



Zero Rate Curve Bootstrapping

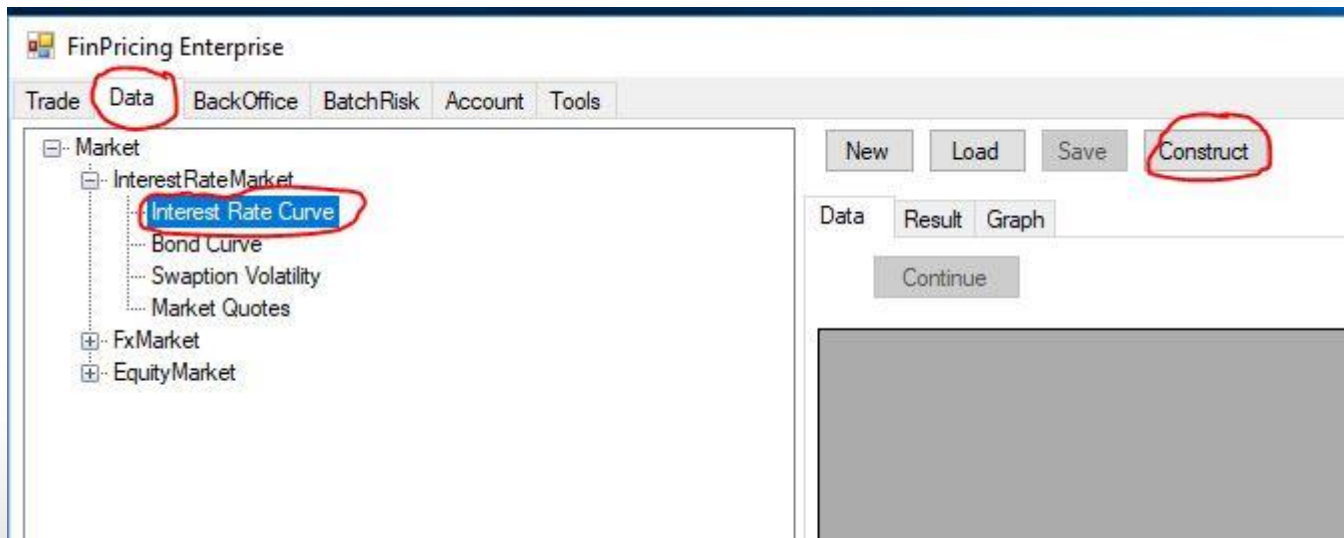




- Yield curves can be derived from government bonds or LIBOR/swap instruments.
- The term structure of zero rates is constructed from a set of market quotes of some liquid market instruments such as short term cash instruments, middle term futures or forward rate agreement (FRA), long term swaps and spreads.
- Curve construction was based on single-curve approach. However, after the financial crisis, curve bootstrapping started to use multicurve approach that consists of a unique discounting curve and multiple forecasting curves

How to Construct Yield Curve? (Cont'd)

- Click the Data tab at the top-left corner of the application. Then, expand Market -> InterestRateMarket -> Interest Rate Curve and click the Construct button.



How to Construct Yield Curve? (Cont'd)

- A selection template is displayed in the main window. Select Discounting Approach (e.g., OIS), Curve Type (e.g., Base) and Basis Type (e.g., NA for base curve), fill Currency (e.g., USD), Curve Date (e.g., 2/8/2018) and then click the Continue button at the right of the row.

The screenshot shows the 'FinPricing Enterprise' application window. The main area contains a table with the following columns: Column0, Column1, Column2, Column3, Column4, Column5, Column6, Column7, Column8, Column9, and Continue Button. The first row is highlighted with a blue background and contains the text 'Please make selecti...'. The second row contains the following data: 'Discounting Approach' (with 'OIS' selected in a dropdown), 'Currency' (with 'USD' entered), 'Curve Type' (with 'Base' selected in a dropdown), 'Curve Date' (with 'M/d/yyyy' entered), 'Basis Type' (with 'NA' selected in a dropdown), and a 'Continue' button. The 'Continue' button in the second row is circled in red. The interface also includes a menu bar (Trade, Data, BackOffice, BatchRisk, Account, Tools) and a toolbar (New, Load, Save, Construct). A tree view on the left shows the 'Market' structure with sub-items like InterestRateMarket, Interest Rate Curve, Bond Curve, Swaption Volatility, Market Quotes, FxMarket, and EquityMarket.

	Column0	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Continue Button
▶	Please make selecti...										Continue
*	Discounting Approach	OIS	Currency	USD	Curve Type	Base	Curve Date	M/d/yyyy	Basis Type	NA	Continue



How to Construct Yield Curve? (Cont'd)

- Based on your selection, the system knows what kind of curves needed. So it loads the data in the main window if they are available, otherwise it generates new curve templates in the main window for you to fill. If you fill new curves, you need to click the Save button to save them

FinPricing Enterprise

Trade Data BackOffice BatchRisk Account Tools

New Load Save Construct

Data Result Graph

Continue

Column0	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9
USD_3M	Base Curve						USD_OIS	OIS Curve	
Currency	ValuationDate	CurveName	QuoteName	InstrumentT...	Term	Value	Currency	ValuationDate	CurveName
USD	02/08/2018	USD_3M	USD_STUB: ...	Cash	3/21/2018	0.0171232	USD	02/08/2018	USD_OIS
USD	02/08/2018	USD_3M	USD_STUB: ...	FUTURE	03/16/2020	97.2826	USD	02/08/2018	USD_OIS
USD	02/08/2018	USD_3M	USD_STUB: ...	FUTURE	03/18/2019	97.5445	USD	02/08/2018	USD_OIS
USD	02/08/2018	USD_3M	USD_STUB: ...	FUTURE	03/19/2018	98.05	USD	02/08/2018	USD_OIS
USD	02/08/2018	USD_3M	USD_STUB: ...	FUTURE	06/15/2020	97.257	USD	02/08/2018	USD_OIS
USD	02/08/2018	USD_3M	USD_STUB: ...	FUTURE	06/17/2019	97.4659	USD	02/08/2018	USD_OIS
USD	02/08/2018	USD_3M	USD_STUB: ...	FUTURE	06/18/2018	97.8551	USD	02/08/2018	USD_OIS
USD	02/08/2018	USD_3M	USD_STUB: ...	FUTURE	09/14/2020	97.2374	USD	02/08/2018	USD_OIS
USD	02/08/2018	USD_3M	USD_STUB: ...	FUTURE	09/16/2019	97.4076	USD	02/08/2018	USD_OIS
USD	02/08/2018	USD_3M	USD_STUB: ...	FUTURE	09/17/2018	97.7353	USD	02/08/2018	USD_OIS
USD	02/08/2018	USD_3M	USD_STUB: ...	FUTURE	12/14/2020	97.1885	USD	02/08/2018	USD_OIS



How to Construct Yield Curve? (Cont'd)

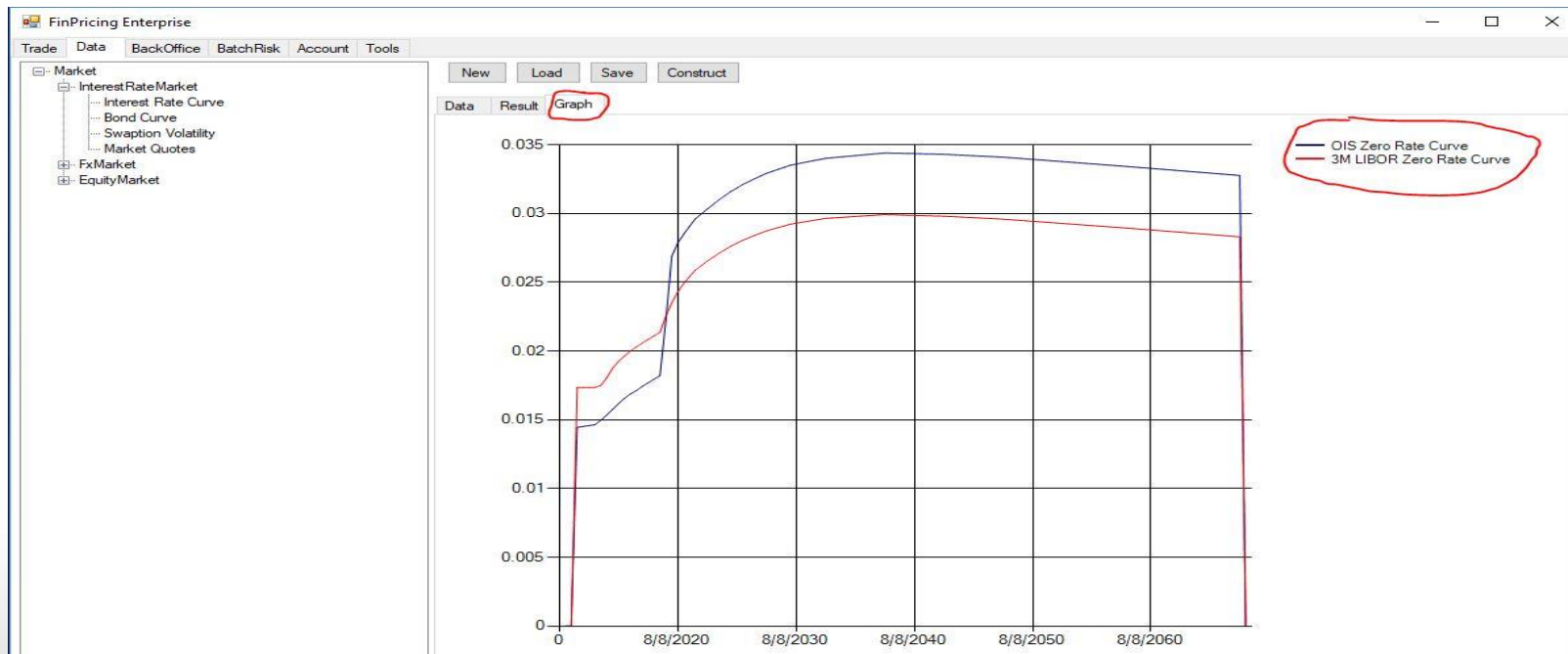
- After filling/validating data, click the Continue button above the main window. FinPricing starts to construct the interest rate curve. The results are shown in the Result tab.

The screenshot shows the 'FinPricing Enterprise' application window. The 'Data' tab is active, and the 'Result' sub-tab is selected. The 'Construct' button is visible. The 'Market' tree on the left shows 'InterestRateMarket' expanded. The main data table displays the results of the construction process, with 'OIS Zero Rate Curve' and '3M LIBOR Zero Rate Curve' highlighted in red circles.

Column1	Column2	Column3
OIS Curve		
Date	OIS Zero Rate Curve	3M LIBOR Zero Rate Curve
2/15/2018	0.0144446958649282	0.0173441159671608
2/22/2018	0.014509035938584	0.0173441159671611
3/1/2018	0.0145738182120647	0.0173441159671613
3/8/2018	0.0146387110354979	0.0173441159671601
4/8/2018	0.0149525775810282	0.0174924148582577
5/8/2018	0.0153440659472915	0.0180432128620182
6/8/2018	0.0157572797339464	0.0187486033483515
7/8/2018	0.0161757489824201	0.0192557542693167
8/8/2018	0.0165624313162406	0.0196316105318471
9/8/2018	0.0168709438162761	0.0199930934728389
10/8/2018	0.0171212056082124	0.0202920969366876
11/8/2018	0.0174237974774616	0.0205708814810946

How to Construct Yield Curve? (Cont'd)

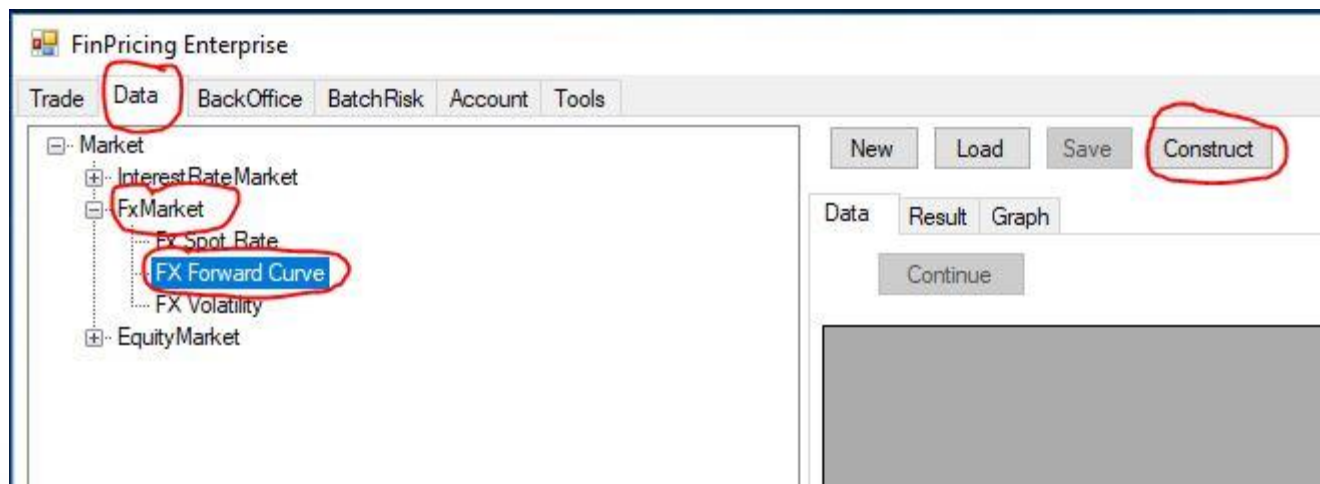
- Based on the results above, a more visually intuitive yield curve graph is provided in the Graph tab.





How to Construct FX Forward Curve?

- Click the Data tab at the top-left corner of the application. Then, expand Market -> FxMarket -> FX Forward Curve and click the Construct button.



How to Construct FX Forward Curve? (Cont'd)

- Click the Data tab at the top-left corner of the application. Then, expand Market -> FxMarket -> FX Forward Curve and click the Construct button.

The screenshot shows the 'FinPricing Enterprise' application window. The 'Data' tab is selected in the top-left corner. The left-hand navigation pane shows a tree structure under 'Market' with 'FxMarket' expanded to 'FX Forward Curve'. The main area contains a 'Construct' button and a 'Data' tab. Below the 'Data' tab is a table with columns for input parameters and a 'Continue Button' column. The values 'USD', 'CAD', and 'M/d/yyyy' are highlighted with red circles, and the 'Continue' button in the third row is also circled in red.

Column0	Column1	Column2	Column3	Column4	Column5	Continue Button
CurrencyCurve	InputCurrency	Currency	InputCurrency	Date	InputDate	Continue
Base Currency	USD	Underlying Currency	CAD	Curve Date	M/d/yyyy	Continue
						Continue
»»						



How to Construct FX Forward Curve? (Cont'd)

- Based on your fillings, the system knows what kind of curves needed. So it loads the curve data in the main window if they are available, otherwise it generates new curve templates in the main window for you to fill. If you fill new curves, you need to click the Save button to save them.

FinPricing Enterprise

Trade Data BackOffice BatchRisk Account Tools

New Load Save Construct

Data Result Graph

Continue

Column0	Column1	Column2	Column3	Column4	Column5	Column6	Column7	Column8	Column9	Column10	Column11	Column12	Column13
USD_3M	Base Curve						FxCurve						
Currency	ValuationDate	CurveName	QuoteName	Instrument...	Tem	Value	Currency	ValuationDate	CurveName	Instrument	Tenor	Type	Value
USD	02/08/2018	USD_3M	USD_STUB: CASH	Cash	3/21/2018	0.0171232	CAD	02/08/2018	USD/CAD	CAD.Dp.18...	18M ...	Dp ...	-76
USD	02/08/2018	USD_3M	USD_STUB: FU...	FUTURE	03/16/2020	97.2826	CAD	02/08/2018	USD/CAD	CAD.Dp.1M ...	1M ...	Dp ...	-3.75
USD	02/08/2018	USD_3M	USD_STUB: FU...	FUTURE	03/18/2019	97.5445	CAD	02/08/2018	USD/CAD	CAD.Dp.1W ...	1W ...	Dp ...	-0.99
USD	02/08/2018	USD_3M	USD_STUB: FU...	FUTURE	03/19/2018	98.05	CAD	02/08/2018	USD/CAD	CAD.Dp.1Y ...	1Y ...	Dp ...	-53.9
USD	02/08/2018	USD_3M	USD_STUB: FU...	FUTURE	06/15/2020	97.257	CAD	02/08/2018	USD/CAD	CAD.Dp.2M ...	2M ...	Dp ...	-9.65
USD	02/08/2018	USD_3M	USD_STUB: FU...	FUTURE	06/17/2019	97.4659	CAD	02/08/2018	USD/CAD	CAD.Dp.2Y ...	2Y ...	Dp ...	-96.5
USD	02/08/2018	USD_3M	USD_STUB: FU...	FUTURE	06/18/2018	97.8551	CAD	02/08/2018	USD/CAD	CAD.Dp.3M ...	3M ...	Dp ...	-14.25
USD	02/08/2018	USD_3M	USD_STUB: FU...	FUTURE	09/14/2020	97.2374	CAD	02/08/2018	USD/CAD	CAD.Dp.3Y ...	3Y ...	Dp ...	-128.5

How to Construct FX Forward Curve? (Cont'd)

- After filling/validating data, click the Continue button above the main window. FinPricing starts to construct the FX forward curve. The results are shown in the Result tab.

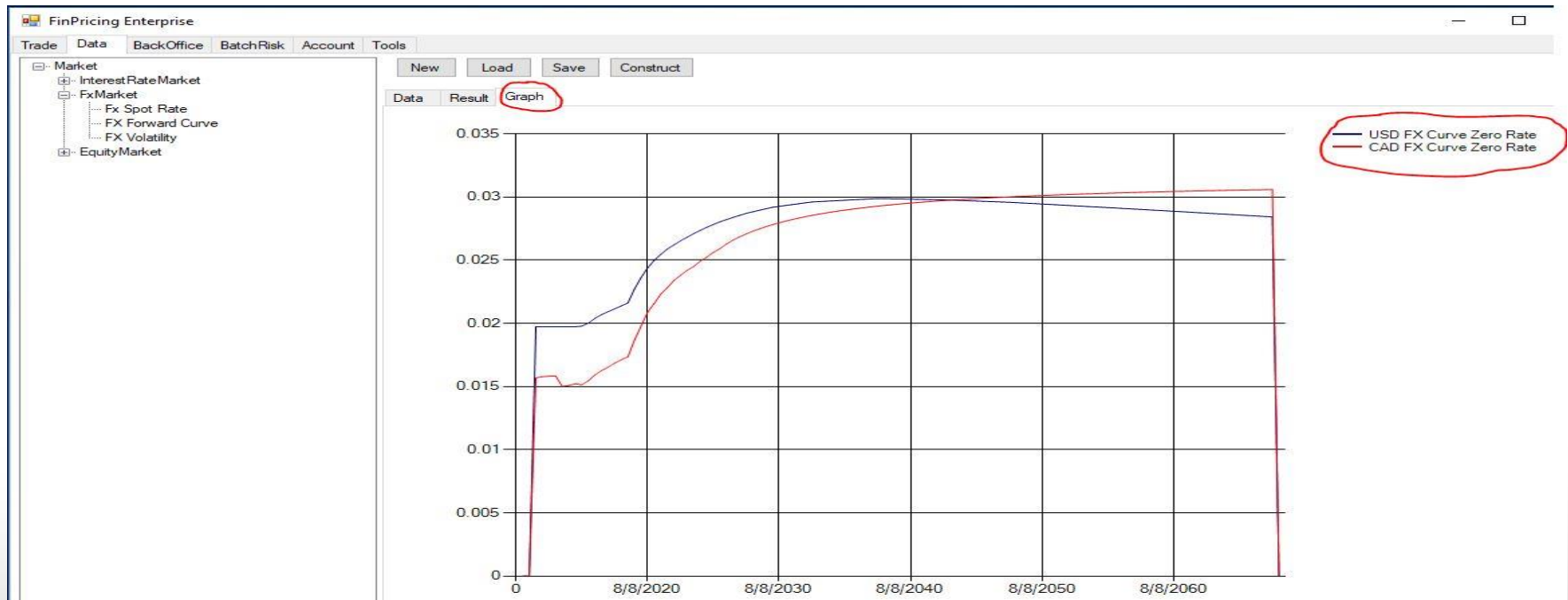
The screenshot shows the FinPricing Enterprise application window. The 'Market' tree on the left includes InterestRateMarket, FxMarket (with sub-items Fx Spot Rate, FX Forward Curve, and FX Volatility), and EquityMarket. The 'Data' tab is selected, and the 'Result' sub-tab is active. The 'Construct' button is highlighted. The table below shows the results of the FX Forward Curve construction.

Column1	Column2	Column3
FX Forward Curve		
Date	USD FX Curve Zero Rate	CAD FX Curve Zero Rate
2/15/2018	0.0197217340580845	0.0156894124493822
2/22/2018	0.0197217340580848	0.015781339343474
3/1/2018	0.0197217340580866	0.0158246016209078
3/8/2018	0.0197217340580875	0.0158450193301923
4/8/2018	0.019721734058088	0.0150100387311001
5/8/2018	0.019721734058087	0.0150862583651021
6/8/2018	0.0197217340580874	0.0152241366701769
7/8/2018	0.0197742942244542	0.0151363158440825
8/8/2018	0.0200233832888533	0.015459628159313
9/8/2018	0.0203976224149791	0.0159241945389144



How to Construct FX Forward Curve? (Cont'd)

- Based on the results above, a more visually intuitive currency forward curve graph is provided in the Graph tab..





Thank You

You can find more details at
<https://finpricing.com/lib/EqSpread.html>