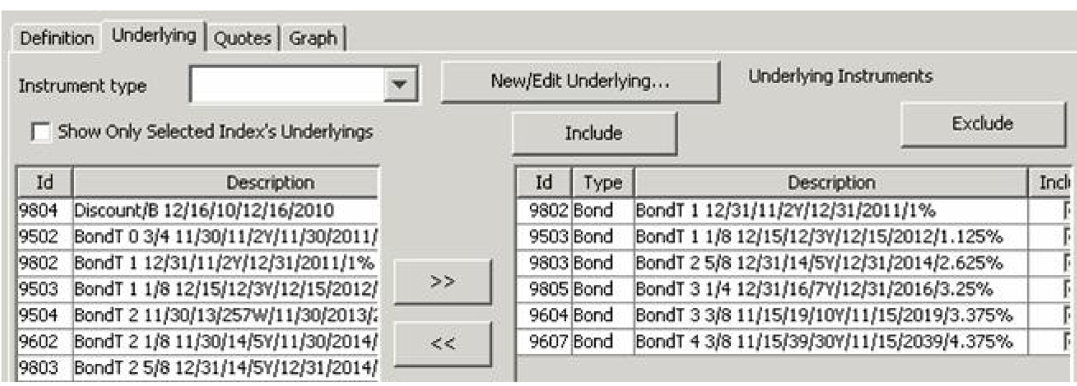
Click **New** to start a new curve.

Select the following to define the curve: currency, Curve Type set to "Benchmark Yield Curve", "Generate from Inst" checked, generator set to "Yield", interpolator, daycount.



» The yields are computed when the curve is generated. Select the Underlying panel to choose underlying bonds, bond benchmarks, or bond benchmark indices.

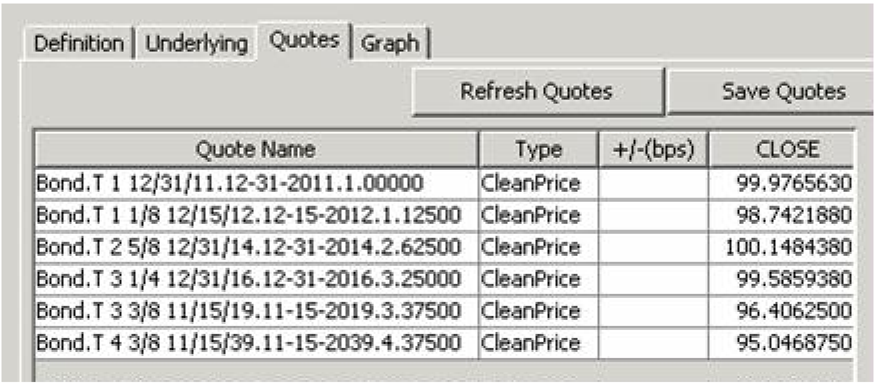
19.1.2 Underlying Panel



» Select the underlying bonds, benchmarks, or benchmark indices.

▶ See Bond Curve Underlying for details.

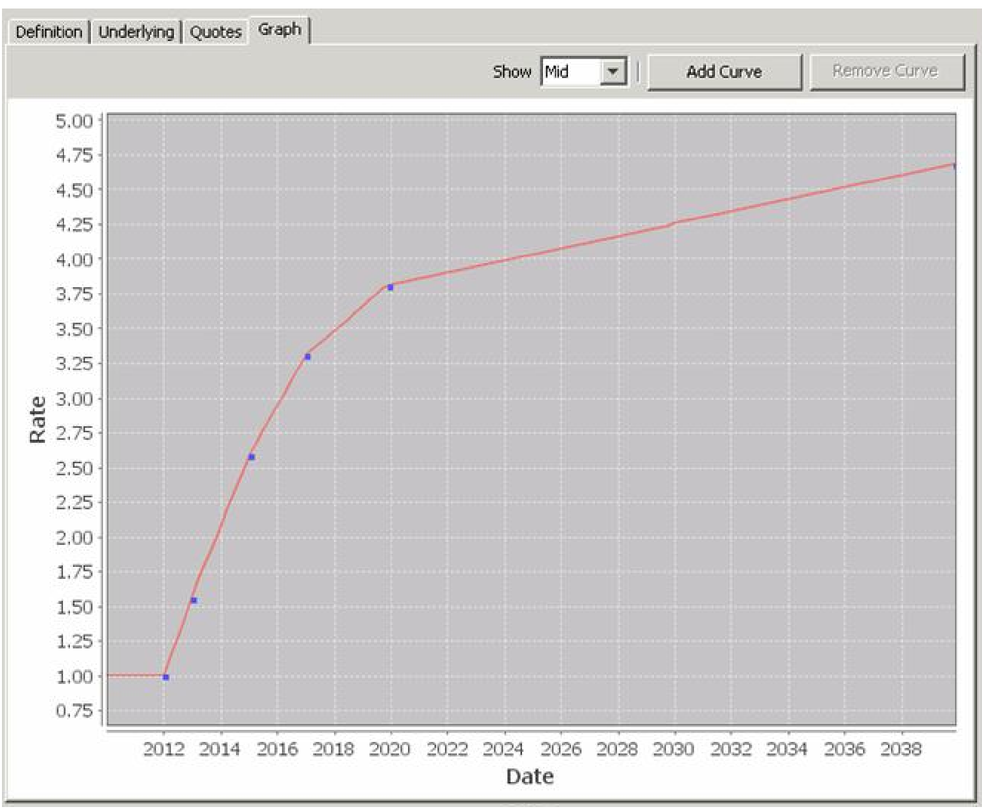
19.1.3 Quotes Panel



» Enter the quotes, and click **Generate**. You can view the curve in the Graph panel.

» For bond benchmark indices, the yields can be directly retrieved from Bloomberg.

19.1.4 Graph Panel



19.1.5 Save Curve

Click **Save** at the bottom of the curve window. Enter a name for the curve, and click **OK**.

When you have the Current checkbox selected in the curve window, the system time stamps the curve with the current date and time.

19.2 Defining a Yield Spread Curve

Yield Spread Curve Quick Reference

Curve Generation

1. Click **New** to start a new curve.

2. Definition Panel — Select the following to define the curve: currency, Curve Type set to “Yield Spread Curve”, interpolator, daycount.

The Base Curve should be a Benchmark Yield Curve: It will set the offsets and benchmark YTM.

Enter the spreads in basis points.

The curve is generated on-the-fly.

3. Graphs Panel — View the curve in graphical format.

4. Click **Save**, enter a name for the curve, and click **OK**.

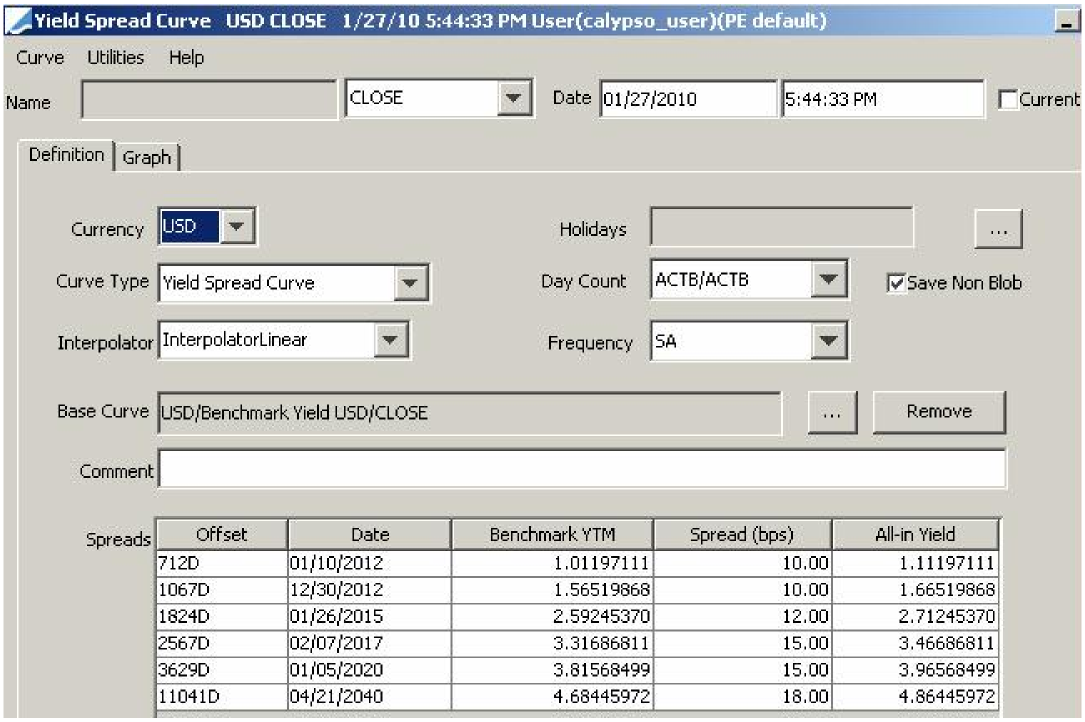
Pricer Configuration

Assign the yield spread curve in the Credit panel of the pricer configuration for curve type "CreditRating" and usage "YIELD".

19.2.1 Definition Panel

Click **New** to start a new curve.

Select the following to define the curve: currency, Curve Type set to “Yield Spread Curve”, interpolator, daycount.

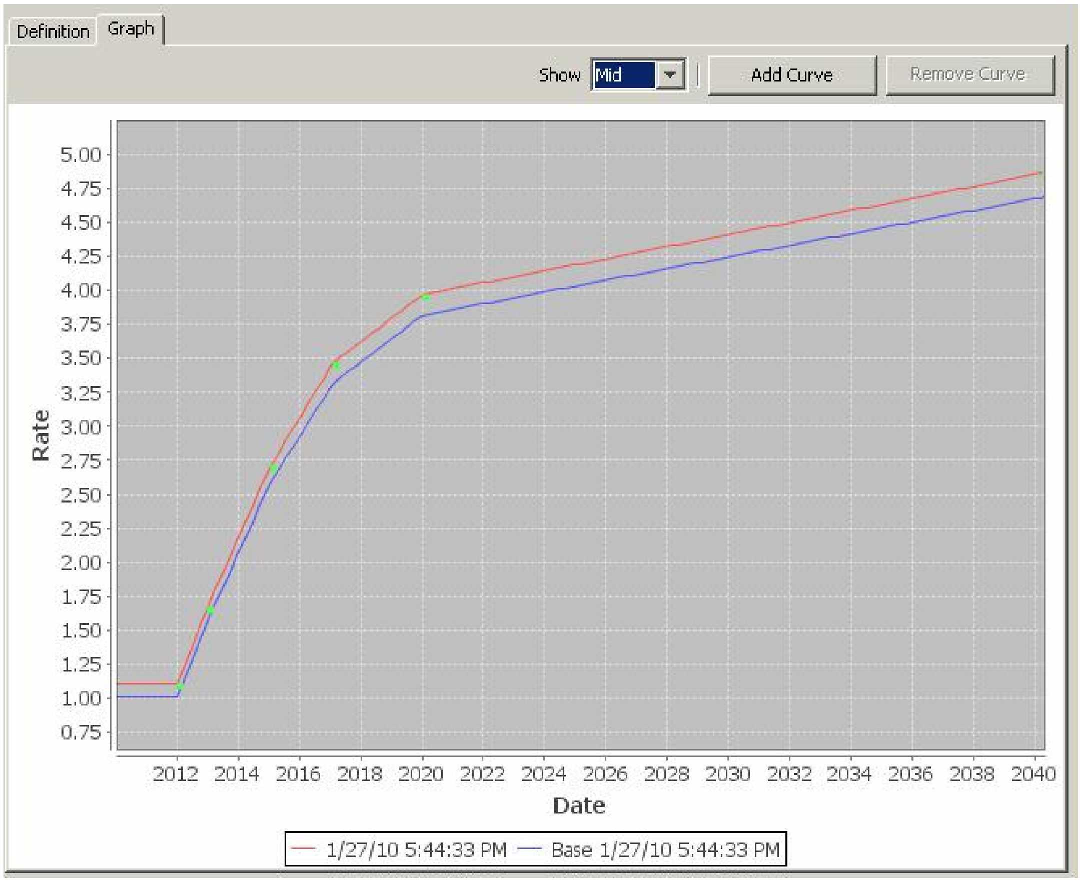


» Select a Benchmark Yield Curve as the base curve - It sets the offsets and benchmark YTM.

» Enter the spreads in basis points - The curve is generated on-the-fly.

» Select the Graph Panel to view the curve.

19.2.2 Graph Panel



19.2.3 Save Curve

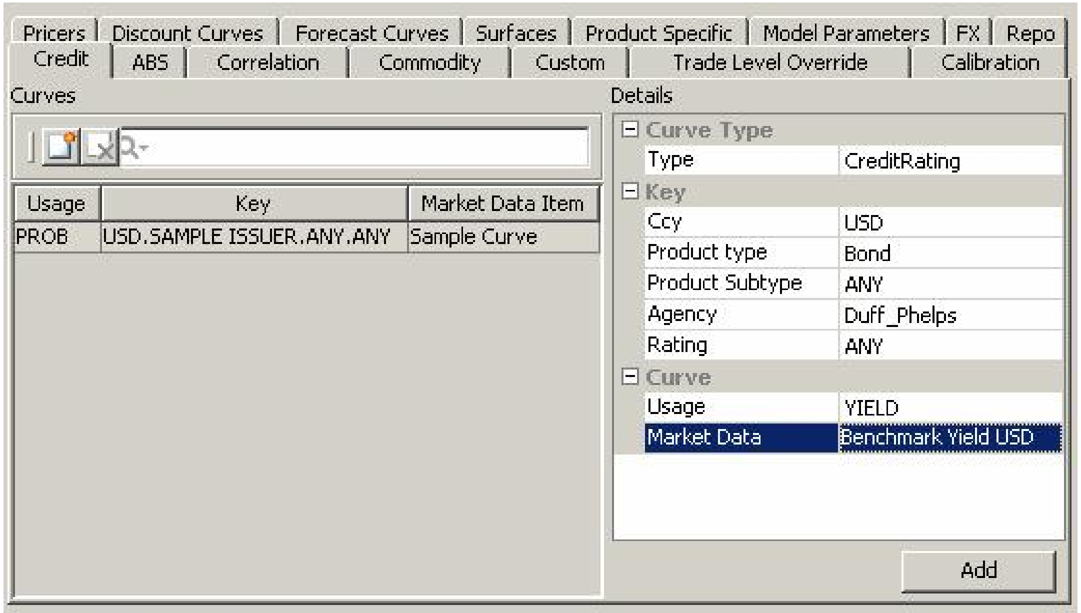
Click **Save** at the bottom of the curve window. Enter a name for the curve, and click **OK**.

When you have the Current checkbox selected in the curve window, the system time stamps the curve with the current date and time.

19.3 Pricer Configuration

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**.

Load a pricer configuration and select the Credit panel.



- Click to add market data.
- In the Details area, select the curve type "CreditRating", then select the credit rating criteria: currency, product type, product subtype or ANY, rating agency, and rating value or ANY.
- Select the usage YIELD, and select a par yield curve from the Market Data field.
- Then click **Add**.
- Click **Save** to save the changes.

20. Zero Curve

Zero curves can be created from offset points, derived from underlying instruments, or derived from underlying instruments with convexity adjustment to futures.

- Zero curve from offset points
- Zero curve from underlying instruments
- Blended zero curve
- Zero curve with convexity adjustments
- Agency option adjusted spread curve
- Pricer configuration

From the Calypso Navigator, navigate to **Market Data > Interest Rate Curves > Zero Yield Curve** (menu action `marketdata.CurveZeroWindow`).

20.1 General Curve Information

- The name of the curve is set upon saving. It will identify the curve throughout the system.
- The instance of the curve dictates the quote side of the underlying instruments to be used for generating the curve.
  - The CLOSE instance uses CLOSE quotes.
  - The LAST instance uses BID, MID, and ASK quotes.
  - The OPEN instance uses OPEN quotes.
- By default, the curve is saved as of the current date and time. You can clear the Current checkbox and change the curve date and time as needed.
- You can change the precision of the discount factors using **Utilities > Set Df Precision** - Default is 8.

Curve Update

You can use the scheduled task PROP_RATE_1BUSDAY to roll the quotes which are not liquid.

You can use the scheduled task GENERATE_CURVE to regenerate a curve as of the current valuation date.

Setup Information

The environment property INT_CURVE_INTERP_RATE_B impacts the zero curve.

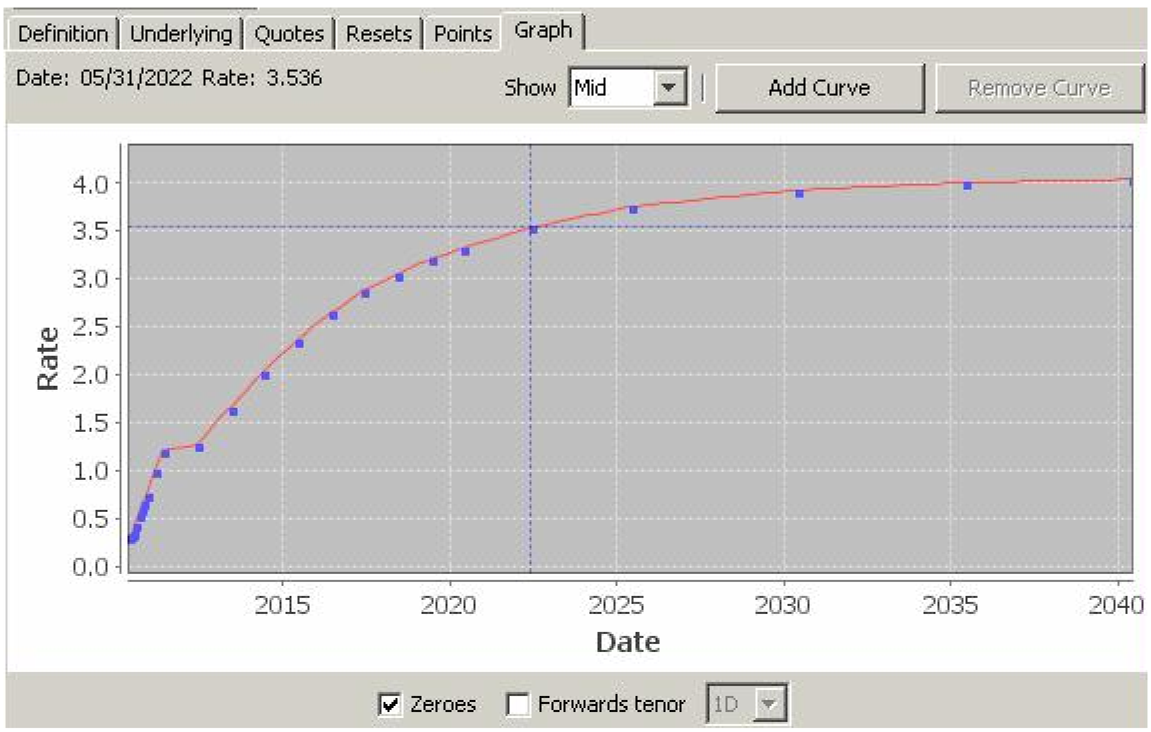
- If INT_CURVE_INTERP_RATE_B = Y (Default value), curves are interpolated on the zero rates.
- If INT_CURVE_INTERP_RATE_B = N, curves are interpolated on the discount factors.

However, you can override the interpolation space at the curve level using the "Interp As" field in the curve definition window:

- Default - Uses the value of environment property INT_CURVE_INTERP_RATE_B.
- Rate - Interpolates the curve on the zero rates, regardless of environment property INT_CURVE_INTERP_RATE_B.
- DiscountFactor - Interpolates the curves on the discount factors, regardless of environment property INT_CURVE_INTERP_RATE_B.

Graph Panel

Once a curve is generated, you can select the Graph panel to view the curve in graphical form.



Curve Generation Monitoring

The debug category "CurveGenInputs" logs the inputs passed to the curve generator from the curve (underlyings, generator parameters, quotes, points, underlying market data items) and some information from the pricing environment, such as quotes and pricing parameters.

This debug category is supported for all yield curve generators, and only for a few other generators (FXPoints, Probability).

20.2 Generating Zero Curves From Offsets

Zero Curve from Offsets Quick Reference

Configuration Requirements

- Rate Index Definition – From the Calypso Navigator, navigate to **Configuration > Interest Rates > Rate Index Definitions**.

Curve Generation

1. Click **New** to start a new curve.

2. Definition Panel — Select the following information to define the curve: currency, index, tenor, holidays, “Generate from instruments” should be unchecked, interpolator, interpolation space, generation algorithm, curve type set to “CurveZero”, Pricing Env.

3. Offsets Panel — Select the tenors and dates.

4. Points Panel — Click **Generate** to generate the points. Enter the zero rates.

5. Click **Save**, and enter a curve name.

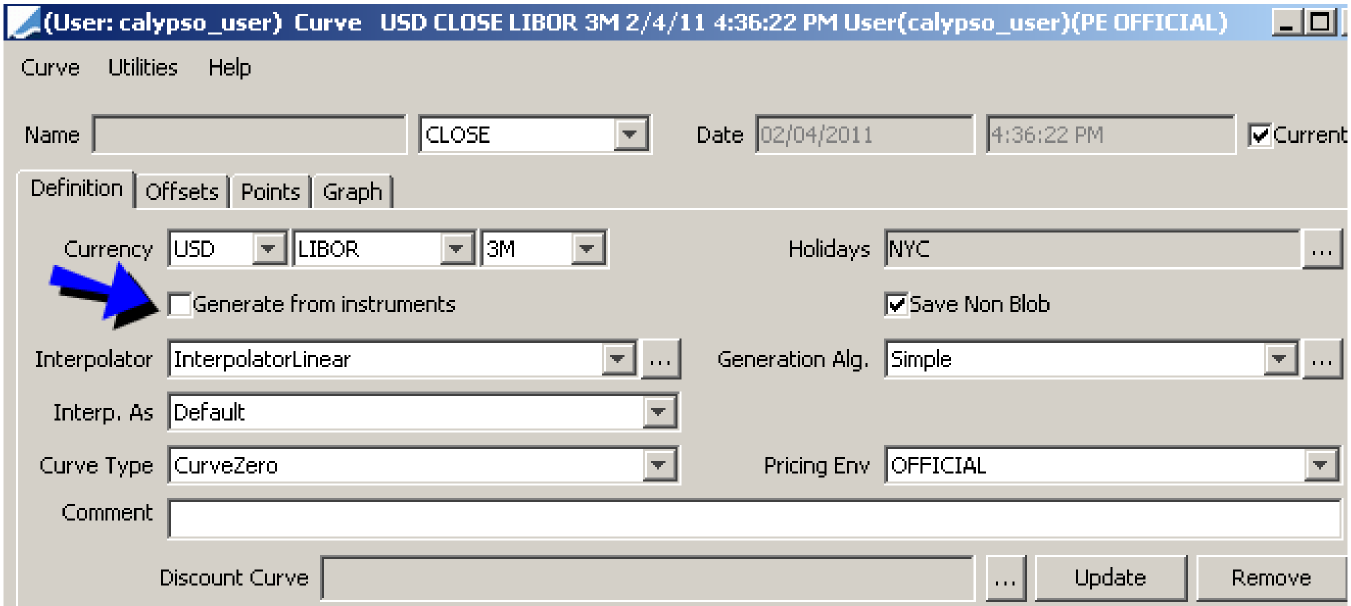
Pricer Configuration

Assign the zero curve from offsets as a discount curve and/or as a forecast curve.

20.2.1 Definition Panel

Click **New** to start a new curve.

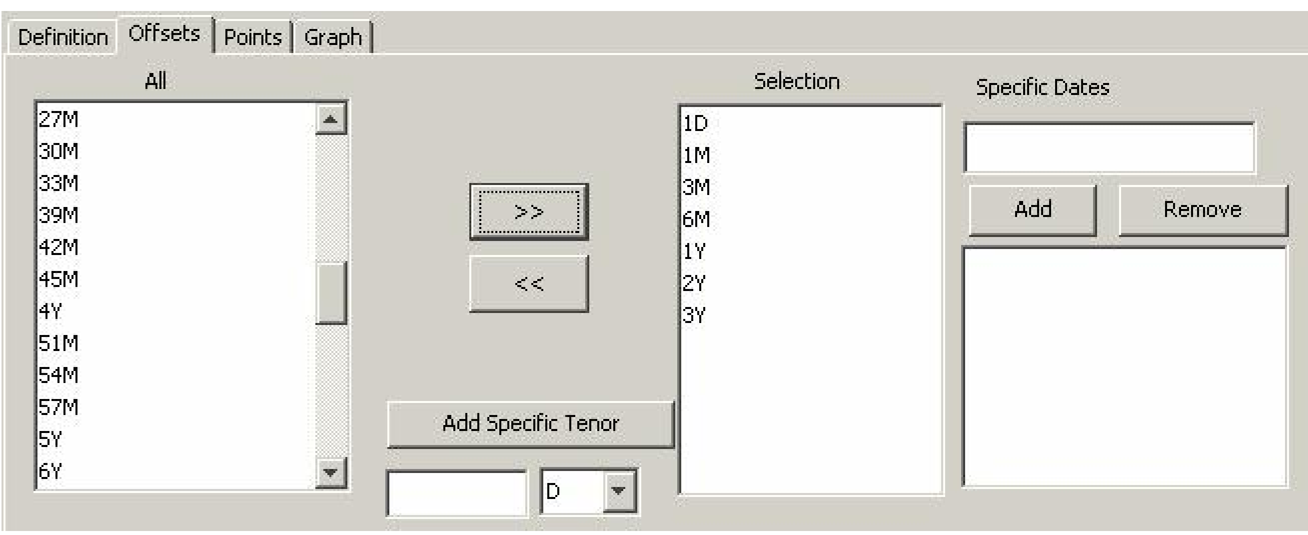
Select the following to define the curve: currency, index, tenor, holidays, “Generate from instruments” should be unchecked, interpolator, interpolation space, generation algorithm, curve type set to “CurveZero”, Pricing Env.



[NOTE: You can click ... next to the "Discount Curve" field to select a discount curve for retrieving the discount factors - The zero curve will only compute the forward points]

20.2.2 Offsets Panel

Click the Offset tab, and select tenors and dates.

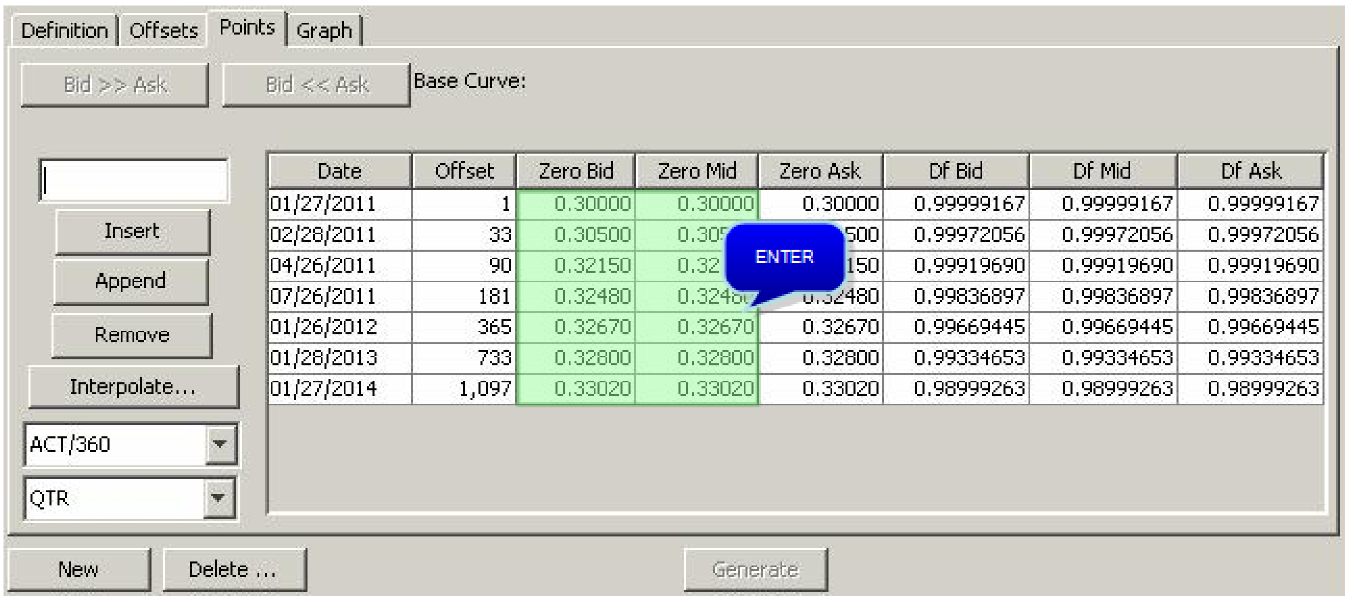


- Select the offsets in the left panel, and click **>>** to add them to the Selection panel.
- Specific Tenors - You can add specific tenors to the list. Enter the number, select the type of tenor, and click **Add Specific Tenor**.

» Specific Dates - Alternatively, you can enter specific dates for the offsets and click **Add** to list them in the panel below.

20.2.3 Points Panel

Click the Points tab, and click **Generate** to generate the point grid.



» You can adjust the daycount and frequency as needed. The default values come from the selected rate index. You will be prompted to recalculate the zero rates or the discount factors.

» You can enter the zero rates manually, or copy and paste from an Excel spreadsheet.

20.2.4 Save Curve

Click **Save** at the bottom of the window to save the curve. You will be prompted to enter a curve name.

20.3 Generating Derived Zero Curves

Zero Curve from Underlying Instruments Quick Reference

Configuration Requirements

- Rate Index Definition – From the Calypso Navigator, navigate to **Configuration > Interest Rates > Rate Index Definitions**.

Curve Underlying Instruments

You can use the following types of underlying instruments for building zero curves: Money

Market, FRA, Future, Bond Future, Swap, Spread, Turn Rate, and Bond.

To define underlying instruments, navigate to **Configuration > Market Data > Curve Underlyings** from the Calypso Navigator, or click **New/Edit Underlying** in the Underlying panel of the Curve window.

Curve Generation

1. Click **New** to start a new curve.

2. Select the curve instance.

3. Definition Panel — Select the following information to define the curve: currency, index, tenor, “Generate from instruments” should be checked, interpolator, interpolation space, generation algorithm, curve type set to “CurveZero”, Pricing Env.

4. Underlying Panel — Select the underlying instruments.

5. Quotes Panel / Resets Panel — Enter / load quotes.

6. Points Panel — Click **Generate** to generate the points.

7. Click **Save**, and enter a curve name.

Pricer Configuration

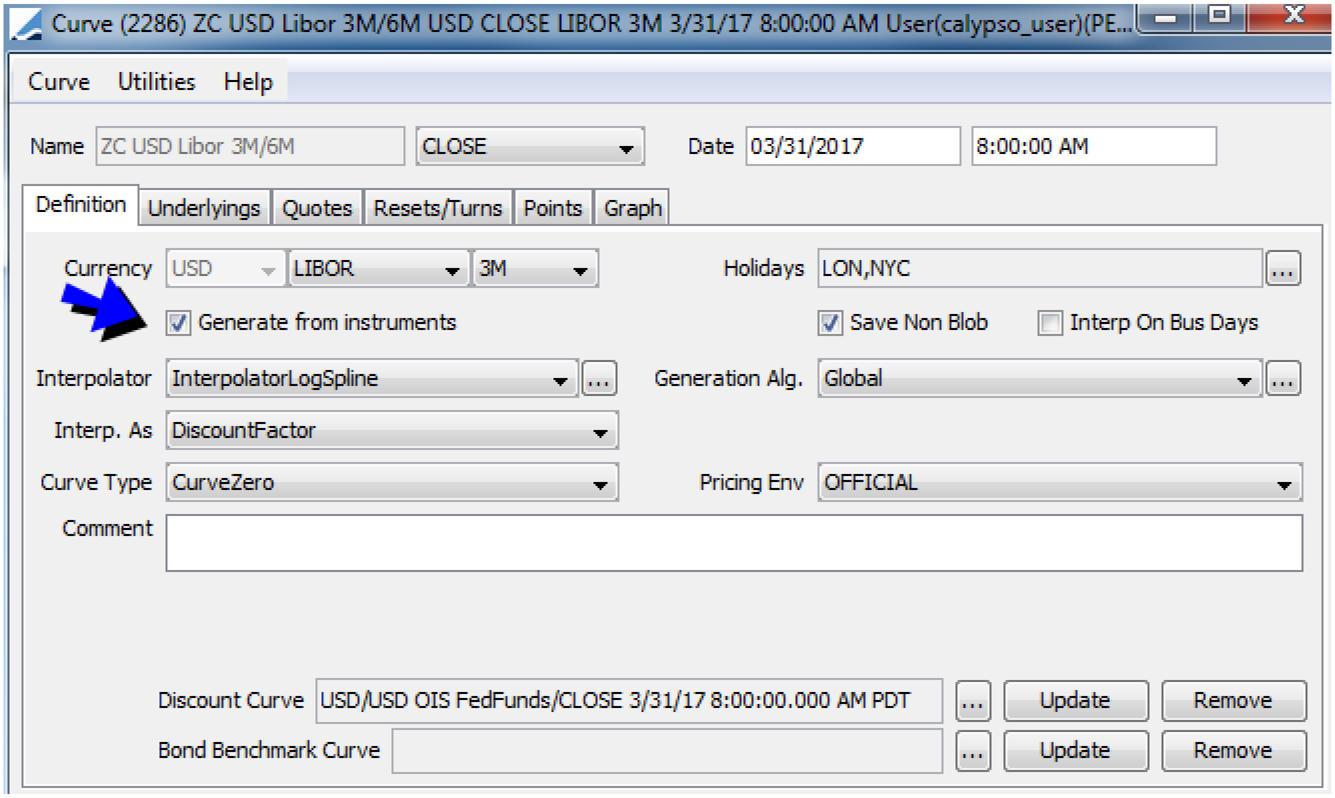
Assign the zero curve as a discount curve and/or forecast curve.

20.3.1 Definition Panel

Click **New** to start a new curve.

Select the following to define the curve: currency, index, tenor, holidays, “Generate from instruments” should be checked, interpolator, interpolation space, generation algorithm, curve type set to “CurveZero”, Pricing Env.

[NOTE: When a holiday calendar is set on the underlying instrument, the curve holiday calendar is ignored]



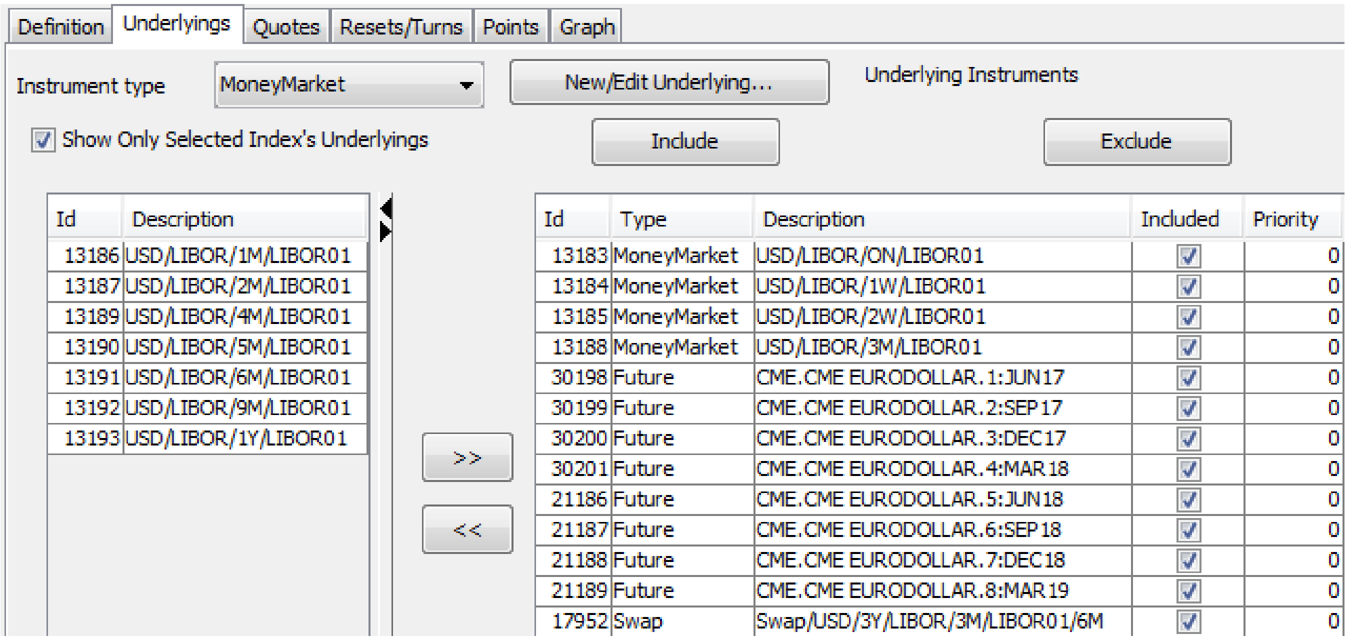
[NOTE: You can click ... next to the "Discount Curve" field to select a discount curve for retrieving the discount factors - The zero curve will only compute the forward points, and the discount curve will be used for discounting]

The generation algorithms are described in the *Calypso Yield Curves Generation* guide.

[NOTE: The yield curve generator BootstrapISDA replicates the ISDA C code discount factors to within 1.0e-9. With this curve generator, comparison with Markit is identical to 1 dollar. Because of rounding of cents may be different, sometimes Calypso results will round opposite to Markit and be off by Markit by 1 dollar, but usually the rounding is to the same number]

20.3.2 Underlying Panel

Click the Underlying tab, and select the underlying instruments.



» Select an instrument type to display the list of available instruments. If none appear, you can click **New/Edit Underlying** to create new instruments.

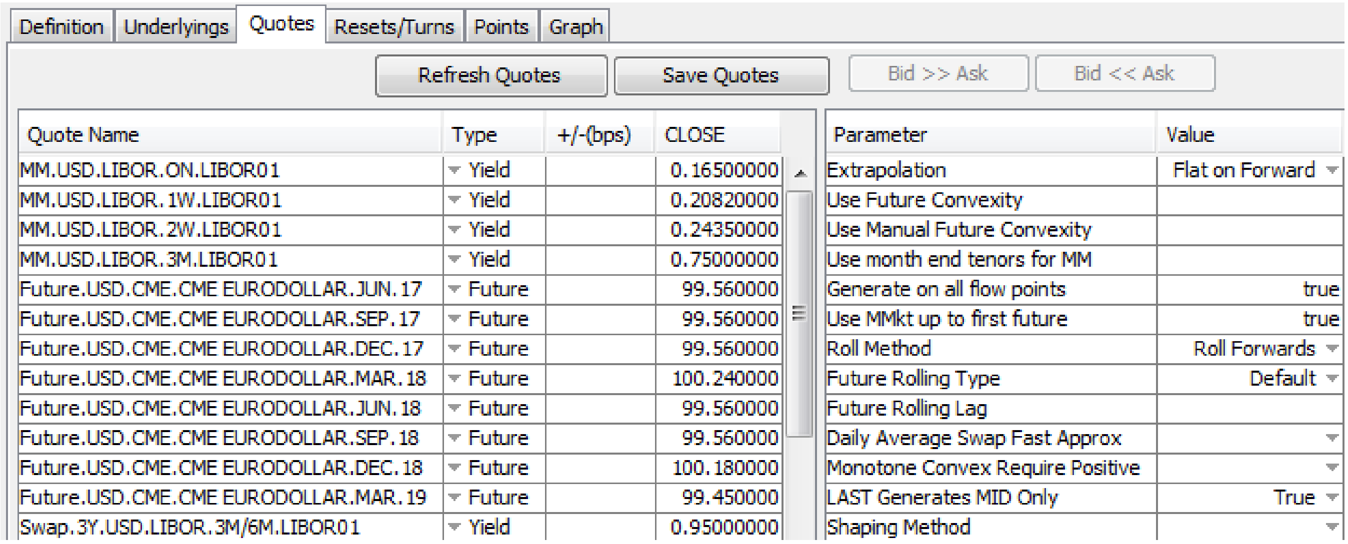
» Select instruments from the list of available instruments on the left-hand side, and click **>>** to add them to the list of selected instruments on the right-hand side.

You can exclude instruments from the curve generation if they are no longer needed.

You can set a priority when multiple instruments have the same maturity date. The lowest priority is 0. When two underlying instruments have the same end date, the one with the lowest priority is automatically removed, if the priority is set.

20.3.3 Quotes Panel

Click the Quotes tab.



» You can click **Refresh Quotes** to load the quotes from the pricing environment selected in the Definition panel. If your market data server is running, quotes will be updated in real-time.

» You can also enter the quotes manually, and save them to the pricing environment.

Quotes Parameters Details

Parameter	Description
Extrapolation	Select the method to extrapolate points outside of the curve. • Flat on Zero - The last known zero rate is kept constant • Flat on Forward - The last known forward rate is kept constant
Use Future Convexity	If set to True, the system uses a RATE volatility surface to compute the convexity adjustments when you generate the curve points. ▶ See Generating Zero Curves with Convexity Adjustments for details.
Use Manual Future Convexity	Set to True to manually set the convexity adjustment for futures. Another option is to set the environment property USE_QUOTE_ADJUSTMENT to False, and set specific spread quotes for the convexity adjustments. ▶ See Generating Zero Curves with Convexity Adjustments for details.
Use month end tenors for MM	If set to True, the following rules are applied in the curve generation: • If a swap underlying starts on the last business day of a month, we set the END_MONTH period rule on the swap. This is NOT applied if the underlying swap PeriodRule is “Unadjusted” or “Mat Unadjusted.” • If period rule is “Unadjusted,” end month date roll is not used. • If period rule is “Mat Unadjusted,” maturity date is not adjusted, but end month date roll

Parameter	Description
	is used to generate other payment dates. The default value is False.
Generate on all flow points	Set to True to generate curve points for each flow date of multi-period instruments, such as swaps.
Use MMkt up to first future	If set to True, money markets instruments with a maturity date after the first available future instrument, are not used in curve generation. The default value is False.
Roll Method	You can select the roll method. For example, you create a curve instance on T0. On T1 you price a trade. • Roll Forwards - Forward rates are unchanged between any two dates. In particular, when pricing on T1, the discount factor for pricing a cashflow is the same as the discount factor between T1 and T0 when obtained from the T0 curve. • Roll Points - Curve points are rolled forward when pricing. The points are the same on T1 as on T0. • Regenerate - Curve points are regenerated when rolled. The points are regenerated on T1 using quotes from T0.
Future Rolling Type Future Rolling Lag	You can select the rolling method for futures: • Default – Futures are rolled the day before the expiry day. • Last Trading Day – Futures are rolled on the last trading day. • Lag Days – Futures are rolled based on a user-defined number of days before the expiry day. Enter the number of days in Future Rolling Lag. **[NOTE: This functionality is also compatible with FRA underlyings created from Date Rules. The default behavior for date-rule driven FRA underlyings is that they roll 1 day prior to expiry. You can use these parameters to specify a number of days the FRA underlyings roll before the expiry defined in the date rule.]**
Daily Average Swap Fast Approx	When True, a fast approximation is used when generating a curve with daily averaging MM futures (e.g. FedFunds futures). When False, the curve is calibrated exactly to the daily average MM futures. In case 1, performance is better than in case 2. In case 2, round-trip pricing of daily average MM futures is better than in case 1.
Use FX Reset	Only available when the generator is BasisGlobal. Indicates whether the Spot Alternative FX reset should be used instead of the FX spot rate. The generator parameter value will be False by default to retain current functionality.

Parameter	Description
	When set to True: • The generator will require an FX reset for the given currency pair whose FX Rate Definition has the “Spot Alternative” checkbox selected. • The Spot Alternative quote name for the FX Reset will appear in the Resets/Turns tab of the curve. • If a Spot Alternative FX reset for the given currency pair is not defined, the generator will throw an error and require the user to define the FX reset before generating the curve. ▶ For more details on Spot Alternative, see Defining FX Rate Fixings in the Calypso *Getting Started* documentation.

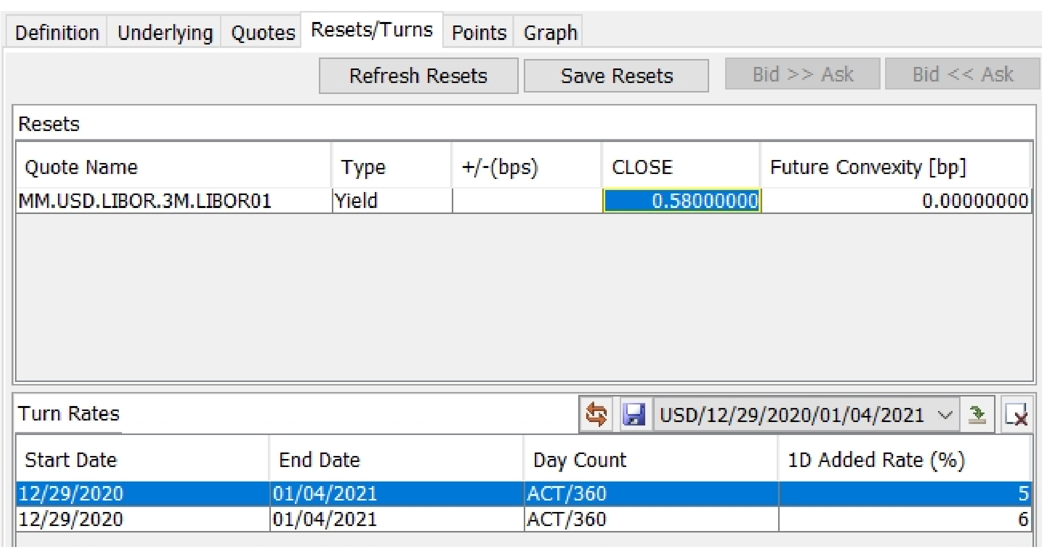
▶ The other parameters apply to the Global generator and are described in details in the *Calypso Yield Curve Generation* guide.

Resets Panel

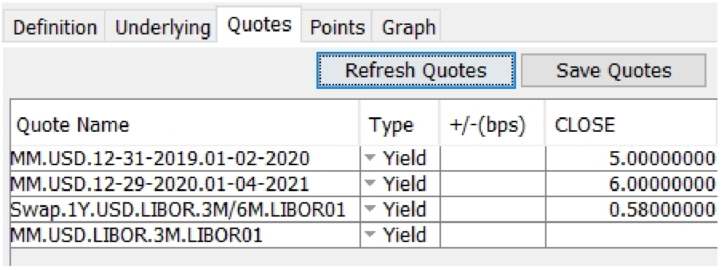
You can choose **Curve > Show Reset/Turn Tab** to display / hide the Resets/turns panel.

The Resets area panel shows manual resets requirements for underlying instruments (cash quotes associated with a given underlying instrument). This applies when "Manual First Reset" is checked in the definition of the underlying instrument.

In the Turn Rates area, you can select turn rates that you have defined as underlying instruments and click to associate them with the curve. Then you can set the quotes and save.



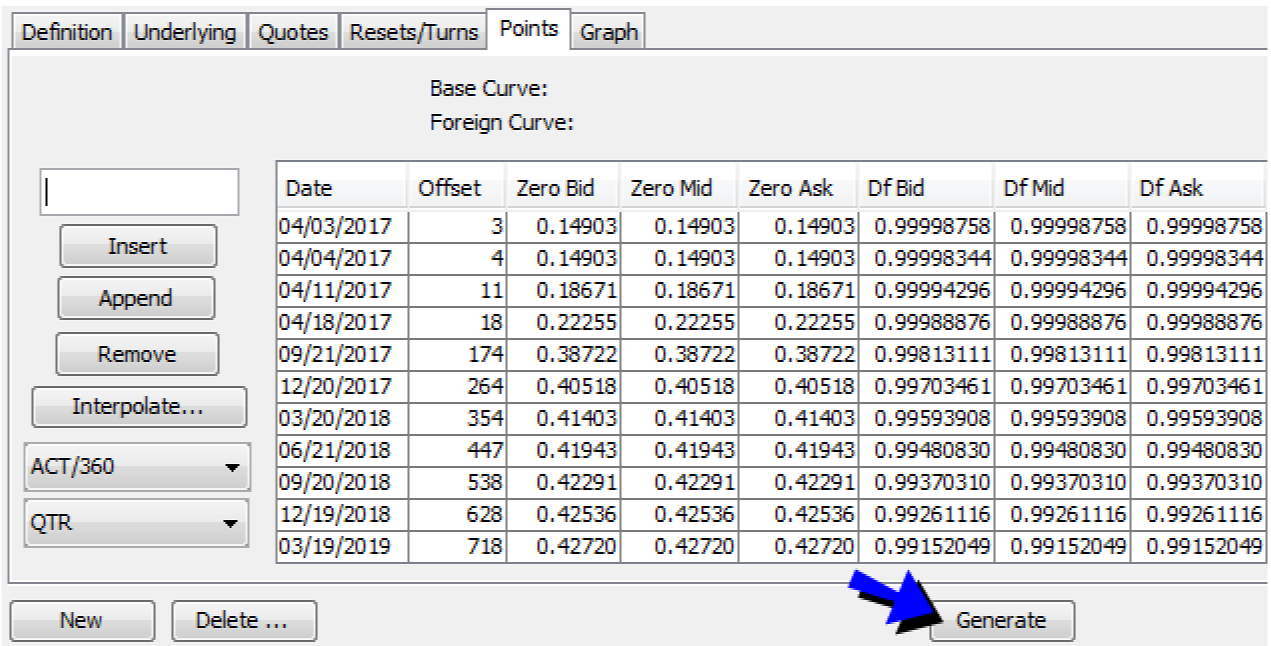
[NOTE: If you hide the Resets/Turns panel, the required quotes are displayed in the Underlying panel, along with the quotes of the underlying instruments - For Turn Rates however, you need to use the Resets/Turns panel to associate them with the curve]



Quote Name	Type	+/-(bps)	CLOSE
MM.USD.12-31-2019.01-02-2020	Yield		5.00000000
MM.USD.12-29-2020.01-04-2021	Yield		6.00000000
Swap.1Y.USD.LIBOR.3M/6M.LIBOR01	Yield		0.58000000
MM.USD.LIBOR.3M.LIBOR01	Yield		

20.3.4 Points Panel

Click the Points tab. Click **Generate** to view the generated zero rates and discount factors.



Date	Offset	Zero Bid	Zero Mid	Zero Ask	Df Bid	Df Mid	Df Ask
04/03/2017	3	0.14903	0.14903	0.14903	0.99998758	0.99998758	0.99998758
04/04/2017	4	0.14903	0.14903	0.14903	0.99998344	0.99998344	0.99998344
04/11/2017	11	0.18671	0.18671	0.18671	0.99994296	0.99994296	0.99994296
04/18/2017	18	0.22255	0.22255	0.22255	0.99988876	0.99988876	0.99988876
09/21/2017	174	0.38722	0.38722	0.38722	0.99813111	0.99813111	0.99813111
12/20/2017	264	0.40518	0.40518	0.40518	0.99703461	0.99703461	0.99703461
03/20/2018	354	0.41403	0.41403	0.41403	0.99593908	0.99593908	0.99593908
06/21/2018	447	0.41943	0.41943	0.41943	0.99480830	0.99480830	0.99480830
09/20/2018	538	0.42291	0.42291	0.42291	0.99370310	0.99370310	0.99370310
12/19/2018	628	0.42536	0.42536	0.42536	0.99261116	0.99261116	0.99261116
03/19/2019	718	0.42720	0.42720	0.42720	0.99152049	0.99152049	0.99152049

- You can adjust the daycount and frequency as needed. The default values come from the selected rate index. You will be prompted to recalculate the zero rates or the discount factors.
- You can modify the zero rates and discount factors.

20.3.5 Save Curve

Click **Save** at the bottom of the window to save the curve. You will be prompted to enter a curve name.

20.4 Generating Blended Zero Curves

Blended zero curves can be used for collateral pricing.

Collateral pricing is the ability to select the discount curve based on the collateral agreement's collateral policy instead of the trade currency.

Blended Zero Curve Quick Reference

You can build a cheapest-to-deliver collateral curve by blending up to three other collateral discount curves.

Curve Generation

1. Click **New** to start a new curve.

2. Definition Panel — Select the generation algorithm "CTDCollateral", and select the discount curves.

All the curves must be defined with the same currency but each curve can have underlying instruments in another currency.

3. Click **Generate** to generate the points.

4. Click **Save**, and enter a curve name.

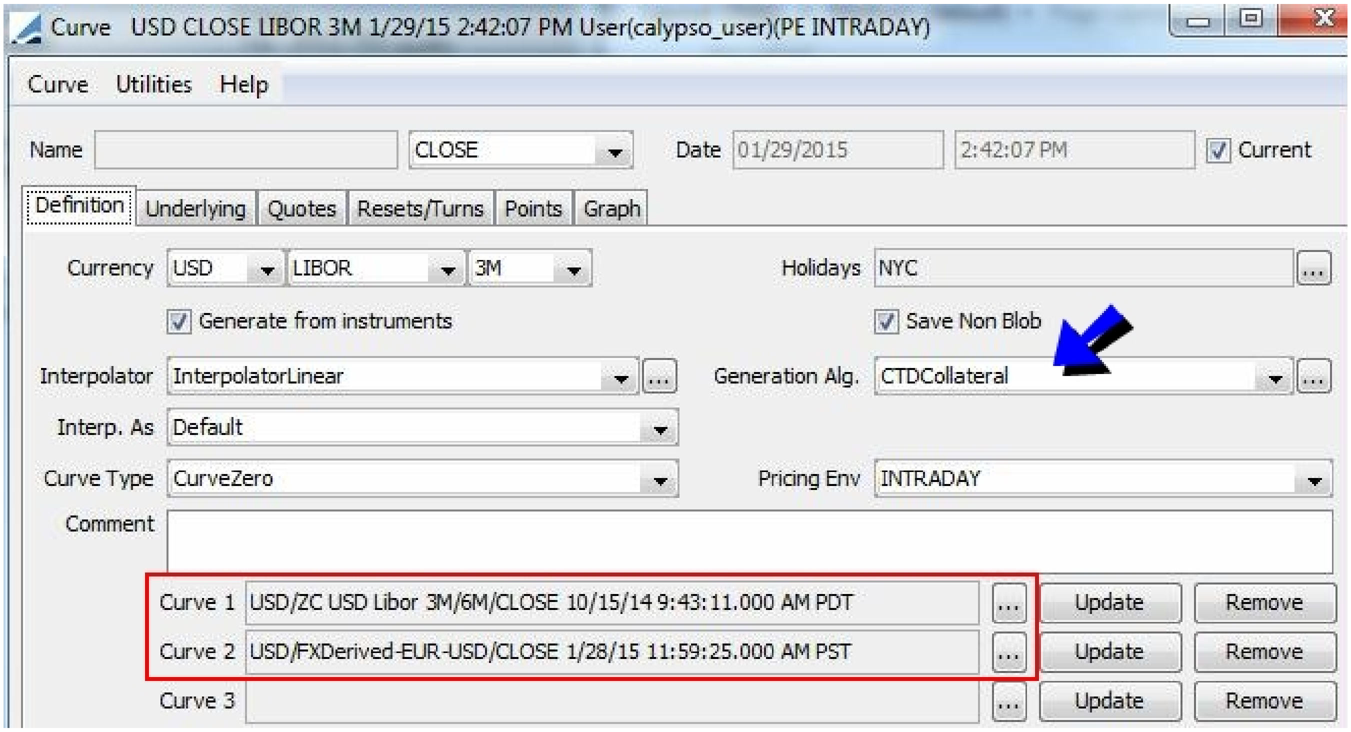
Pricer Configuration

Assign the zero curve as a discount curve with the appropriate collateral policy.

20.4.1 Definition Panel

Click **New** to start a new curve.

Select the following to define the curve: currency, index, tenor, holidays, “Generate from instruments”, interpolator, interpolation space, generation algorithm "CTDCollateral", curve type set to “CurveZero”, Pricing Env.



- Select Curve 1, Curve 2, and optionally Curve 3.

  All the curves must be defined with the same currency but each curve can have underlying instruments in another currency.

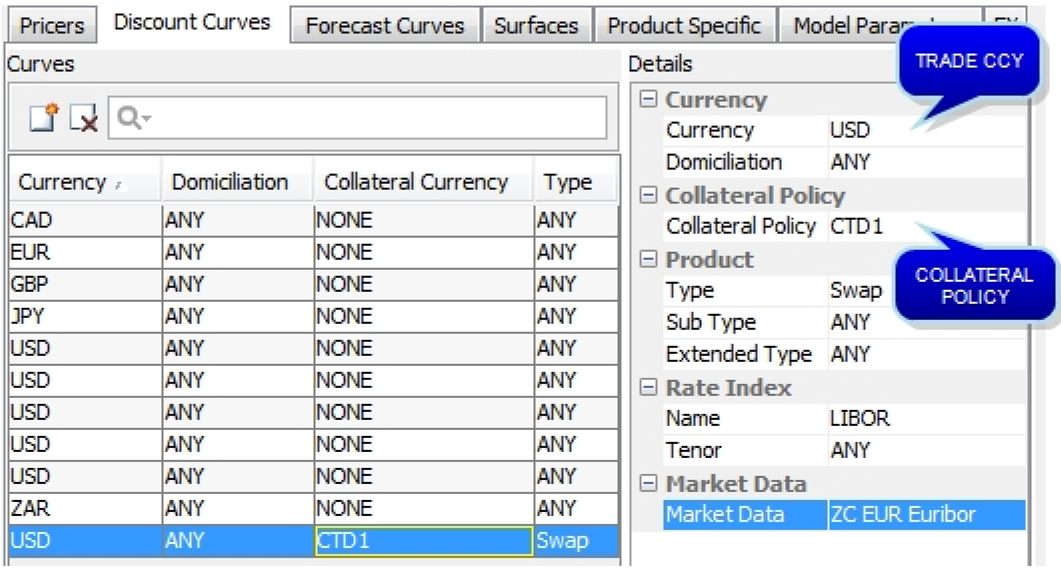
- Click **Generate** to generate the curve.

20.4.2 Save Curve

Click **Save** at the bottom of the window to save the curve. You will be prompted to enter a curve name.

20.4.3 Pricer Configuration

In the Discount Curves panel, select the trade currency, the collateral policy, and the other criteria as needed.



▶ Please refer to Calypso Collateral Pricing (Trade CSA) for complete setup details.

20.5 Generating Zero Curves with Convexity Adjustments

Zero Curve with Convexity Adjustments Quick Reference

You can perform convexity adjustment using one of the following methods:

- Load convexity adjustment values from a RATE volatility surface
- Manually set convexity adjustment values
- Use convexity spread quotes

These methods are described below in details.

Curve Generation

1. Generate a derived curve.

▶ See Generating Derived Zero Curves for details.

2. In the Quotes panel, select the type of convexity adjustment you want to perform, and enter / load the convexity adjustment values.

3. Click **Save**, and enter a name for the curve.

Pricer Configuration

Assign the zero curve as a discount/forecast curve.

20.5.1 Quotes Panel

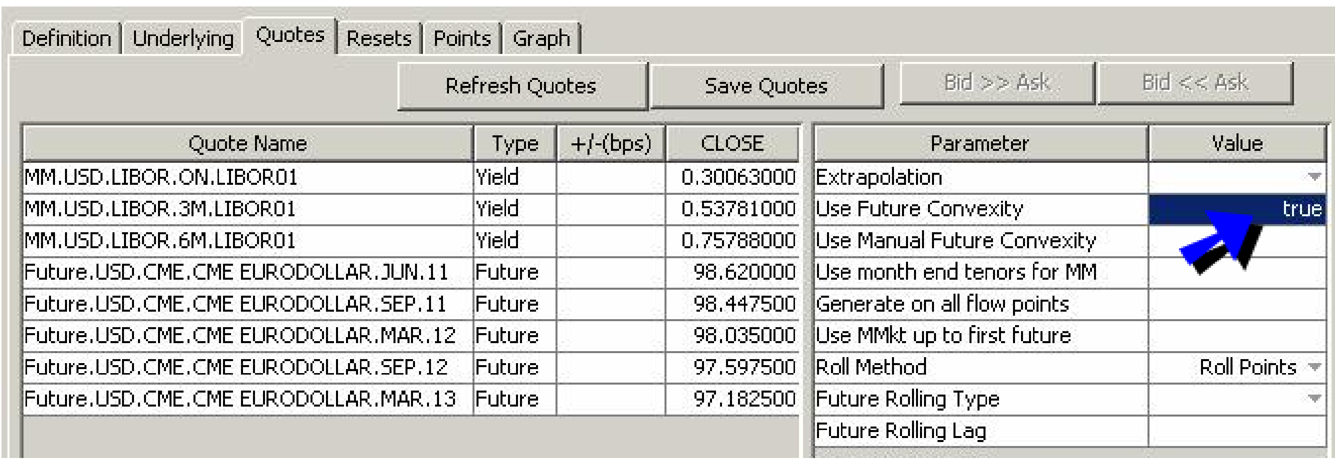
After you have defined a derived zero curve that contains future underlyings, click the Quotes tab. You can perform convexity adjustment using one of the following methods.

Convexity Adjustments from RATE Volatility Surface

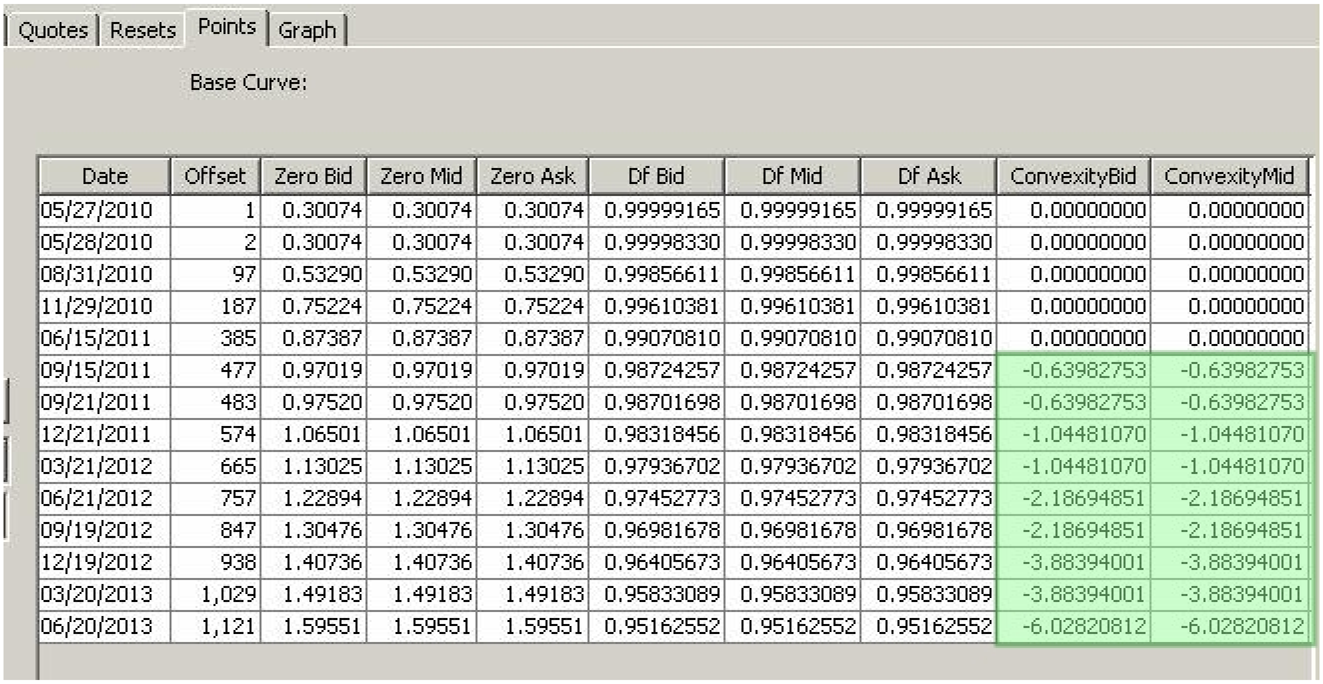
Create a volatility surface for Future MM volatilities. The volatility surface may be a simple surface from offsets, using Black volatilities or basis point volatilities. From the Calypso Navigator, navigate to **Market Data > Volatilities > Volatility Surface**.

Register the volatility surface in the Pricer Configuration - Product Specific panel using PricerFutureMM and/or PricerFutureOptionMM and the FUT_CONVEXITY usage.

In the Quotes panel, of the zero cuve, set the following parameter.



» Set the parameter “Use Future Convexity” to True. The system will use the assigned volatility surface to compute the convexity adjustments when you generate the curve points. You can see the convexity quotes in the Points panel.



Quotes | Resets | Points | Graph

Base Curve:

Date	Offset	Zero Bid	Zero Mid	Zero Ask	Df Bid	Df Mid	Df Ask	ConvexityBid	ConvexityMid
05/27/2010	1	0.30074	0.30074	0.30074	0.99999165	0.99999165	0.99999165	0.00000000	0.00000000
05/28/2010	2	0.30074	0.30074	0.30074	0.99998330	0.99998330	0.99998330	0.00000000	0.00000000
08/31/2010	97	0.53290	0.53290	0.53290	0.99856611	0.99856611	0.99856611	0.00000000	0.00000000
11/29/2010	187	0.75224	0.75224	0.75224	0.99610381	0.99610381	0.99610381	0.00000000	0.00000000
06/15/2011	385	0.87387	0.87387	0.87387	0.99070810	0.99070810	0.99070810	0.00000000	0.00000000
09/15/2011	477	0.97019	0.97019	0.97019	0.98724257	0.98724257	0.98724257	-0.63982753	-0.63982753
09/21/2011	483	0.97520	0.97520	0.97520	0.98701698	0.98701698	0.98701698	-0.63982753	-0.63982753
12/21/2011	574	1.06501	1.06501	1.06501	0.98318456	0.98318456	0.98318456	-1.04481070	-1.04481070
03/21/2012	665	1.13025	1.13025	1.13025	0.97936702	0.97936702	0.97936702	-1.04481070	-1.04481070
06/21/2012	757	1.22894	1.22894	1.22894	0.97452773	0.97452773	0.97452773	-2.18694851	-2.18694851
09/19/2012	847	1.30476	1.30476	1.30476	0.96981678	0.96981678	0.96981678	-2.18694851	-2.18694851
12/19/2012	938	1.40736	1.40736	1.40736	0.96405673	0.96405673	0.96405673	-3.88394001	-3.88394001
03/20/2013	1,029	1.49183	1.49183	1.49183	0.95833089	0.95833089	0.95833089	-3.88394001	-3.88394001
06/20/2013	1,121	1.59551	1.59551	1.59551	0.95162552	0.95162552	0.95162552	-6.02820812	-6.02820812

Manual Convexity Adjustments

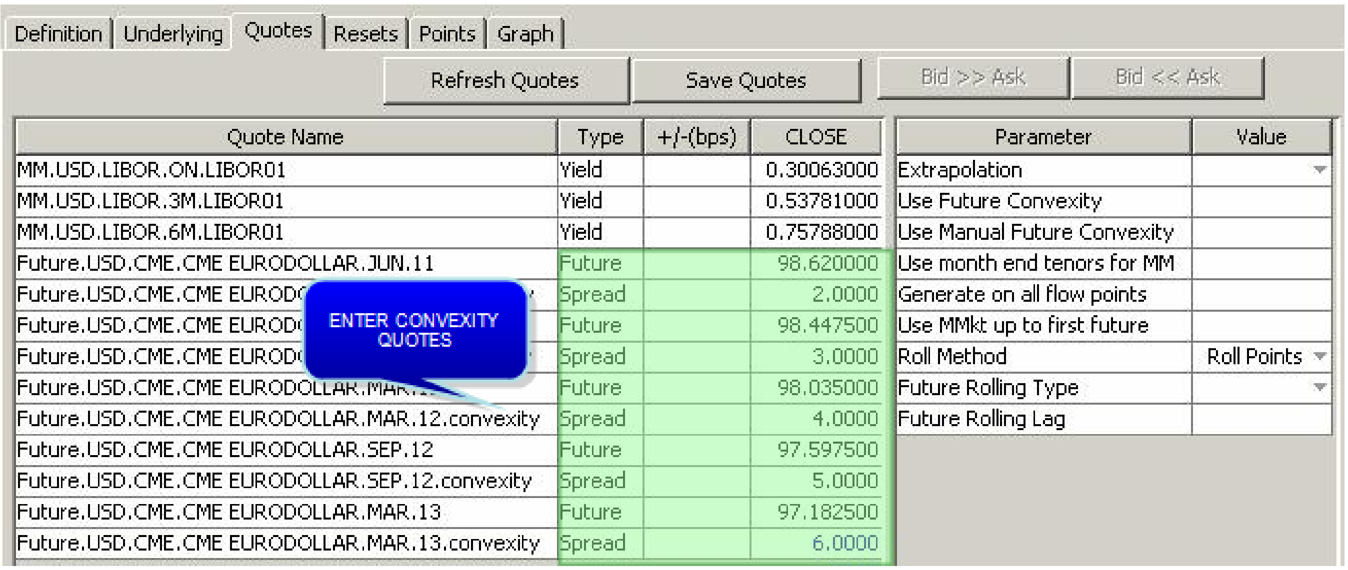
- » Set the parameters “Use Future Convexity” AND “Use Manual Future Convexity" to true.
- » Enter the future convexity adjustments in the field "Future Convexity". When you generate the curve, you can view the convexity quotes in the points panel.

Convexity Adjustments from Spread Quotes

You can also elect to directly enter the convexity quotes.

Set the environment property "USE_QUOTE_ADJUSTMENT" to False (default is True).

The convexity quotes are created by appending ".convexity" to the future quotes, for example "Future.USD.CME.EURODOLLLAR.DEC.06.convexity", and the quote type is a Spread expressed in basis points.



» Enter / load the convexity quotes.

20.5.2 Save Curve

Click **Save** at the bottom of the window to save the curve. You will be prompted to enter a curve name.

20.6 Generating Agency Option Adjusted Spread Curves

Agency Option Adjusted Spread (AOAS) curves are used to price European callable bonds.

AOAS Curve Quick Reference

Configuration Requirements

- Rate Index Definition – From the Calypso Navigator, navigate to **Configuration > Interest Rates > Rate Index Definitions**.

Curve Generation

1. Click **New** to start a new curve.

2. Definition Panel — Select the following information to define the curve: currency, index, tenor, holidays, "Generate from instruments" should be checked, interpolator, interpolation space, generation algorithm set to "AgencyBootStrap", curve type set to "CurveZero", Pricing Env.

3. Offsets Panel — Select the tenors and dates.

4. Points Panel — Click **Generate** to generate the points. Enter the zero rates.

5. Click **Save**, and enter a curve name.

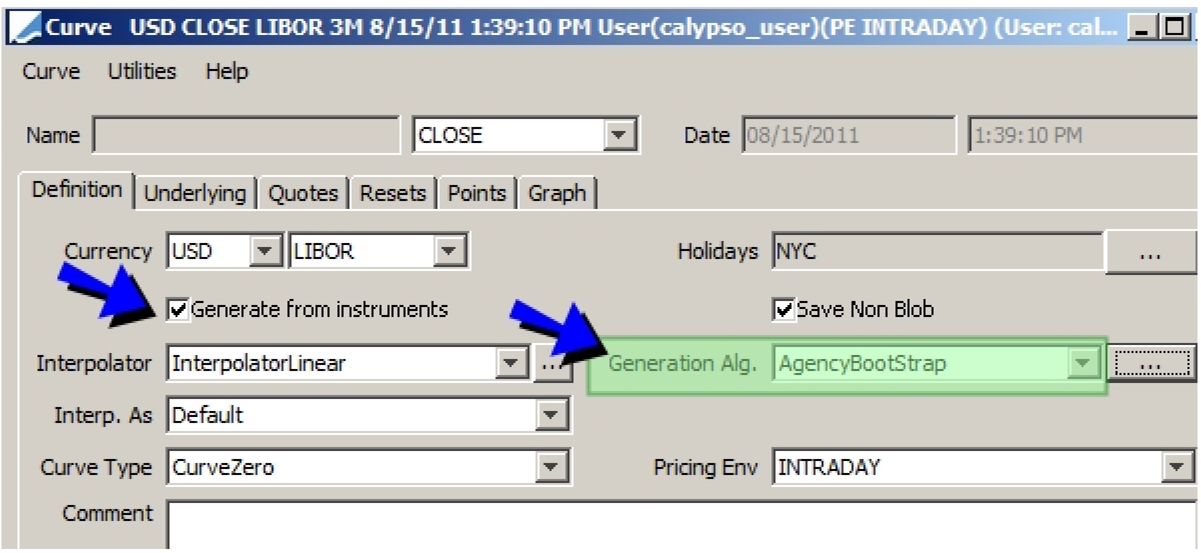
Pricer Configuration

Assign the AOAS curve as a forecast curve.

20.6.1 Definition Panel

Click **New** to start a new curve.

Select the following to define the curve: currency, index, tenor, holidays, “Generate from instruments” should be checked, interpolator, interpolation space, generation algorithm set to "AgencyBootStrap", curve type set to “CurveZero”, Pricing Env.

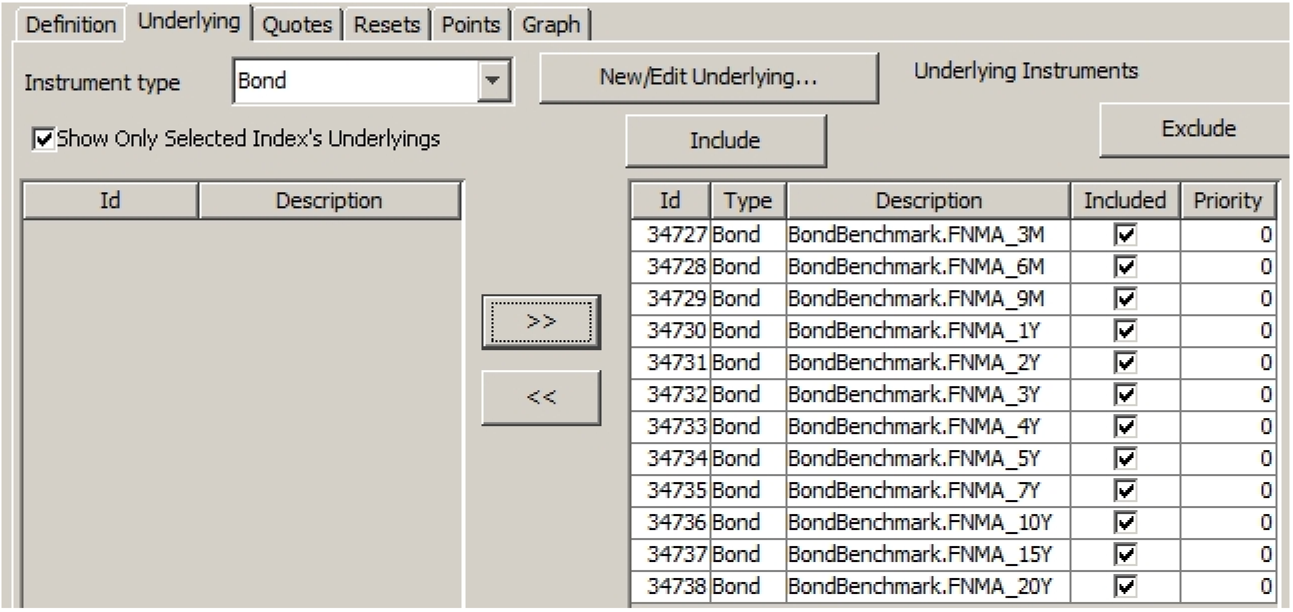


20.6.2 Underlying Panel

Click the Underlying tab, and select the underlying instruments: benchmark bonds.

Benchmark bonds are created using **Configuration > Fixed Income > Benchmarks** from the Calypso Navigator.

▶ Refer to Calypso Fixed Income documentation for information on creating benchmark bonds.



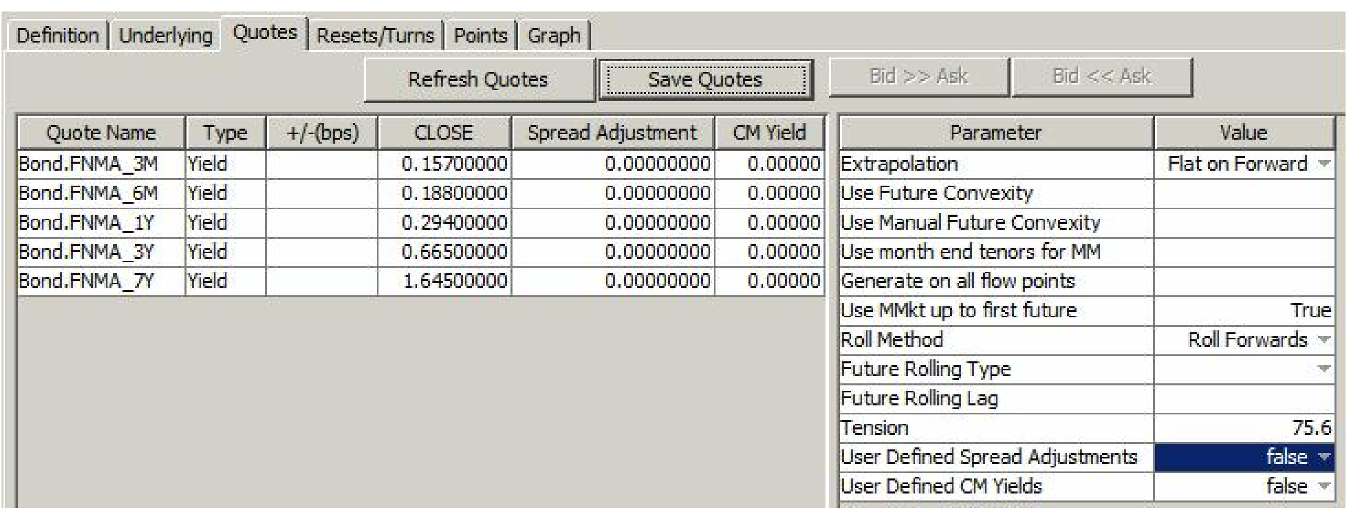
- Select instrument type "Bond" to display the list of available instruments. If none appear, you can click **New/Edit Underlying** to create new instruments.
- Select bond benchmarks from the list of available instruments on the left-hand side, and click **>>** to add them to the list of selected instruments on the right-hand side.

  You can exclude instruments from the curve generation if they are no longer needed.

  You can set a priority when multiple instruments have the same maturity date. The lowest priority is 0.

20.6.3 Quotes Panel

Click the Quotes tab.



- You can click **Refresh Quotes** to load the quotes from the pricing environment selected in the Definition panel. If your market data server is running, quotes will be updated in real-time.
- You can also enter the quotes manually, and save them to the pricing environment.

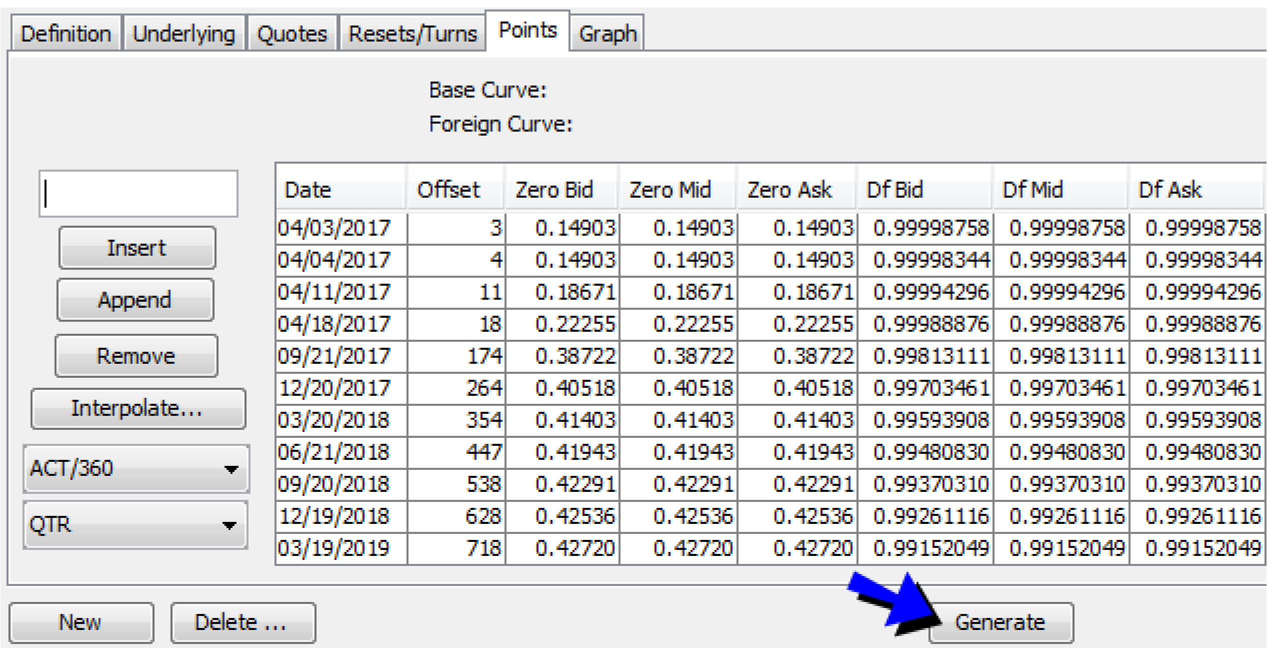
Quotes Parameters Details

▶ See Quotes Panel for details on the other parameters.

Parameter	Description
Tension	Should be set to "75.6" per SIFMA.
Use Defined Spread Adjustments	Set to True to enable the Spread Adjustments column in the Quotes panel.
User Defined CM Yields	Set to True to enable the Constant Maturity Yields column in the Quotes panel.

20.6.4 Points Panel

Click the Points tab. Click **Generate** to view the generated zero rates and discount factors.



Date	Offset	Zero Bid	Zero Mid	Zero Ask	Df Bid	Df Mid	Df Ask
04/03/2017	3	0.14903	0.14903	0.14903	0.99998758	0.99998758	0.99998758
04/04/2017	4	0.14903	0.14903	0.14903	0.99998344	0.99998344	0.99998344
04/11/2017	11	0.18671	0.18671	0.18671	0.99994296	0.99994296	0.99994296
04/18/2017	18	0.22255	0.22255	0.22255	0.99988876	0.99988876	0.99988876
09/21/2017	174	0.38722	0.38722	0.38722	0.99813111	0.99813111	0.99813111
12/20/2017	264	0.40518	0.40518	0.40518	0.99703461	0.99703461	0.99703461
03/20/2018	354	0.41403	0.41403	0.41403	0.99593908	0.99593908	0.99593908
06/21/2018	447	0.41943	0.41943	0.41943	0.99480830	0.99480830	0.99480830
09/20/2018	538	0.42291	0.42291	0.42291	0.99370310	0.99370310	0.99370310
12/19/2018	628	0.42536	0.42536	0.42536	0.99261116	0.99261116	0.99261116
03/19/2019	718	0.42720	0.42720	0.42720	0.99152049	0.99152049	0.99152049

- You can adjust the daycount and frequency as needed. The default values come from the selected rate index. You will be prompted to recalculate the zero rates or the discount factors.
- You can modify the zero rates and discount factors.

20.6.5 Save Curve

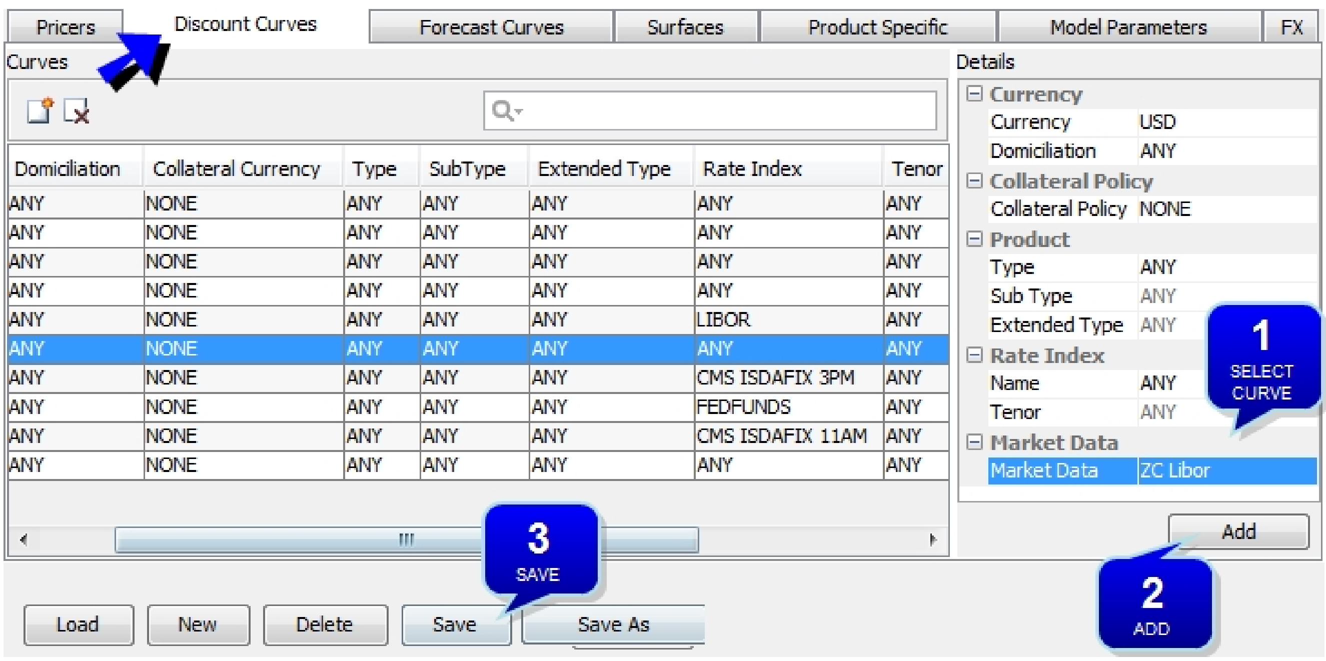
Click **Save** at the bottom of the window to save the curve. You will be prompted to enter a curve name.

20.7 Pricer Configuration

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**, and click **Load** to select a pricer configuration name.

20.7.1 Discount Curves

Click the "Discount Curves" tab.



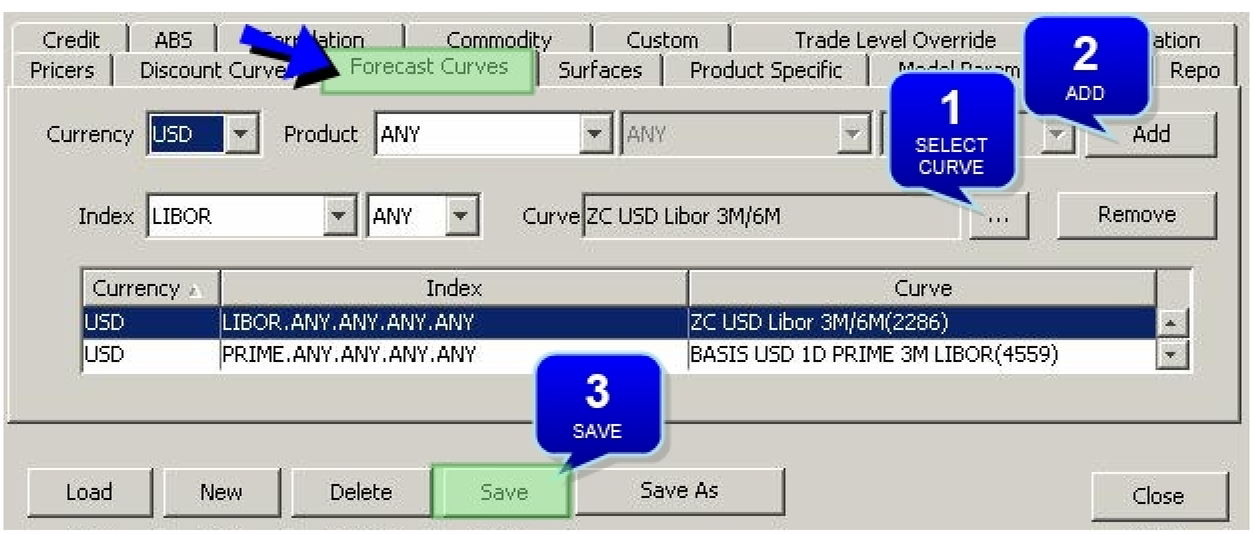
- Select the parameters for which the curve applies, and select the curve. The parameters are described below.
- Click **Add** to add the curve to the pricer configuration.
- Then click **Save** to save the pricer configuration.

Fields	Description
Currency	Select the currency for which the curve applies.
Domiciliation	Select the domiciliation for which the curve applies: • Onshore - Legal entity and currency specified as located inside the jurisdiction of its primary operations. Currency will link to a collateral currency.

Fields	Description
	• Offshore - Legal entity and currency specified as located outside the jurisdiction of its primary operations. Currency will link to a collateral currency. • ANY - Any domiciliation. The domiciliation is based on the book attribute "Domiciliation".
Collateral Policy	Select the collateral policy for which the curve applies if any, or select NONE otherwise. If the pricing parameter COLLATERALIZED_PRICING is set to true, the system checks if the trade is associated with a CSA agreement. If it is, the system uses the collateral policy of the CSA agreement to select the discount curve accordingly. If the collateral policy is not set on the CSA agreement, the trade currency is used to select the discount curve. If COLLATERALIZED_PRICING is set to false, the collateral policy is not used. ▶ Refer to Calypso Trade CSA documentation for more details.
Type	Select the product type for which the curve applies, or ANY.
Sub Type	Select the product subtype for which the curve applies, or ANY.
Extended Type	Select the extended type for which the curve applies, or ANY.
Rate Index	Select the rate index for which the curve applies, or ANY.
Tenor	Select the rate index tenor for which the curve applies, or ANY.
Market Data	Select the curve.

20.7.2 Forecast Curves

Click the "Forecast Curves" tab.



- Select a currency, a product or ANY, a subtype or ANY, an index, a tenor or ANY.
- Click **...** to select the curve.
- Click **Add** to add the curve to the pricer configuration.
- Click **Save** to save the pricer configuration.

Zero curves used for forecasting equity forward prices using non-linear pricers (for Equity Derivatives trades) may be mapped using the FWD_PRICE_FOR usage in the Product Specific panel of the pricer configuration.

21. Multi-curve Package

A multi-curve package allows creating a set of zero curves that are generated simultaneously using a multi-curve generator that generates and saves multiple curves at once.

The curves of a multi-curve package are always generated and saved together anywhere in the system where a zero curve is generated: pricing, risk analyses, the GENERATE_CURVE scheduled task, the market data manager, etc. However, they are associated to the pricer configuration independently.

To build a multi-curve package, you can either copy configurations from existing curves and rename them, or configure new curves for the package in the Multicurve Package Generation window itself.

[NOTE: The curves of a multi-curve package cannot be modified in the Curve window]

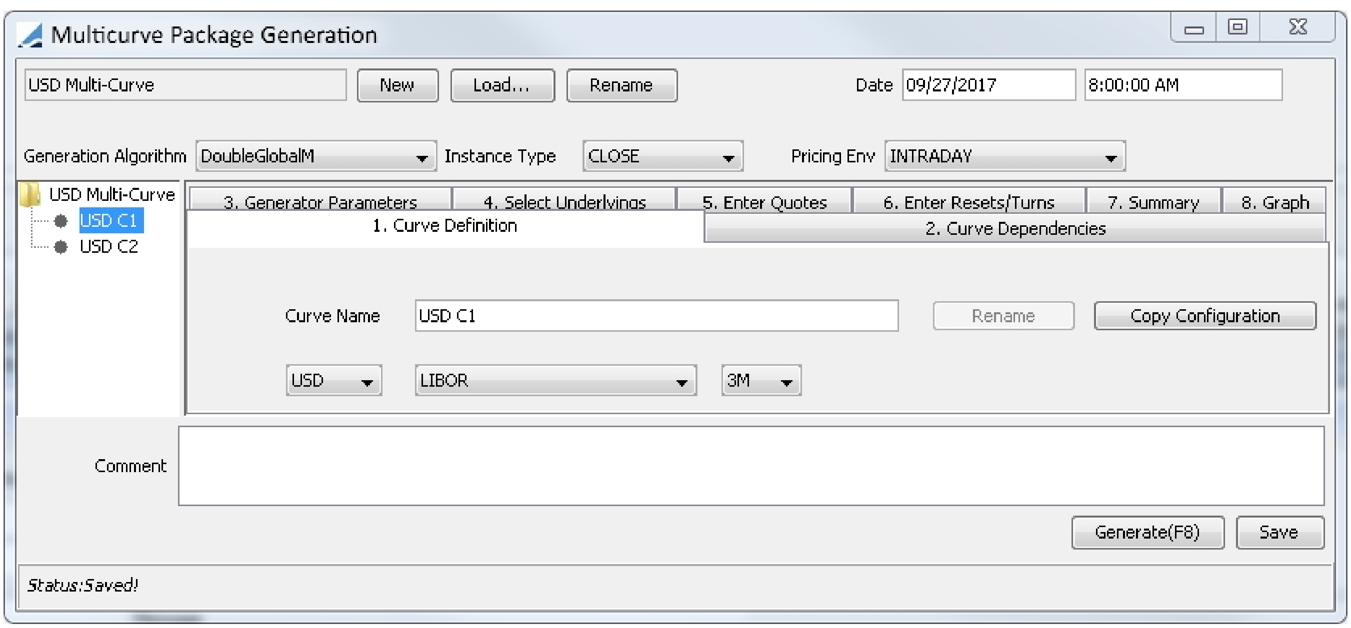
Before you begin

In addition to the access permissions related to market data, the following access permissions are required by the Multicurve window.

- CreateMulticurvePackage
- ModifyMulticurvePackage
- RemoveMulticurvePackage

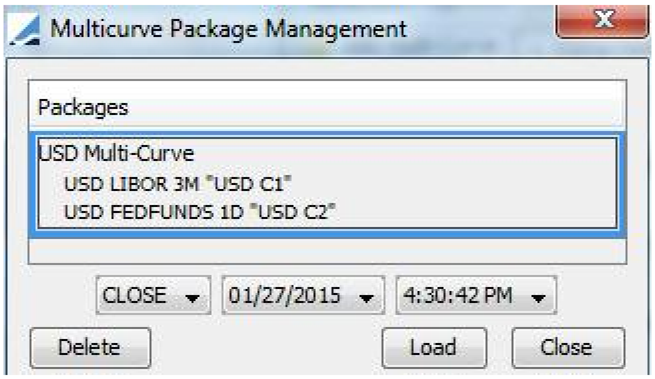
21.1 Defining a Multi-curve Package

From the Calypso Navigator, navigate to **Market Data > Multicurve Window** (menu action `marketdata.MultiCurvePackageGenerationWindow`) to define multi-curve packages.



- You can click **Load** to load an existing package.

  The existing packages are displayed.



  Select a package and click **Load**.

  You can modify and generate the package as needed.

- To create a new package: Click **New** and enter the fields described below.

  Then perform the following steps:

  1. Select each curve under the Package Name label, and define it in the Curve Definition tab.
  2. Define the dependency between the curves in the Curve Dependencies tab.
  3. Define generator parameters for each curve as needed in the Generator Parameters tab.
  4. Select underlying instruments for each curve in the Select Underlyings tab.
  5. Enter / review quotes for each curve in the Enter Quotes tab.
  6. Enter / review resets and turn rates as needed for each curve in the Enter Resets/Turns tab.
  7. Click **Generate** to generate the curves. For a new package, you will be prompted to enter a package name.
     - You can view the package summary in the Summary tab.
     - You can click View for each curve to display the generated curve.
  8. Click **Save** to save the package.

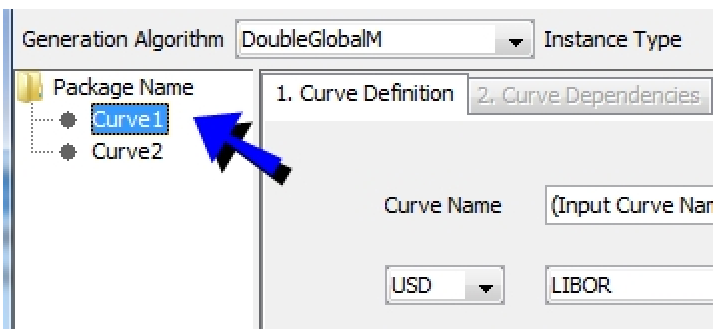
  The steps are described below.

Package Definition

Parameter	Description
Current	By default, the curve is saved as of the current date and time. You can clear the Current checkbox and change the curve date and time as needed.
Generation Algorithm	Select a multi-curve generator. • "DoubleGlobalM" - Generates and saves both a discount curve and a forecast curve at once.

Parameter	Description
	• "TripleGlobal" - Generates three curves simultaneously for cross-currency swaps: two forward curves and one cross-currency curve. If the generator is not available for selection, please add it to the domain "MultiMDIGenerators". Make sure that this generator is also available in the domain for zero curve generators "CurveZero.gen".
Instance Type	Select the instance of the curve. It dictates the quote side of the underlying instruments to be used for generating the curve. • The CLOSE instance uses CLOSE quotes. • The LAST instance uses BID, MID, and ASK quotes. • The OPEN instance uses OPEN quotes.
Pricing Env	Select the Pricing Env to be used for retrieving market data.

Step 1 - Curve Definition tab - Select each curve under the Package Name label, and define it in the Curve Definition tab.



» Enter the curve name and the required information for each curve.

For new multi-curve packages, you can select the curve type: CurveZero or CurveBasis.

The CurveBasis acts as with a single curve, that is, it has one base curve over its entire length. You cannot have two basis curves where each has the other as base curve. There must always be a discount curve to spread from.

▶ See Generating Derived Zero Curves for details on zero curves.

▶ See Generating Basis Curves for details on basis curves.

» You can click **Copy Configuration** to copy the configuration from an existing curve. You will be prompted to select a curve.

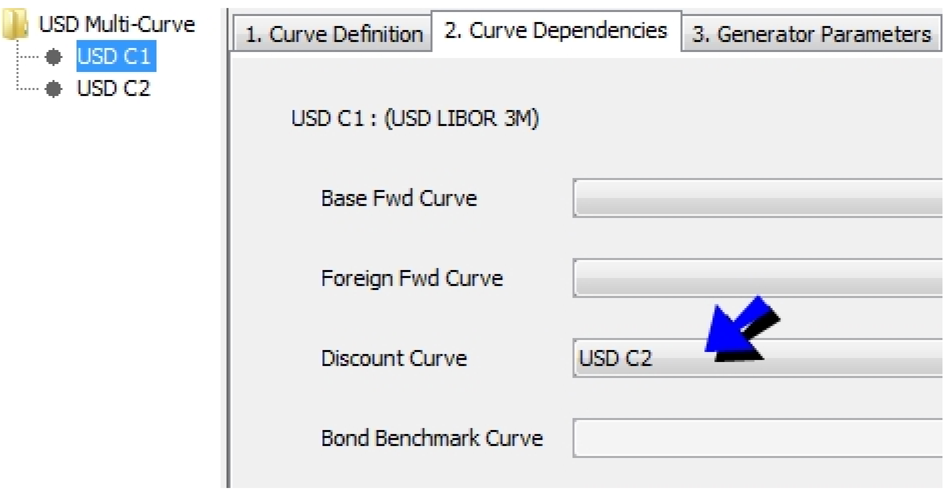
Step 2 - Curve Dependencies tab - Define the dependency between the curves in the package, or with curves outside of the package.

DoubleGlobalM Generator

For the DoubleGlobalM generator, the system generates and saves both a discount curve and a forecast curve.

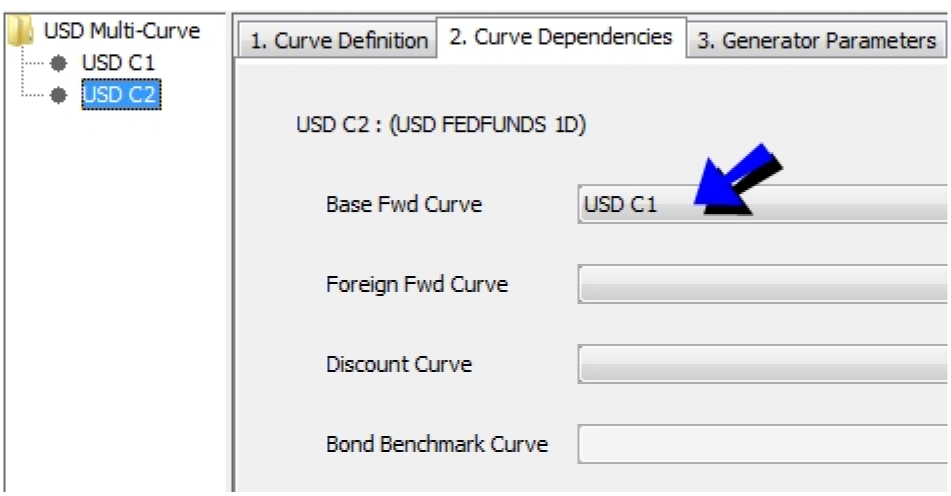
For the forecast curve, select the discount curve in the Discount Curve field. You can click ... to select a curve outside of the package.

You can also select a bond curve from the Bond Benchmark Curve field to be used with the SwapSpread curve underlying. The quote of the underlying (a spread) is added to the yield calculated from the bond curve and the benchmark bonds to get the swap quote.



For the discount curve, select the forecast curve in the Base Fwd Curve field. You can click ... to select a curve outside of the package.

[NOTE: Curves outside the package are NOT regenerated. They are only used by the package]



TripleGlobal Generator

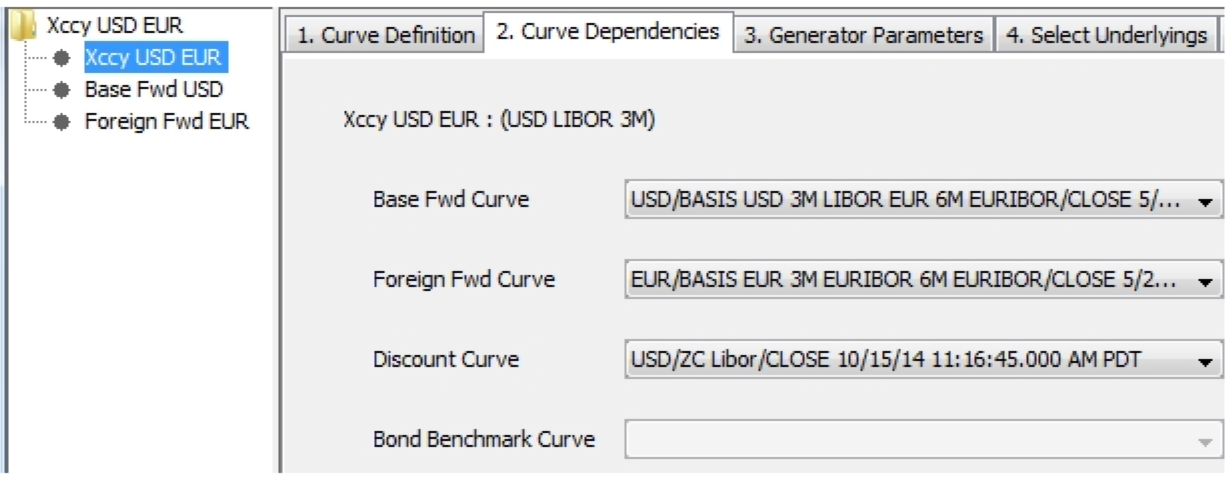
For the TripleGlobal generator, the system generates three curves simultaneously for cross-currency swaps: two forward curves and one cross-currency curve.

For the cross currency curve:

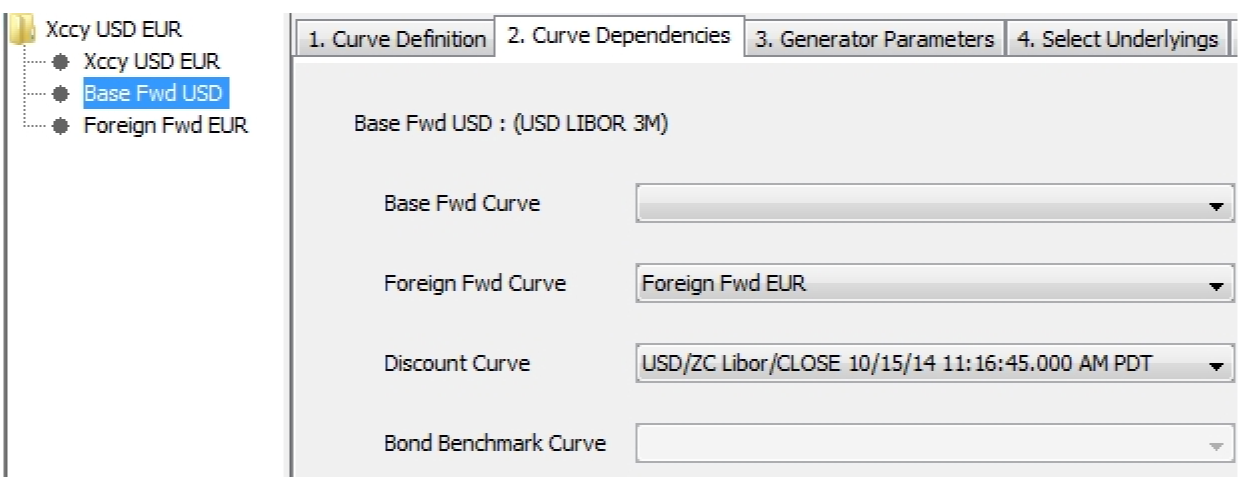
- Select a curve in base currency in the Base Fwd Curve field (it can be the forecast curve in base currency defined in the package).
- Select a curve in foreign currency in the Foreign Fwd Curve field (it can be the forecast curve in foreign currency defined in the package).
- Select a discount curve.

You can click ... to select a curve outside of the package.

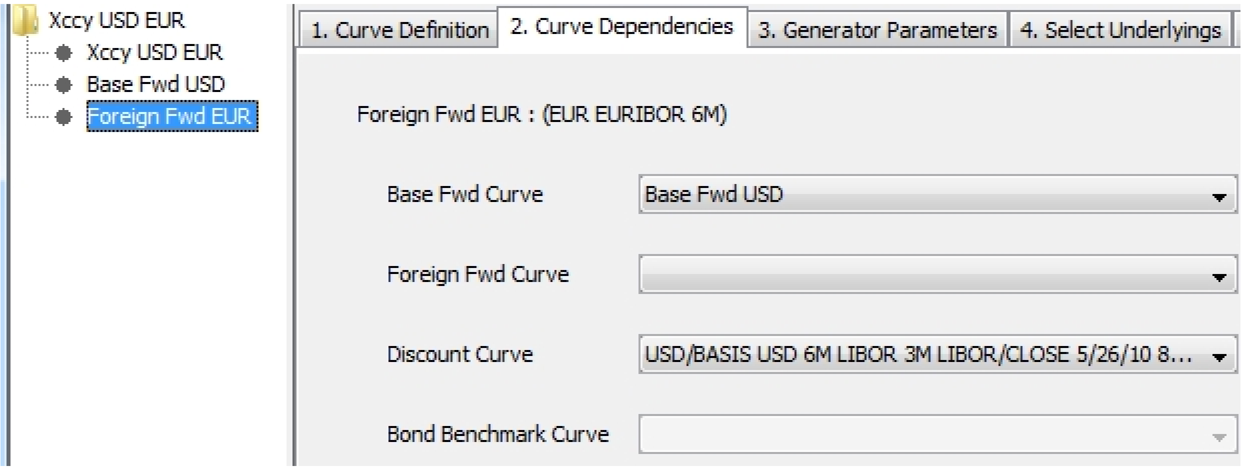
[NOTE: Curves outside the package are NOT regenerated. They are only used by the package]



For the forecast curve in base currency, select the forecast curve in foreign currency in the Foreign Fwd Curve field, and a discount curve in the Discount Curve field. You can click ... to select a curve outside of the package.



For the forecast curve in foreign currency, select the forecast curve in base currency in the Base Fwd Curve field, and a discount curve in the Discount Curve field. You can click ... to select a curve outside of the package.



Step 3 - Generator Parameters tab - Define generator parameters for each curve as needed.

▶ See Generating Derived Zero Curves for details on zero curves.

▶ See Generating Basis Curves for details on basis curves.

Only one curve in the package can use the shaping method "Daily Forwards Spread". Unlike for a single curve, in the multi-curve this spread method is computed for the entire curve (the "100Y" choice), regardless of the user's choice. Thus it cannot be applied to only parts of the curve, as it can in the single curve window.

Also, daily points are not stored on the curve. This decreases memory requirements of the curve and increases speed. Instead, the points seen on the curve will be the union of the maturity dates of the curve underlying and all the points calculated on the shaping curve (the curve to which the spreads are added). The shaping curve is specified by the generator parameter of that name, and has choices of Base and Discount.

Initial Guess Strategy (DoubleGlobalM Generator)

DoubleGlobalM generator generates two curves simultaneously, in two phases: in the initial guess phase, suitable trial curves are found for both curves, and in the optimization phase, the optimization algorithm is executed, using the trial curves from the initial phase as the initial guess.

This parameter adds flexibility to the initial guess phase. It can be set to: Single Trial Curve (default) or Distinct Trial Curves.

- Single Trial Curve - One single curve is bootstrapped and used as the initial trial curve for both curves in the package.
- The "Distinct Trial Curves" option introduces new behavior: two distinct trial curves are bootstrapped, one for each curve in the package. This option is not supported when the two curves in the package are Base Curve of

each other, in which case an exception is thrown, as this type of mutual dependency makes it impossible to bootstrap the curves independently of each other.

There is a performance trade-off between the 2 strategies:

- Single Trial Curve spends less time on the initial guess phase but since there is only one trial curve, it can happen that the initial guess is significantly off from the optimal curves, resulting in a longer optimization phase time.
- Distinct Trial Curves spends more time on the initial phase, but that will be partially offset by a faster optimization, since there is a good chance that the distinct trial curves are closer to the optimal curves than in the single curve case.

Step 4 - Select Underlyings tab- Select underlying instruments for each curve.

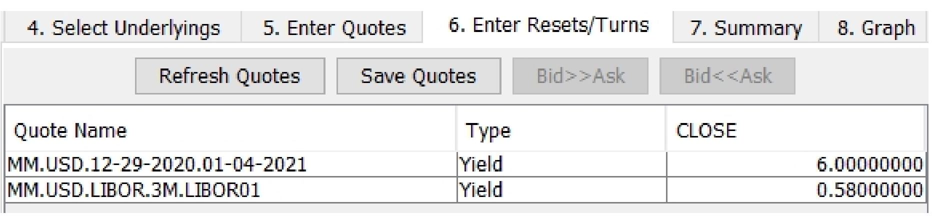
▶ See Generating Derived Zero Curves for details on zero curves.

▶ See Generating Basis Curves for details on basis curves.

TIP: To open any of the underlyings from the Select Underlyings tab, press Ctrl and double-click the underlying.

Step 5 - Enter Quotes tab - Enter / review quotes for each curve.

Step 6 - Enter Resets/Turns tab - Enter / review resets and turn rates for each curve as needed.

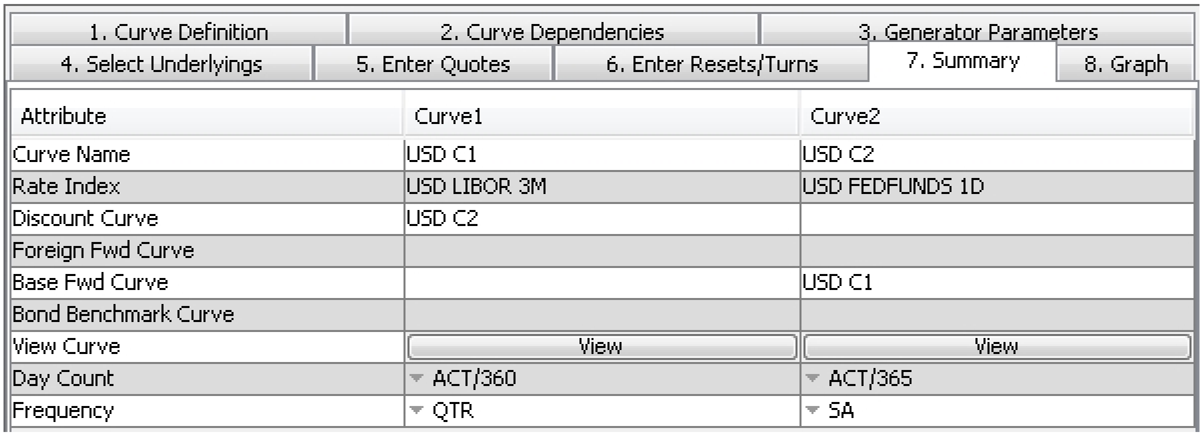


Step 7 - Generate the curves.

Click **Generate** to generate the curves. For a new package, you will be prompted to enter a package name.

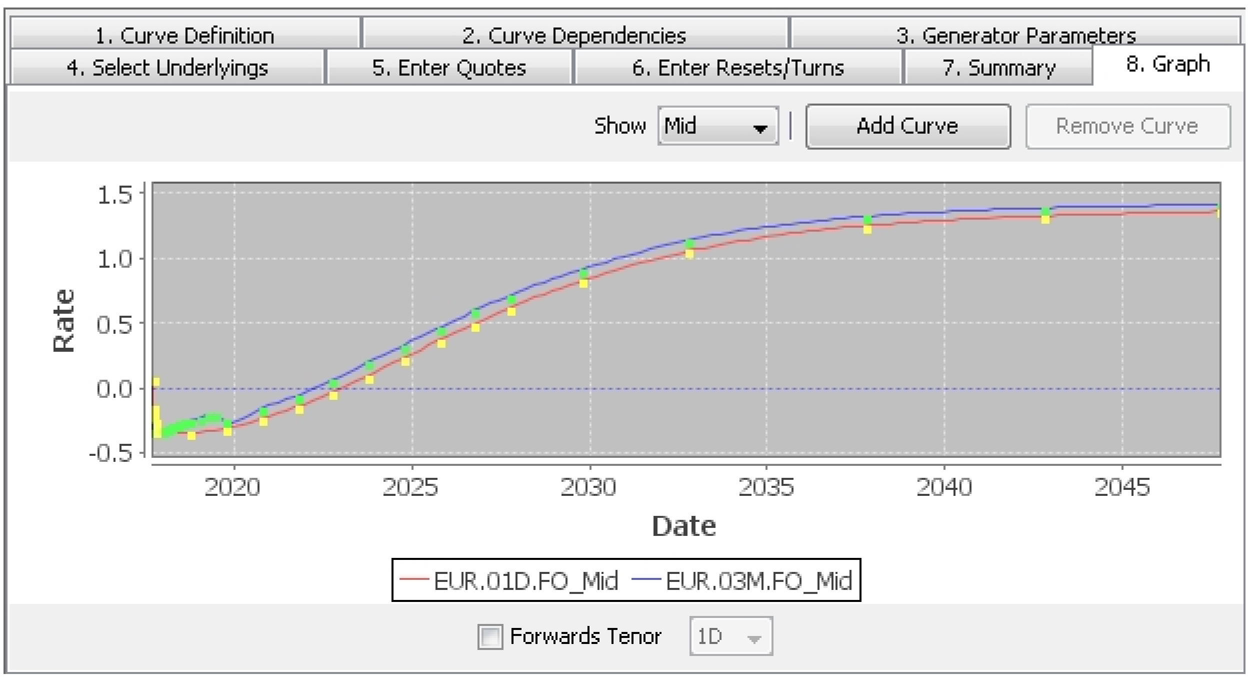
- You can view the package summary in the Summary tab with the curve dependencies.

  Here you can also make Day Count and Frequency settings for each curve in the package. Different curves can use different settings.



Attribute	Curve1	Curve2
Curve Name	USD C1	USD C2
Rate Index	USD LIBOR 3M	USD FEDFUNDS 1D
Discount Curve	USD C2	
Foreign Fwd Curve		
Base Fwd Curve		USD C1
Bond Benchmark Curve		
View Curve	View	View
Day Count	ACT/360	ACT/365
Frequency	QTR	SA

- You can click **View** for each curve to display the generated curve.
- To see a graph of points plotted for all curves in the package, see the Graph tab.



  - Use the "Show" drop-down to select the quote type.
  - You can click **Add Curve** to manually load dependent curves. Click **Remove Curve** to remove any curve from the graph.
  - Select the "Forwards Tenor" checkbox to display forwards. When the checkbox is selected you can choose the tenor from the drop-down.

Step 8 - Save.

Click **Save** to save the package.

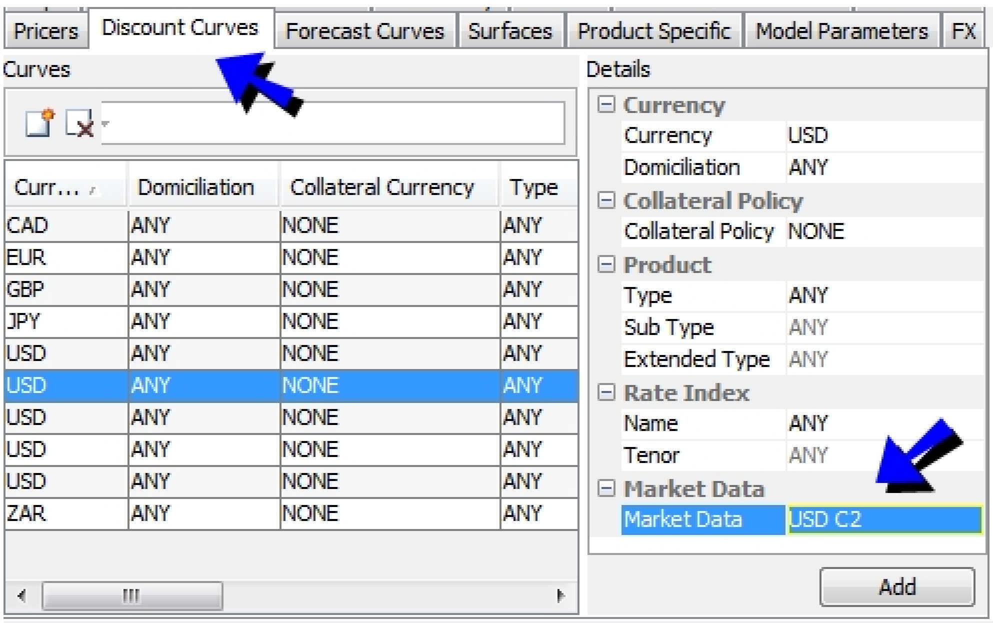
21.2 Pricer Configuration

You need to assign each curve defined in the multi-curve package to a pricer configuration.

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**, and click **Load** to select a pricer configuration name.

21.2.1 Discount Curves

Select the "Discount Curves" panel to assign the discount curves.

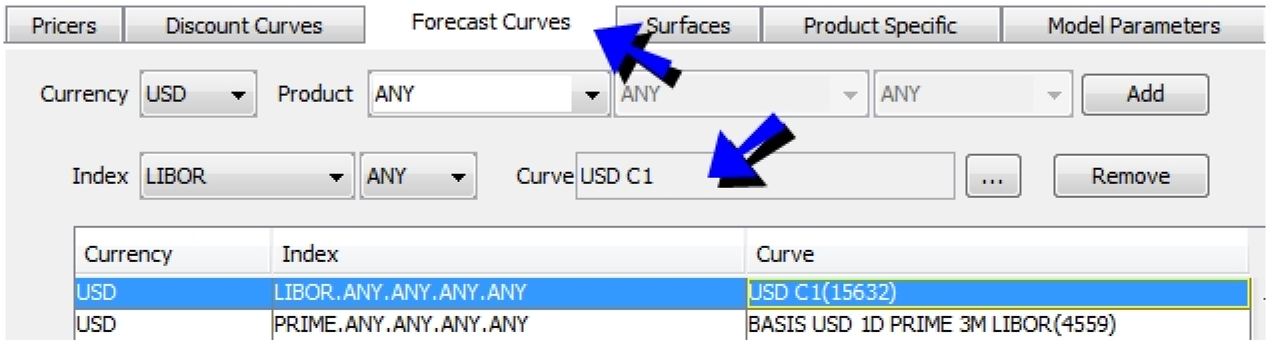


- Select the parameters for which the curve applies, and select the curve.
- Click **Add** to add the curve to the pricer configuration.
- Then click **Save** to save the pricer configuration.

▶ See Pricer Configuration for details on this panel.

21.2.2 Forecast Curves

Select the "Forecast Curves" panel to assign the forecast curves.



» Select a currency, a product or ANY, a subtype or ANY, an index, a tenor or ANY.

» Click **...** to select the curve.

» Click **Add** to add the curve to the pricer configuration.

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

▶ See Pricer Configuration for details on this panel.

22. Zero Curves Reports

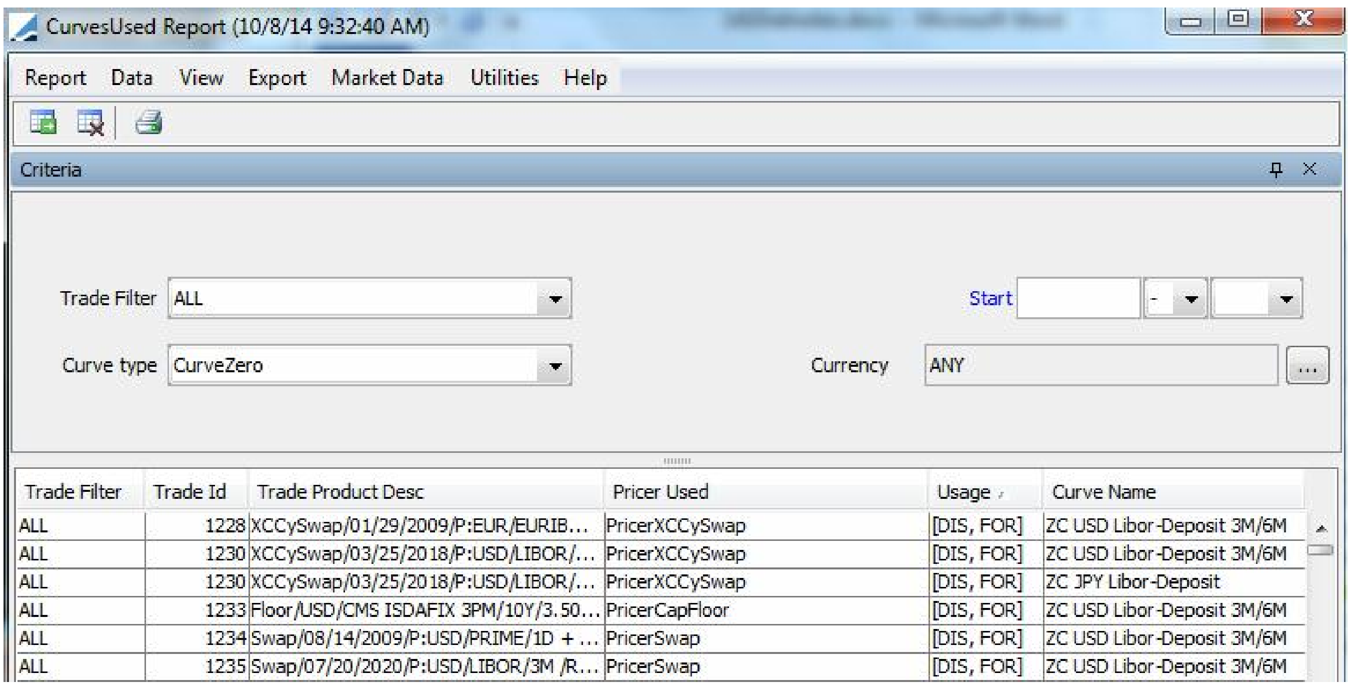
The following reports are available for zero curves.

- Curves Used
- Curves Points
- Daily Discount Factors

22.1 Curves Used

Add a menu item for action `reporting.ReportWindow$CurvesUsed`.

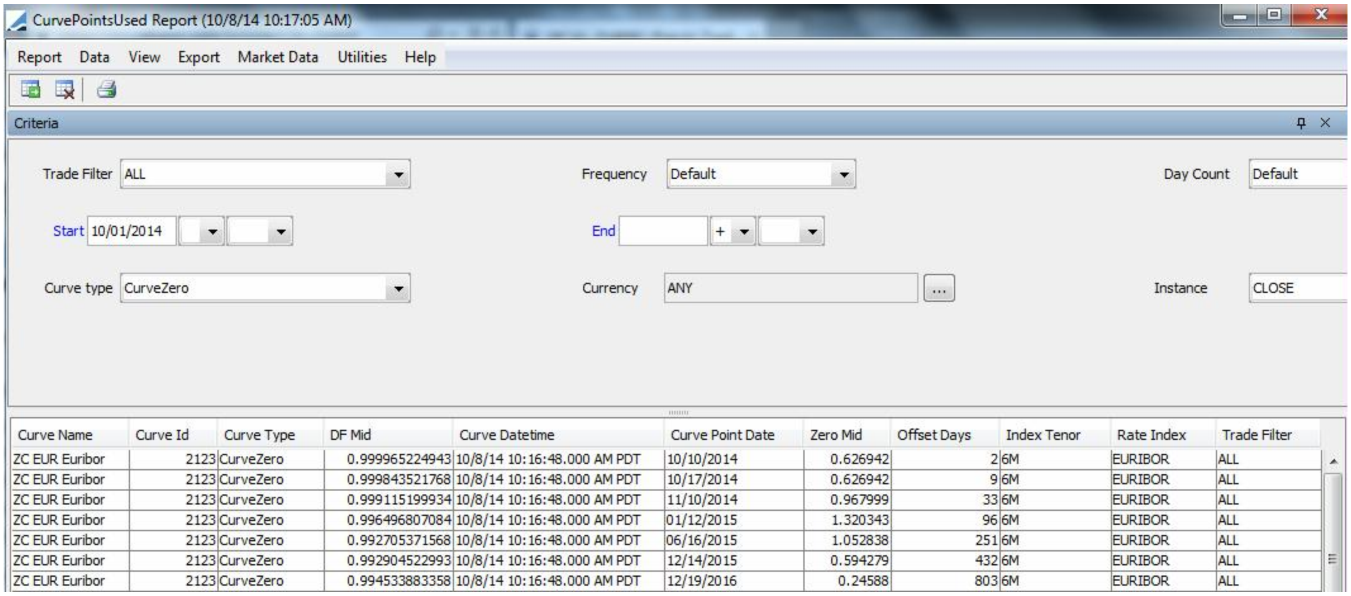
The Curves Used report allows viewing zero curves used for a given trade filter.



22.2 Curves Points

Add a menu item for action `reporting.ReportWindow$CurvePointsUsed`.

The Curves Points report allows viewing points of zero curves used for a given trade filter.



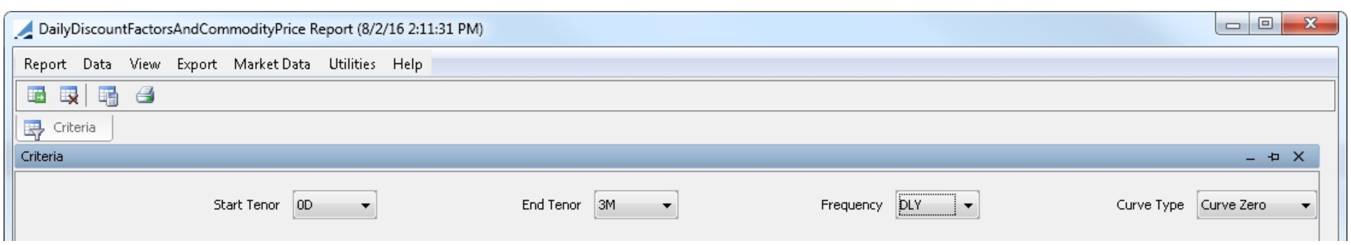
Make sure to select a start date.

22.3 Daily Discount Factors Report

The Daily Discount Factors report displays daily discount factors and zero rates for all discount curves used in a particular pricing environment. The report exports curve points as they exist in the curve object based on selections made for start and end tenors and frequency.

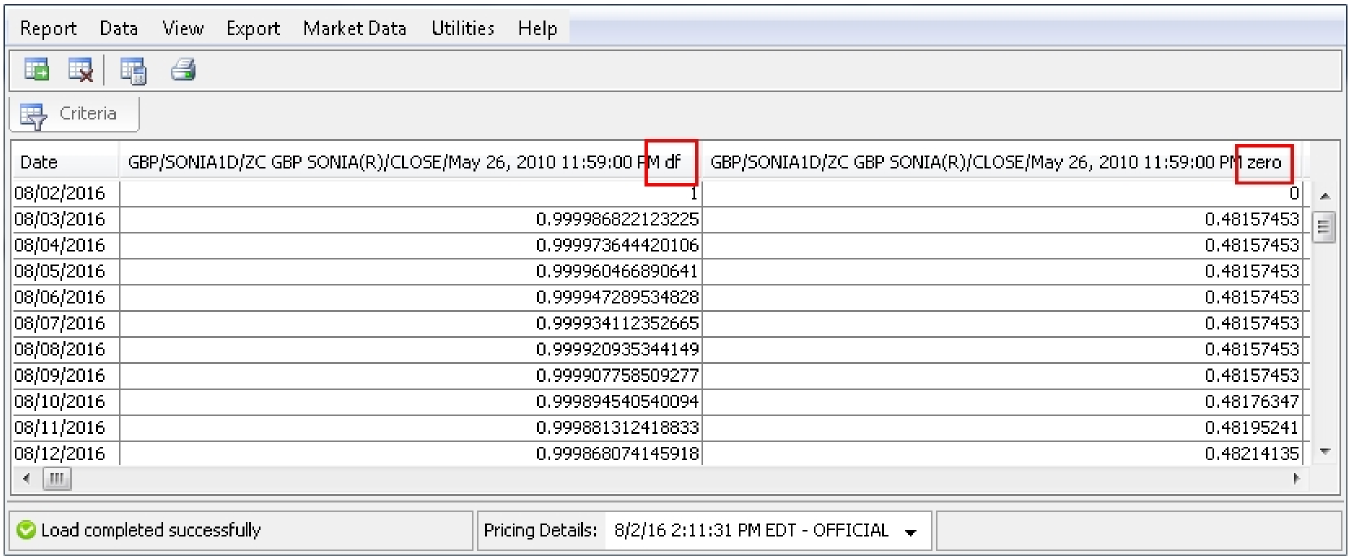
The menu action to launch the report is `reporting.ReportWindow$DailyDiscountFactorsAndCommodityPrice`.

After you launch the report, click **Criteria** to make settings for the report output.



» Select a Start Tenor, End Tenor, and Frequency from the drop-down lists. Curve Zero is currently the only option for the Curve Type setting.

» Click to load the report and view results.



Date	GBP/SONIA1D/ZC GBP SONIA(R)/CLOSE/May 26, 2010 11:59:00 PM df	GBP/SONIA1D/ZC GBP SONIA(R)/CLOSE/May 26, 2010 11:59:00 PM zero
08/02/2016	1	0
08/03/2016	0.999986822123225	0.48157453
08/04/2016	0.999973644420106	0.48157453
08/05/2016	0.999960466890641	0.48157453
08/06/2016	0.999947289534828	0.48157453
08/07/2016	0.999934112352665	0.48157453
08/08/2016	0.999920935344149	0.48157453
08/09/2016	0.999907758509277	0.48157453
08/10/2016	0.999894540540094	0.48176347
08/11/2016	0.999881312418833	0.48195241
08/12/2016	0.999868074145918	0.48214135

- The names of curves are listed horizontally at the tops of columns, and dates for curve points are listed vertically in the first column.
- Each curve provides output in two columns to display both daily discount factors and zero rates.

» You can click to clear items in the report panel and any templates that were used to generate results.

» You can select a template and click to display the number of objects that will be loaded from the database before loading the report.

» You can click to print the report results.

» You can also click the down arrow in the Pricing Details field to change the valuation date and select a different pricing environment.

23. Market Data Smoothness Report

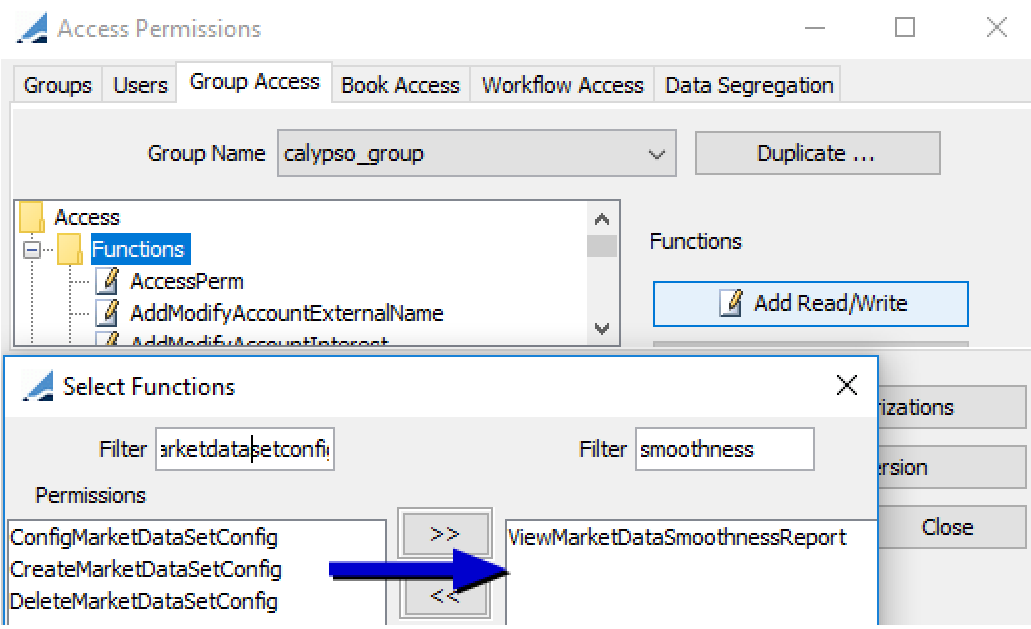
Market data smoothness report allows you to review the smoothness of the interest rate zero curves, forward curves as well as vol surfaces. This report helps in highlighting any steep jumps in the market data like interest rate curves and vol surfaces. This report will enable you to identify any inconsistent points and capture any false market data moves.

It will run on persisted market data only. Currently there is no support for any real-time updates however it will be possible to manually refresh the report to pick up any newly updated and saved market data instances.

Before you Begin

You will need to specify the following access permissions to be able to view the market data smoothness report as well as create, configure and delete a market data set.

- CreateMarketDataSetConfig
- ConfigMarketDataSetConfig
- DeleteMarketDataSetConfig
- ViewMarketDataSmoothnessReport



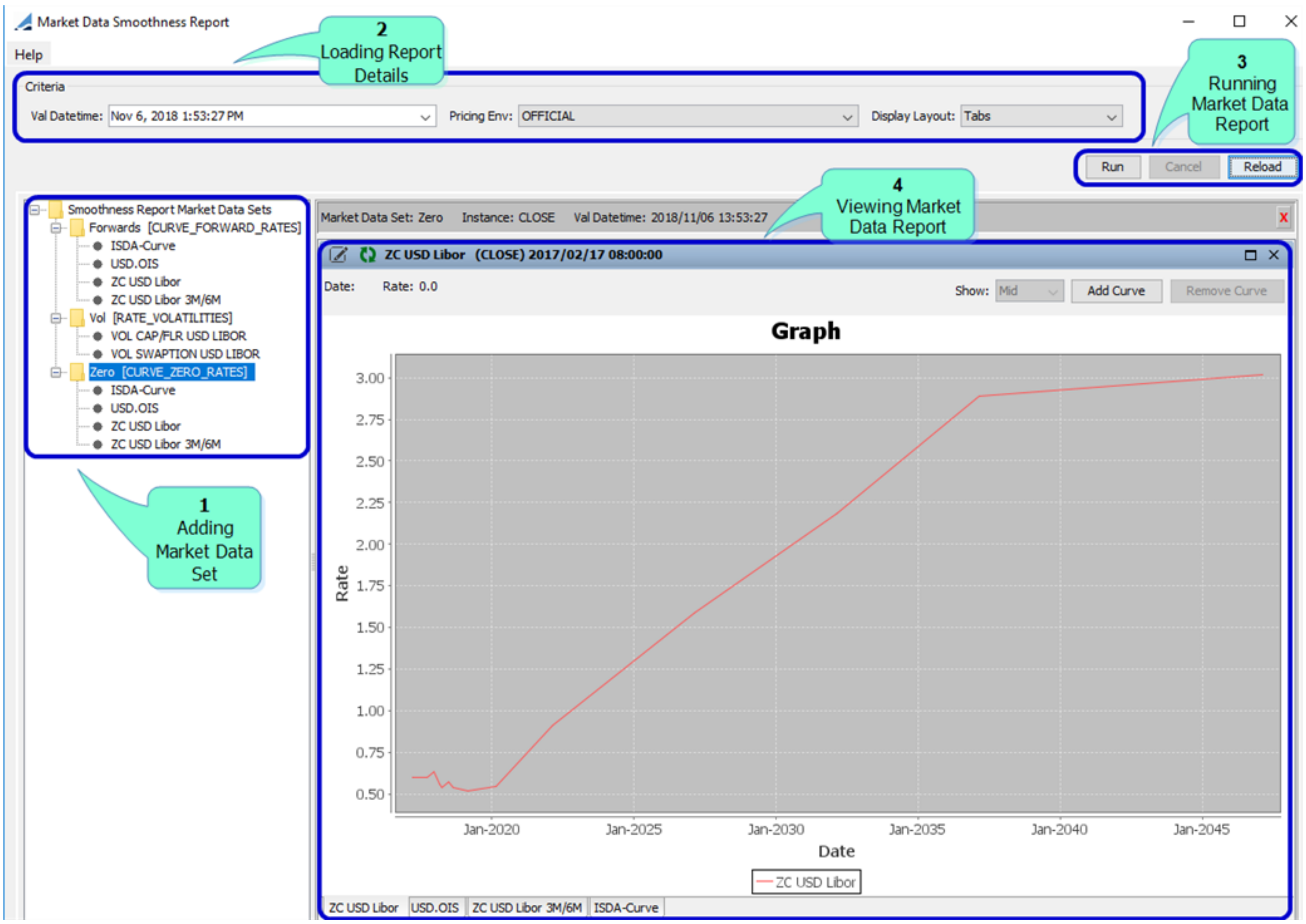
You need to create a menu item for the Market Data Smoothness Report using menu action `marketdata.reports.MDSmoothnessReportFrame`.

23.1 Supported Market Data

The Market Data Smoothness Report currently supports the market data of type:

- CurveZero
- CurveBasis
- CurveZero or CurveBasis generated via Multicurve Package (Please refer to the *Calypso Multicurve Package* documentation for more details)
- VolSurface3D of Type = RATE

23.2 Tour of market data smoothness report

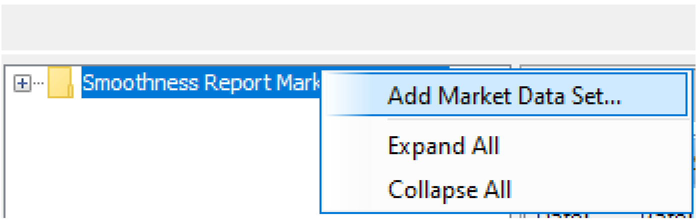


Sample of a Zero Curve Market Data Report in tab view mode

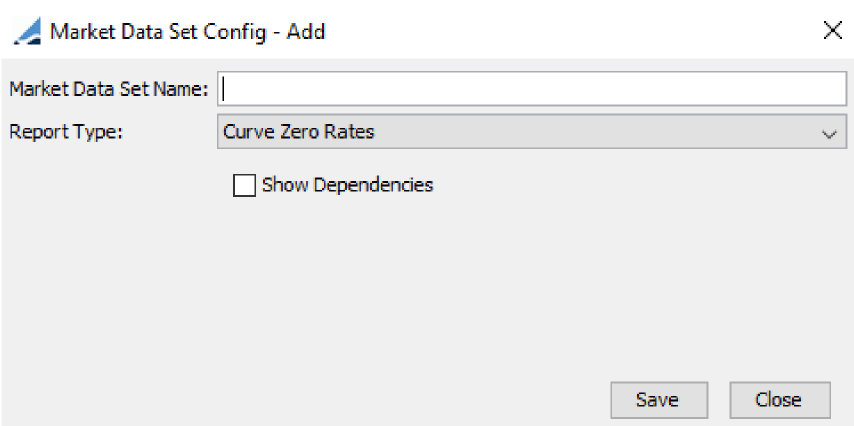
23.2.1 Adding Market Data Set

Market data set will contain the name of the market data set, report type and configured market data.

Step 1: Right click on the folder *Smoothness Report market Data Set*to add the market data set. It will open up a pop-up as shown below.

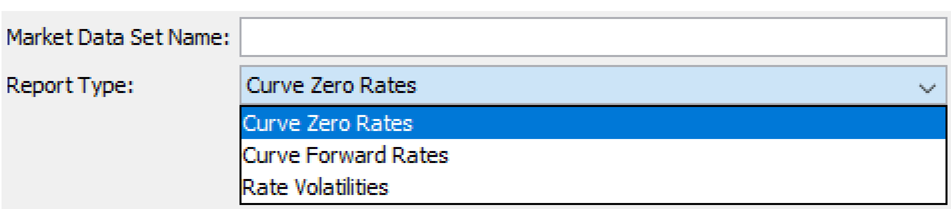


Step 2: Click on the **Add Market Data Set** and that will open another pop-up *Market Data Set Config*.



» Market Data Set Name - Enter the name of the market data set.

» Report Type - Enter the type of market data that can be selected in the market data set. Click **Save**. Possible options are Curve Zero Rates, Curve Forward Rates and Rate Volatilities.



- Curve Zero Rates - Displays graphs of zero rates for selected curves. This includes Curve Zero, CurveBasis using standard and multicurve generators.

  Additional Options :

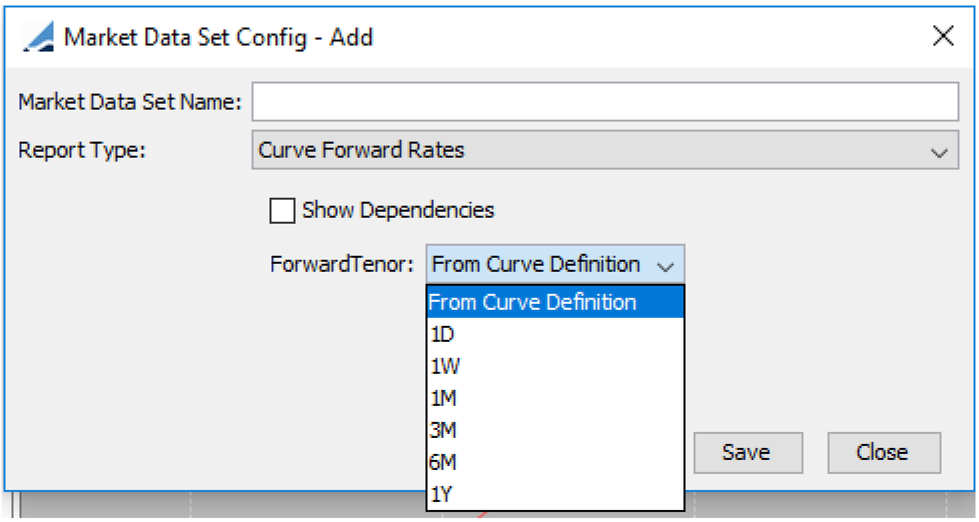
  – Show Dependencies : A boolean flag with default value as FALSE when unchecked. If TRUE when checked, then the dependent curves(if any) will be graphed along with the selected curve.

- Curve Forward Rates - Displays graphs of forward rates for selected curves. This includes CurveZero, CurveBasis using standard and multicurve generators.

  Additional Options :

- Show Dependencies : A boolean flag with default value as FALSE when unchecked. If TRUE when checked, then the dependent curves(if any) will be graphed along with the selected curve.
- Forward Tenor Selection : A drop down list with the following hard coded values; "From Curve Definition", 1D, 1W, 1M, 3M, 6M, 1Y.

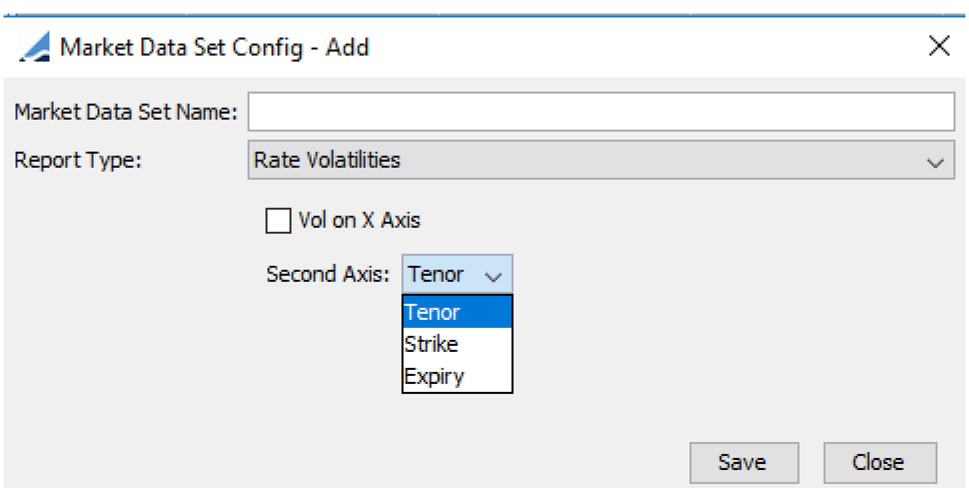
  Default value is "From Curve Definition" meaning the Rate Index Tenor is selected from the curve definition tab. If the Rate Index Tenor is blank, it falls back to 1D.



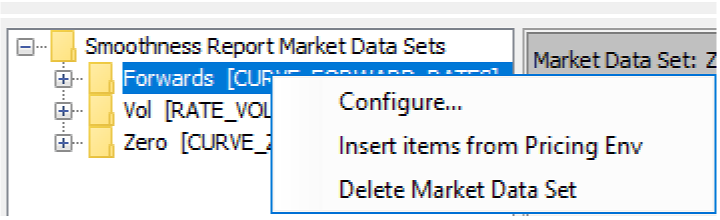
- Rate Volatilities - Displays 2D graphs of implied volatilities and selected axis. It includes VolSurface3D of Type = RATE.

  Additional Options :

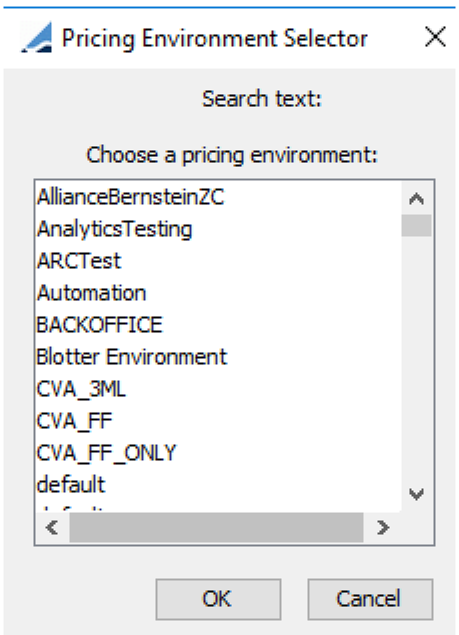
  - Vol on X-axis : A boolean flag with a default value as FALSE when unchecked. If checked it means, the vol will be displayed on the X axis. The implied vol is graphed on the Y axis by default.
  - Second Axis : A drop down list which enables you to select Tenor, Strike or Expiry to be graphed on the second axis.



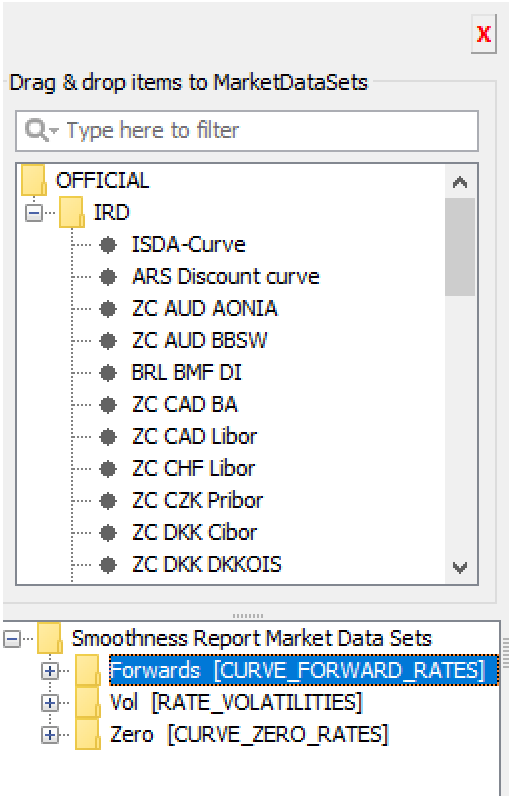
Step 3 : A market data set node is added to the tree panel under the main folder *Smoothness Report Market Data Sets* once its added as described above. Right click on the added market data set node. That will open up a pop up as shown below.



- Configure - The configure option will open up the *Market Data Set Config* as described in **Step 2**.
- Insert Items from Pricing Env - Click to open the pricing environment selector.

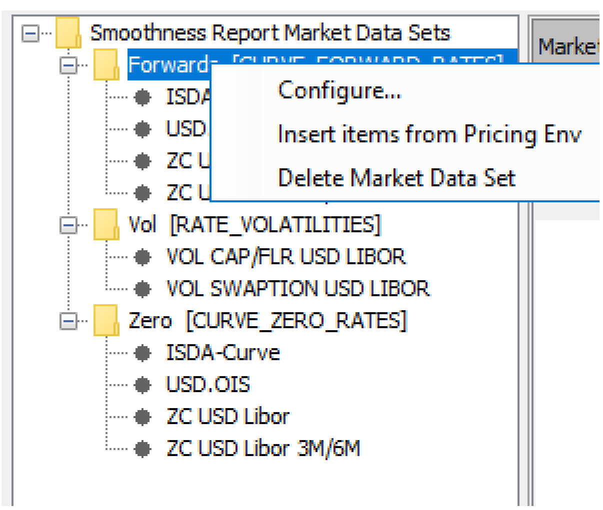


Click on the pricing environment of interest and click **OK**. That will open up a pop up window with list of configured market data filtered for the report type on the selected node. If the report type is "CurveZero Rates" only the curve types falling under zero category will be displayed in the pop up window for the selected pricing environment.



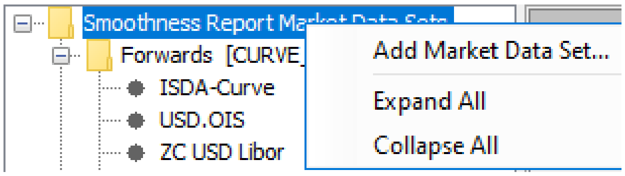
You should be able to drag and drop single or multiple selections to Market Data Set nodes. It is also possible to filter on name, currency as an example using the filter as shown above.

Market Data Tree Panel

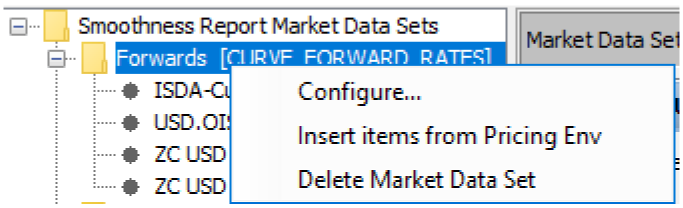


On the left side of the Market Data Smoothness Report, there is a tree panel that gets added after you follow steps described above. The hierarchy is as follows:

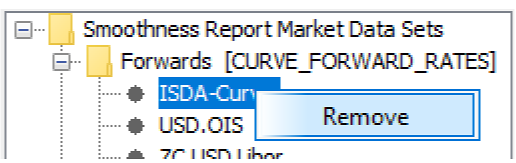
Main node - Smoothness Report Market Data Sets. When you right click on this node, you can Add a market data set. You can expand to the lowest market data dependency node. You can also collapse to market data sets node.



Secondary node- Configured report type . When you right click on this node, you can configure and add market data items to the market data set.



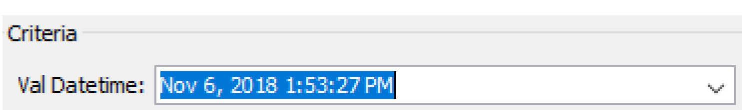
Tertiary node - Items inserted by dragging and dropping from the pricing environment pop up. When you click on this node, you can delete or remove the market data item added.



23.2.2 Loading Report Details

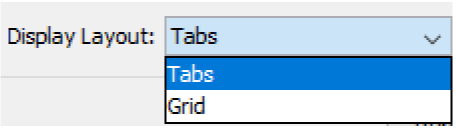
The system will allow you to enter the following input parameters for generating the report.

- Val Datetime - Enter valuation date and time for which you want to run the report. The report will run as of this date and time. It loads the latest market data instances as of this date for the market data specified in the market data set. Default is current date and time.

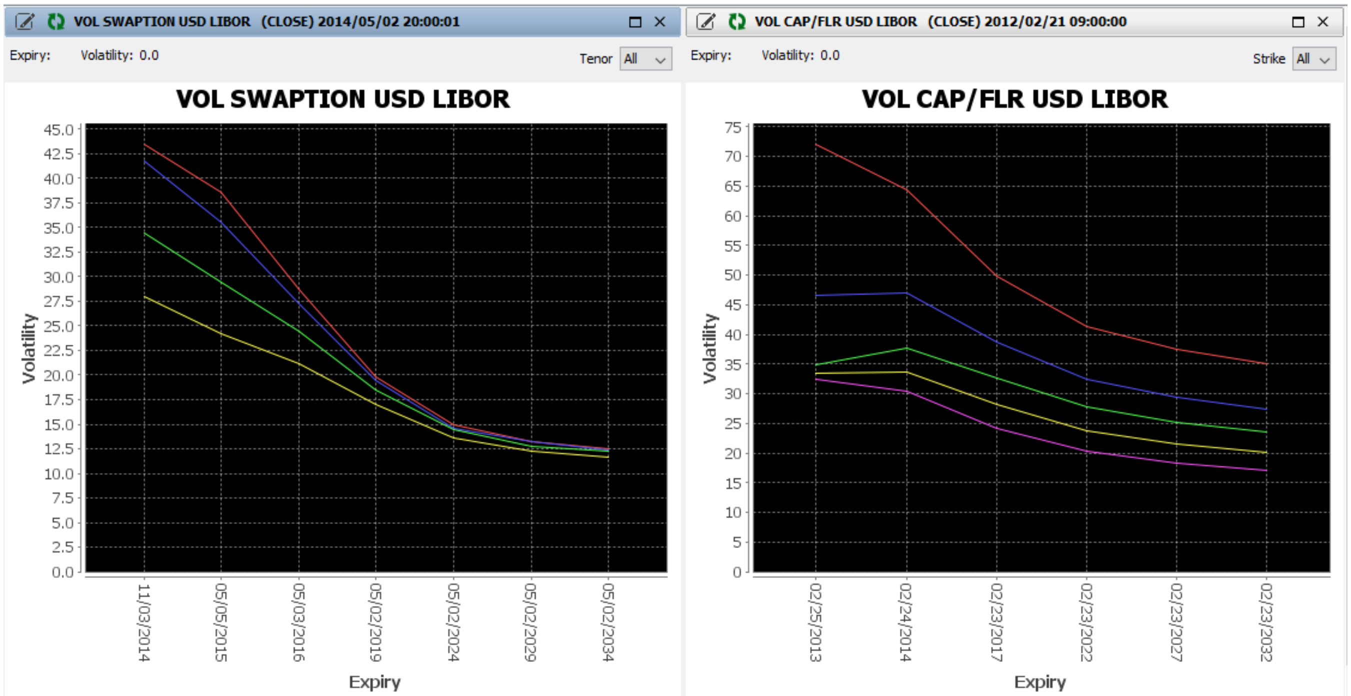


- Pricing Env - Enter the pricing environment which determines the instance type of market data to be loaded (CLOSE, LAST, OPEN). It also supplies the time zone for comparing the Val Date and Market data instance dates.

- Display Layout - Grid and Tabs



Grid - All market data graph panels will be displayed as a grid.



An example of swaption and cap/floor vol surfaces in grid view mode

Tab - All market data graph panels will be displayed as tabs so only the first graph is visible and you must tab through to see the remaining panels.

[Note: You need to re-run the report when you change the view from tab to grid or vice-versa]

23.2.3 Running market data report

Click on the market data set node in the tree panel on the left side of the smoothness report. You can perform the following actions:

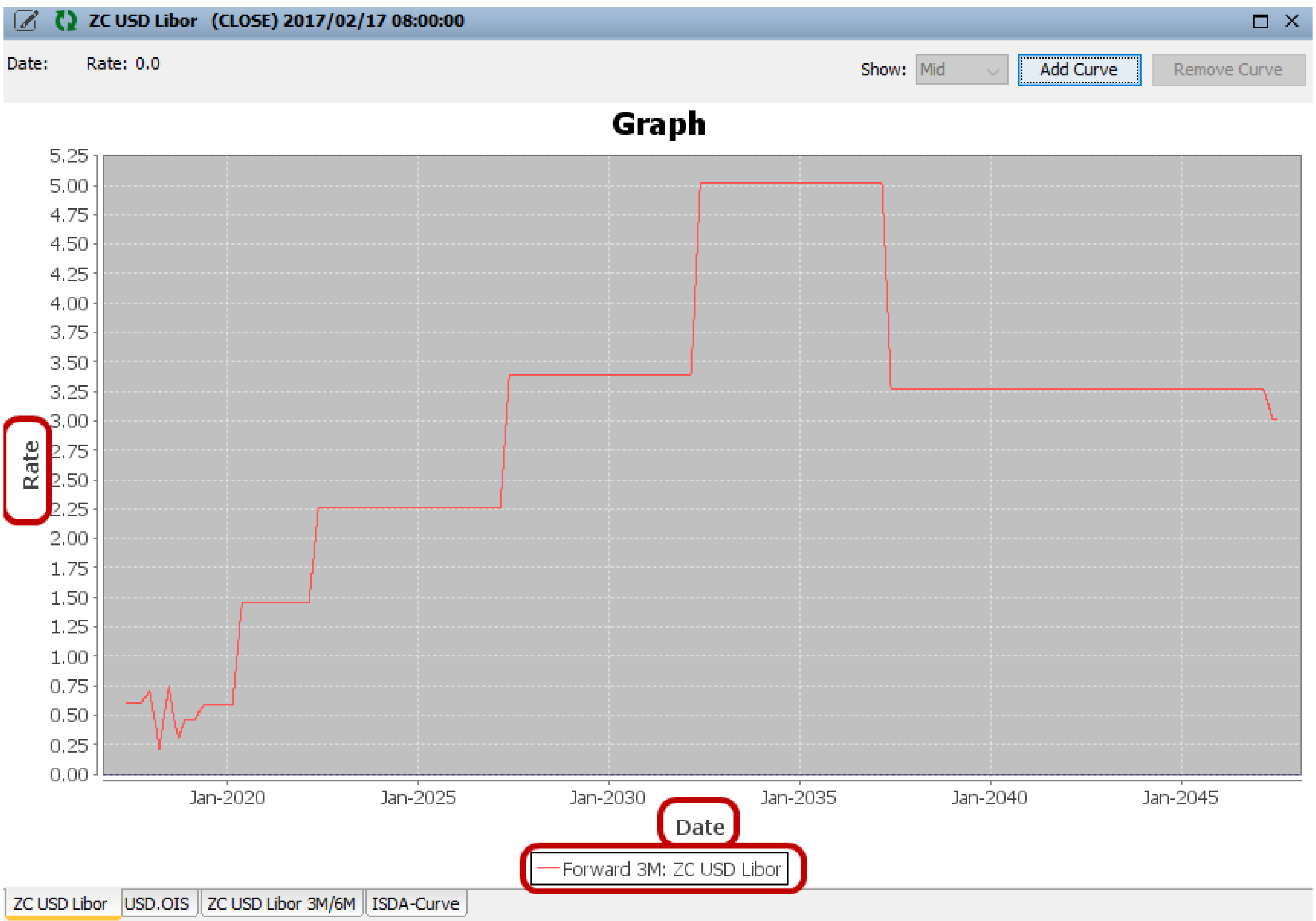
- Run - Click on the **Run** to execute the report. A graph will be displayed on the screen based on the market data set selected as of the val date, time and pricing environment entered on the top of the report.
- Cancel - Click on **Cancel** to stop loading the report.

- Reload - Click on **Reload** to reload the entire report or individual market data graphs. The button will reload the whole report and pick up any newly saved instances of market data since the last run.

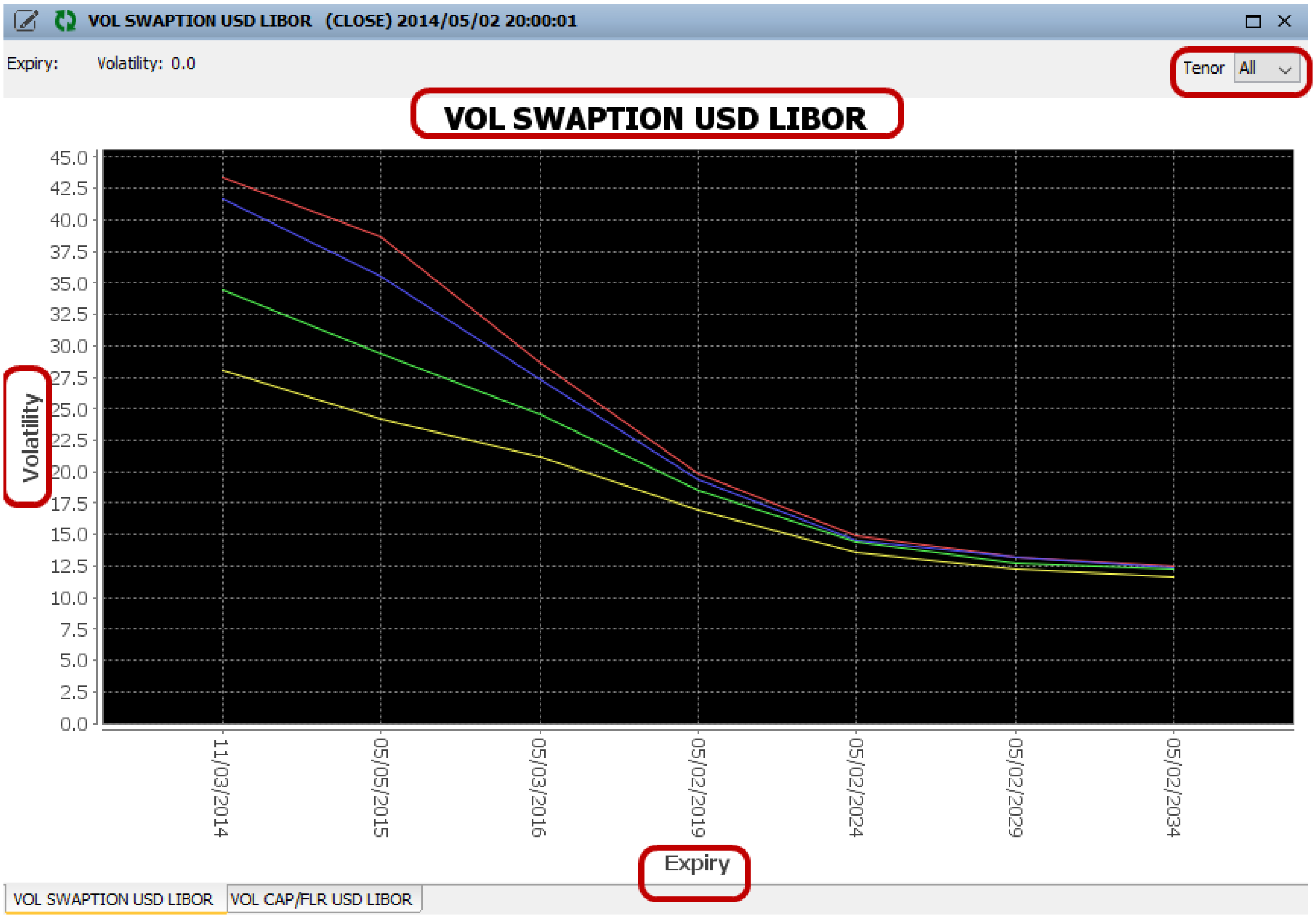
23.2.4 Viewing Market Data report

Graph panel comprises of the following :

- Graph - All graphs will be 2D graphs. For curves, the axes are always Rate (Y axis) by Date (X axis). Based on the configuration, it can either be zero rates or forward rates. For vols, the Y axis is implied volatility and X axis is driven by you based on your selection in the market data set config window. By default, the report always displays "Mid" data.



An example of forward rate curve

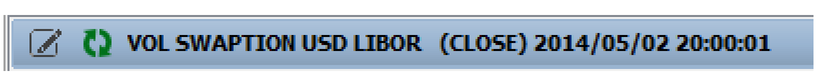


An example of swaption vol surface

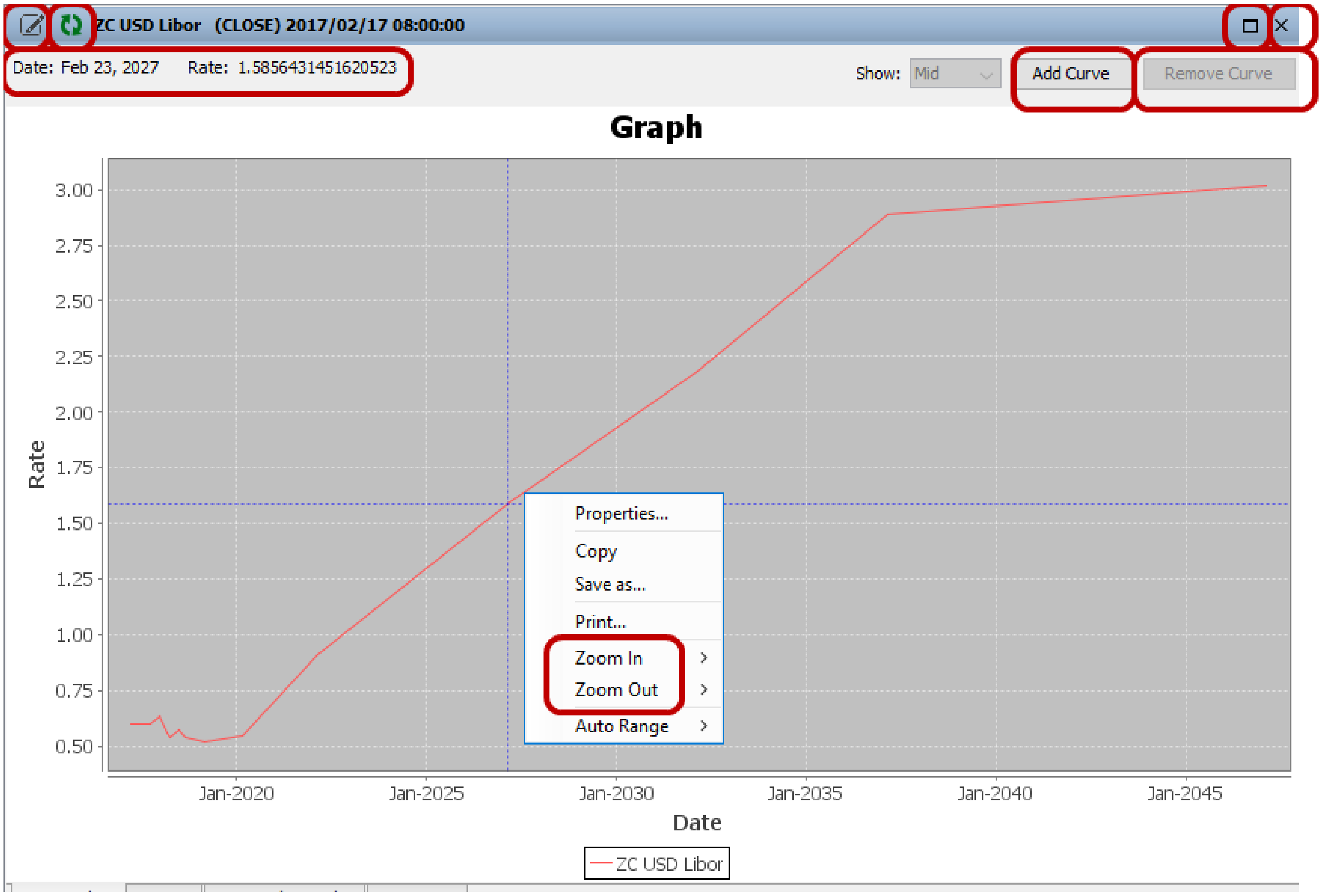
For the Vol surface, there is a third data set displayed as a slice. When the vol graph is first opened, the slice drop down uses "ALL" by default. You can filter on individual slice values as desired. The example above has expiry on the X second axis.

- Labels - The graph axes are labeled with Rate, Date, Expiry Volatility, Tenor, Strike based on the selection made in the market data set config. It also displays the headings of the market data items selected in the market data set.

- Market Data Information - The graph panel top heading includes a market data name, market data instance (CLOSE, LAST, OPEN) and market data instance Datetime.



- Interactions -



An example of a zero rate curve opened in tab view

Once the report is loaded, you can interact with the output in the following ways:

– Zoom : Provides the ability to zoom in and zoom out of the graph.
– Show Data : Clicking on any part of the graph will give detailed data regarding the point on the graph. For curves, the detailed data shows Date and Rate. For vols, the detailed data shows Tenor, Strike, Expiry and Volatility depending upon what is selected in the market data set.
– Add/Remove Curve - You can add a curve to the selected graph however this selection is only valid for the current session. When you reload the report, all adhoc curves that were added will be lost.
– Refresh/Reload Market Data - You can refresh  any specific graph panel. In this case, the latest persisted instance of the market data will be retrieved and re-graphed.
– Open Market Data Window - You can open the market data window  associated with the given graph panel. This helps in investigating any issues with market data items for unexpected results.

- Maximize and Close Panel - You can temporarily maximize any single graph panel to the size of the overall report window. This is applicable when the display layout is grid. For both tab and grid views, there is an to close any panel.

24. FX Derived Zero Curves

From the Calypso Navigator, navigate to **Market Data > Interest Rate Curves > FX Derived Curve** (menu action `marketdata.CurveZeroFXDerivedWindow`).

An FX Derived Zero Curve generates an interest rate curve in one currency from the interest rate curve of another currency and an FX curve.

Refer to the *FX and Money Market Analytics Guide* for details about the curve generation algorithm.

24.1 General Curve Information

- The name of the curve is set upon saving. It will identify the curve throughout the system.
- The instance of the curve dictates the quote side of the underlying instruments to be used for generating the curve.
  - The CLOSE instance uses CLOSE quotes.
  - The LAST instance uses BID, MID, and ASK quotes.
  - The OPEN instance uses OPEN quotes.
- By default, the curve is saved as of the current date and time. You can clear the Current checkbox and change the curve date as needed.
- You can change the precision of the discount factors using **Utilities > Set Df Precision** - Default is 8.

Curve Update

You can use the scheduled task PROP_RATE_1BUSDAY to roll the quotes which are not liquid.

You can use the scheduled task GENERATE_CURVE to regenerate a curve as of the current valuation date.

Setup Information

The environment property INT_CURVE_INTERP_RATE_B impacts the zero curve.

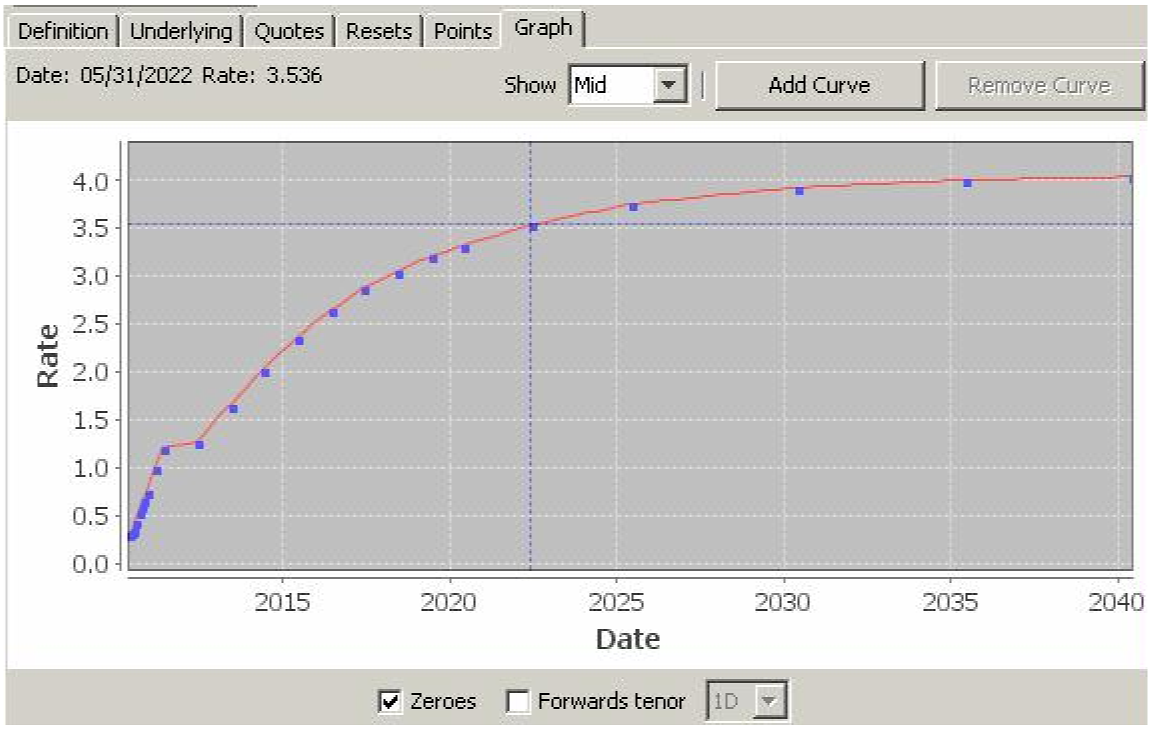
- If INT_CURVE_INTERP_RATE_B = Y (Default value), curves are interpolated on the zero rates.
- If INT_CURVE_INTERP_RATE_B = N, curves are interpolated on the discount factors.

However, you can override the interpolation space at the curve level using the "Interp As" field in the curve definition window:

- Default - Uses the value of environment property INT_CURVE_INTERP_RATE_B.
- Rate - Interpolates the curve on the zero rates, regardless of environment property INT_CURVE_INTERP_RATE_B.
- DiscountFactor - Interpolates the curves on the discount factors, regardless of environment property INT_CURVE_INTERP_RATE_B.

Graph Panel

Once a curve is generated, you can select the Graph panel to view the curve in graphical form.



24.2 Generating an FX Derived Zero Curve

FX Derived Zero Curve Quick Reference

Curve Underlying Instruments

The curve automatically includes the spot underlying instrument.

Optional — You can use Swap underlying instruments in building the curve. From the Calypso Navigator, navigate to **Configuration > Market Data > Curve Underlyings**, or in the curve application's Underlying panel, click **New/Edit Underlying**.

Curve Generation

1. Click **New** to start a new curve.

2. The Current checkbox is selected by default, meaning that when you save the curve, the system timestamps the curve with the current date and time. Clear the Current checkbox to enter a back-dated curve. You can modify the date and time fields.

3. Select the following to define the curve: solving for currency, reference index, and tenor, holiday calendars, interpolator, generation algorithm “FXDerived”, curve type CurveZeroFXDerived should be selected, Pricing Env, FX curve, and zero curve in the other currency.

4. Underlyings Panel — by default, the curve adds the spot underlying instrument for the currency pair defined in the FX curve. Also, you can select swap underlying instruments.

5. Quotes Panel — enter quotes manually, use quotes from the quote set, or use real-time quotes.

6. Points Panel — click **Generate** to generate the points.

7. Click **Save**, enter a name for the curve, and click **OK**.

Pricer Configuration

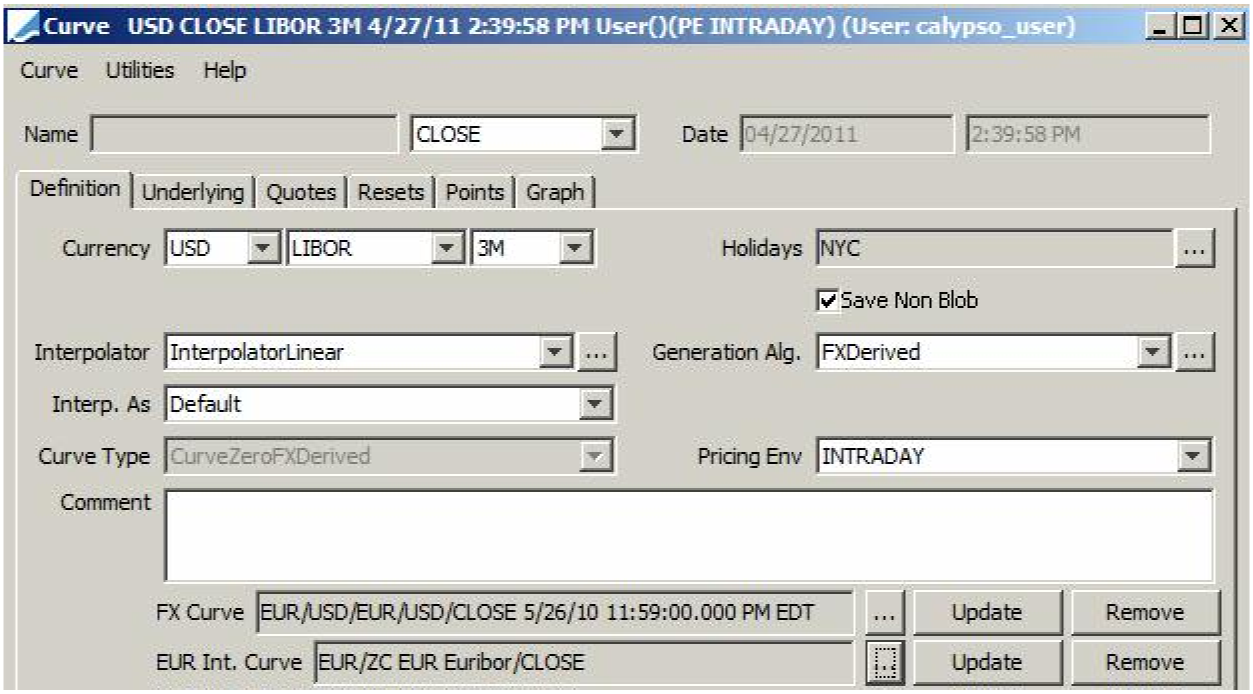
An FX Derived Zero Curve can be associated with a pricing environment under the Discount Curves or Forecast Curves panel in the pricer configuration.

[NOTE: The selected FX Curve and curve in the other currency must also be registered with the selected pricing environment]

24.2.1 Definition Panel

Click **New** to start a new curve.

Select the following to define the curve: solving for currency, reference index, and tenor, holiday calendars, interpolator, generation algorithm “FXDerived”, curve type CurveZeroFXDerived should be selected, Pricing Env, FX curve, and zero curve in the other currency.



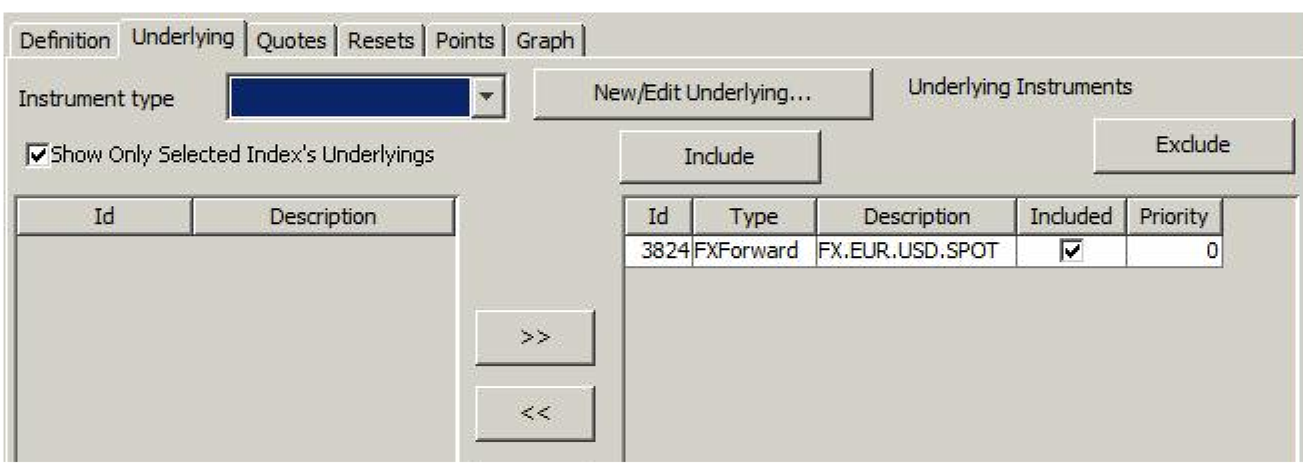
» Select the solving for currency, reference index, and tenor.

» Click ... to select the FX curve.

» Click ... to select the zero curve in the other currency.

24.3 Underlying Panel

Click the Underlying tab.



» By default, the curve adds the spot underlying instrument for the currency pair defined in the FX curve.

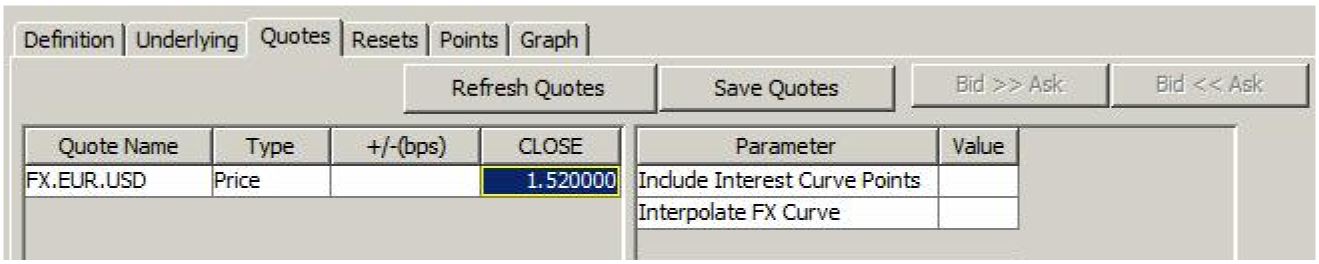
» Select other instruments as needed.

The panel below displays existing underlying instruments in the solving for currency. You can select these instruments to extend the curve beyond the points in the FX curve. This is optional.

24.3.1 Quotes Panel

Click the Quotes tab. You can enter quotes and **Save Quotes** to the quote set associated with the selected pricing environment.

The quotes may be automatically populated if you are running a real-time feed, or they may be populated from the quote set associated with the selected pricing environment.



You can set “Include Interest Curve Points” to true to include the interest rate points; otherwise, the points come only from the FX curve underlyings.

You can set "Interpolate FX Curve" to true to calculate the discount factor from the FX curve and other currency yield curve, instead of being interpolated between tenors.

Resets Panel

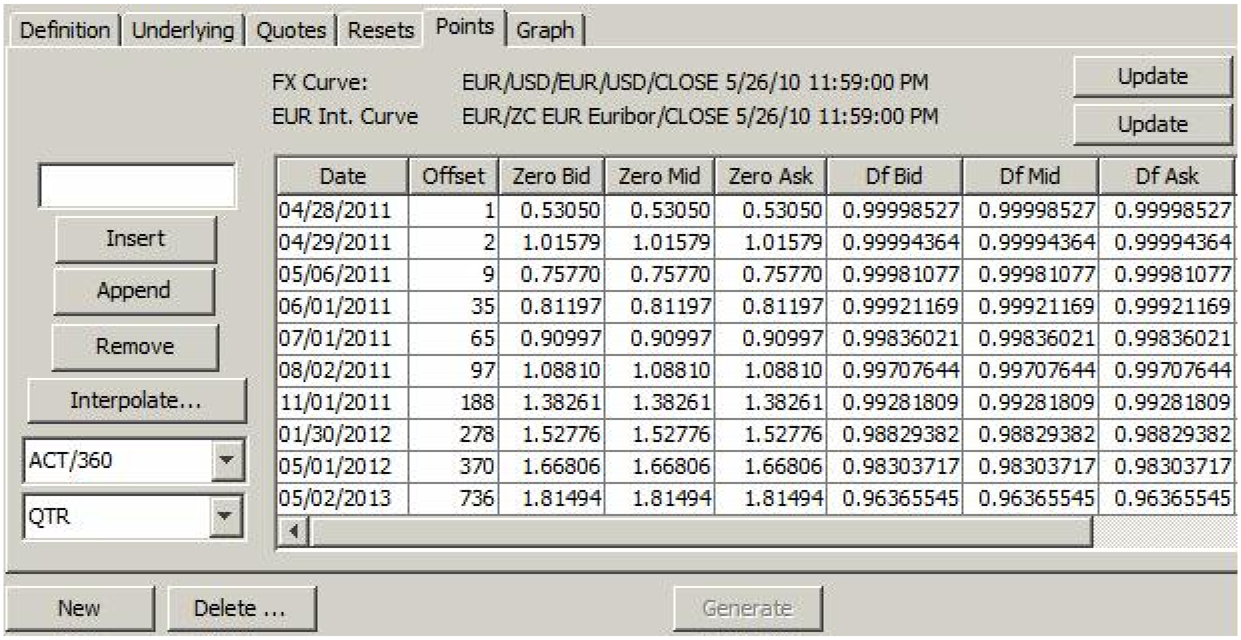
You can choose **Curve > Show Reset Tab** to display / hide the Resets panel.

The Resets panel shows manual resets requirements for underlying instruments (cash quotes associated with a given underlying instrument). This applies when "Manual First Reset" is checked in the definition of the underlying instrument.

[NOTE: If you hide the Resets panel, the required cash quotes are displayed in the Underlying panel, along with the quotes of the underlying instruments]

24.3.2 Points Panel

Click the Points tab.



- Select a daycount convention. From the Calypso Navigator, navigate to **Help > Day-Count Conventions** for descriptions.
- Click **Generate** to generate the points.

24.3.3 Save Curve

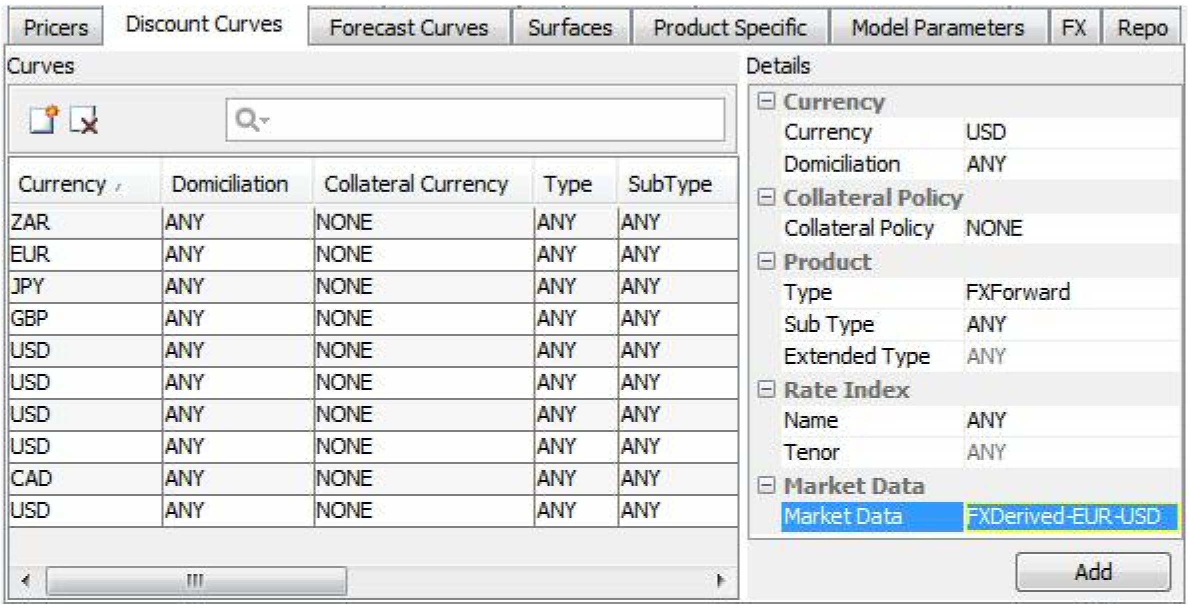
Click **Save** in the bottom of the curve window. Enter a name for the curve, and click **OK**.

24.4 Pricer Configuration

You can assign the FX Derived Zero Curve as a discount curve in the pricer configuration.

From the Calypso Navigator, navigate to **Market Data > Pricing Environment > Pricer Configuration**, and click **Load** to select a pricer configuration.

Click the Discount Curves tab.



- Select a currency, a product or ANY, a subtype or ANY, an index or ANY, a tenor or ANY.
- Click **...** to select a curve.

  If the curve you have created is not available for selection, make sure that CurveZeroFXDerived is set in domain "curveZeroType".
- Click **Add** to add the curve to the pricer configuration.
- Click **Save** to save the pricer configuration.

25. Zero Curve Worksheet

From the Calypso Navigator, navigate to **Market Data > Interest Rate Curves > Zero Yield Curve (Alternate)** (menu action `marketdata.USDCurveZeroWindow`).

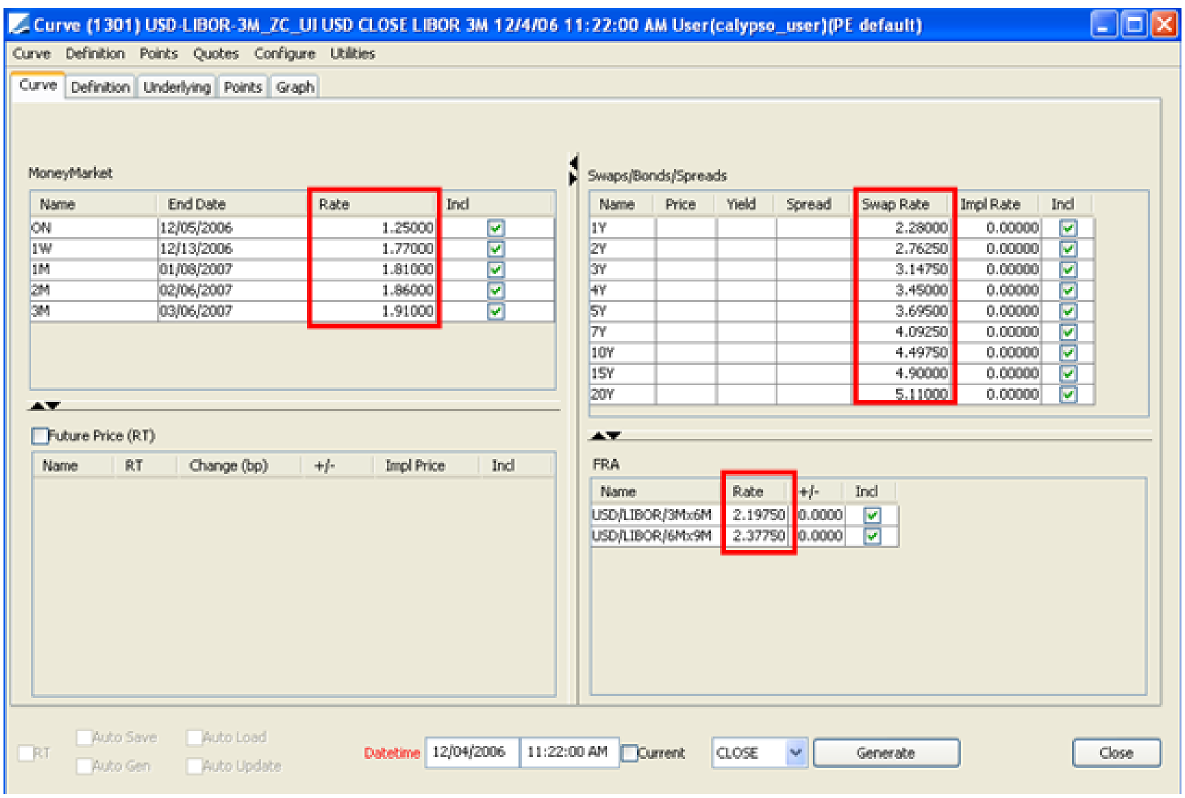
You can create zero curves using the Zero Curve Worksheet.

» Press [F4] to start a new curve.

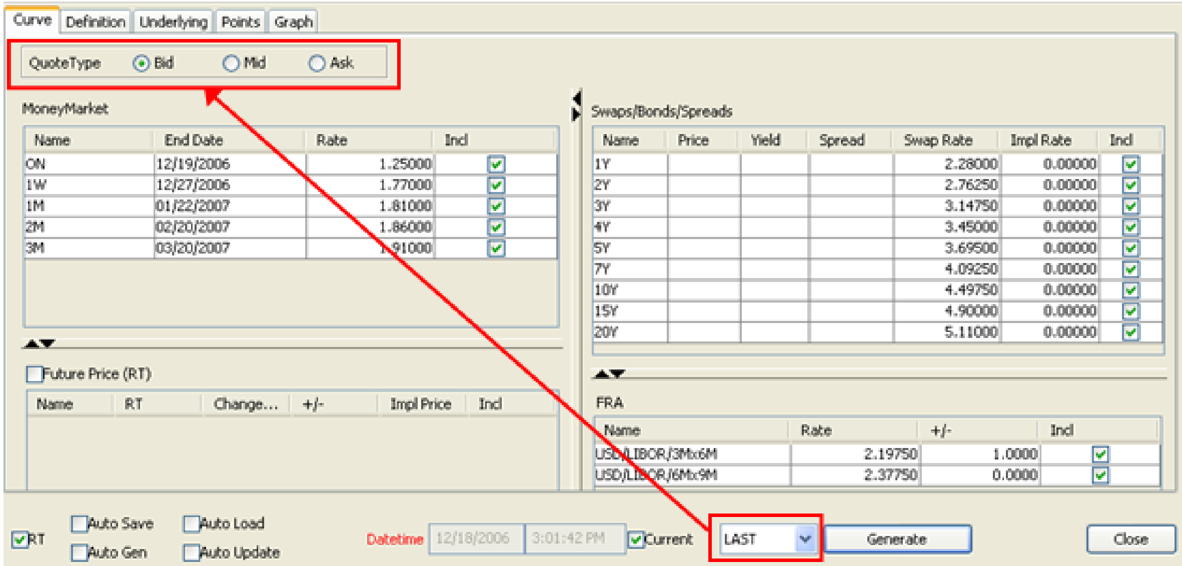
» Press [F7] to select and open an existing curve.

25.1 Curve Panel

In the Curve panel, enter rates for the underlying instruments. The rates may be displayed automatically if you are running a real-time feed, or they may be populated from the quote set associated with the selected pricing environment. If you are starting a new curve, this panel does not display any instruments.



If you select the curve instance LAST, then you can select whether to view and enter the BID, MID, or ASK rates.



To enter quotes, double-click a cell and type the quote.

- Money Market — enter quotes in the Rate column. Enter cash rate quotes as percentages. For example, a quote of five percent would be entered as 5.0.
- Futures — enter prices in the Close column. Use the standard futures quoting format. For example, a typical price might be 93.75. By default, futures are displayed in color-coded blocks; the menu item **Configure > Invert Colors** is automatically selected.
- Swaps — enter rates in the Swap Rate column. Enter the quotes as percentages. For example, a quote of five percent would be entered as 5.0.
- FRA — enter rates in the Rate column. You can also enter a spread in the adjacent column.

After entering quotes, you can choose **Quotes > Save Quotes** to save the values that you entered in the quote set. They include the instance and timestamp of your curve.

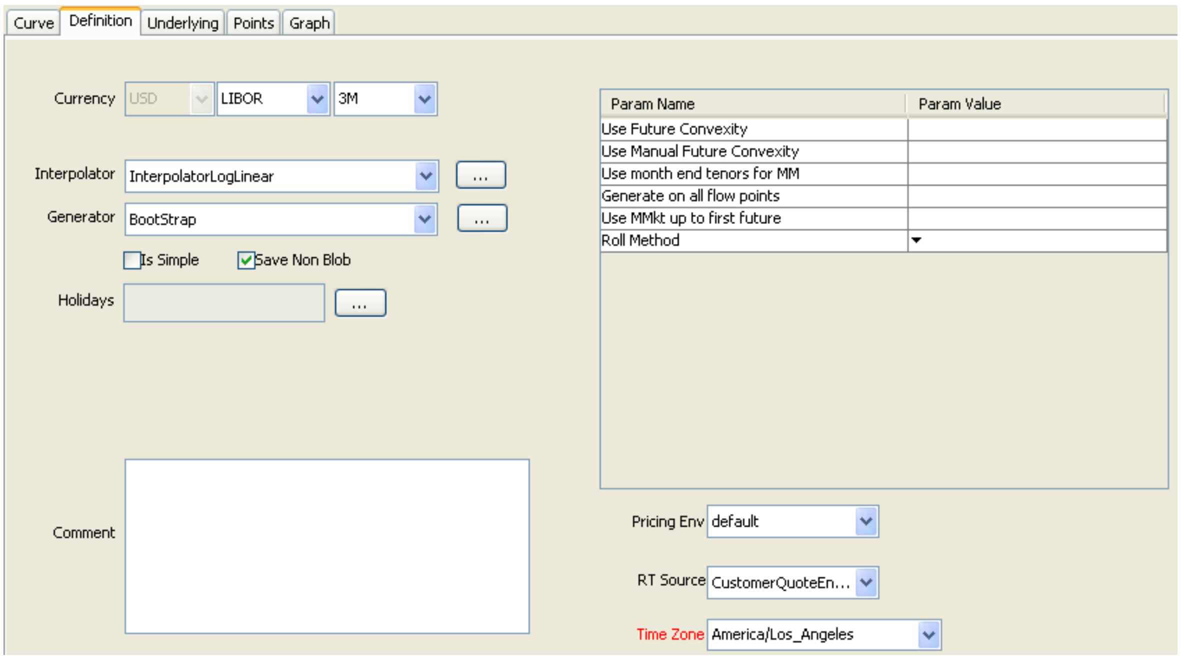
- Including/excluding instruments — as you enter each quote in the Curve panel, make sure the Incl checkbox in that row is set to ON so that the instrument will be included in the curve. If you wish to exclude the instrument, click the checkbox to the OFF position.
- Entering missing quotes — if you have entered most of your quotes and need to find the instruments that still need quotes, select the menu item **Quotes > Quotes Window**. This opens the Quotes Window where you can enter quotes for instruments that do not yet have quotes. The Quotes Window only displays the quotes for the instruments selected in the curve worksheet.
- The implied rate is calculated for Swaps, Bonds, and Spreads when you select the menu item **Configure > Calculate RT Impl Rate**.

25.2 Definition Panel

Click the Definition tab.

Select the following to define the curve: currency, index, tenor, “Is Simple” should not be selected to generate a curve from underlying instruments, interpolator, generation algorithm, holiday calendar(s), pricing environment for the quote set, feed or source for the real-time market data feature, and time zone.

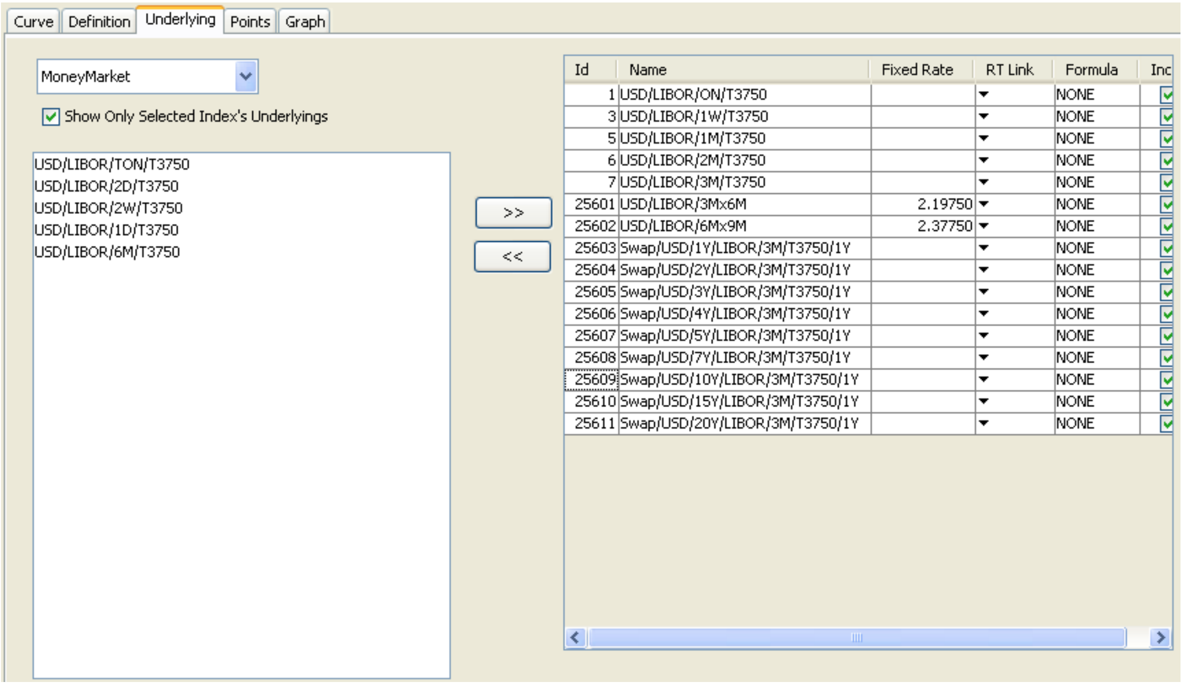
▶ See Zero Curves for details.



25.3 Underlying Panel

Click the Underlying tab. Select the underlying instruments.

Select the set of underlying instruments for the curve. Instruments assigned here can later be excluded from the curve by not selecting the Include checkbox in the Curve panel. The application shades excluded instruments in gray in the Curve and Underlying panels.



» Select the instrument type, and the panel below displays the list of available instruments. The panel is blank if you have not set up any instruments. Click **New/Edit Underlying** to create new instruments.

» Select instruments and click **>>** to add them to the instrument list in the right panel.

You can set the following details on each underlying instrument.

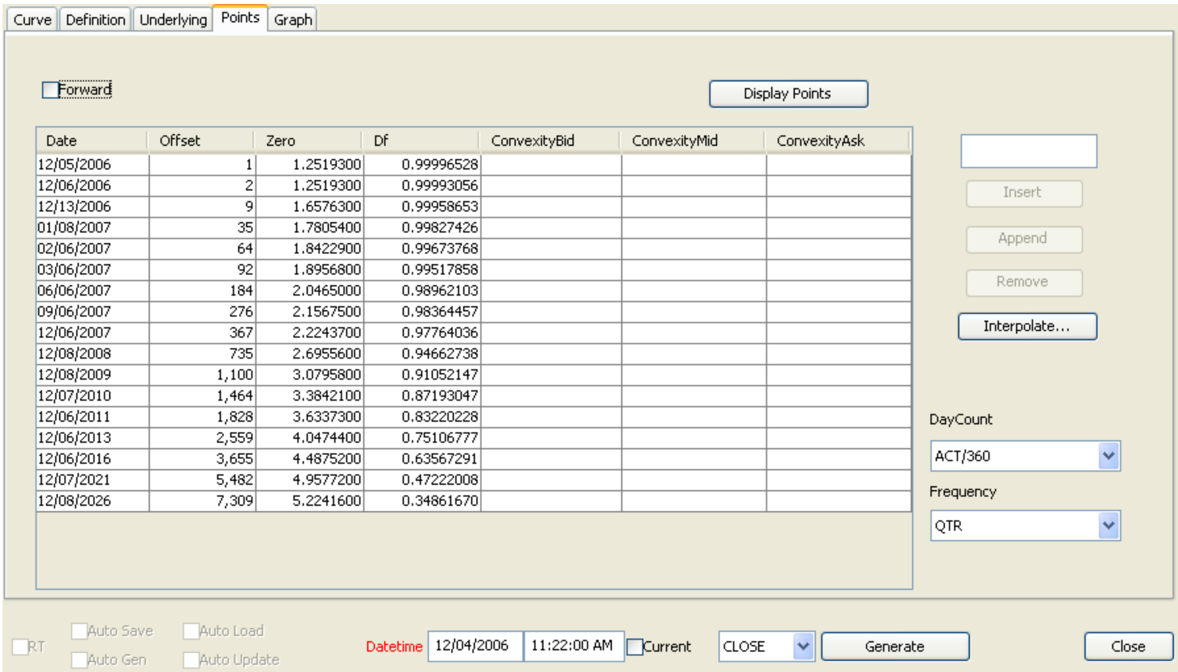
» Set which real-time quote instance to use for each underlying instrument. Double-click the RT Link field to select the quote instance from the drop-down menu.

» Add a multiplier and/or spread to each quote. Double-click the Formula field to open the curve function dialog window.

[NOTE: When you modify the underlying instruments of a given curve, the previously saved instances of that curve keep the previous underlying instruments definition. If you want to override existing instances, you need to resave those instances with the proper date and timestamp]

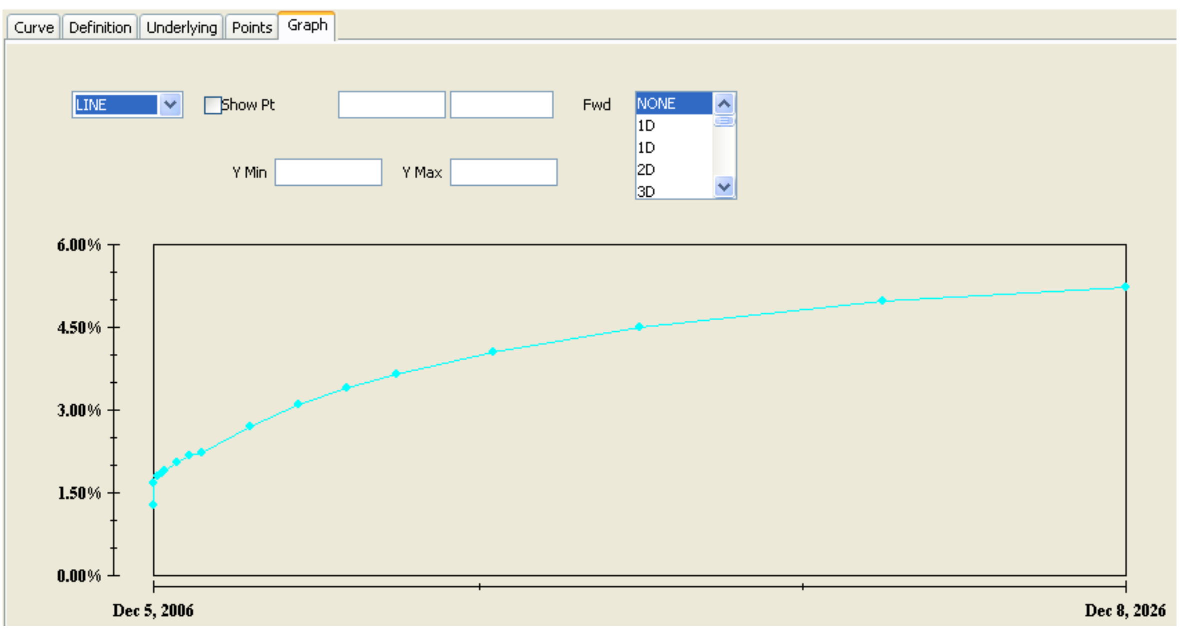
25.4 Points Panel

Click the Points tab. Click **Generate** to view the generated zero rates and discount factors.



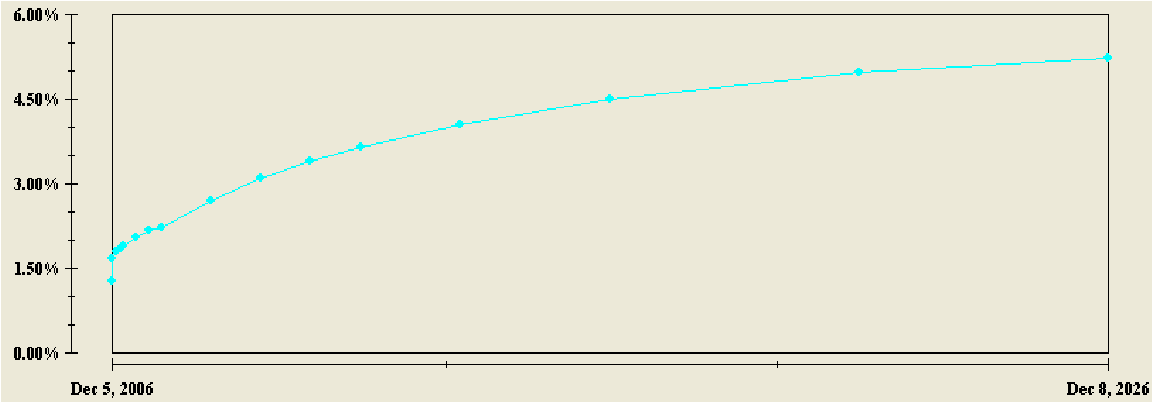
25.5 Graph Panel

Click the Graph tab. You can view the curve in graphical format.

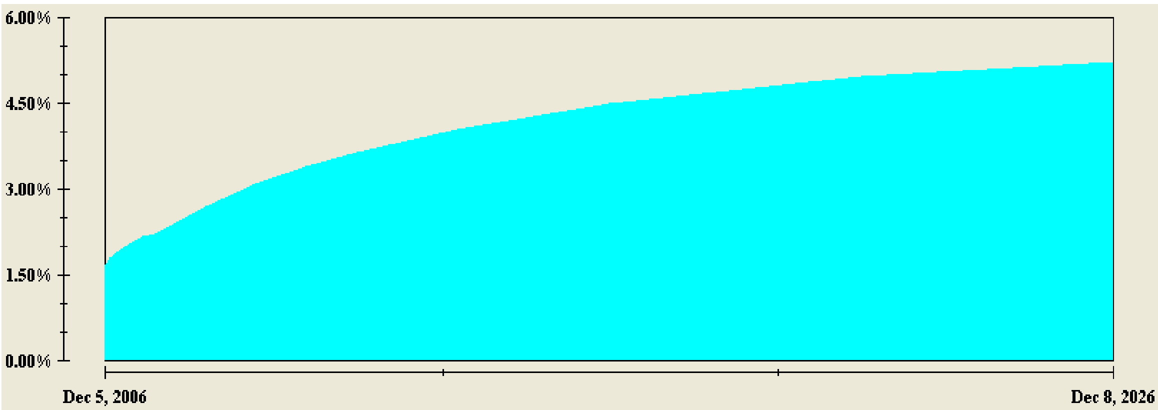


You can select the following details in the Graph panel:

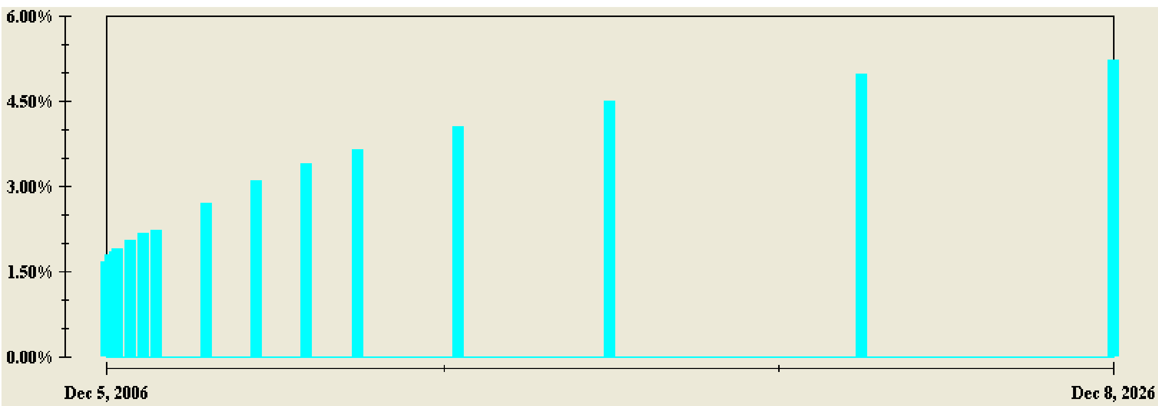
» Graph Type — the curve worksheet can display the curve in one of the following formats:
  – Line



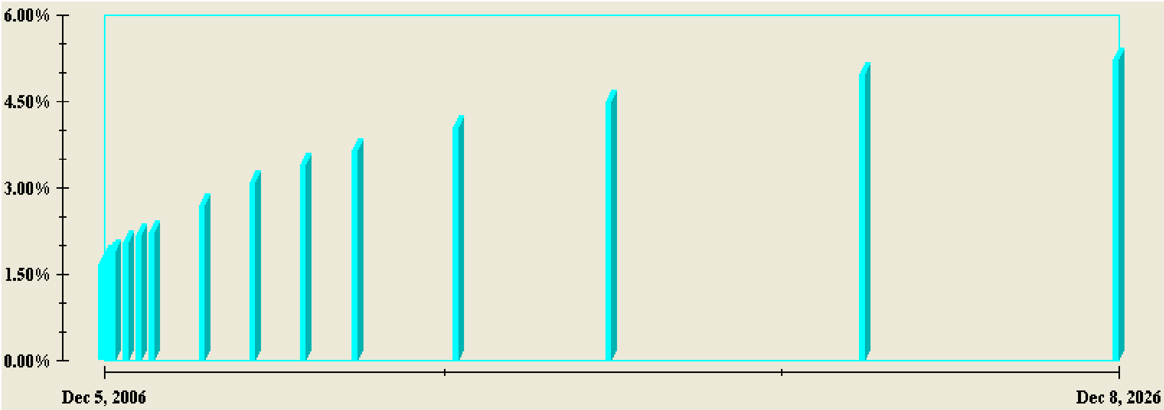
– Filled



– Bar



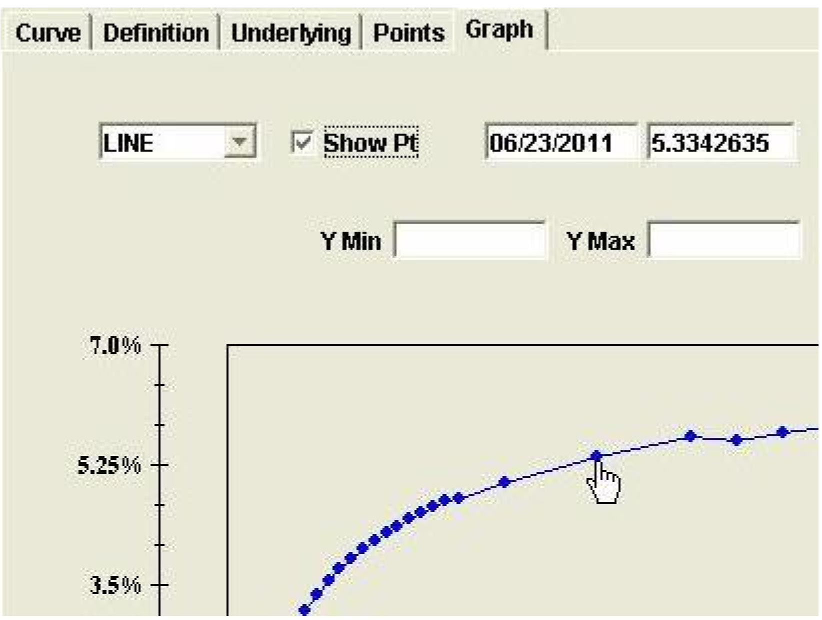
– Bar 3D



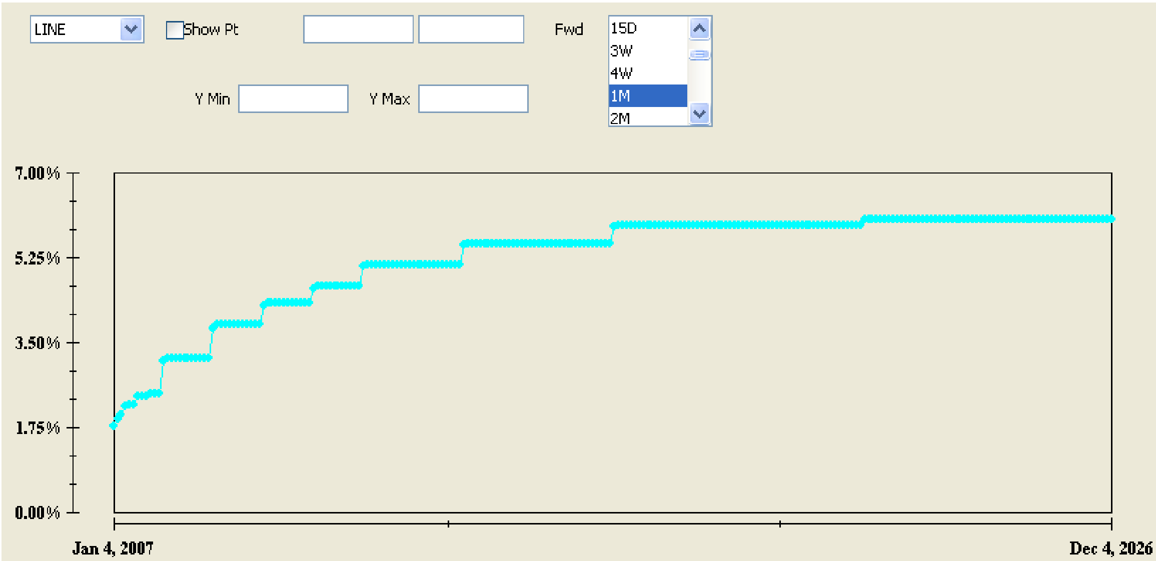
» Show Points — select to show points on the graph.

Select a point on the graph, and the date and value display in the boxes to the right of Show Pt.

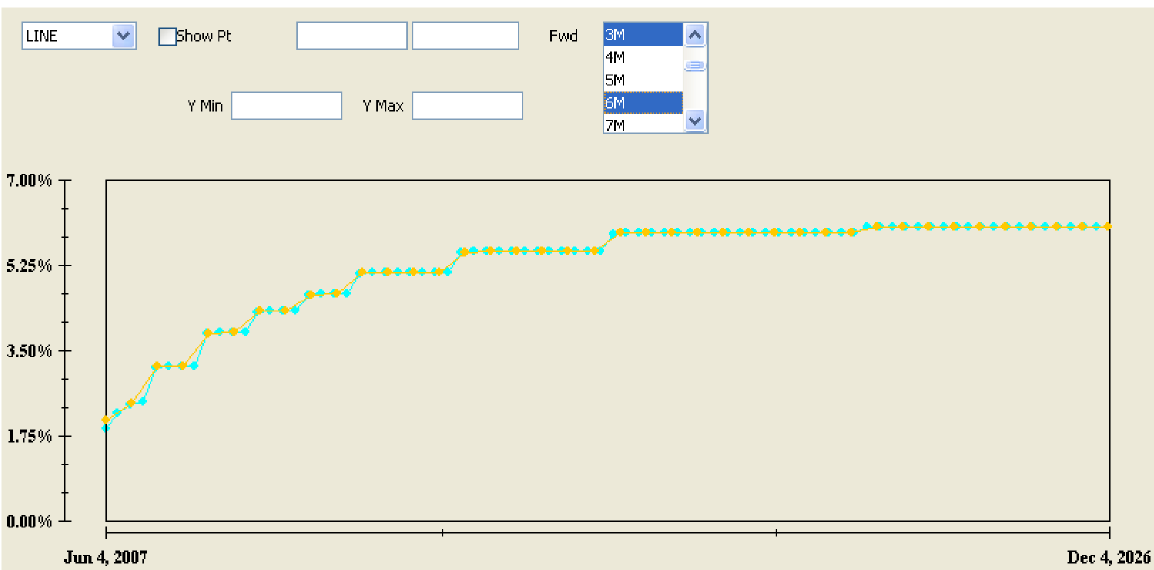
In the curve graph, you can drag points to modify the curve, and then you can view the resulting rates in the Points panel. Mouse-over any curve point in the graph and depress your mouse button. Then drag the point up or down, and release your mouse button to set the point. Click the Points panel to inspect the resulting rate and forward rate.



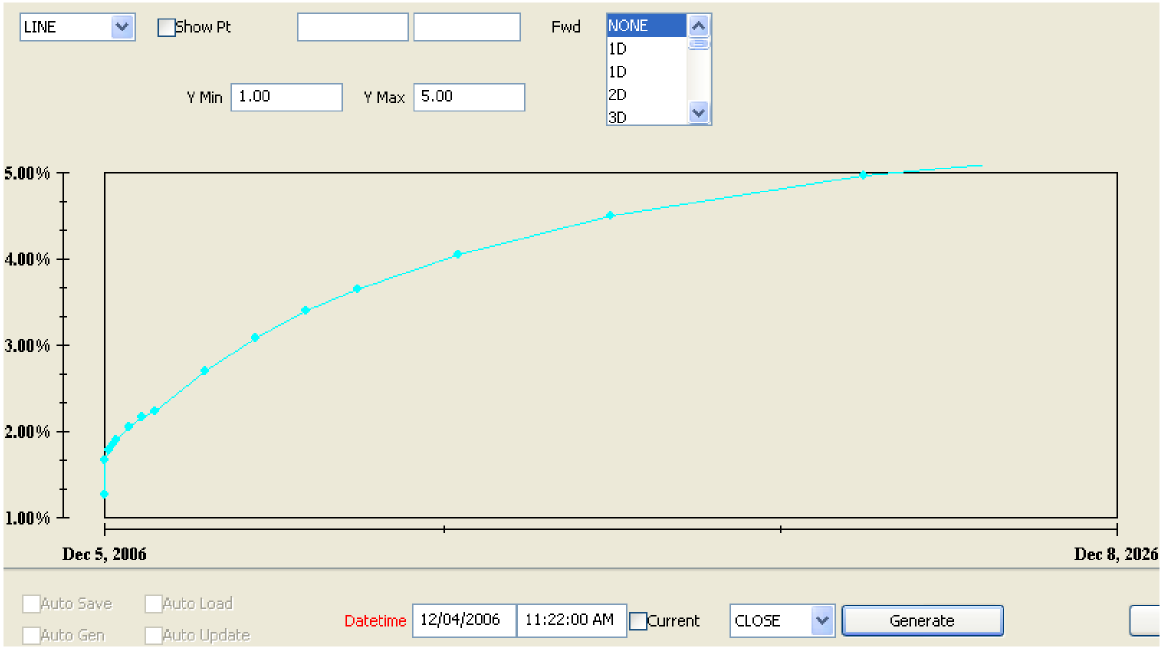
» Shift Curve Forward — select a tenor to shift the curve forward to that tenor.



» Graph Two Forward Curves — select a forward tenor, and then press [Ctrl] and select another tenor to graph both curves.



» Y-Axis Percentage Values — you can enter the minimum and maximum percentage values for the Y axis. Click Generate to apply the changes to the Y axis.



25.6 Save Curve

To save the curve, choose **Curve > Save** or press [F5]. Enter a name for the curve, and click **OK**.

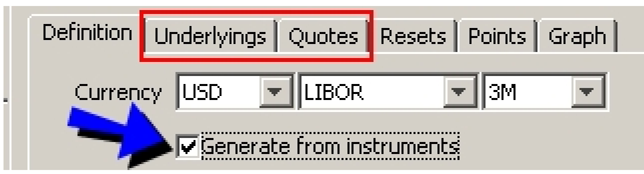
26. Curve Underlying Overview

Underlying instruments can be used to build curves.

You can set up underlying instruments before creating a curve using **Configuration > Market Data > Curve Underlyings** from the Calypso Navigator, or while you are creating a curve. When you save an underlying instrument, the system automatically creates a quote name for that instrument so that you can set quotes.

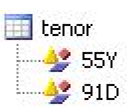
Using Underlying Instruments

To use underlying instruments for building curves, check “Generate from instruments” in the curve window definition. The curve window then displays the Underlying panel where you can select the underlying instruments, and the Quotes panel where you can set / load quotes for the underlying instruments. This is described in details for each type of curve.



Tenors for Underlying Instruments

Tenors for underlying instruments can be added to the "tenor" domain using **Configuration > System > Domain Values** from the Calypso Navigator.



Contents

[Commodity Swap - Curve Underlying]
[Equity Index - Curve Underlying]
[Exchange Traded Option (ETO) - Curve Underlying]
[Forward Rate Agreement (FRA) - Curve Underlying]
[MM Future - Structured Flows Future - Curve Underlying]
[Future Commodity - Curve Underlying]
[Future Equity Index - Curve Underlying]
[FX Future - Curve Underlying]
[FX Forward Fixed - Curve Underlying]
[FX Forward Tenor and Contango - Curve Underlying]
[Generic CDS - Curve Underlying]
[Inflation Spread (Instrument Spread) - Curve Underlying]
[Spread - Curve Underlying]
[Swap - Curve Underlying]
[Turn Rate - Curve Underlying]

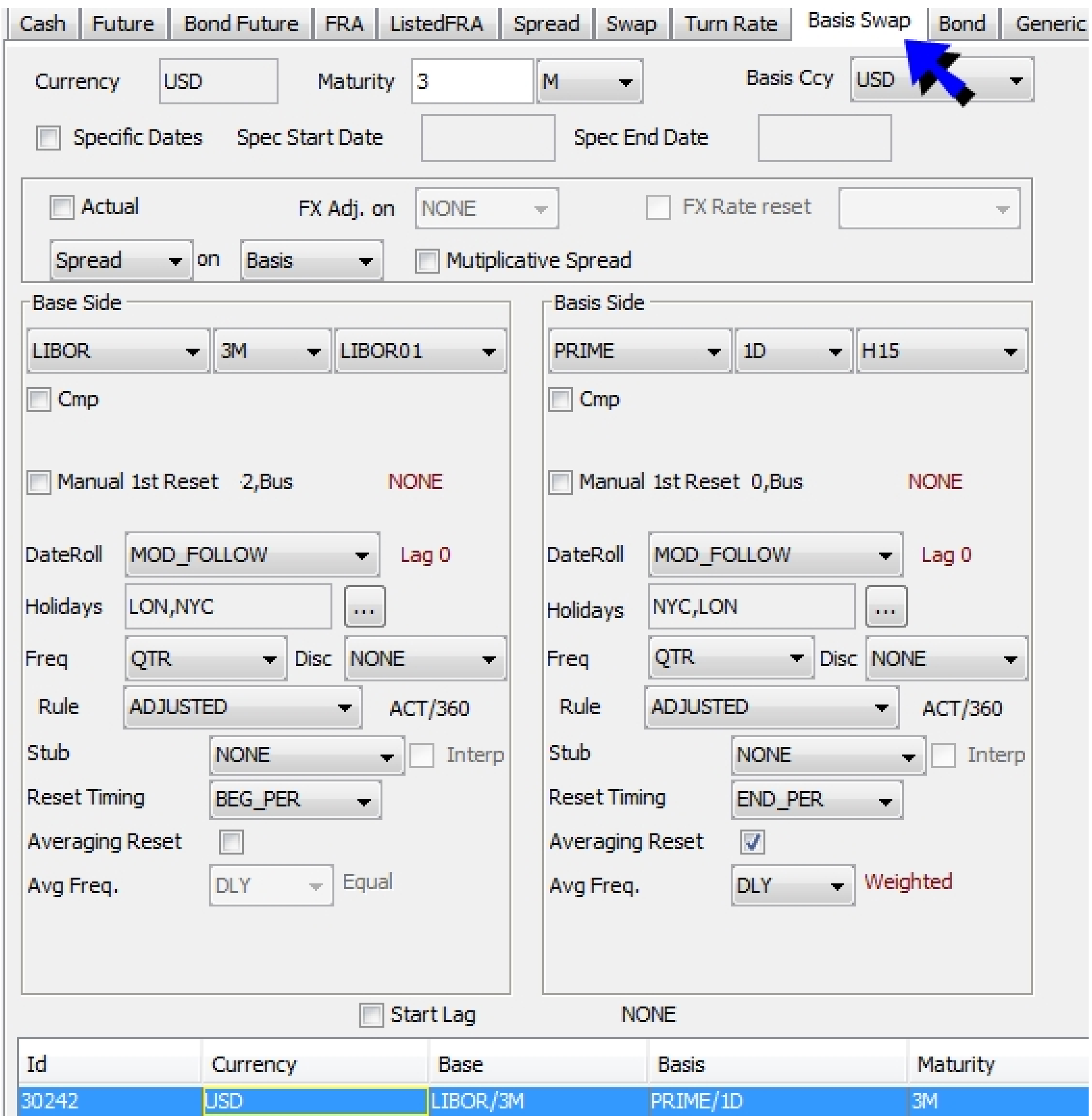
27. Basis Swap - Curve Underlying

Before you begin

- Create rate indices using **Configuration > Interest Rates > Rate Index Definitions** from the Calypso Navigator.

Creating a Basis Swap Underlying

The basis swap underlying has two floating sides, and can be cross currency.



» Select a currency at the bottom of the window.

You can click **Load** to load any existing underlying.

» Click **New** to create a new underlying.

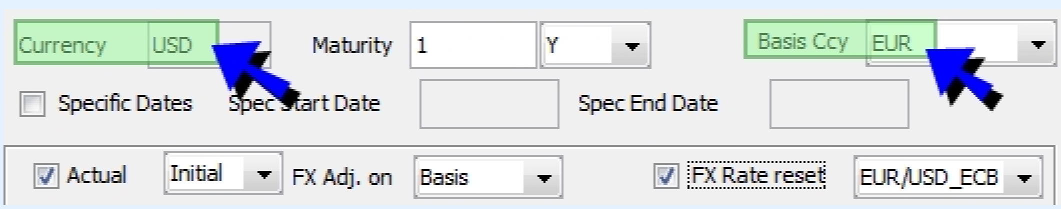
Complete the fields described below.

» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

The system creates quote names like: "`Swap.<Currency>.<Maturity>.<Base rate index>.<Base tenor>/<Basis rate index>.<Basis tenor>.<Basis source>`".

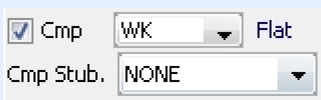
Example "`Swap.USD.1Y.LIBOR.3M/LIBOR.6M.LIBOR01`".

Fields Details

Fields	Description
Currency	Base currency selected at the bottom of the window.
Maturity	Enter the maturity of the swap: number of Days, Weeks, Months, or Years.
Basis Ccy	Select the basis currency. Modifying this to a different currency will prompt you to enter FX information.
Specific Dates	When checked, you can specify a specific start data and a specific end date in the adjacent fields.
Actual	Check to indicate that there is an actual principal exchange. Then select which principal is exchanged from the adjacent field: Initial, Final, Initial and Final.
FX Adj. on FX Rate reset	Only used if Basis Ccy is different from default currency.  Select the leg for FX adjustment: "Base" or "Basis". You can select and FX Rate Reset to set the FX rate.
Quote Type Spread / Factor / Inflation Real Rate	You can choose the quote type: "Spread", "Factor" or "Inflation Real Rate", and the leg to which it applies "Basis" or "Base". If you select Spread, the underlying will be quoted using a spread quote. If you select Factor, the underlying will be using a factor quote. If you select Inflation Real Rate, the underlying will be using the fixed real rate on the inflation leg.

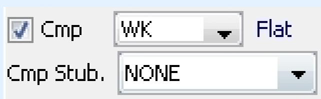
Fields	Description
	For a spread quote, if you select Basis, the spread will be added to the Basis leg, and if you select Base, the spread will be added to the Base leg. It will be multiplicative instead if you check "Multiplicative Spread". For a factor quote, if you select Basis, the factor will multiply the basis leg, and if you select Base, the factor will multiply the base leg.

Base Side

Fields	Description
Index	Select the rate index, tenor and source.
Cmp	Check for compounding interest.  You can select the compounding frequency and stub method. Double click on the blue text to select 'Flat', 'Spread' (and enter a spread) or 'Simple'.
Manual 1st Reset	Check to indicate that the first reset is manual.
DateRoll	Select the date roll convention - From the Calypso Navigator, navigate to **Help > Date Roll Conventions** for details.
Holidays	Select the holiday calendars.
Freq	Select the payment frequency.
Disc.	Select a discount.
Rule	Select the accrual period adjustment rule on non-business days.
Daycount	Displays the daycount convention from the rate index definition.
Stub	Select a stub period as needed.
Reset Timing	Select the reset timing: beginning of the period, or end of the period.
Averaging Reset Avg Freq. Day of Sampling	Check "Averaging Reset" if the rate resets more frequently than the swap. In this case, you need to select the averaging frequency, and day of sampling if needed. You can also select the type of average by toggling the red label: • Equal - Resets within the sampling period are equally weighted. • Weighted - Resets are weighted according to the number of days for which they apply. For example, if a reset occurs on a Monday, the weight is 1 day; if it occurs on a Friday, the weight is 3 days (Friday, Saturday and Sunday). • Simple - The reset rate is calculated as the mean rate within the sampling period.

Fields	Description
	• Cutoff - Calculates weighting up to cutoff date. The cutoff date is set as a number of days from the last sample period’s end date.

Basis Side

Fields	Description
Index	Select the rate index, tenor and source.
Cmp	Check for compounding interest.  You can select the compounding frequency and stub method. Double click on the blue text to select 'Flat', 'Spread' (and enter a spread) or 'Simple'.
Manual 1st Reset	Check to indicate that the first rest is manual.
DateRoll	Select the date roll convention.
Holidays	Select the holiday calendars.
Freq	Select the payment frequency.
Disc.	Select EXP if the swap should have exponential interest, or NONE otherwise.
Rule	Select the accrual period adjustment rule on non-business days.
Daycount	Displays the daycount convention from the rate index definition.
Stub	Select a stub period if needed..
Reset Timing	Select the reset timing: beginning of the period, or end of the period.
Averaging Reset Avg Freq. Day of Sampling	Check "Averaging Reset" if the rate resets more frequently than the swap. In this case, you need to select the averaging frequency, and day of sampling if needed. You can also select the type of average by toggling the red label: • Equal - Resets within the sampling period are equally weighted. • Weighted - Resets are weighted according to the number of days for which they apply. For example, if a reset occurs on a Monday, the weight is 1 day; if it occurs on a Friday, the weight is 3 days (Friday, Saturday and Sunday). • Simple - The reset rate is calculated as the mean rate within the sampling period. • Cutoff - Calculates weighting up to cutoff date. The cutoff date is set as a number of days from the last sample period’s end date.
Inflation Indexed	This only applies when the rate index is an inflation index.

Fields	Description
	It drives the calculation type for applying a change in inflation to the cashflows. • If checked, the inflation Leg is using the calculation type "InflationIndexation" on both Interest and Principal: [Final Level / Initial Level] • If not checked, the inflation leg is using the calculation type "InflationIncome" on Interest: [(Final Level / Initial Level) - 1]

Start Lag

Fields	Description
Start Lag	You can check Start Lag to define a start lag. Double-click the NONE label to define the start lag details (number of lag days, Cal for calendar days or Bus for business days), holiday calendar.

28. Basis Two Swap - Curve Underlying

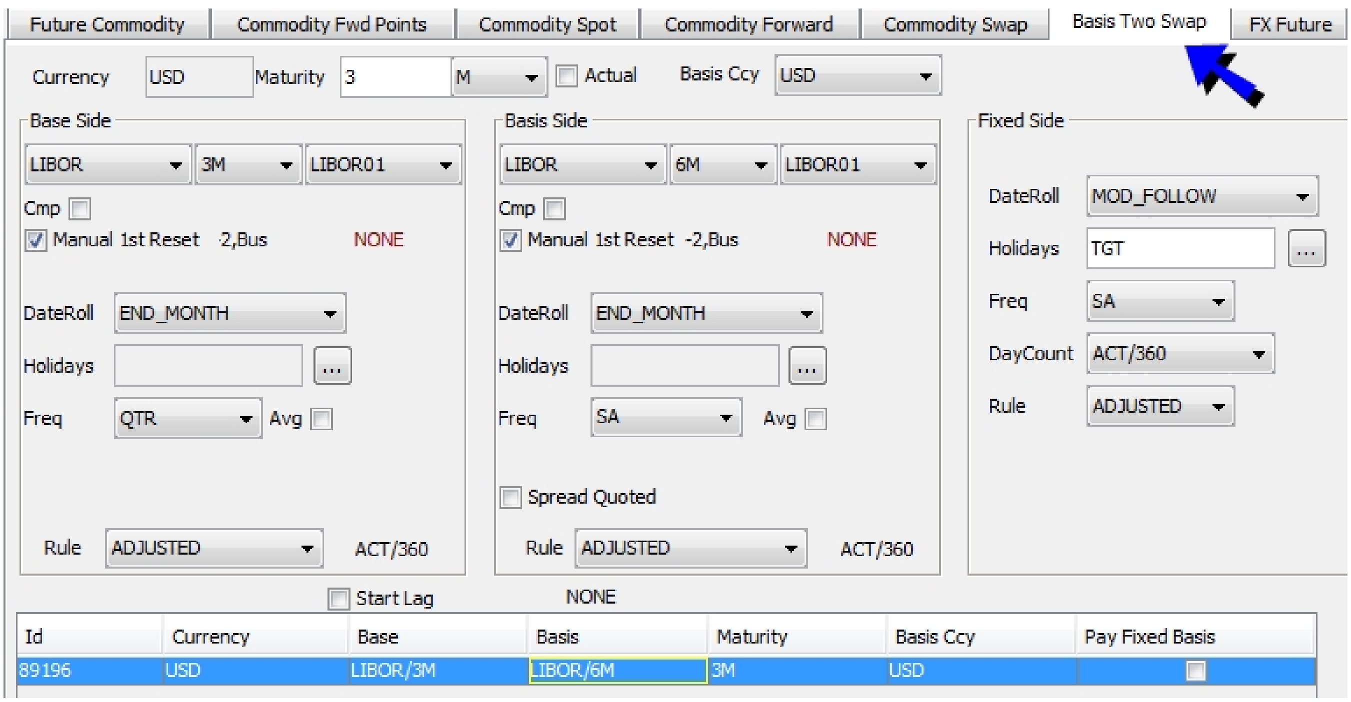
The Basis Two Swap underlying allows specifying a spread between two swap trades.

Before you begin

- Create rate indices using **Configuration > Interest Rates > Rate Index Definitions** from the Calypso Navigator.

Creating a Basis Two Swap Underlying

The basis two swap underlying has two floating indices and a fixed rate, and can be cross-currency.



» Select a currency at the bottom of the window.

You can click **Load** to load any existing underlying.

» Click **New** to create a new underlying.

Complete the basis swap fields as described in the Basis Swap Underlying.

▶ See Basis Swap Underlying for details.

Complete the fixed side fields described below.

» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

Fields Details

Fields	Description
Pay Fixed Basis	Check to pay the fixed side, or clear to receive the fixed side.
DateRoll	Select the date roll convention. From the Calypso Navigator, navigate to **Help > Date Roll Conventions** for details.
Holidays	Select holiday calendars.
Freq	Select the payment frequency.
DayCount	Select the daycount convention displayed from the rate index definition.
Rule	Select the accrual period adjustment rule on non-business days.

29. Bond - Curve Underlying

You can create bond underlyings from specific bond products, from benchmarks, or from benchmark indices.

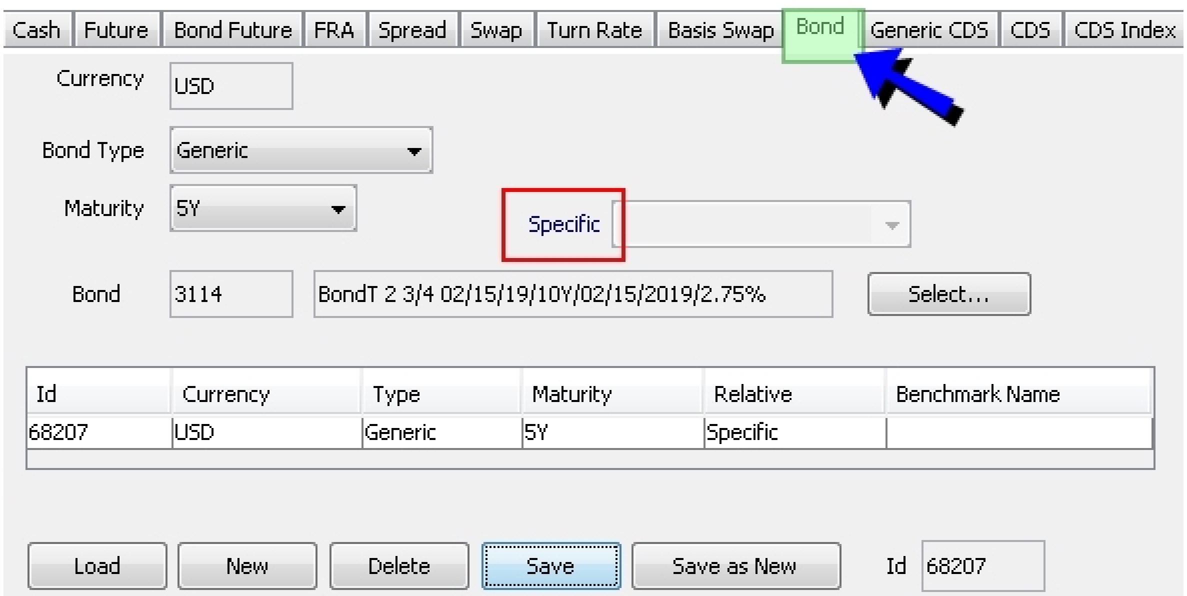
Before you begin

- Create bond products using **Configuration > Fixed Income > Bond Product Definition** from the Calypso Navigator.
- Create benchmarks using **Configuration > Fixed Income > Benchmark Management** from the Calypso Navigator - You can create bond benchmarks, bond future benchmarks, and CDS index benchmarks.

Previously created underlyings can be loaded using the **Load** button. You can use the Currency drop down menu at the bottom of the window to filter results by currency type.

29.1 Creating a Specific Bond Underlying

You can select a specific bond as the underlying instrument.



Bond Curve Underlying Window - Specific bond

» Click **New** to create a new underlying.

Select the bond type and maturity.

Make sure that the Specific label is displayed.

Click **Select** to select a specific bond.

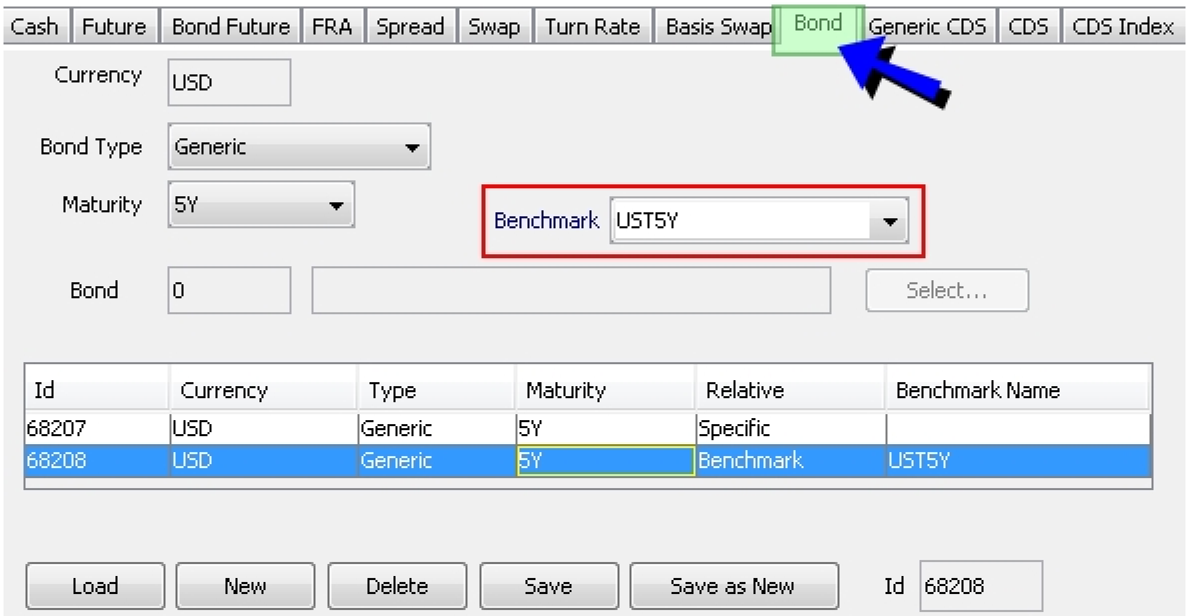
» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

The system creates quote names like "Bond.<Bond description>.<Bond maturity date>.<Coupon rate>".

Example "Bond.FHLB 4 3/4 04/08/19.04-08-2019.4.75000".

29.2 Creating a Benchmark Underlying

You can select a benchmark as the underlying instrument. The benchmark is quoted as a spread over the benchmark product (Bond, Bond Future, or CDS Index).



Bond Curve Underlying Window - Benchmark bond

» Click **New** to create a new curve underlying.

Select the bond type and maturity.

Click the "Specific" label to toggle to "Benchmark", and select a benchmark from the Benchmark field.

» Click **Save** to create the curve underlying. It appears in the table.

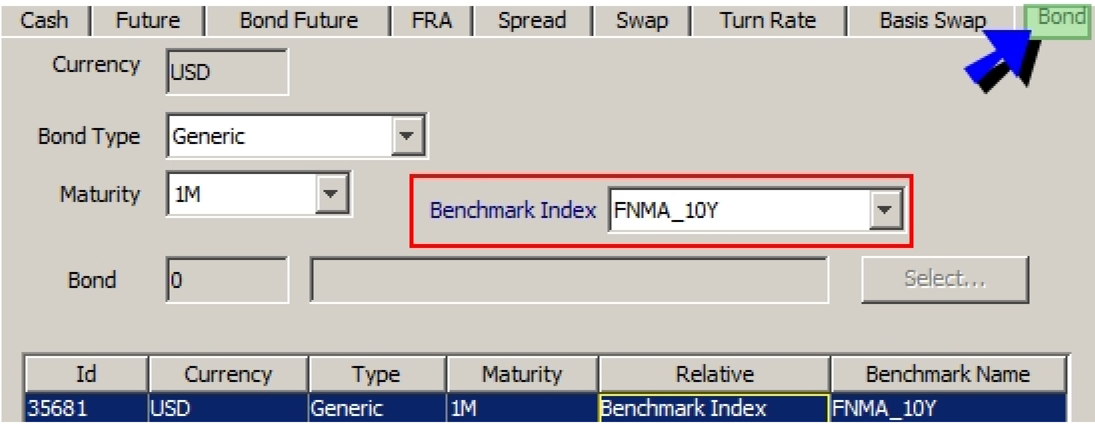
The system creates quote names like "Bond.<Benchmark name>".

Example for the underlying created above "Bond.UST5Y".

29.3 Creating a Benchmark Index Underlying

You can select a benchmark index as the underlying instrument. The benchmark index is quoted as a yield. It can be retrieved directly from Bloomberg.

This can be used to build real-time par yield curves.



Bond Curve Underlying Window - Benchmark index

» Click **New** to create a new curve underlying.

Select the bond type and maturity.

Click the "Specific" label to toggle to "Benchmark Index", and select a benchmark index from the Benchmark field.

The benchmark index should be created with no tenor, off a generic bond quoted in Yield.

» Click **Save** to create the curve underlying. It appears in the table.

Repeat for each maturity and click **Save as New**.

The system creates quote names like "Bond.<Benchmark name>.<Maturity>".

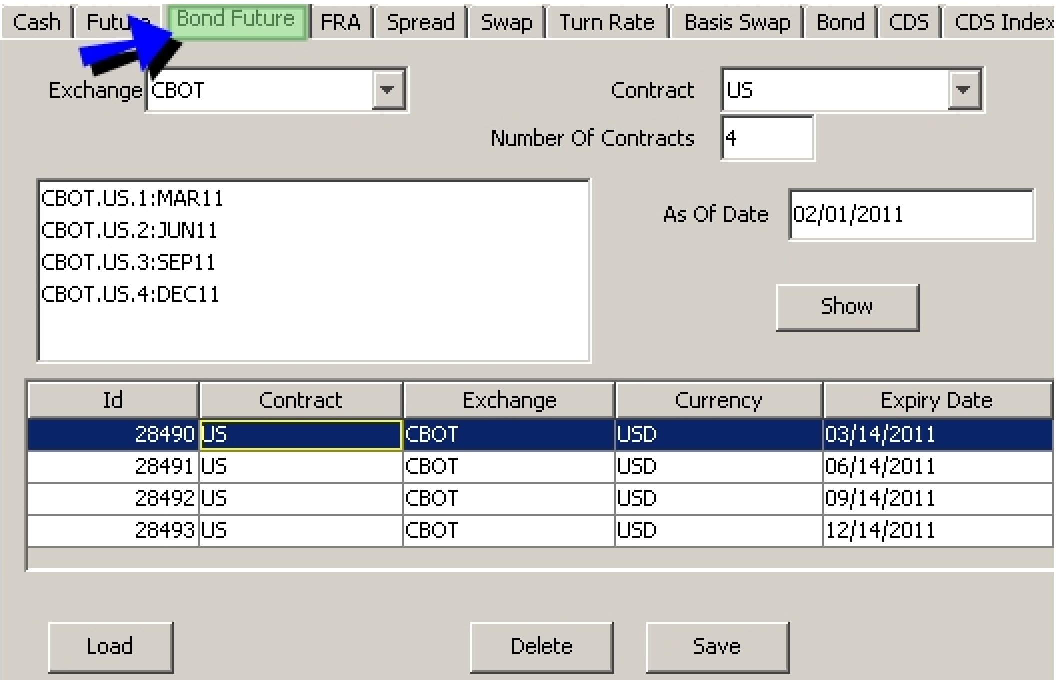
Example for the underlying created above "Bond.FNMA_10Y.1M".

30. Bond Future - Curve Underlying

Before you begin

- Create bond future contracts using **Configuration > Listed Derivatives > Future Contracts** from the Calypso Navigator - You can create future underlyings from that window as well

Creating Bond Future Underlyings



» You can click **Load** to load any existing underlying.

» Complete the fields described below, and click **Show** to view the corresponding future products.

» Click **Save** to save the underlyings. The system saves an underlying for each product. They are each given a unique ID by the system, and are displayed in the table.

The system creates quote names like "BondFuture.<Contract name>.<Expiration date>".

Example "BondFuture.US.03-14-2011".

Fields Details

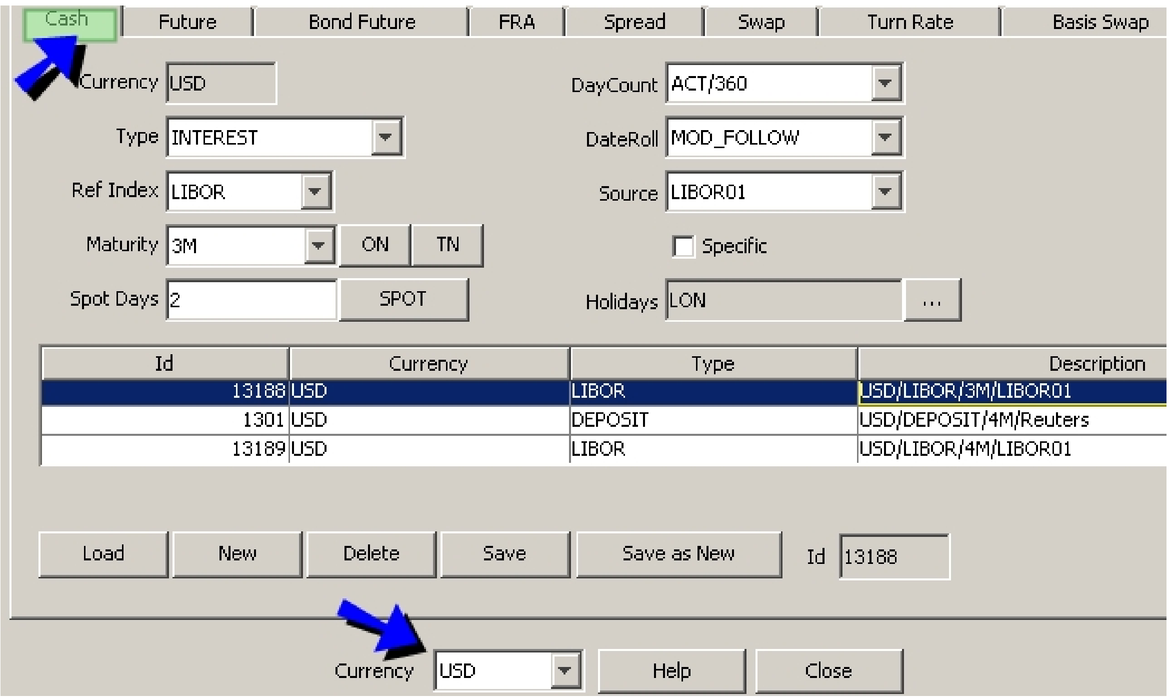
Fields	Description
Exchange	Select the name of the exchange.
Contract	Select the contract name.
Number of Contracts	The application automatically displays the number of contracts as defined in the contract definition. You can modify this number.
As Of Date	The application automatically displays today's date as the "As Of Date" to start generating the products. You can modify this date.

31. Cash (Money Market) - Curve Underlying

Before you begin

- Setup currencies using **Configuration > Definitions > Currency Definitions** from the Calypso Navigator.
- Create holiday calendars using **Configuration > Definitions > Calendar Definitions** from the Calypso Navigator.
- Create rate indices using **Configuration > Interest Rates > Rate Index Definitions** from the Calypso Navigator.

Creating a Cash Underlying



» Select a currency at the bottom of the window.

You can click **Load** to load any existing underlying.

» Click **New** to create a new underlying.

Complete the fields described below.

» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

The system creates quote names like: "`MM.<Currency>.<Reference index>.<Maturity>.<Source>`".

Example "`MM.USD.LIBOR.3M.LIBO01`".

Fields Details

Fields	Description
Currency	Currency selected at the bottom of the window.
DayCount	The day count defaults from the rate index definition - See **Main Entry > Help > Day-Count Conventions** for descriptions of the conventions.
Type	Select the type of cash underlying: INTEREST or DISCOUNT.
DateRoll	The date roll defaults from the rate index definition - See **Main Entry > Help > Date Roll Conventions** for descriptions of the conventions.
Ref Index	Select the rate index.
Source	Select the quoting source for the rate index.
Maturity	Select the maturity of the underlying. You can click **ON** to create an overnight instrument, **TN** to create an overnight instrument from tomorrow, or **SPOT** to create a spot instrument.
Specific	You can check Specific to create an underlying with a specific start date and end date.
Spot Days	Enter the spot days for the underlying as needed.
Holidays	The holiday calendar(s) defaults from the rate index definition. You can click **...** to modify the calendar selection.

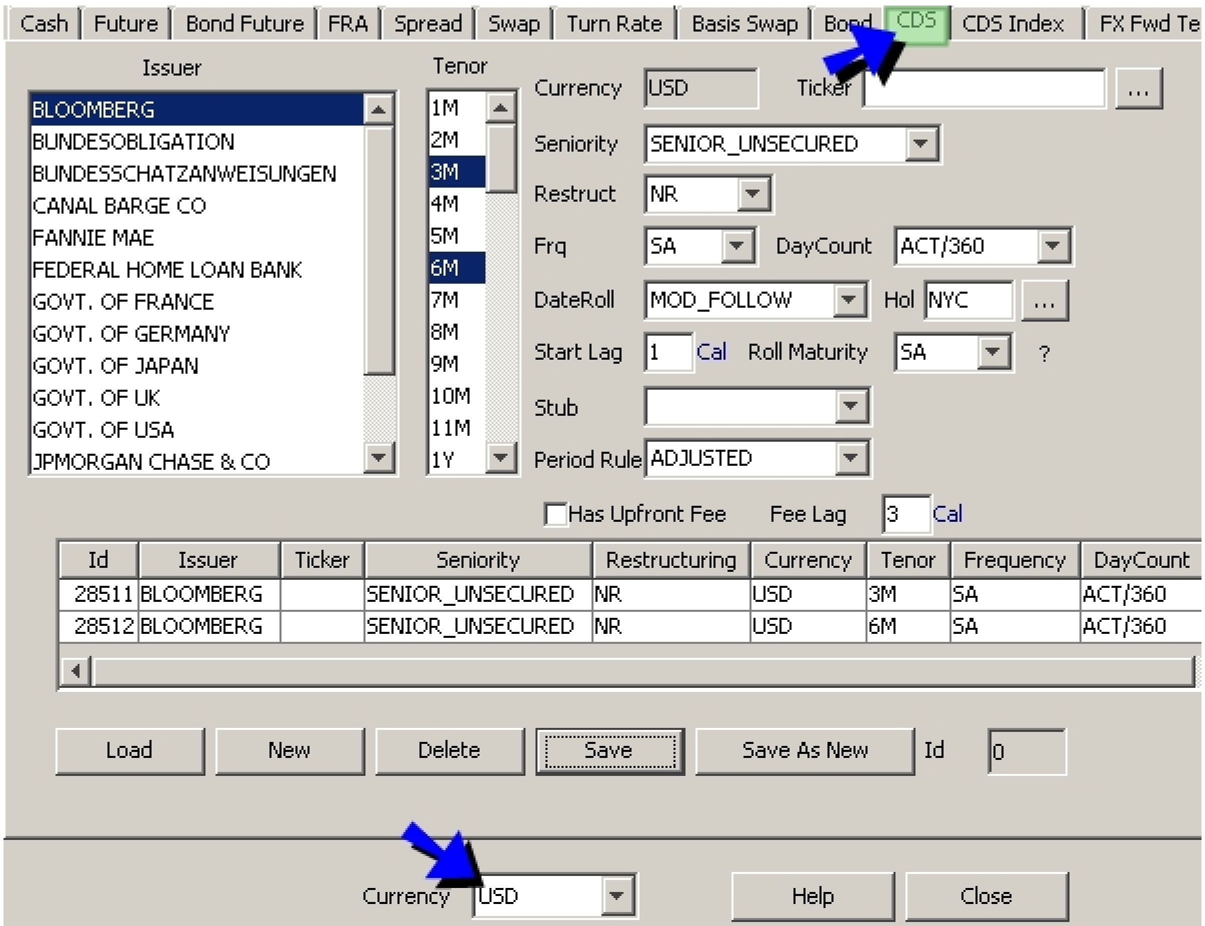
32. CDS - Curve Underlying

Before you begin

- Create issuers using **Configuration > Legal Data > Entities** from the Calypso Navigator.

Creating a CDS Underlying

Create an underlying representing a Credit Default Swap for an issuer and different tenors. The quotes are the market spreads for each tenor.



» Select a currency at the bottom of the window.

You can click **Load** to load any existing underlying.

» Click **New** to create a new underlying.

Complete the fields described below.

» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

The system creates quote names like "CDS.<Currency>.<Issue>.<Seniority>/<Tenor>/<Restructuring type>", and if "Has Upfront Fee" is checked additional quote names like "CDS.<Currency>.<Issue>.<Seniority>/<Tenor>/<Restructuring type>/FEE".

Example "CDS.USD.BLOOMBERG.SENIOR_UNSECURED/3M/NR".

Fields Details

Fields	Description
Issuer	Select the issuer.
Tenor	Select one or multiple tenors.
Currency	Displays the currency selected at the bottom of the window.
Ticker	Optional. Click ... to select a ticker. A ticker is a combination of currency, issuer, seniority, and reference obligation used as selection criteria – You can create tickers from the Probability Curve window, or Credit Market Data window.
Seniority	Select the seniority.
Restruct	Select the restructuring type: • NR – No Restructuring • R – Standard Restructuring • MR – Restruct Mat Limit and Fully Transferable Obligation • MMR – Mod Restruct Mat Limit and Conditionally Transferable • NR14 – No Restructuring, with 2014 ISDA provisions • R14 – Standard Restructuring, with 2014 ISDA provisions • MR14 – Restruct Mat Limit and Fully Transferable Obligation, with 2014 ISDA provisions • MM14 – Mod Restruct Mat Limit and Conditionally Transferable, with 2014 ISDA provisions
Frq	Select the frequency.
DayCount	Select the day count convention.
DateRoll	Select the date roll convention.
Hol	Select the holiday calendar to define the business days.
Start Lag	Define the start offset in business or calendar days.
Roll Maturity	Roll the maturity to the 20^{th} of the month, quarterly, or semi-annual months.
Stub	Select the rule to apply in case of a stub period:

Fields	Description
	• LONG FIRST • LONG LAST • SHORT FIRST • SHORT LAST
Period Rule	Select the period rule: • ADJUSTED – Adjusts the period's end date if it falls on a non-business day, according to the payment date roll convention. Rolling the end date adjusts the period length, so a rolled date changes the interest amount. • UNADJUSTED – Does not adjust the period's end date for non-business days. • MAT_UNADJUSTED – Adjusts the period's end date if it falls on a weekend unless it is the last period (maturity), in which case it is not adjusted. Thus the adjustment method may affect intermediate interest amounts, but it does not change the maturity date.
Has Upfront Fee	If you check "Has Upfront Fee," you can enter two quotes for the curve underlying, the spread plus a fee. The second quote appears when you select the curve underlying in the curve application. Note that the second quote is currently not used by our generator.
Fee Lag	You can enter a number of days lag for the upfront fee, and select whether the lag is business days or calendar days.

Scheduled Task for Updating Roll Maturity

The scheduled task UPDATE_CURVE_UNDERLYING can be used for bulk updating the roll maturity of CDS curve underlyings and regenerating the curves.

Task Attributes

Task Attributes	
UNDERLYING TYPE	CurveUnderlyingCDS
UNDERLYING CCY	
ROLL FREQUENCY	SA

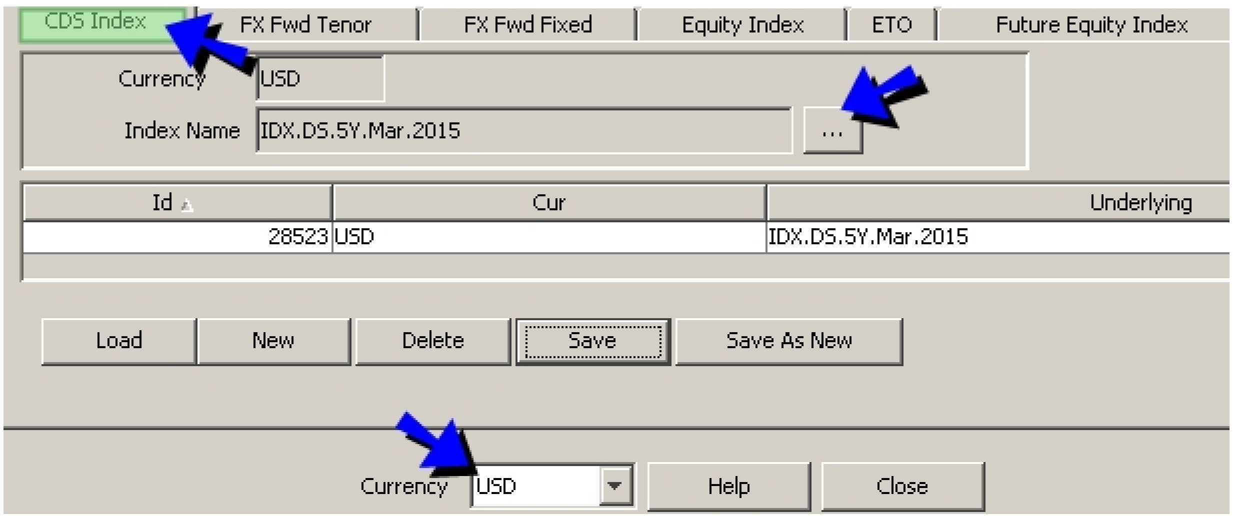
- UNDERLYING TYPE – Select the underlying type: CDS, Generic CDS, or Fixed Coupon CDS.
- UNDERLYING CCY – Select a currency as needed to be updated, or leave blank to update all.
- ROLL FREQUENCY – Select the roll frequency: SA or QTR.

33. CDS Index - Curve Underlying

Before you begin

- Create CDS indices using **Configuration > Credit Derivatives > CDS Index Definition** from the Calypso Navigator.

Creating a CDS Index Underlying



» Select a currency in the bottom of the window.

You can click **Load** to load any existing underlying.

» Click **New** to create a new underlying.

Click **...** to select a CDS Index.

» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

The system creates quote names like "`CDSIndex.<Index name>.<Index maturity>`".

Example "`CDSIndex.IDX.DS.5Y.Mar.2015`".

34. Commodity Forwrd - Curve Underlying

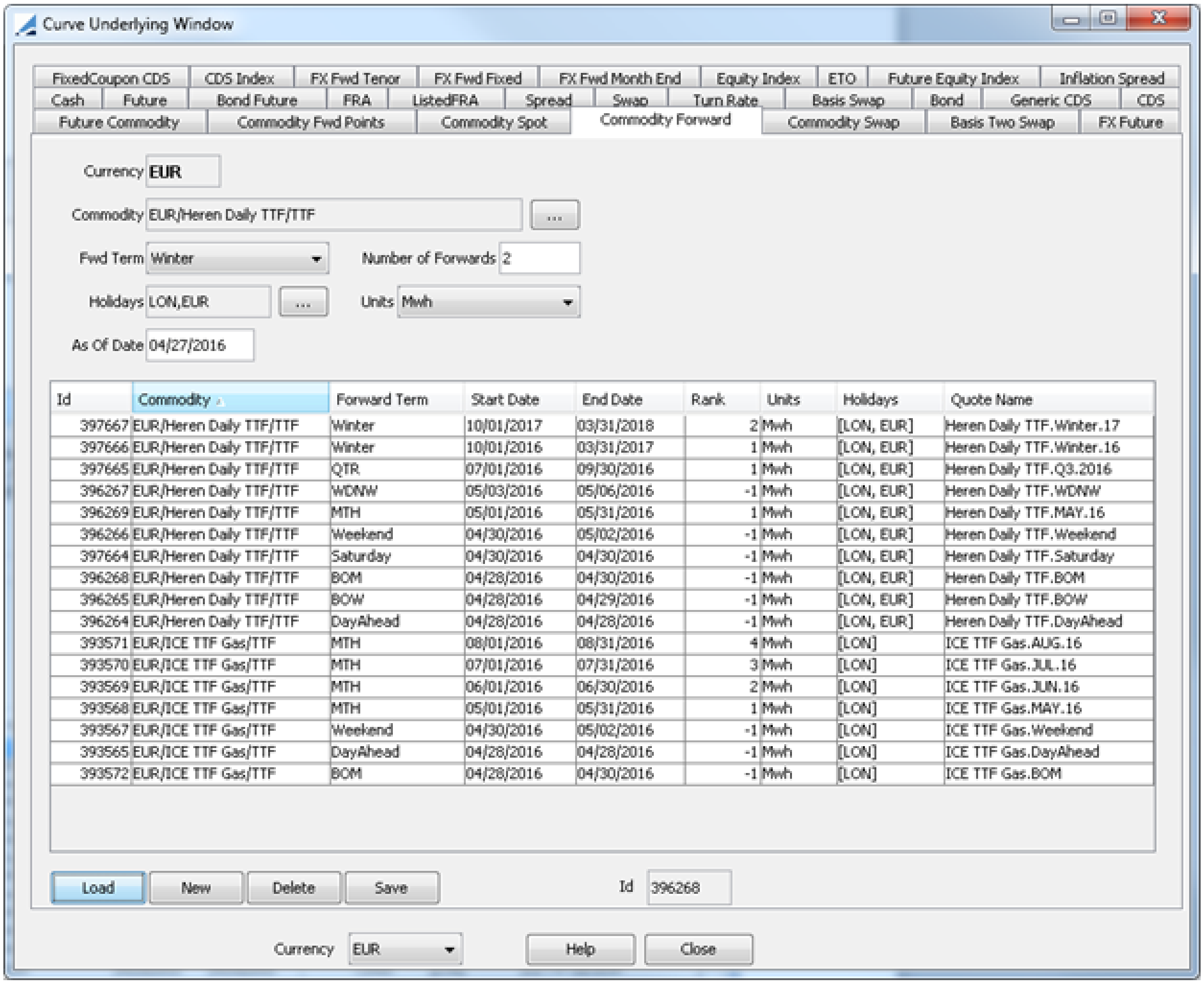
The Commodity Forward curve underlying is used primarily for natural gas markets. In the European natural gas markets, future contract prices are quoted in pence per therm, and EUR per MWh. The flow of natural gas is assumed to be continuous throughout the delivery period, the prices are average prices for the number of days or hours in the delivery period.

For example, if the current month is June and the forward price for next month's delivery is 44 p/therm, then the average of teh prices for each delivery day in July is 44 p/therm. If the forward price for the next quarter delivery is 47 p/therm, it cannot be said that the price for July, August and September are all 47 p/therm because it is known that the July delivery price is 44 p/therm.

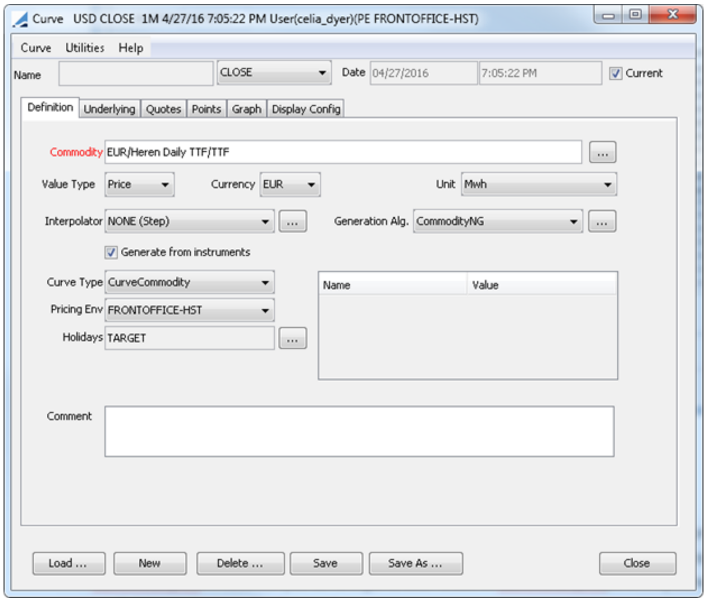
The curve underlying allows the user to capture named periods or forward terms. The supported forward terms are:

WithinDay	Single Day: current day	Daily Points
DayAhead (DAH)	Single Day: next business day	Daily Points
BOW	Range: DayAhead to last business day of the week into which DayAhead falls	Daily Points
Saturday	Single Day: Saturday after the current day	Daily Points
Sunday	Single Day: Sunday after the current day	Daily Points
Weekend (WE)	Range: Saturday to Sunday	Daily Points
Week +1 (WDNW)	Range: Monday after the current day to the Friday of the same week (excluding holidays)	Daily Points
Balance of Month (BOM)	Range: DayAhead to last delivery day of the month in which DayAhead falls	Daily Points
Calendar Month (MTH)	The first full month after the current day + user specified number of months	First and last of month
Calendar Quarters (QTR)	The first full quarter after the current day + user specified number of quarters	First and last of each month
Calendar Year (YEAR)	The first full year after the current day + user specified number of years	First and last of each month
Winter	The first full winter gas season (October - March) after the current day + user specified number of winter gas seasons	First and last of each month
Summer	The first full summer gas season (April - September) after the current day + user specified number of summer gas seasons	First and last of each month

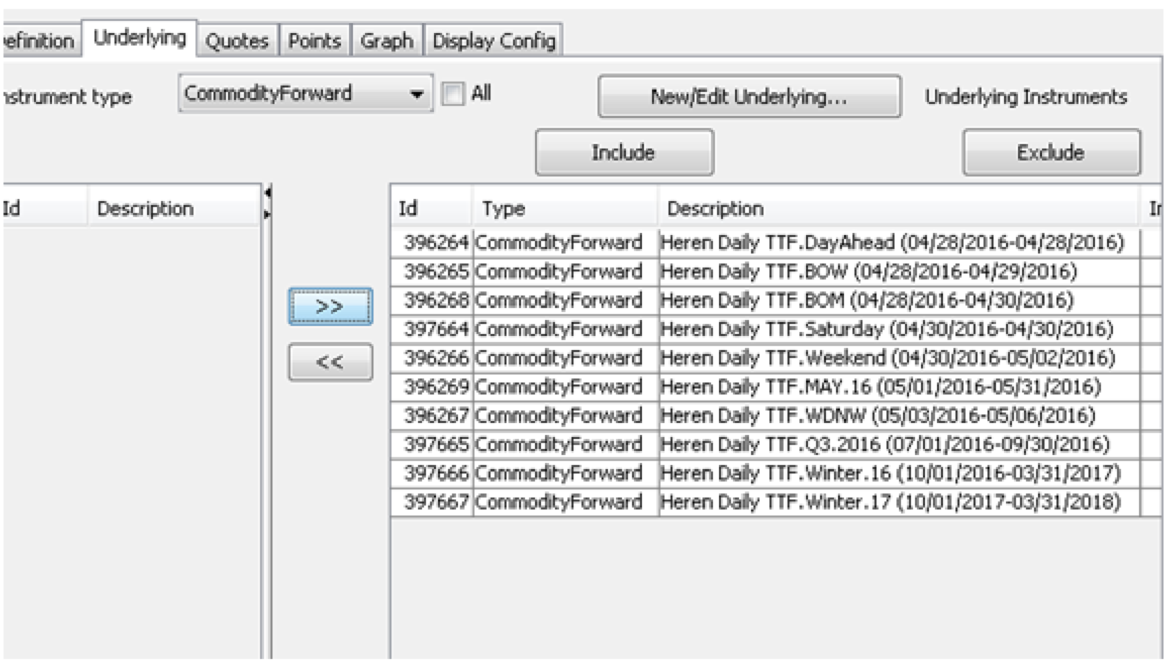
Gas Year	The first full gas year after the current day + user specified number of gas years	First and last of each month

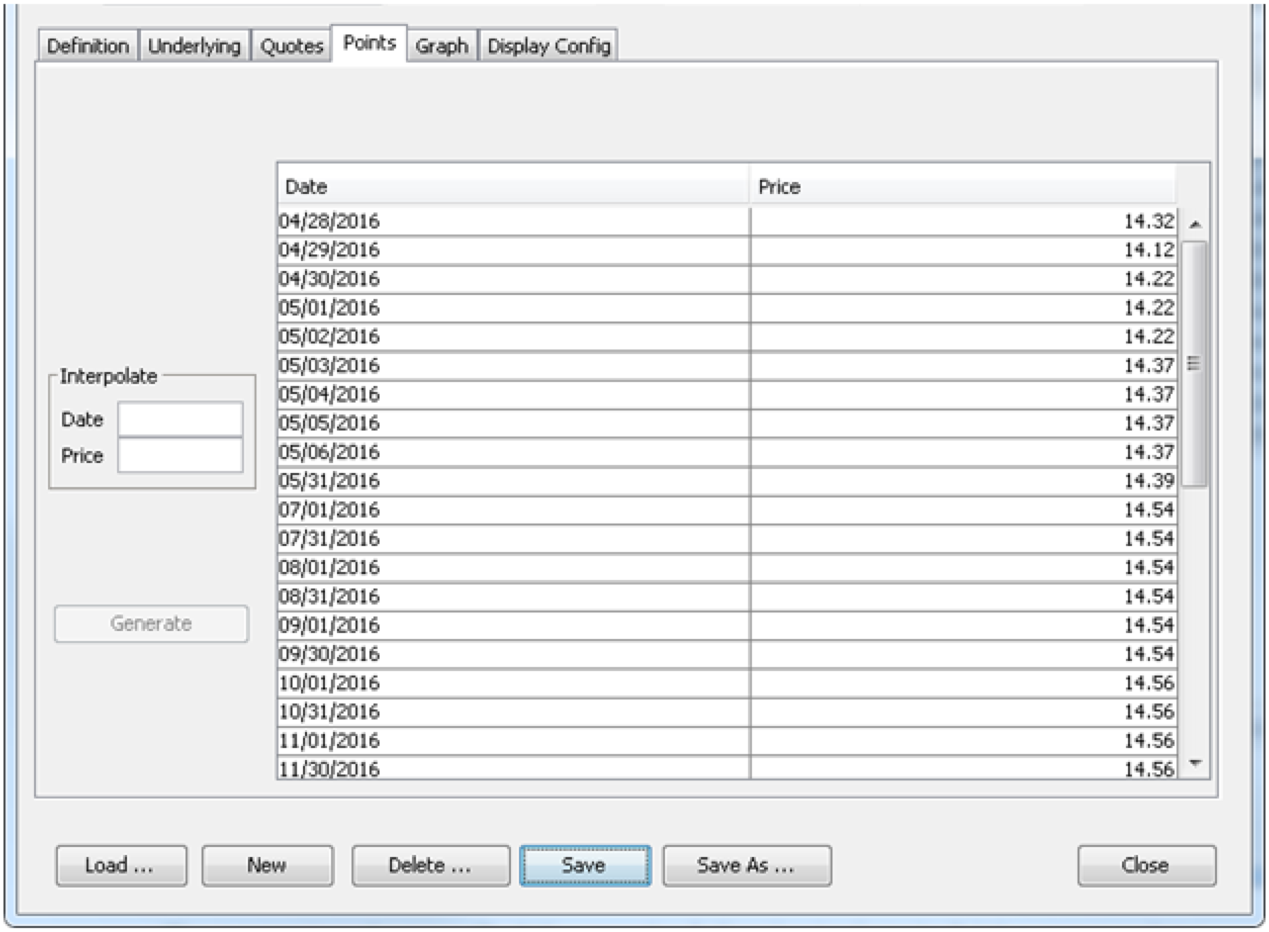


The only curve type that can use the Commodity Forward curve underlying is the Commodity Forward curve. The Commodity forward can only use these curve underlyings when the generator is set to *CommodityNG*. Additionally, when the generator is set to *CommodityNG*, the only curve underlyings available are Commodity Forward.



Once the underlyings are selected for the curve, the date range represented by each forward term is displayed relative to the curve date.





- For any forward terms indicated as having daily points (as seen above), a point will be generated for each day. Days will not be repeated.
- For any forward terms not having daily points, a point will be generated for the first and last calendar day of each month. Months will not be repeated.
- Once the points are generated, there can be no gaps in the date ranges or else the point prices will not be calculated.
- The price for each day will be calculated by first seeing if the day corresponds to a forward term with a single day. The price of the quote will be used for that day.
- Depending on the curve date, there can be situations where BOW and /or BOM is a single day. In this case, they could also be equal to DayAhead. When this is the case, the market quotes the same price. However, the curve generator will choose to ignore all but one of these prices.
- If a Saturday, Sunday and Weekend price are provided, the weekend price will not be used. If a Weekend price is provided and no Saturday or Sunday prices, then the Weekend p rice is used for both Saturday and Sunday. If a Saturday and Weekend price are provided, but no Sunday, then the Sunday price is calculated as *2 × Weekend price – Saturday price*.

- If prices are provided for DayAhead, BOW, Weekend and BOM and the date ranges for these forward terms are all different, the DayAhead and Weekend points can use the provided prices directly. The BOW points will overlap with the DayAhead by one day, so the remaining BOW points will be calculated such that the average of the BOW days will equal the provided BOW price. Then, the BOM point can be calculated by taking into account all the points prices already calculated, and ensuring that the average of the BOM days will equal the provided BOM price.
- The rest of the curve will be calculated in a similar way, except now prices can be considered for an entire month instead of at the daily level. First month prices will be generated, then quarter, then seasons and finally, years.

35. Commodity Forward Points - Curve Underlying

Before you begin

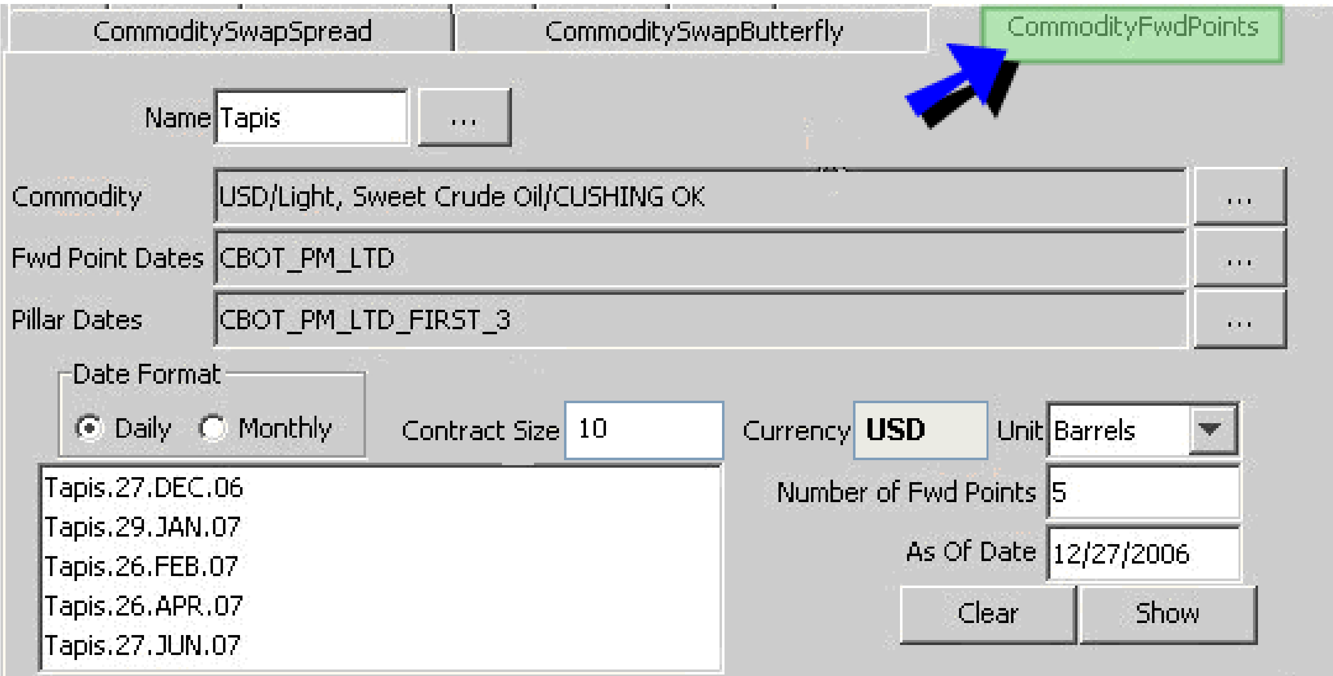
- Create commodity products using **Configuration > Commodities > Commodities** from the Calypso Navigator.
- Create dates rules using **Configuration > Definitions > Date Schedule Definitions > Date Rules** from the Calypso Navigator.
- When using the CommodityCumulative generator to build Commodity Weather Derivative curves:
  - The unit type for daily forward points must be stored in the CommodityCumulativeDailyFwdPointKeywords domain to differentiate between monthly forward points and daily forward points. An error message will be generated in the log if the name is missing from this domain.
  - The unit type for monthly forward points must be stored in the CommodityCumulativeMonthlyFwdPointKeywords domain to differentiate between monthly forward points and daily forward points. An error message will be generated in the log if the name is missing from this domain.
  - From the Calypso Navigator, navigate to **Configuration > System > Domain Values** to set the unit type values.

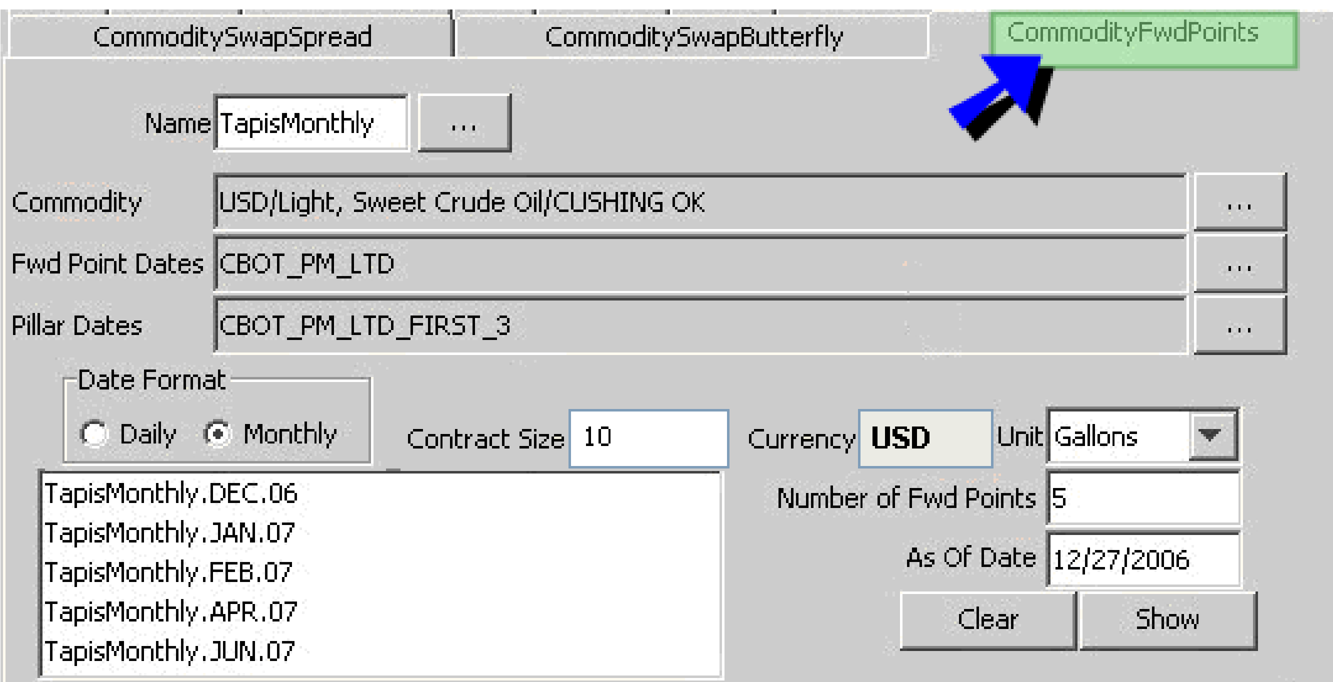
After creating the underlying, you can set up and run the GENERATE_FWD_POINTS scheduled task to regenerate the commodity forward points underlying as of the val date.

▶ Refer to Calypso Scheduled Tasks documentation for details.

Creating a Commodity Forward Points Underlying

The commodity forward points curve underlying can be used in construction of the commodity curve or commodity spread curve.





» Select a currency at the bottom of the window.

» Click **New** to create a new curve underlying.

Complete the details as described in the table below.

Click **Show** to display the generated forward points.

» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

The system creates quote names for the daily and monthly formats, respectively, like in the following examples.

Quote Name	Quote Type
CommdFwdPt.USD.Tapis.20.APR.07	Price

Quote Name	Quote Type
CommdFwdPt.USD.TapisMonthly.MAR.07	Price

Fields Details

Fields	Description
Name	Enter the name for the underlying. You can click ... to select an existing underlying.
Commodity	Click ... to select the underlying commodity product.
Fwd Point Dates	Click ... to select a date rule to generate the dates of the points on the curve.
Pillar Dates	Click ... to select a date rule to generate the delivery dates for the points.
Date Format	Select a date format for the underlying according to the market convention: • Daily — includes the date, month, and year in the quote name. Use the daily format when generating multiple underlying in the same month. • Monthly — includes the month name and year in the quote name.
Contract Size	Enter the contract size.
Currency	Select the currency for the underlying.
Unit	Select the unit of the underlying.
Number of Fwd Points	Enter the number of forward points.
As Of Date	Enter the as of date for creating the new points.

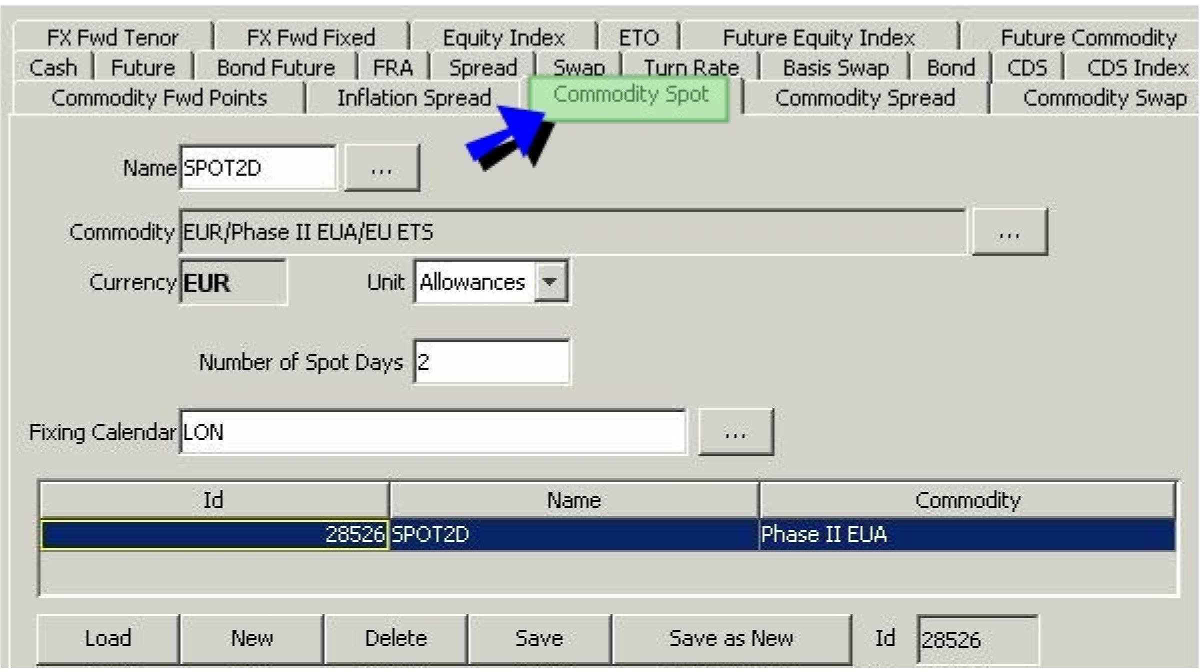
36. Commodity Spot - Curve Underlying

Before you begin

- Create commodity products using **Configuration > Commodities > Commodities** from the Calypso Navigator.

Creating a Commodity Spot Underlying

The commodity spot underlying can be used in the construction of the commodity curve using the Commodity generation algorithm.



» You can click **Load** to load existing underlyings.

» Click **New** to create a new underlying.

Complete the details as described in the table below.

» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

The system creates quote names like "`CommoditySpot.<Currency>.<Underlying name>`".

Example "`CommoditySpot.EUR.SPOT2D`".

Fields Details

Fields	Description
Name	Enter the name for the curve underlying.
Commodity	Click ... to select the underlying commodity product.
Currency	Currency of the selected commodity.
Number of Spot Days	Enter the number of spot days to determine the spot date.
Fixing Calendar	Select a holiday calendar.

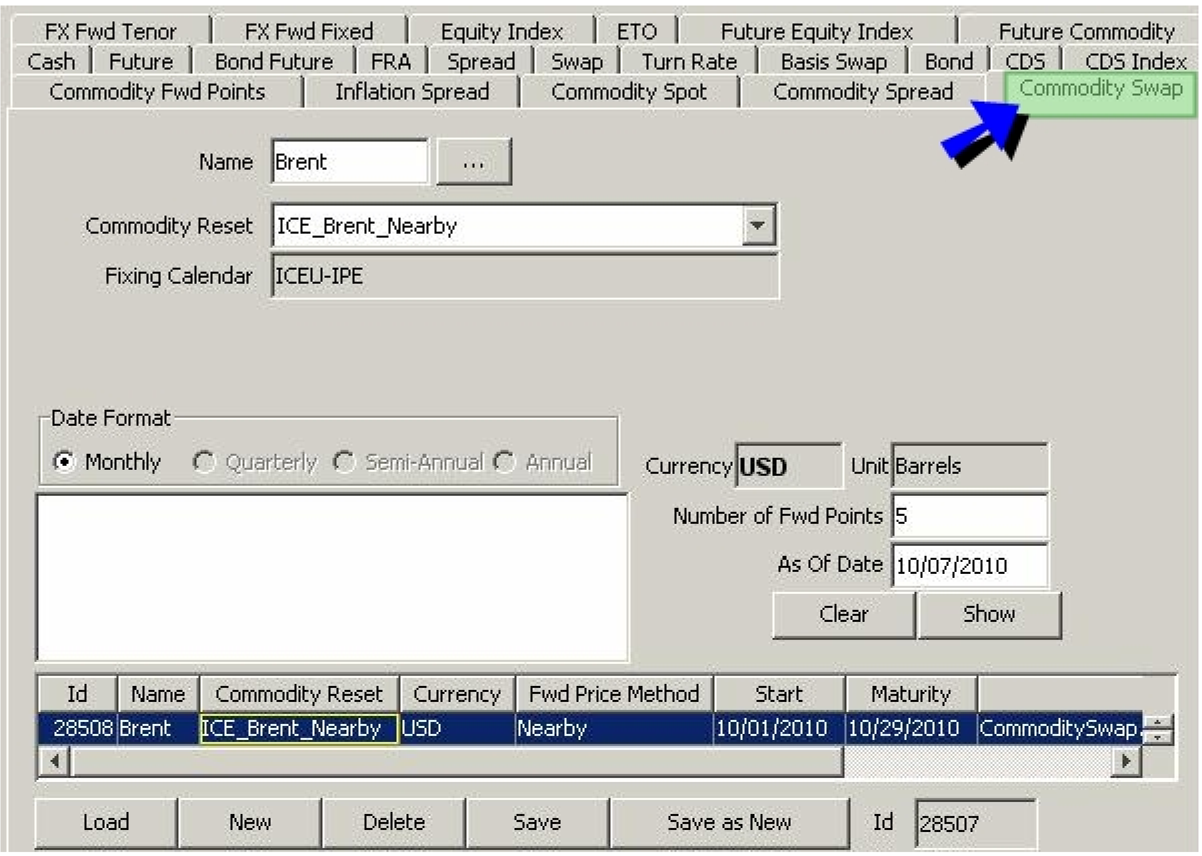
37. Commodity Swap - Curve Underlying

Before you begin

- Create commodity resets using **Configuration > Commodities > Commodity Reset** from the Calypso Navigator.

Creating a Commodity Swap Underlying

Commodity swap underlyings are used in combination with Swap Calendar Commodity Spread underlyings to build commodity curves.



» Click **New** to create a new underlying.

Complete the details as described in the table below.

Click **Show** to display the generated forward points.

» Click **Save** to save the underlyings. Each underlying is given a unique ID by the system, and is displayed in the table.

Fields Details

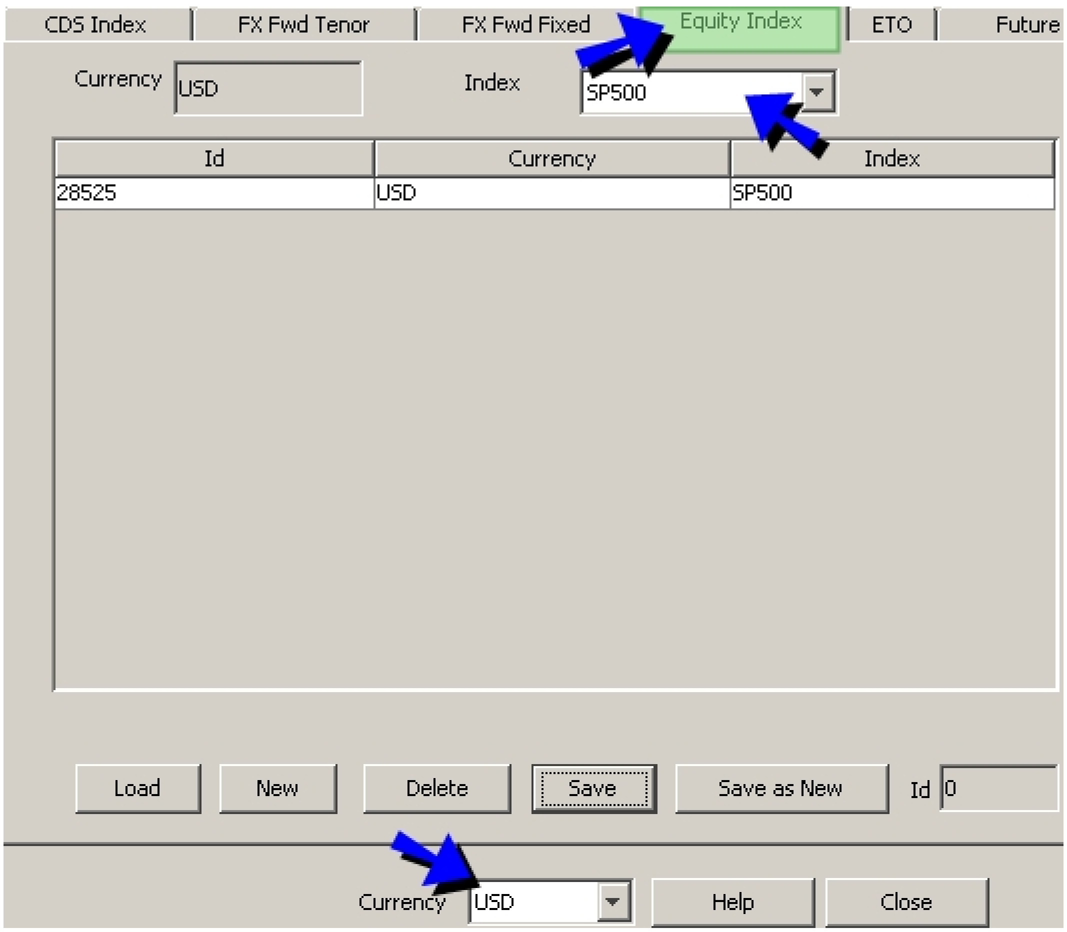
Fields	Description
Name	Enter the name for the curve underlying.
Commodity Reset	Select a commodity reset. It is used for the holiday calendar and forward price calculation method.
Date Format	Select either Monthly, Quarterly, Semi-Annually or Annually.
Currency	Displays the currency of the selected commodity.
Unit	Displays the unit of the selected commodity.
Number of Fwd Points	Enter the number of points to generate.
As Of Date	Enter the generation start date.

38. Equity Index - Curve Underlying

Before you begin

- Create equity indices using **Configuration > Equity > Equity Indexes** from the Calypso Navigator.

Creating an Equity Index Underlying



» Select a currency at the bottom of the window - It is displayed at the top of the window.

You can click **Load** to load any existing underlying.

» Click **New** to create a new underlying.

Select an equity index.

» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

The system creates quote names like "`EquityIndex.<Equity index name>`".

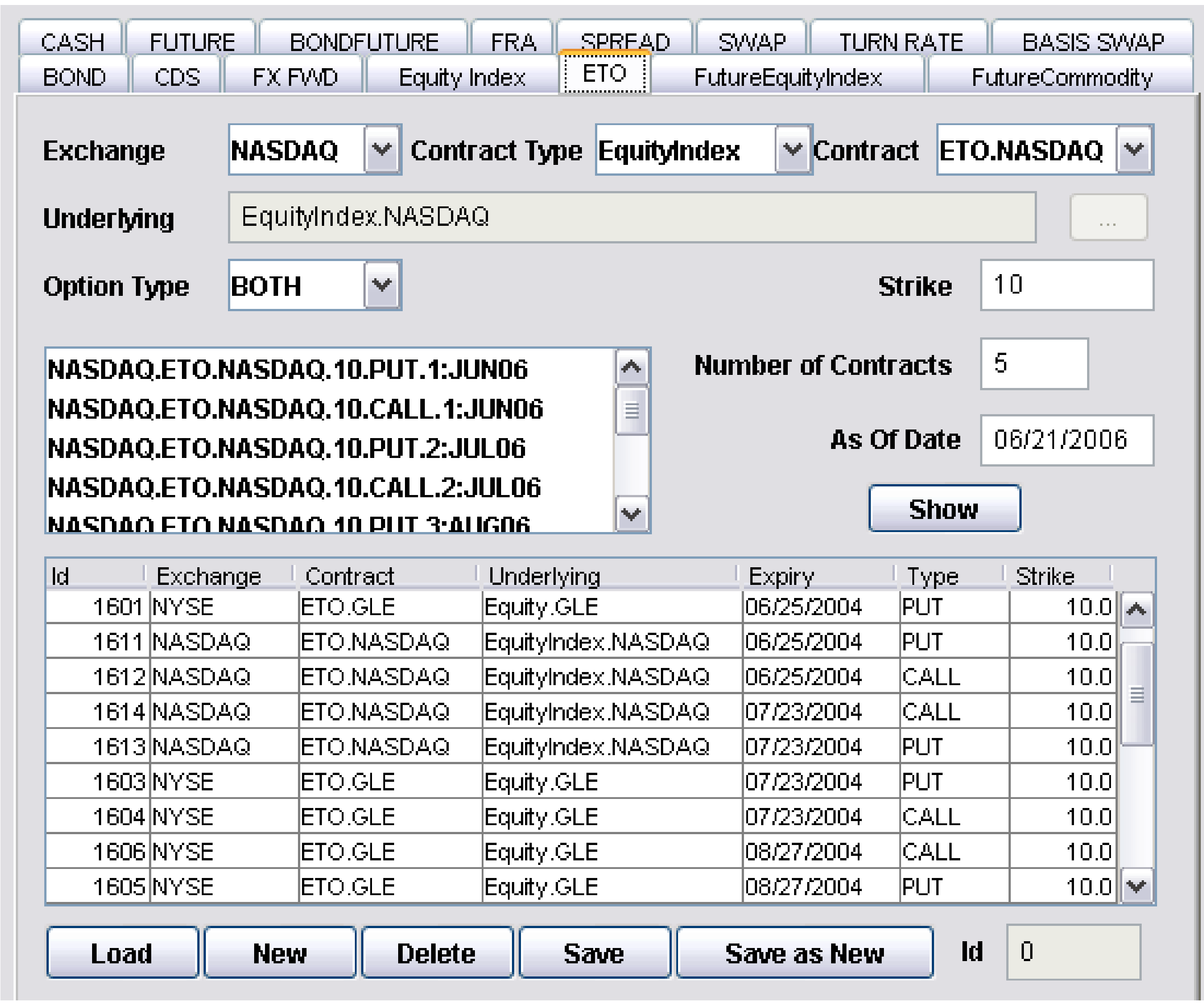
Example "`EquityIndex.SP500`".

39. Exchange Traded Option (ETO) - Curve Underlying

Before you begin

- Create option contracts using **Configuration > Listed Derivatives > Options contracts** from the Calypso Navigator.

Creating an ETO Underlying



» Select the currency in the bottom of the window.

» Click **Load** to load any existing underlying instruments.

To create a new product, click **New**. Then complete the fields as described in the table below.

» Click **Show** to generate the products.

» Click **Save** to create the curve underlying. They appear in the table.

The system creates quotes like in the following example.

Type	Description
ETOEquity	NYSE.ETO.GLE.10.CALL.1:JUN04
ETOEquity	NYSE.ETO.GLE.10.CALL.3:AUG04
ETOEquity	NYSE.ETO.GLE.10.PUT.4:NOV04
ETOEquity	NYSE.ETO.GLE.10.CALL.5:FEB05
ETOEquityIndex	NASDAQ.ETO.NASDAQ.10.CALL.5:FEB05

Fields Details

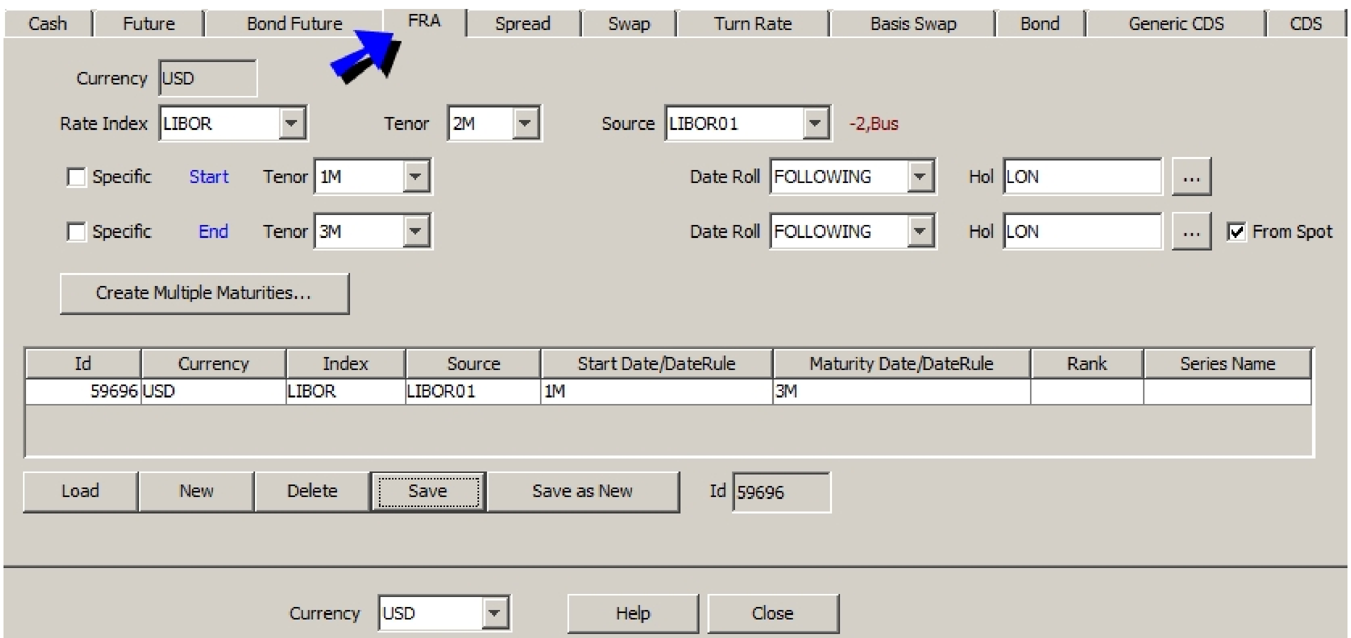
Field	Description
Exchange	Exchange where the ETO trades.
Contract Type	Contract type (Commodity, Equity, EquityIndex, or FX).
Contract	Select the contract name.
Underlying	Displays the underlying contract details.
Option Type	Option type (both, put, call).
Strike	Strike of the option.
Number of Contracts	The application automatically displays the number of ETO products traded in the contract as defined in the contract definition. You can modify this number.
As Of Date	The application automatically displays today's date as the "As Of Date" to start generating the products. You can modify this date.
Id	Displays the system assigned unique identifier for the ETO curve underlying.

40. Forward Rate Agreement (FRA) - Curve Underlying

Before you begin

- Set up currencies using **Configuration > Definitions > Currency Definitions** from the Calypso Navigator.
- Create the rate indices using **Configuration > Interest Rates > Rate Index Definitions** from the Calypso Navigator.

40.1 Creating a FRA Underlying



» Select a currency at the bottom of the window.

You can click **Load** to load any existing underlying.

» Click **New** to create a new underlying.

Complete the fields described below.

» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

The system creates quotes like: "`FRA.<Currency>.<Start tenor>x<Maturity tenor>`".

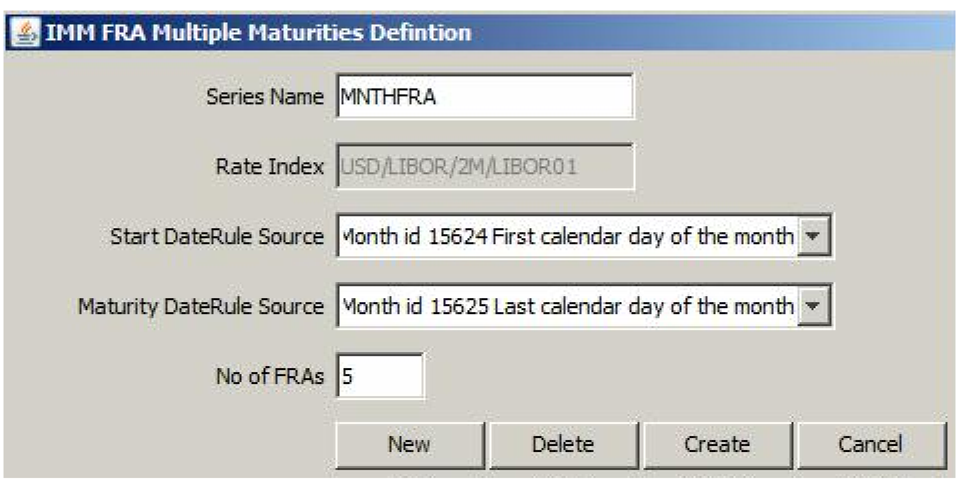
Example for start tenor 1M and end tenor 4M in USD, "`FRA.USD.LIBOR.1Mx4M`".

Fields Details

Fields	Description
Currency	Displays the currency selected at the bottom of the window.
Rate Index Tenor Source	Select the name of the rate index, tenor and source. The tenor is the forward tenor.
Start / End: Tenor Specific Date Roll Hol	Select the start tenor and forward tenor. You can also check Specific to enter a start date instead. Select the date roll method when the calculated date for the tenor falls on a non-business day, and the holiday calendar to determine business days.
From Spot	"From Spot" is checked by default to compute the end date based on the spot date. Calibration is checked by comparing the forward DF coming from the curve, between the start and end date of the FRA, with the forward DF consistent with the FRA quote. You can clear the "From Spot" checkbox to compute the end date using the start date instead. Calibration is checked by solving for the Break Even rate of the FRA using PricerFRA, and comparing the Break Even rate with the FRA quote. To compute the spot date properly, you need to set the Reference Index attribute SpotDateCalculator = BBARateIndexSpotDateCalculator.

40.2 Creating FRA Underlyings using Date Rules

Click **Create Multiple Maturities...** to bring up the IMM FRA Multiple Maturities Definition window.



- Select the date rules to generate the FRAs and the number of underlyings you want to generate. Then click **Create** to create the underlying FRAs.

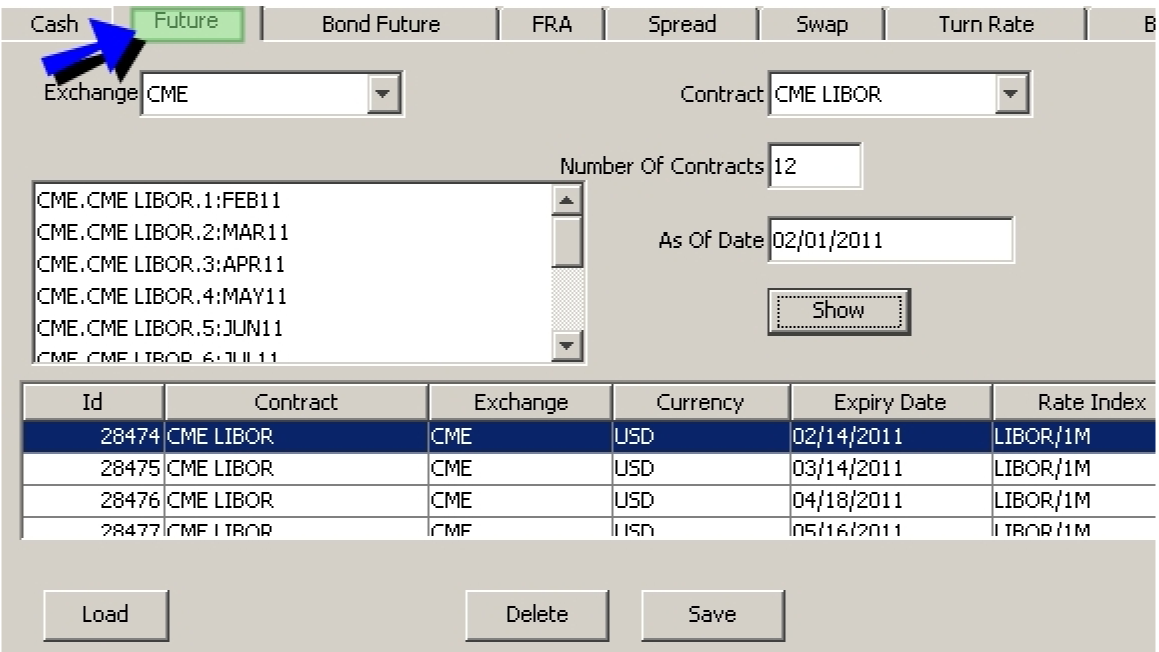
These underlying FRAs will be rolled during curve generation.

41. MM Future - Structured Flows Future - Curve Underlying

Before you begin

- Create money market future contracts or structured flows future contracts using **Configuration > Listed Derivatives > Future Contracts** from the Calypso Navigator - You can create future underlyings from that window as well.

Creating MM Future / Structured Flows Future Underlyings



» You can click **Load** to load any existing underlying.

» Complete the fields described below, and click **Show** to view the corresponding future products.

» Click **Save** to save the underlyings. The system saves an underlying for each product. They are each given a unique ID by the system, and are displayed in the table.

The system creates quote names like "Future.<Currency>.<Exchange>.<Contract name>.<Expiration>".

Example "Future.USD.CME.CME LIBOR.FEB.11".

Fields Details

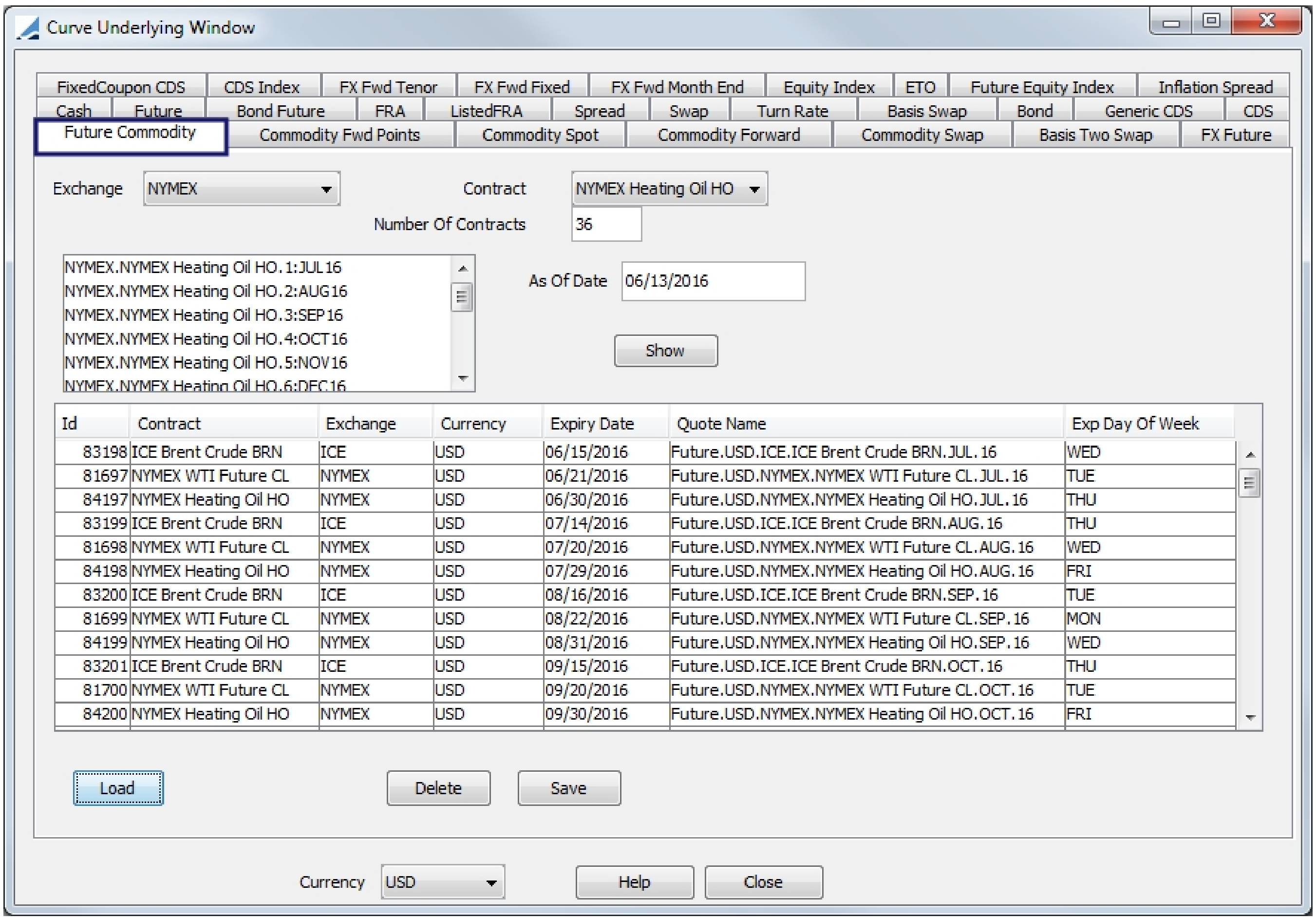
Fields	Description
Exchange	Select the exchange where the future trades.
Contract	Select the name of the future contract.
Number of Contracts	The application automatically displays the number of products as defined in the contract definition. You can modify this number.
As Of Date	The application automatically displays today's date as the "As Of Date" to start generating the products. You can modify this date.

42. Future Commodity - Curve Underlying

Before you begin

- Create commodity products using **Configuration > Commodities > Commodities** from the Calypso Navigator.
- Create commodity future contracts using **Configuration > Listed Derivatives > Future Contracts** from the Calypso Navigator - You can create future underlyings from that window as well.

Creating a Future Commodity Underlying



» Click **Load** to load any existing underlying.

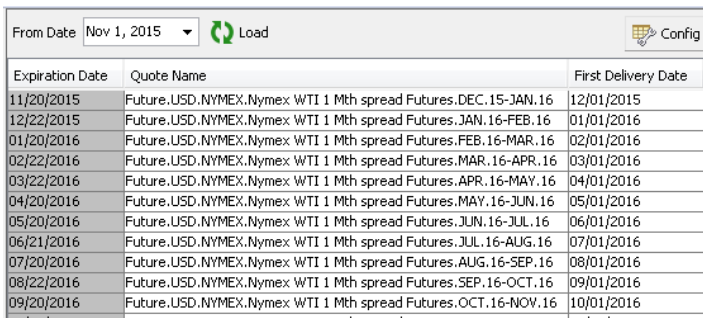
» Complete the fields described below, and click **Show** to view the corresponding future products.

» Click **Save** to save the underlyings. The system saves an underlying for each product. They are each given a unique ID by the system, and are displayed in the table.

The system creates quote names like "Future.<Currency>.<Exchange>.<Contract name>.<Future.USD.NYMEX.NYMEX Heating Oil HO.SEP.16".

Note: Calendar spread Underlyings can be created for use in commodity forward curves. The quote name is formatted differently, reflecting the spread. The first future underlying on the curve cannot be a calendar spread. It must be an outright price, either Future Commodity, Commodity Spot or Commodity Fwd Point underlying.

For Calendar Spread Underlyings, there are two expiry dates, one for the near expiry and one for the far expiry. If a Calendar Spread Underlying is used in a curve, the previous underlying in the series must have it's expiry date equal to the current underlying's near expiry date. If the previous underlying is a calendar spread, then its far expiry date must equal the current underlying's near expiry date.


From Date Nov 1, 2015 Load Config

Expiration Date	Quote Name	First Delivery Date
11/20/2015	Future.USD.NYMEX.Nymex WTI 1 Mth spread Futures.DEC.15-JAN.16	12/01/2015
12/22/2015	Future.USD.NYMEX.Nymex WTI 1 Mth spread Futures.JAN.16-FEB.16	01/01/2016
01/20/2016	Future.USD.NYMEX.Nymex WTI 1 Mth spread Futures.FEB.16-MAR.16	02/01/2016
02/22/2016	Future.USD.NYMEX.Nymex WTI 1 Mth spread Futures.MAR.16-APR.16	03/01/2016
03/22/2016	Future.USD.NYMEX.Nymex WTI 1 Mth spread Futures.APR.16-MAY.16	04/01/2016
04/20/2016	Future.USD.NYMEX.Nymex WTI 1 Mth spread Futures.MAY.16-JUN.16	05/01/2016
05/20/2016	Future.USD.NYMEX.Nymex WTI 1 Mth spread Futures.JUN.16-JUL.16	06/01/2016
06/21/2016	Future.USD.NYMEX.Nymex WTI 1 Mth spread Futures.JUL.16-AUG.16	07/01/2016
07/20/2016	Future.USD.NYMEX.Nymex WTI 1 Mth spread Futures.AUG.16-SEP.16	08/01/2016
08/22/2016	Future.USD.NYMEX.Nymex WTI 1 Mth spread Futures.SEP.16-OCT.16	09/01/2016
09/20/2016	Future.USD.NYMEX.Nymex WTI 1 Mth spread Futures.OCT.16-NOV.16	10/01/2016

The most likely setup for a curve is a nearby outright future, followed by sequential calendar spreads. The commodity generator will give priority to outright prices over calendar spreads. For example, if a curve has underlyings for the Dec.15 WTI future and the Dec.15-Jan.16 spread, the generator will derive the price of the Jan.16 forward price by adding the spread and the Dec.15 future price. However, if the curve has underlyings for the Dec.15 WTI future, the Jan.16 WTI future and the Dec.15-Jan.16 spread, the generator will use the prices of the Dec.15 and Jan.16 WTI futures and ignore the spread.

Fields Details

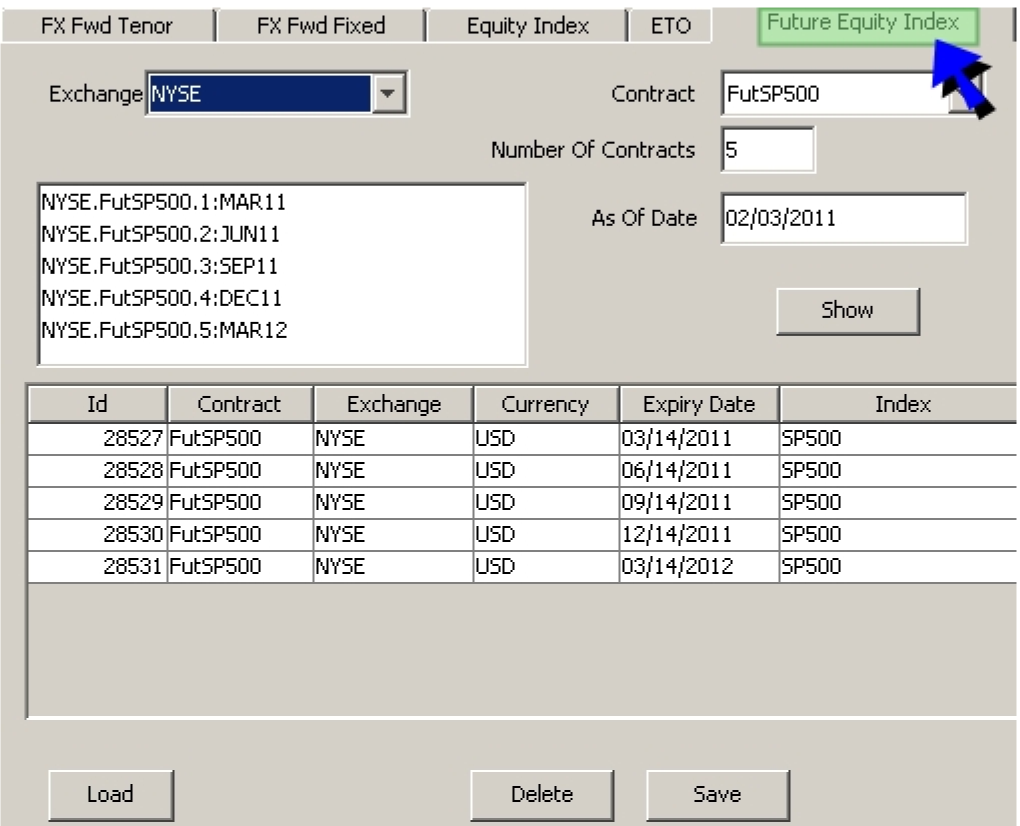
Fields	Description
Exchange	Select the exchange where the future trades.
Contract	Select the name of the future contract.
Number of Contracts	The application automatically displays the number of products as defined in the contract definition. You can modify this number.
As Of Date	The application automatically displays today's date as the "As Of Date" to start generating the products. You can modify this date.

43. Future Equity Index - Curve Underlying

Before you begin

- Create equity indices using **Configuration > Equity > Equity Indexes** from the Calypso Navigator.
- Create future equity index contracts using **Configuration > Listed Derivatives > Future Contracts** from the Calypso Navigator - You can create future underlyings from that window as well.

Creating a Future Equity Index Underlying



» You can click **Load** to load any existing underlying.

» Complete the fields described below, and click **Show** to view the corresponding future products.

» Click **Save** to save the underlyings. The system saves an underlying for each product. They are each given a unique ID by the system, and are displayed in the table.

The system creates quote names like "Future.<Currency>.<Exchange>.<Contract name>.<Expiration>".

Example "`Future.USD.NYSE.FutSP500.MAR.11`".

Fields Details

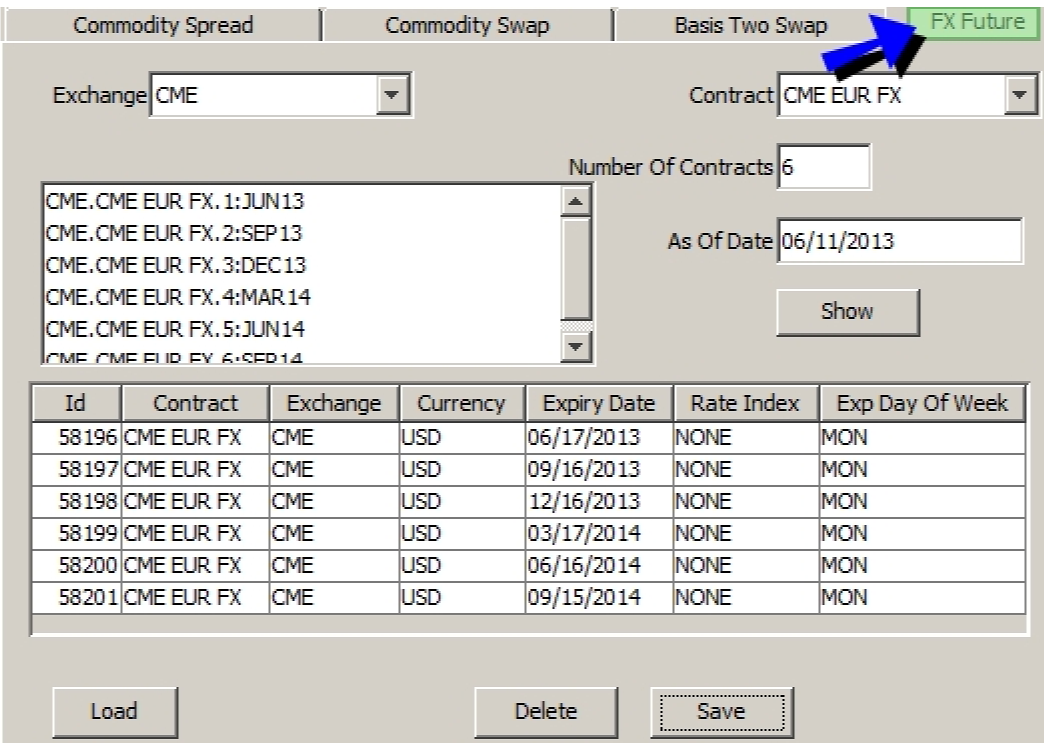
Fields	Description
Exchange	Select the exchange where the future trades.
Contract	Select the name of the future contract.
Number of Contracts	The application automatically displays the number of products as defined in the contract definition. You can modify this number.
As Of Date	The application automatically displays today’s date as the “As Of Date” to start generating the products. You can modify this date.

44. FX Future - Curve Underlying

Before you begin

- Create FX future contracts using **Configuration > Listed Derivatives > Future Contracts** from the Calypso Navigator - You can create FX future underlyings from that window as well.

Creating FX Future Underlyings



» You can click **Load** to load any existing underlying.

» Complete the fields described below, and click **Show** to view the corresponding FX future products.

» Click **Save** to save the underlyings. The system saves an underlying for each product. They are each given a unique ID by the system, and are displayed in the table.

The system creates quote names like "Future.<Currency>.<Exchange>.<Contract name>.<Expiration>".

Fields Details

Fields	Description
Exchange	Select the exchange where the FX future trades.
Contract	Select the name of the FX future contract.
Number of Contracts	The application automatically displays the number of products as defined in the contract definition. You can modify this number.
As Of Date	The application automatically displays today's date as the "As Of Date" to start generating the products. You can modify this date.

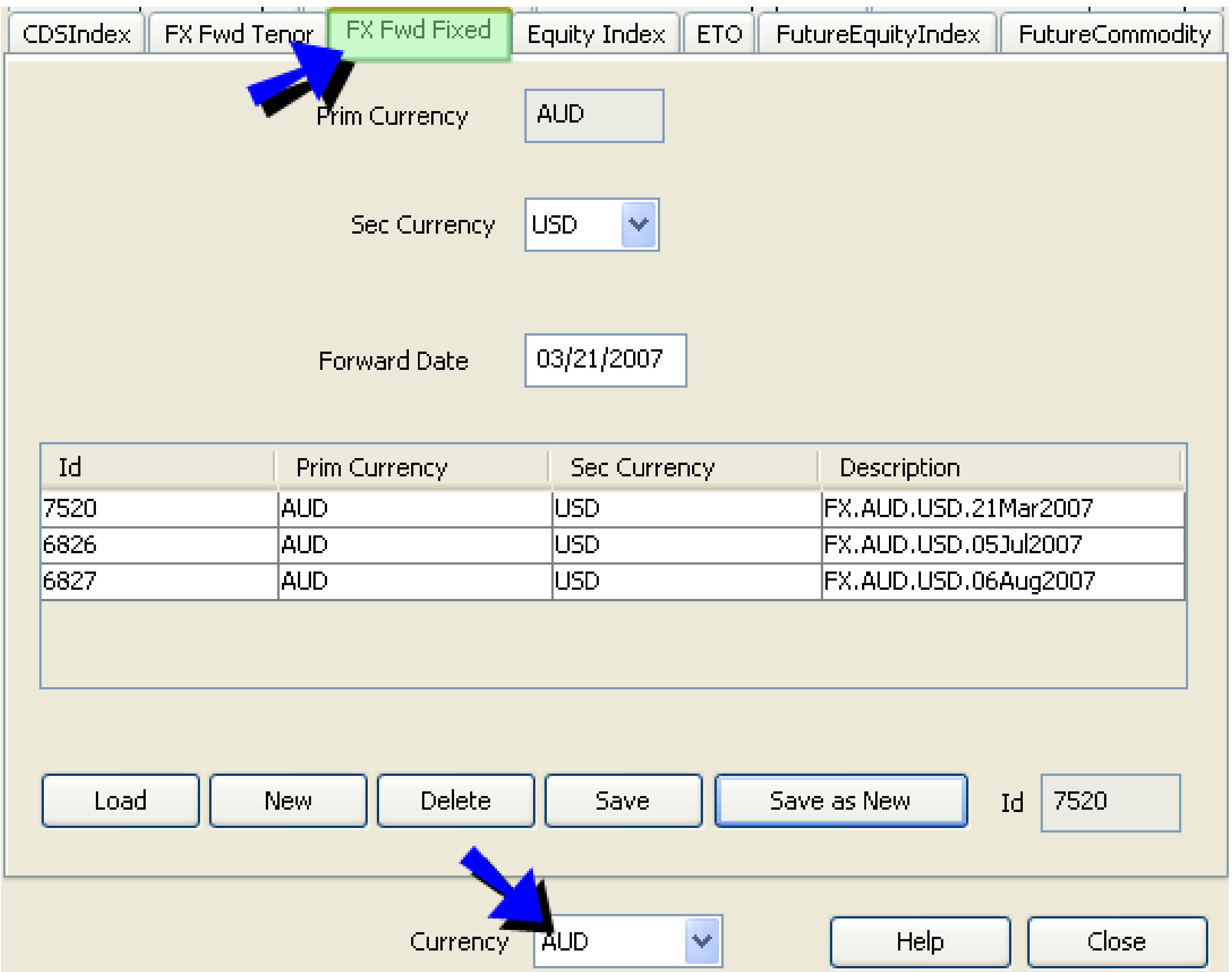
45. FX Forward Fixed - Curve Underlying

Before you begin

- Setup currencies and currency pairs using **Configuration > Definitions > Currency Definitions** from the Calypso Navigator.

Creating an FX Forward Fixed Underlying

Fixed underlyings can be created for an event on a fixed date, such as a Reserve Bank meeting date. The start date for forward points is the spot date.



» Select a currency at the bottom of the window - It is the primary currency.

You can click **Load** to load any existing underlying.

» Click **New** to create a new underlying.

Select the secondary currency and enter the forward date.

» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

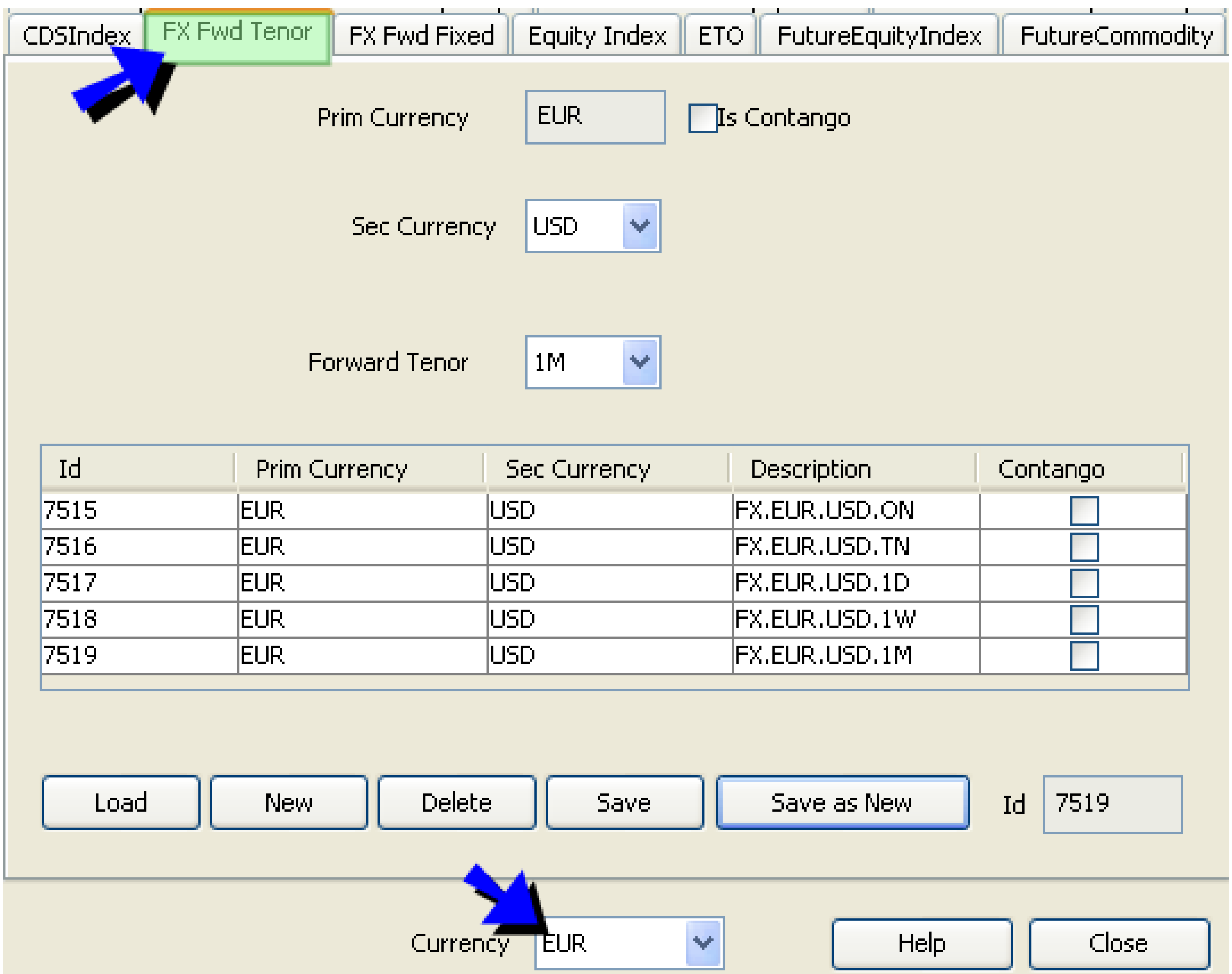
The system creates quote names like "`FX.<Primary currency>.<Secondary currency><Forward date>`". Example "`FX.AUD.USD21Mar2007`".

46. FX Forward Tenor and Contango - Curve Underlying

Before you begin

- Setup currencies and currency pairs using **Configuration > Definitions > Currency Definitions** from the Calypso Navigator.
- Add tenors as needed to the "tenor" domain.

46.1 Creating an FX Forward Tenor Underlying



» Select a currency at the bottom of the window - It is the primary currency.

You can click **Load** to load any existing underlying.

» Click **New** to create a new underlying.

Select the secondary currency and the forward tenor.

For a Contango, check "Is Contango". A Contango underlying can be used for building precious metal curves.

» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

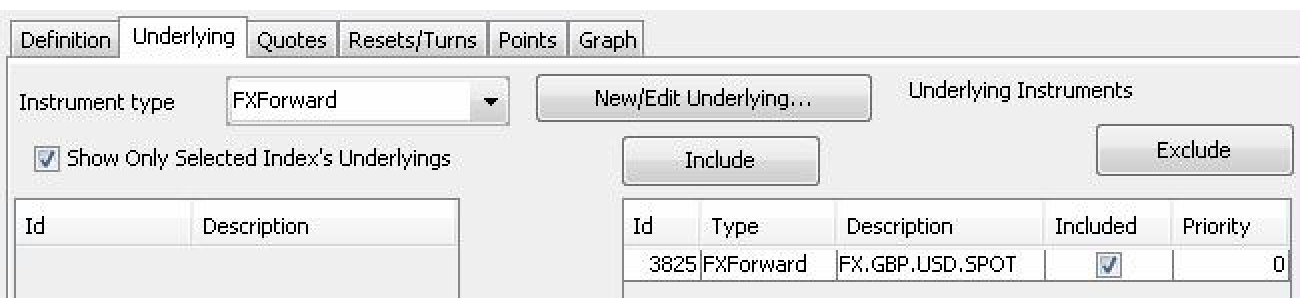
The system creates quote names like "FX.<Primary currency>.<Secondary currency>.<Forward tenor>".

Example "FX.EUR.USD.1M".

46.2 Creating the SPOT Tenor Underlying for a Given Currency Pair

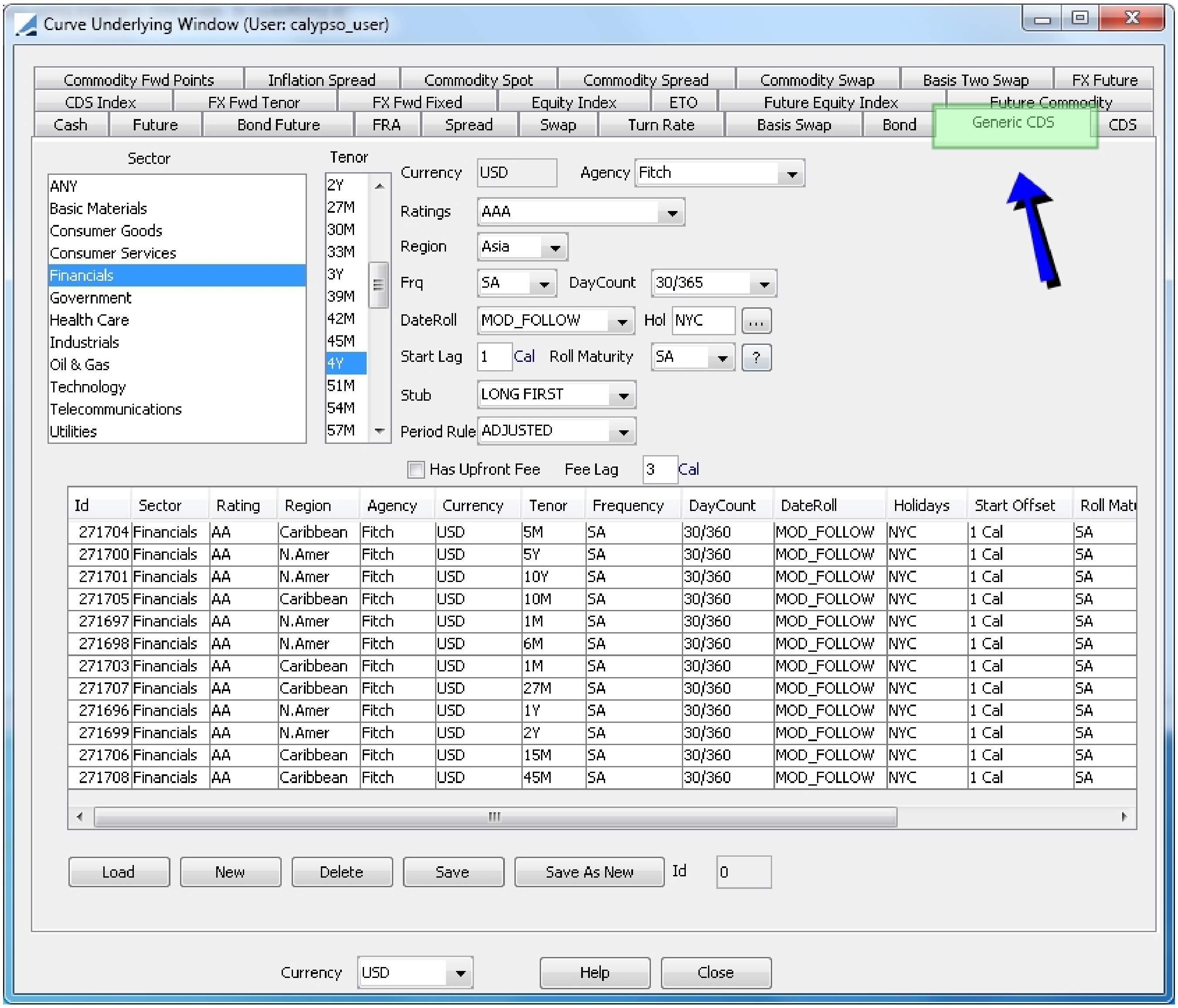
If you want to create the SPOT tenor underlying for a given currency pair, bring up **Market Data > Interest Rate Curves > Basis Curve**.

Select a currency and a foreign curve in a different currency. Then select FXForward in the Underlying panel, and it automatically creates the SPOT tenor underlying for the corresponding currency pair. You can then use the underlying in FX curves for example.



47. GenericCDS - Curve Underlying

Specify a curve underlying using a generic CDS trade. Use this type of underlying for a sector curve.



In the 'GenericCDS' tab:

» Select the sector for the curve to use. You can select ANY to use a rating only.

You can click **Load** to load any existing underlying.

» Select a tenor.

» Click **New** to create a new underlying.

Complete the fields described below.

» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

Example "`CDS.USD.ANY.ANY/4Y`".

Fields Details

Field	Description
Sector	Sector defined by the rating agency (Markit, Fitch, etc.).
Tenor	Tenor for the curve generator.
Currency	Underlying currency type. Field is non-editable. select currency type from drop-down at the bottom of the window.
Agency	Ratings agency. If you do not see a specific agency, add it to your domain values.
Ratings	Select the rating for the sector.
Region	Select the geographic region.
Frq	Underlying (payment) frequency.
DayCount	Select the daycount convention.
DateRoll	Select the date roll definition. From the Calypso Navigator, navigate to **Help > Date Roll Conventions** for details.
Hol	select the holiday schedule.
Start Lag	Define the start lag details (number of lag days, Cal for calendar days or Bus for business days).
Roll Maturity	Select the roll maturity.
Stub	Select the stub period if any.
Period Rule	Select the accrual period adjustment on non-business days.
Has Upfront Fee	Check to attach an upfront fee.  Select the details (number of fee lag days, Cal for calendar days or Bus for business days).

Scheduled Task for Updating Roll Maturity

The scheduled task UPDATE_CURVE_UNDERLYING can be used for bulk updating the roll maturity of CDS curve underlyings and regenerating the curves.

Task Attributes

Task Attributes	
UNDERLYING TYPE	CurveUnderlyingCDS
UNDERLYING CCY	
ROLL FREQUENCY	SA

- UNDERLYING TYPE – Select the underlying type: CDS, Generic CDS, or Fixed Coupon CDS.
- UNDERLYING CCY – Select a currency as needed to be updated, or leave blank to update all.
- ROLL FREQUENCY – Select the roll frequency: SA or QTR.

48. Inflation Spread (Instrument Spread) - Curve Underlying

Inflation spread is a spread over a swap's quote.

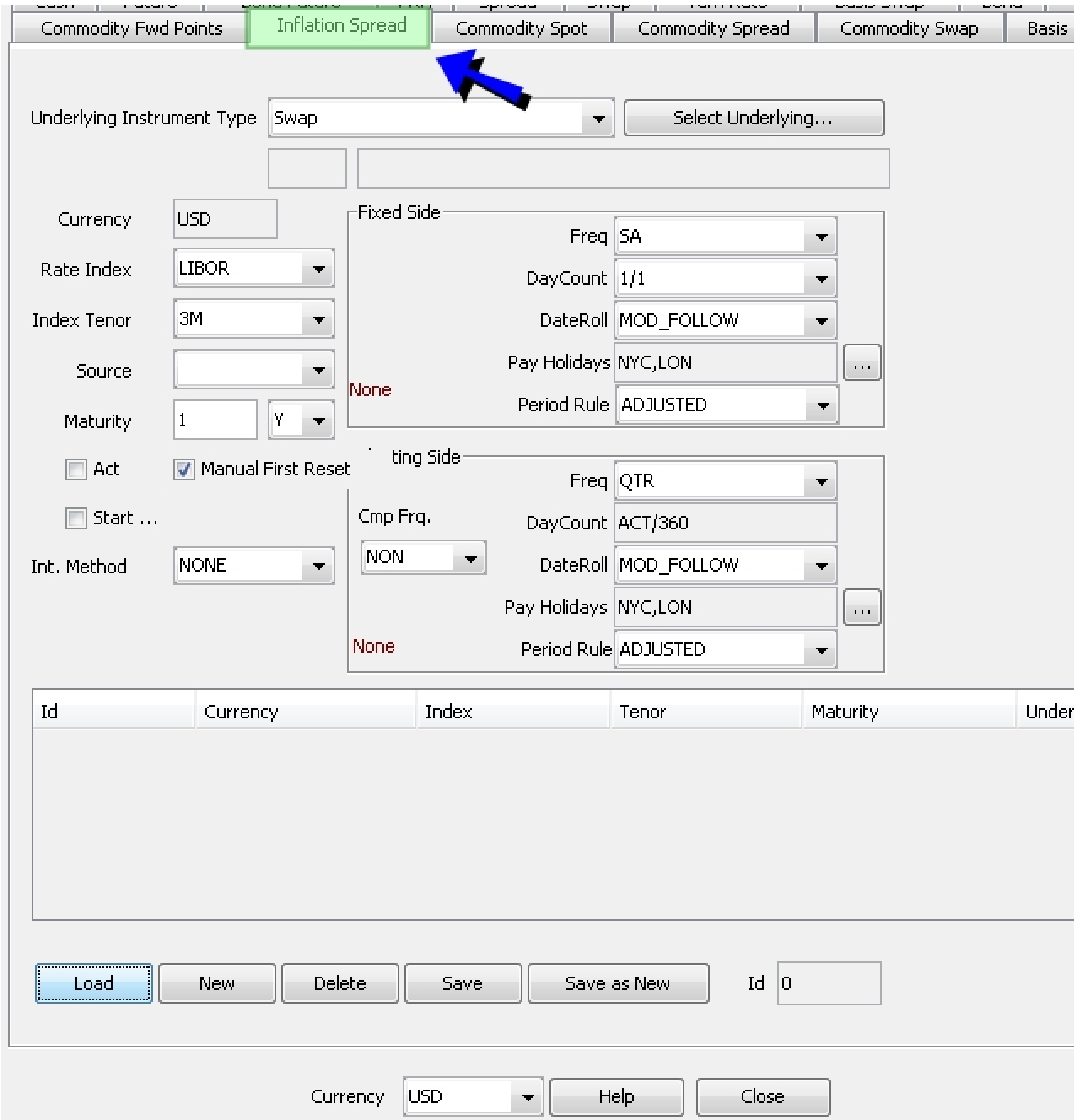
Before you begin

- Create "Inflation" rate indices using **Configuration > Interest Rates > Rate Index Definitions** from the Calypso Navigator.

Creating an Instrument Spread Underlying

The instrument spread can be used as a curve underlying of the Inflation Curve.

This underlying instrument allows selecting a swap, and entering a spread over the swap’s quote.



» Select a currency at the bottom of the window.

» Click **New** to create a new underlying.

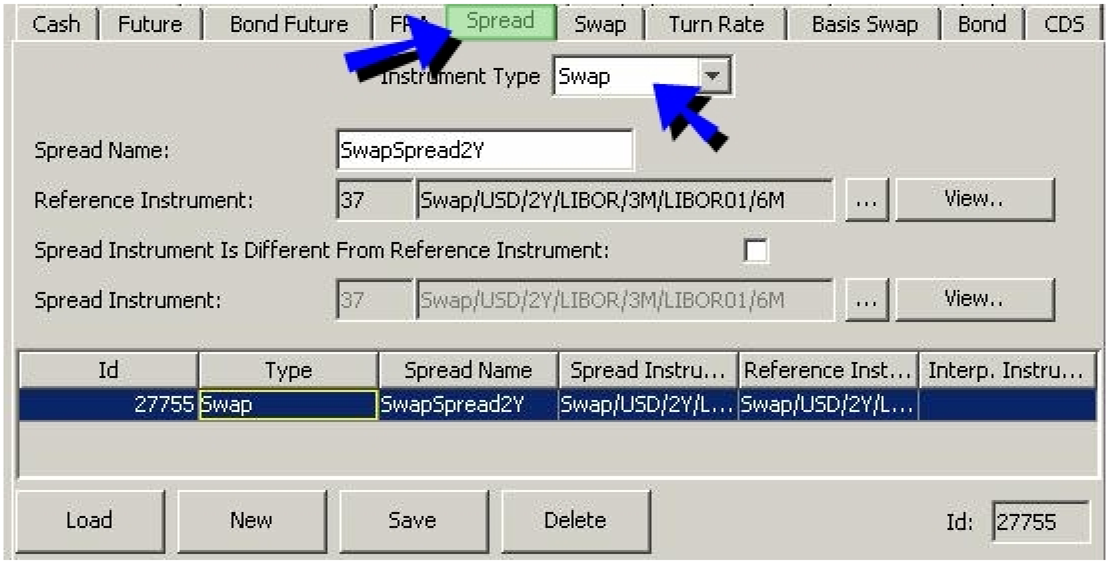
Click **Select Underlying** to select an existing swap underlying instrument - This populates the fixed side and floating side of the underlying. You can modify the fields as needed.

» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

The system create quote names like "Spread.<Spread maturity>.<Rate index currency>.<Rate index name>.<Rate index tenor>/<Spread fixed side tenor>.<Rate index source>/<Swap quote name>".

49. Spread - Curve Underlying

Spreads are used as underlying instruments for generating interest rate curves.



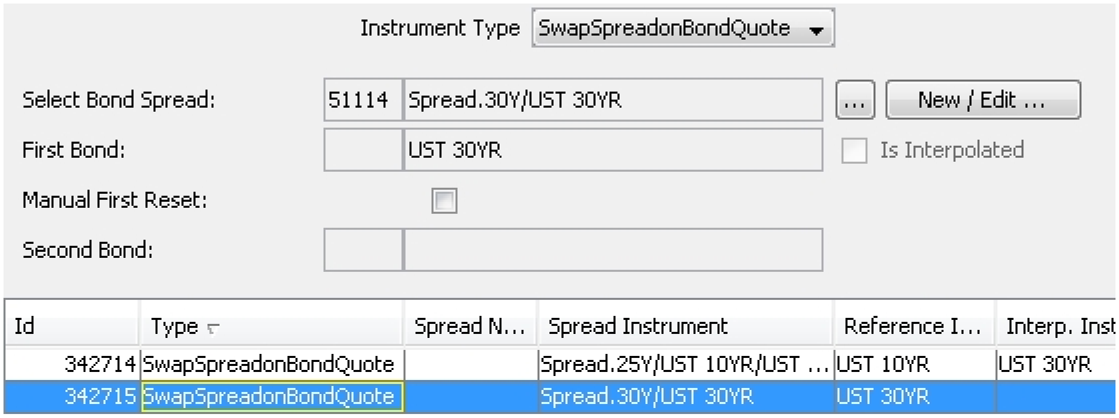
- You can click **Load** to load any existing underlying.
- Click **New** to create a new underlying, and select the instrument type: Bond, BondEFP, Swap, FRA, or MoneyMarket.

  Enter a name to identify the spread, and select the reference instrument as described below.
- Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

The system creates quote names like "`Spread.<Spread maturity>/<Reference instrument maturity>/<Interpolated instrument maturity>`" for bond, and "`Spread.<Instrument type>.<Spread name>`" for Swap, FRA and MoneyMarket.

Swap Spread on Bond Quote

The Swap Spread on Bond Quote product references the underlying bond quote.



» Select the SwapSpreadonBondQuote product.

You can create bond spread products using **Configuration > Fixed Income > Spread** from the Calypso Navigator, or click **New/Edit**.

If you select a bond spread created from two bonds with an interpolated interest rate, then the curve underlying window displays the bond spread, reference bond, and interpolated bond details.

You can check "Manual First Reset" to apply a first reset manually. The system will request a first reset quote for the rate (a cash quote) in the form "`MM.Currency.Rate index.Tenor.Source`", for example "`MM.USD.LIBOR.3M.LIBOR01`".

Sample spread / bond quote name: "`Spread.27M/03-15-2012`".

Swap Spread on Bond Curve

The Swap Spread on Bond Curve product references the Bond Benchmark Curve to calculate the bond yields. To make this product available for underlyings in the curve window, you first need to add the Bond Benchmark Curve on the Definition panel for either CurveZero or CurveBasis, or the Curve Dependencies tab for the Multicurve Package.

» Select the SwapSpreadonBondCurve product.

You can create bond spread products using **Configuration > Fixed Income > Spread** from the Calypso Navigator, or click **New/Edit**.

If you select a bond spread created from two bonds with an interpolated interest rate, then the curve underlying window displays the bond spread, reference bond, and interpolated bond details.

You can check "Manual First Reset" to apply a first reset manually. The system will request a first reset quote for the rate (a cash quote) in the form "`MM.Currency.Rate index.Tenor.Source`", for example "`MM.USD.LIBOR.3M.LIBOR01`".

Sample swap spread quote name: "`SwapSpread.10Y.USD.LIBOR.3M/UST CT10`".

Swap (SpreadOnSwap), FRA (SpreadOnFRA), MoneyMarket (SpreadOnMoneyMarket)

- You can select a reference instrument, and the spread will be over that instrument. You can enter a spread over the instrument's quote.
- If you check "Spread Instrument Is Different From Reference Instrument", you can select a spread instrument. The spread is interpolated between the spread instrument and the reference instruments.

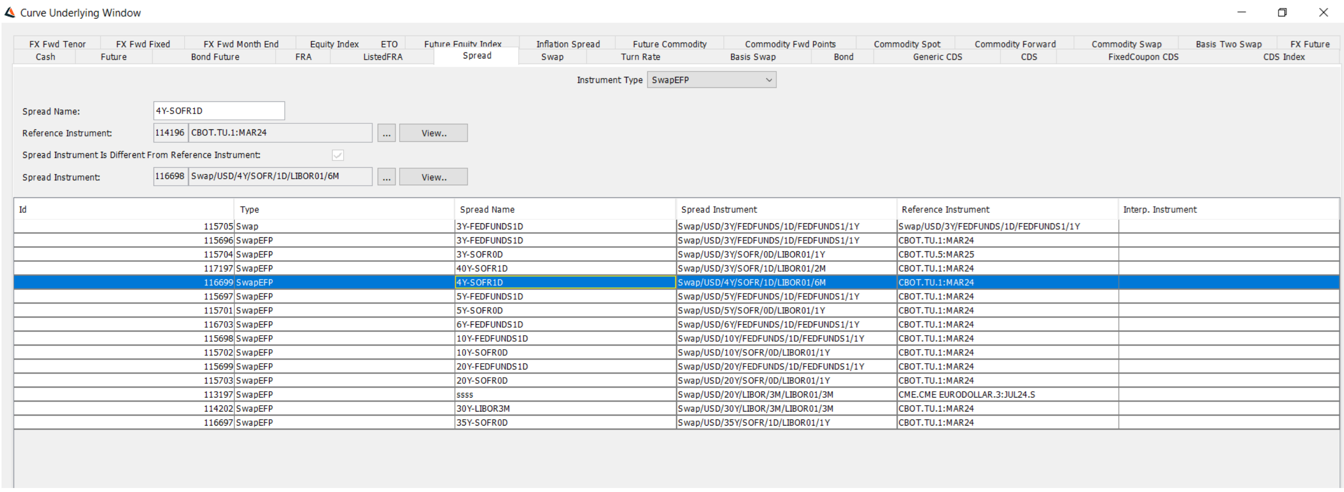
Sample spread / swap quote name "`Spread.Swap.SwapSpread2Y`".

SwapEFP / Bond EFP Curve Underlyings

You can quote swap and bond prices on an EFP (Exchange of Futures for Physical) basis where a swap / bond is quoted as a spread to the relevant future price.

Specification:

Create a new Spread Instrument Type – SwapEFP or BondEFP – on the Spread tab of the Curve Underlying Window.



The new SwapEFP / BondEFP CU will work similarly to the other spread CU's.

- **Spread Name**: Allow users to input a name for the Spread part of the Quote Name. See below for full Quote Name logic.
- **Reference Instrument**: Allow users to choose an existing Future Curve Underlying.
- **Spread Instrument**: Allow users to select an existing Swap / Bond Curve Underlying that represents the Swap / Bond being priced by the bootstrapper based on a spread quote.
- **Spread Instrument Is Different From Reference Instrument**: This property can be hidden, or set to true and disabled.

Quote Name Format

The Quote Name for the curve underlying will be as follows:

SwapEFP.[Spread Name].ContractName.[Expiry-same format as Future Product in use]

BondEFP.[Spread Name].ContractName.[Expiry-same format as Future Product in use]

Example:

Spread Name = 1Y-BBSW3M (configured and defined by user)

Reference Future Quote Name = BondFuture.3Y T Bond.03-15-2024

SwapEFP Quote Name = SwapEFP.1Y-BBSW3M.3Y T Bond.03-15-2024

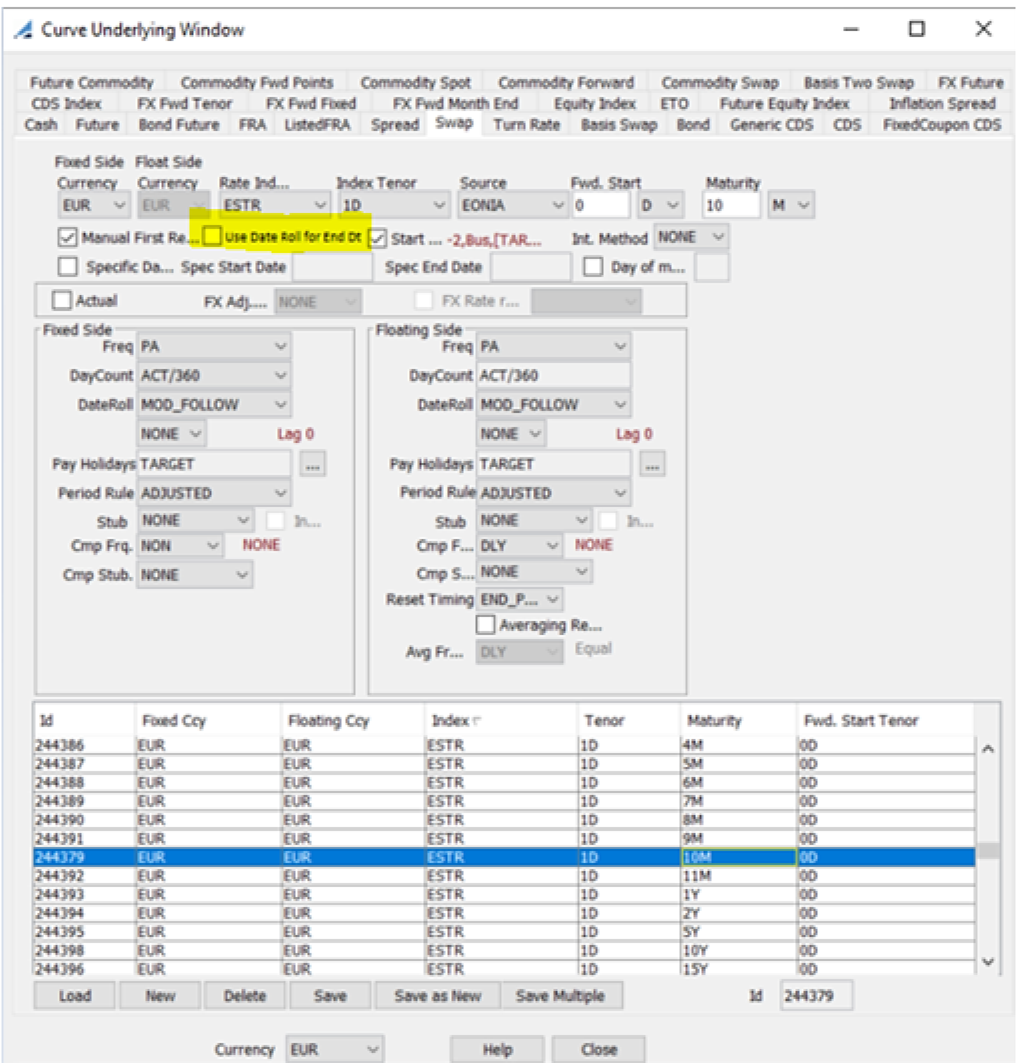
50. Swap - Curve Underlying

Before you begin

- Create rate indices using **Configuration > Interest Rates > Rate Index Definitions** from the Calypso Navigator.

Creating a Swap Underlying

The swap underlying has a fixed side and a floating side, and can be cross currency.



» Select a currency at the bottom of the window.

You can click **Load** to load any existing underlying.

» Click **New** to create a new underlying.

Complete the fields described below.

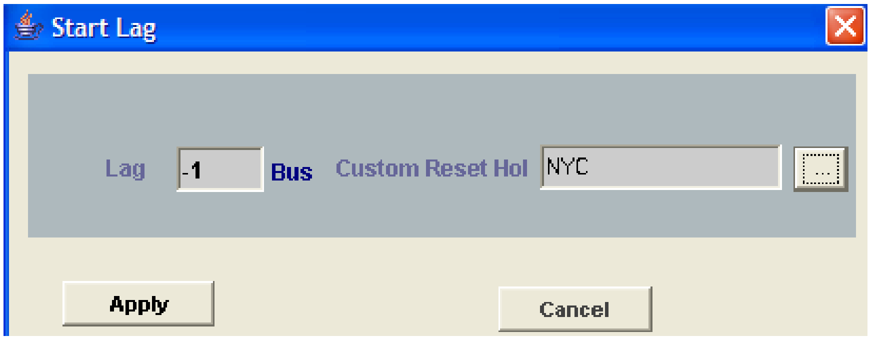
» Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

The system creates quote names like: "`Swap.<Maturity>.<Currency>.<Rate index>.<Tenor>/<Fixed side frequency>.<Source>`".

Example "`Swap.2Y.USD.LIBOR.3M/6M.LIBOR01`".

Fields Details

Fields	Description
Fixed Side Currency	Select a currency for the fixed side.
Floating side Currency	Currency of the floating side selected at the bottom of the window.
Rate Index	Select the rate index.
Index Tenor	Select the index tenor.
Source	Select the quoting source of the index.
Fwd. Start	Enter a tenor when creating a Forward Start Swap underlying. The selection for Fwd. Start indicates when the Swap starts. The Maturity setting (immediately below) indicates how long after the start the Swap will mature (e.g., Fwd. Start = 5Y; Maturity = 5Y >> Swap starts in five years and ends in 10 years). The quote name for a Forward Start Swap has the prefix "FWDSwap" and includes the Fwd. Start and Maturity tenors. Example: FWDSwap.3Y5Y.USD.LIBOR.3M/6M.LIBOR01 Once Forward Start underlyings are created, they are added in the curve window using "Instrument type" = Swap.
Maturity	Enter the maturity of the swap: number of Days, Weeks, Months, or Years.
Manual First Reset	Check to indicate that the first reset is manual.
Start Lag	Swap underlying start date is curve date + reset lag by default. Select Start Lag to enter a custom lag for the starting date of the swap. Click the red lag label to open the Start Lag window. Enter the lag, select business or calendar days (double-click Bus to toggle to Cal, respectively), and click **...** to select custom reset holidays if applicable. Click **Apply** to set the custom lag.

Fields	Description
	
Use Date Roll for End Date	When this property is unchecked, which is also the expected default behavior, we expect the current behavior to continue. That is, End Date of a Swap curve underlying is rolled using the date roll of the associated Rate Index Tenor configuration. When this property is checked, End Date of a Swap curve underlying is rolled using the Floating side Date Roll of Swap Curve Underlying configuration.
Int. Method	Select EXP if the swap should have exponential interest, or NONE otherwise.
Specific Dates	You can check "Specific Dates" to create an underlying with a specific start date and end date.
Day of Month	When specified, the maturity month is found based on the selected maturity, and the maturity date is set to the selected day of that month. For example, if you set it to "9", and the maturity is in April, it will be set to April 9th.
Actual Exch	Check to indicate that there is an actual principal exchange.
FX Adj. on	If the fixed currency and the floating currency are different, you can add FX adjustments on either leg: Select NONE, Fixed, or Floating. For Fixed and Floating you can select and FX Rate Reset to set the FX rate.

Fixed Side

Fields	Description
Freq	Payment frequency.
DayCount	Select the daycount convention used for determining the payment periods.
DateRoll	Select the date roll convention to use when the date falls on a non-business day.
Pay Holidays	Holiday calendars used in calculating the pay dates.
Period Rule	Select the accrual period adjustment on non-business days.
Stub	Select the stub period if any.
Cmp Frq	Select the interest compounding frequency as applicable.

Fields	Description
	The "None" label is not active.
Cmp Stub	Select the stub period on compounding period if any.

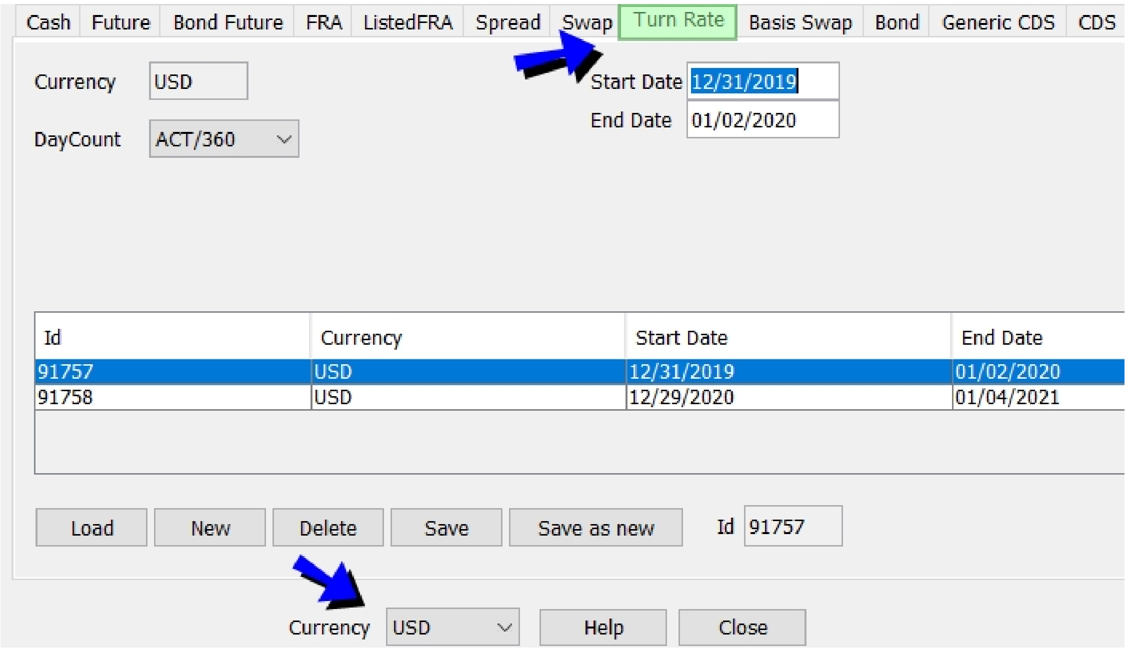
Floating Side

Fields	Description
Freq	Payment frequency.
DayCount	Displays the daycount convention on the rate index.
DateRoll	Select the date roll convention to use when the date falls on a non-business day.
Pay Holidays	Holiday calendars used in calculating the pay dates.
Period Rule	Select the accrual period adjustment on non-business days.
Stub	Select the stub period if any.
Cmp Frq	Select the interest compounding frequency if any. Difference between LUN and LUN(R), BIWK and BIWK(R), WK and WK(R). For a 3M swap paying MONTHLY compounding WEEKLY: • Original method splits the 90 days into periods of 7 days and puts the remaining as STUB. • Regular (R) method splits the 90 days into 3 periods of 30 days each, and then splits the 30 day periods into periods of 7 days thus leaving stubs on each coupon period. The "None" label is not active. The Compounding Accrual Method is set to "UNADJUSTED", when Rate Index has attribute is7DayRepo = True and a compounding frequency is selected.
Cmp Stub	Select the stub period on compounding period if any. Only applies to LUN(R), BIWK(R), WK(R) compounding frequencies.
Reset Timing	Select the reset timing: beginning of the period, or end of the period.
Averaging Reset Avg Frq Day of Sampling	Check "Averaging Reset" if the rate resets more frequently than the swap. In this case, you need to select the averaging frequency, and day of sampling if needed. You can also select the type of average by toggling the red label: • Equal - Resets within the sampling period are equally weighted. • Weighted - Resets are weighted according to the number of days for which they apply. For example, if a reset occurs on a Monday, the weight is 1 day; if it occurs on a Friday, the weight is 3 days (Friday, Saturday and Sunday). • Simple - The reset rate is calculated as the mean rate within the sampling period.

Fields	Description
	• Cutoff - Calculates weighting up to cutoff date. The cutoff date is set as a number of days from the last sample period's end date.

51. Turn Rate - Curve Underlying

You can use turn rates to hedge interest rate risk over year-end periods.



- Select a currency at the bottom of the window.

  You can click **Load** to load any existing underlying.
- Click **New** to create a new underlying.

  Complete the fields described below.
- Click **Save** to save the underlying. It is given a unique ID by the system, and is displayed in the table.

The system creates quote names like "`MM.<Currency>.<Start date>.<End date>`".

Example: "`MM.USD.02-03-2011.03-01-2011`".

[NOTE: Turn rate underlyings are associated with the curve using the Resets/Turns panel provided you have selected Curve > Show Reset/Turn Tab - In a multi-curve package, they can be selected in the Underlyings section]

Fields Details

Fields	Description
Currency	Displays the currency for the underlying. Select the currency in the Currency drop-down

Fields	Description
	menu in the bottom of the window.
Start Date End Date	Enter the start and end dates for the turn rate period, which correspond to the last business day of the year and the first business day of the next year, respectively.
DayCount	Select the day count convention.