

Computing Tools for Fixed Income

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December 12, 2014

Agenda for today

- Bloomberg commands
- Excel quotes through Bloomberg
- Excel quotes through Interactive Brokers
- Visual Basic programming
- Combining VB with streaming data

Bloomberg is available in the ASAP office and Library:

- FIT - Basic fixed income screen. Sub-screens with detailed bond issue data.
- BTMM - Another fixed income overview screen. Contains REPO, EURO DOLLAR futures, FED FUNDS futures, stock mkt. data, etc.
- ECO - economic calendar. Lists market relevant macro releases.
- FED - overview of FED related news and data
- USSW - Swap market overview screen.

<HELP> for explanation.

97) Change Country			98) Feedback		16:36:46		Treasury & Money Markets: United States																				
1) FED Funds(FOMC)			08:21		US T-Bill		EURO\$DEP		Reverse (Bid)		Repo (Ask)																
BID/ASK			0.1100 0.1300		4W 0.02 -0.02 0.02 0.02		3M 0.1500 0.2400		0/N 0.18 0.15																		
LST/OPEN			0.1200 0.1200		3M 0.03 +0.00 0.03 0.03		6M 0.2000 0.3600		1W 0.18 0.16																		
HIGH/LOW			0.2300 0.1100		6M 0.09 +0.00 0.10 0.09		1Y 0.3100 0.4300		2W 0.18 0.16																		
					1Y 0.20 +0.00 0.21 0.20				1M 0.24 0.20																		
Dow Jones					S&P 500 Future		NASDAQ Composite Index		CRB Commodity Index																		
DJIA			17596.34 +63.19		SPX Future 2024.00 +4.60		CCMP 4708.16 +24.13		CRB		245.42 -1.51																
2) US Bonds (BBT)						Comm Paper		90D EUR\$ FUT		Funds Future		3) LIBOR Fix															
T 0 1/2 11/30/16						0.604 99-25 1/4 99-25+ - 02 1/4		15D 0.140 DEC 99.7600		DEC 99.890		0/N 0.11200															
T 1 12/15/17						1.045 99-27+ 99-27 3/4 - 03 3/4		30D 0.150 MAR 99.7100		JAN 99.890		1W 0.13500															
T 1 1/2 11/30/19						1.599 99-16 3/4 99-17 - 06		60D 0.190 JUN 99.5500		FEB 99.880		1M 0.16080															
T 1 3/4 11/30/21						1.938 99-18+ 99-19 - 06		90D 0.220 SEP 99.3500		MAR 99.875		2M 0.20750															
T 2 1/4 11/15/24						2.167 100-23 100-23+ - 01		120D 0.260 DEC 99.1100		APR 99.860		3M 0.23990															
T 3 11/15/44						2.810 103-26 103-26+ + 14+		180D 0.320 MAR 98.8600		MAY 99.830		6M 0.33770															
												1Y 0.60260															
4) Spot FOREX (FXC)						Key Rates		Swaps		10Y Note Future		5) 30Y MBS (BBTM)															
JPY						118.914		Prime 3.25		3Y 1.2366		CBT 126-29 - 06															
EUR						1.2397		BLR 2.00		5Y 1.7410		Commodities															
GBP						1.5721		FDTR 0.25		10Y 2.2931		NYM WTI 59.36 -1.58															
CHF						0.9689		Discount 0.75		30Y 2.7780		GOLD 1225.30 -1.36															
CAD						1.1535						FNMA 3.5 104-02 104-03 + 00															
30) Economic Releases (ECO)																											
Date Time								A		M		R		Event		Period		Surv(M)		Actual		Prior		Revised			
31) 12/11 08:30														Retail Sales Advance MoM		Nov		0.4%		0.7%		0.3%		0.5%			
32) 12/11 08:30														Retail Sales Ex Auto MoM		Nov		0.1%		0.5%		0.3%		0.4%			
33) 12/11 08:30														Retail Sales Ex Auto and Gas		Nov		0.5%		0.6%		0.6%		0.7%			
34) 12/11 08:30														Retail Sales Control Group		Nov		0.5%		0.6%		0.5%		--			
35) 12/11 08:30														Import Price Index MoM		Nov		-1.8%		-1.5%		-1.3%		-1.2%			
Australia 61 2 9777 8600 Brazil 5511 2395 9000 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000																											
Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2014 Bloomberg Finance L.P.																											
SN 842817 EST GMT-5:00 H433-933-3 11-Dec-2014 16:36:46																											

Figure: BTMM screen in Bloomberg

<HELP> for explanation.

97) Regions		98) Settings		99) Feedback		16:36:04		Swaps Markets: United States				
GV	Ask/Chg	SW/GV		Swap Mid		FNMA	FN/GV	FN/SW	FHLMC	FH/GV	FH/SW	
2Y	0.604 +0.036	22.63 +0.00		0.832 +0.035		0.543	-7.0 -0.2	-17.2 +1.1	0.584	-2.0 -0.5	-17.9 +0.8	
3Y	1.045 +0.040	18.88 +0.50		1.236 +0.044		1.037	-2.5 -0.1	-13.1 -0.1	1.029	-2.0 +0.1	-12.8 +0.2	
4Y	1.378 +0.041	20.88 +0.75		1.531 +0.047		0.000	-34.0 -0.6	-13.6 -1.2	1.241	17.1 +0.3	-8.8 -0.2	
5Y	1.597 +0.038	14.13 +0.38		1.738 +0.042		1.673	2.5 +0.2	-1.7 -0.4	1.712	10.2 -0.3	0.2 -0.9	
7Y	1.935 +0.027	8.69 -0.13		2.024 +0.025		1.704	-23.9 +1.3	0.8 -0.6	1.858	-9.9 +1.0	3.7 -0.2	
10Y	2.166 +0.002	12.63 +1.00		2.291 +0.011		2.505	53.7 -2.0	20.1 -0.5	2.165	-3.5 +2.8	10.0 +0.6	
30Y	2.808 -0.024	-3.38 +0.50		2.776 -0.017		2.913	5.4 +0.1	28.7 -1.6	2.962	12.1 +1.1	31.1 -0.5	

Dow Jones			S&P 500 Index			NASDAQ Composite Index			Bloomberg European 500		
DJIA	17596.34	+63.19	S&P 500	2035.33	+9.19	CCMP	4708.16	+24.13	BE500	231.42	+0.13

Cash Market		Active Futures		Swaption 1Y		3Y	5Y	7Y	10Y	Cap/Flr
1M LIBOR	0.16080	5 Year	118-31+ -06+	1Y	58.915	46.150	39.750	35.750	31.440	69.120
3M LIBOR	0.23990	10 Year	126-29 -06	2Y	47.400	40.190	36.560	33.840	30.540	66.870
6M LIBOR	0.33770	LONG BOND	144-08 +10	3Y	41.610	37.380	34.550	32.430	29.680	59.380
1Y LIBOR	0.60260	5Y Swap	102-13+ -06	4Y	38.880	35.190	32.860	31.090	28.970	53.820
Fed Funds	0.12000	10Y Swap	105-22 +00+	5Y	36.350	33.410	31.550	29.940	28.220	49.880
O/N Repo	0.16500	30Y Swap	114-15 +11	7Y	32.850	30.700	28.780	27.650	26.495	44.720
1w Repo	0.17000			10Y	27.970	26.800	25.930	24.950	23.880	39.980

30 Economic Releases (ECO)										
Date Time	C	A	M	R	Event	Period	Surv(M)	Actual	Prior	Revised
1) 12/11 08:30	US				Retail Sales Advance MoM	Nov	0.4%	0.7%	0.3%	0.5%
2) 12/11 08:30	US				Retail Sales Ex Auto MoM	Nov	0.1%	0.5%	0.3%	0.4%
3) 12/11 08:30	US				Retail Sales Ex Auto and Gas	Nov	0.5%	0.6%	0.6%	0.7%
4) 12/11 08:30	US				Retail Sales Control Group	Nov	0.5%	0.6%	0.5%	--
5) 12/11 08:30	US				Import Price Index MoM	Nov	-1.8%	-1.5%	-1.3%	-1.2%

Australia 61 2 9777 8600 Brazil 5511 2395 9000 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000
 SN 842817 EST GMT-5:00 H433-933-3 11-Dec-2014 16:36:05

Figure: USSW screen in Bloomberg.

Navigating Bloomberg

Right click on a price to get a number of options:

- DES gives a description of the security. For a bond, it will give you the issue date, coupon, etc.
- YA - yield analysis gives several measures of YTM and also Duration measures.
- GP - gives the price graph



Figure: Right-click menu.

Bloomberg in Excel

To use Bloomberg's excel functionality, you need to open excel on a BB terminal/ computer.

The function BDP returns live market data.

It takes two arguments

- 1 A security identifier. Typically the CUSIP # followed by an identifier such as "govt cusip"
- 2 A field identifier. Examples: BID, ASK, DUR (duration), CPN (coupon), PX_DIRTY_BID, MATURITY

The next page shows the BDP function call in the spreadsheet "discountFNs2014."

- Row1 : identifiers
- Column A: CUSIP codes

Example:

CELL D7 (highlighted in green) is calling =BDP(\$A7 & "govt cusip",D\$1).

The first argument is "912828DM9" which is the cusip code in A7. The statement "\$A7 & "govt cusip" is equal to "912828DM9 govt cusip"

This is a text-string. The second argument is also a text-string. In this case, `NXT_CPN`.

The BDP function then returns the next coupon date, 2/15/2015 in this case.

Code		Add-Ins		Mode		Run Dia	
		Add-Ins		Controls			
07		fx		=BDP(\$A7 & "govt cusip",D\$1)			
A	B	C	D	E	F	G	
CUSIP	MATURITY	cpn	NXT_CPN	BID	ASK	INT	
CUSIP	MATURITY	cpn	NXT_CPN	BID	ASK	INT	A
912828CA6	2/15/2014	4	#N/A Field	#VALUE!	#VALUE!		
912828CJ7	5/15/2014	4.75	#N/A Field	#VALUE!	#VALUE!		
912828CT5	8/15/2014	4.25	#N/A Field	#VALUE!	#VALUE!		
912828DC1	11/15/2014	4.25	#N/A Field	#VALUE!	#VALUE!		
912828DM9	2/15/2015	4	2/15/2015	101.9849	101.9927	1.293	
912828DV9	5/15/2015	4.125	5/15/2015	102.0147	102.0264	0.307	
912828EE6	8/15/2015	4.25	2/15/2015	104.1282	104.1399	1.374	
912828EN6	11/15/2015	4.5	5/15/2015	104.2809	104.2927	0.335	
912828EW6	2/15/2016	4.5	2/15/2015	106.3497	106.377	1.455	
912828FF2	5/15/2016	5.125	5/15/2015	107.1049	107.1323	0.382	
912828FQ8	8/15/2016	4.875	2/15/2015	108.885	108.9124	1.576	
912828FY1	11/15/2016	4.625	5/15/2015	108.0129	108.0403	0.344	
912828GH7	2/15/2017	4.625	2/15/2015	109.9409	109.9682	1.495	
912828GS3	5/15/2017	4.5	5/15/2015	109.1403	109.1716	0.335	
912828HA1	8/15/2017	4.75	2/15/2015	111.5985	111.6298	1.536	
912828HH6	11/15/2017	4.25	5/15/2015	109.567	109.5982	0.316	
912828HR4	2/15/2018	2.5	2/15/2015	109.100	109.128	1.124	
live prices		Plot Discount		Nelson Siegel EX		nelson siege	

Figure: BDP function.

Visual Basic Programming

We will discuss the most elementary concepts in computer programming: How to write functions, and then to use those functions in Excel.

A simple function declaration looks like this:

```
Function sq(x)  
    sq = x * x  
End Function
```

You can now call this function in a spreadsheet. For example "`=sq(2)`" returns the number 4 in the spreadsheet.

Local variables

Programming statements are always executed right-to-left. It is sometimes useful to be able to do intermediate calculations. If so, we might want to declare a local variable to store the result temporarily. Local variables are cannot be accessed outside the function. Here 'y' is a local variable

```
Function sq(x)
    y = x*x
    sq = y
End Function
```

The result of the multiplication $x \times x$ is stored temporarily in the new (local) variable y. That number is then assigned to the output "sq"

Note that since programming statements are executed right to left, this does not work

```
Function sq(x)  
    x*x = y  
    sq = y  
End Function
```

and will return an error.

Here's an example of an "if"

```
Function lessThanFive(x)
  If (x<5) Then
    sq = 0
  Else
    sq = 1
  End if
End Function
```

If called with an argument less than 5, this function returns 0, otherwise 1.

Loops

One of the most important concepts in numerical programming is loops. We use loops to compute sums.

An example is

```
i =1  
Do While i < n  
    i = i + 1  
Loop
```

The statement increases the index i from 1 to n (a variable) in increments of 1.

Other minor topics

- Functions can take multiple arguments $f(x, y, z, ..)$
- Functions can call other functions
- We can call built in mathematical functions (i.e, EXP())
- We can also call Excel functions from VB

A real example:

```
Function NelsonSiegel(timeToExp, b1, b2, b3, lambda)
'' gives a single point along the yeild curve using the NS yie
    temp = Exp(-lambda * timeToExp)
    If (timeToExp < 0) Then
        NelsonSiegel = 0.0
    Else
        NelsonSiegel = b1 + b2 * (1 - temp) / (lambda * timeTo
            + b3 * ((1 - temp) / (lambda * timeToExp) - temp)
    End If
End Function
```

- This function takes 5 arguments
- The first line starts with " which means that it is a comment
- not executable code
- The second line defines the temporary variable "temp" which is subsequently used. This avoids having to compute this multiple times
- The if statement is actually not necessary if the function is always called with a positive timeToExp as it should