

Homework assignment #1

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The purpose of this assignment is to build a forward curve based on actual closing market data as of January 8, 2007, and use it. I suggest that you:

- (A) Use Excel as your development platform. Excel comes with a number of date functions that will allow you generate the relevant dates and day count fractions for both 30/360 and act/360 conventions (you should not try do it yourself!). You can easily find these functions in the category “Date & Time” of Excel functions.
- (B) Ignore the holidays and end of the month issues (I chose the date so that it should not matter). This will lead to small inaccuracies but is going to be good enough.
- (C) All your functions can be programmed either in VBA for Excel (recommended) or directly in Excel cells if you cannot program in VBA.
- (D) Don't delete your files, you will need them later.

Problems

1. Use the enclosed market data sheet and the bootstrap method to build the discount curve by means of three different ways of interpolation: (a), (b), and (c) explained in the lecture notes¹.
2. Calculate the 3 month forward rates for all monthly settlements from now to the end of the curve. Plot the curves and compare the results for various interpolation methods.

¹Optional: do it also by means of method (e) but this requires a bit more calculations.

3. Build a function pricing any spot or forward starting swap based on your discount curve.
4. Build a function calculating the DVO1 of a swap under the -1 basis point move of all market inputs. Calculate the DVO1s of the spot starting swaps for maturities 2Y, 5Y, 10Y, and 30Y.

This assignment is due two weeks

Deposit Rates

Instrument	StartDate	End Date	Rate
USD O/N	1/8/2007	1/9/2007	5.300%
1 USD 1W	1/10/2007	1/17/2007	5.303%
2 USD 2W	1/10/2007	1/24/2007	5.310%
1 USD 1M	1/10/2007	2/12/2007	5.320%
2 USD 2M	1/10/2007	3/12/2007	5.346%
3 USD 3M	1/10/2007	4/10/2007	5.360%

Futures

Instrument	Price	Conv. Adj	All-in Rate
Mar-07 EDH07	94.665	0.01	5.335%
Jun-07 EDM07	94.790	0.10	5.209%
Sep-07 EDU07	94.955	0.30	5.042%
Dec-07 EDZ07	95.090	0.50	4.905%
Mar-08 EDH08	95.170	0.80	4.822%
Jun-08 EDM08	95.210	1.15	4.779%
Sep-08 EDU08	95.235	1.55	4.750%
Dec-08 EDZ08	95.230	2.00	4.750%

Swap Rates

Instrument	StartDate	End Date	Rate
2 USD SWAP 02Y	1/10/2007	1/10/2009	5.124%
3 USD SWAP 03Y	1/10/2007	1/10/2010	5.048%
4 USD SWAP 04Y	1/10/2007	1/10/2011	5.034%
5 USD SWAP 05Y	1/10/2007	1/10/2012	5.038%
7 USD SWAP 07Y	1/10/2007	1/10/2014	5.065%
10 USD SWAP 10Y	1/10/2007	1/10/2017	5.115%
12 USD SWAP 12Y	1/10/2007	1/10/2019	5.150%
15 USD SWAP 15Y	1/10/2007	1/10/2022	5.193%
20 USD SWAP 20Y	1/10/2007	1/10/2027	5.229%
25 USD SWAP 25Y	1/10/2007	1/10/2032	5.239%
30 USD SWAP 30Y	1/10/2007	1/10/2037	5.238%