Volatility Watch

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Geopolitical risks, poor economic data (e.g. Eurozone Q2 stagnation), and waning inflation prints and expectations have pulled EUR rates to record lows for most of the curve. This and the ECB package from June have impacted the vol grid profoundly as well. In general, the move is up, predominantly on longer tails whereas the ECB-package is depressing quotes such as 2Y2Y to a continued all-time low. Getting below 2% on the 30Y EUR swap rate has caused "flashback pricing" and the correlation between rate movements and vol movements has turned negative there.

We find that gamma now is neutrally priced and that vega is rich/neutral. The notion that the ECB controls a large part of the front of the curve (up to 5Y) has resulted in near all-time highs in bpVol spreads such as 6m10y-6m5y which now lies a shade below 20. Such spreads have been strongly directional with rates and has happened along with a 5s10s flattening move on the EUR swap curve. We think this pricing is biased towards overstating what the ECB and the TLTROs can bring in terms of stability: *As such, we like buying 1y5y vs. 1y10y in straddles which 1.89:1 (delta neutral with normal greeks) gives you 56bps up front.*

An obvious alternative is to consider steepeners in 5s10s, 5s30s and 10s30s in swaptions. Problem is that they "point the wrong way", meaning that for a steepener trade you need to use receivers to short the vol gone rich recently (the longer swap tails). *We still like the trades, but for longer expiries: 5s30s, 2y forward is now near 97bps (spot around 132bps) and 2y5y vol is the cheapest point in the PCA metric (chart 8) on the grid.*

Finally, it is worth acknowledging the moves in skews, especially a bit further out on the grid. As the 5Y5Y has dropped below 2%, the receiver side has gotten pulled down and 100 wide collars are now around 44bps, a high of recent years (data since 2009).

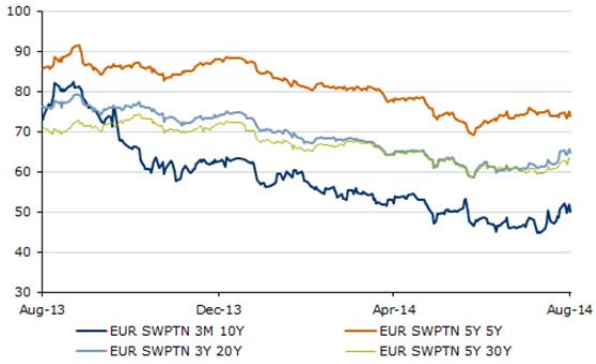
At a glance	
Gamma	**Neutral**
	Cheap
1y10y (fwd prm)	**422 (393)**
Vega	**Rich/Neutral**
	Rich/Neutral
10y10y (fwd prm)	**1564 (1419)**
PCA (rich/cheap)	**2Y5Y/5Y10Y**

1. Vol surface – bpVol change, z.scores in brackets

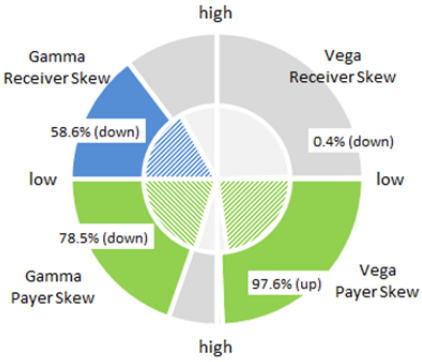
	1Y	2Y	5Y	7Y	10Y	20Y	30Y
1M	2.4 (-0.9)	1.1 (-1.1)	2.9 (-1.2)	4.5 (-0.8)	6.9 (1)	8 (2.4)	8.4 (2.6)
3M	0.9 (-1.2)	0 (-1.3)	-0.8 (-1.5)	0.6 (-1.2)	2.4 (-0.3)	1.9 (1.5)	1.5 (1.9)
6M	0.8 (-1.2)	-0.3 (-1.3)	-1.6 (-1.5)	-0.4 (-1.3)	1.3 (-0.7)	1.8 (0.5)	1.1 (1.3)
1Y	-0.7 (-1.2)	-0.9 (-1.2)	-2 (-1.5)	-0.9 (-1.2)	1.2 (-0.6)	2.2 (0.4)	2 (1)
2Y	-2.4 (-1.4)	-2.2 (-1.4)	-1.5 (-1.3)	0 (-1)	2.7 (-0.3)	3.5 (0.6)	3.1 (0.7)
3Y	-1.2 (-1.4)	-1.9 (-1.3)	-0.8 (-1.1)	0.6 (-0.8)	2.7 (-0.2)	2.8 (0.3)	2.6 (0.3)
5Y	-0.4 (-0.9)	-1.1 (-0.8)	0.1 (-0.7)	0.9 (-0.5)	2.3 (0.1)	2.2 (0.4)	2.5 (0)
7Y	-0.1 (-0.3)	-0.5 (-0.3)	0 (-0.5)	0.7 (-0.2)	1.7 (0.3)	1.7 (0.5)	1.8 (-0.1)
10Y	0.4 (0.6)	0.2 (0.9)	0.1 (0.5)	0.4 (0.6)	1.3 (0.8)	1.3 (0.6)	1.3 (-0.1)
20Y	1.1 (1.8)	1.2 (2)	0.5 (1.5)	0.9 (1.6)	1.5 (1.5)	1.2 (0.5)	1.2 (-0.1)
30Y	1.4 (2)	1.1 (1.8)	0.5 (1.2)	0.9 (0.7)	1.6 (-0.2)	1.2 (-0.3)	1.2 (-0.5)

Z-Score value significant if absolute value > 1.96

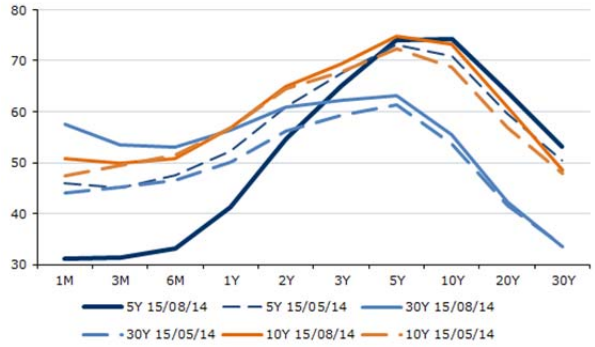
2. Implied bpVol development over the past year



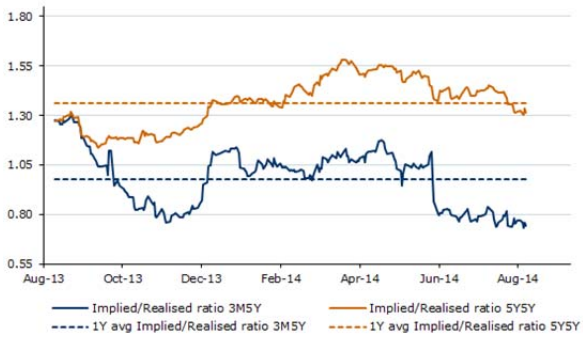
3. Skew overview (current skew vs. last year)



4. bpVol term structures – Current & 3Ms ago



5. Implied/Realized bpVol ratios



6. Vol surface (bpVol)

	1Y	2Y	5Y	7Y	10Y	20Y	30Y
1M	15.8	16.0	31.1	40.0	50.7	55.0	57.6
3M	14.3	15.5	31.3	39.6	50.0	52.0	53.5
6M	14.2	16.8	33.2	41.4	50.7	52.0	53.0
1Y	17.9	23.3	41.4	48.7	56.9	56.6	56.4
2Y	31.0	40.1	54.8	59.7	65.0	62.8	60.9
3Y	52.0	57.6	65.1	67.0	69.4	65.0	62.1
5Y	71.9	73.0	74.0	74.4	74.8	67.8	63.2
7Y	76.7	75.8	74.4	74.4	74.6	65.8	59.8
10Y	77.0	76.1	74.3	73.8	73.2	62.2	55.5
20Y	66.0	65.3	63.9	63.1	60.9	47.7	42.2
30Y	58.7	55.9	53.2	51.2	48.5	37.9	33.6

7. Implied/Realised values

	2Y	5Y	10Y	30Y
	Implied (daily bp)			
1m	1.01	1.96	3.20	3.63
3m	0.98	1.97	3.15	3.37
6m	1.06	2.09	3.19	3.34
	Past 6M realised (daily bp)			
spot	1.04	3.71	2.75	2.61
1m	1.19	2.55	2.81	2.63
3m	1.33	2.65	2.83	2.64
6m	1.53	2.81	2.91	2.68
	Implied/Realised			
1m	0.85	0.77	1.14	1.38
3m	0.73	0.74	1.11	1.27
6m	0.69	0.74	1.10	1.25

8. PCA – Relative Value (Vega grid only)

	2Y	5Y	7Y	10Y	20Y	30Y
2Y	-0.15	-1.65	-0.67	0.83	0.69	-0.09
3Y	-0.89	-1.50	-0.16	1.31	0.85	0.44
5Y	-0.26	-0.52	0.14	1.36	0.88	1.16
7Y	-0.14	-0.63	-0.03	0.77	0.47	0.42
10Y	0.73	-0.49	-0.01	0.58	0.46	0.31
20Y	0.17	-0.67	-0.10	0.73	0.30	0.27
30Y	-0.50	-0.83	-0.50	0.40	0.17	-0.02

Appendix: Calculation details and model description

General:

Calculations are based on data from Nordea Markets. All quotes are end of day quotes, sampled on the trading day preceding the publication date. Volatilities are always normalized volatilities (bp vols).

1. Vol surface

The vol surface on page 1 contains changes in bpVol since last report (2 weeks). The Z-scores in parentheses are based on levels of bpVol over the past 6 months. Current bpVol grid is given in chart 6.

3. Skew overview

The pie chart illustrates the current magnitude of the skews (outer circle) and the magnitude two weeks ago (inner circle) relative to the magnitudes over the previous year. The values given are percentiles. Thus, a value of say 75% for a given skew indicates that 75% of the previous year's skews are below the current skew. The skews are calculated as (impvol(atm-50bp) - impvol(atm)) for the receiver skew and (impvol(atm+50bp) - impvol(atm)) for the payer skew. Here again, "impvol" is understood to be in terms of bp vol. The movement in the skew, relative to 2 weeks ago, is shown as "up", "down" or "unchanged". The gamma option is 6M5Y and the vega option is 5Y5Y.

4. Vol term structures

Current atm vol term structures along with those 3 months ago for 5Y, 10Y, and 30Y tails are shown. Increasing forward periods on the x-axis.

5 & 7. Implied vs. Realised vol

Implied is given as the product of the Black implied volatility and the atmf rate. Realized volatilities are estimated on daily differences of the underlying, based on data from the past six months.

8. PCA – Relative Value

The PCA Relative Value model is designed to detect temporary correlative patterns that differ from historical correlative patterns. It is applied to the historical correlation matrix of the bpVol of all swaptions, using a large data sample window spanning from 2005 to 2014. Each swaption in the grid is evaluated relative to all other swaptions. This is done by comparing each swaption movements with the movements of the market as a whole, with the latter being represented as the movements in the principal components. This gives an expression of value relative to the rest of the volatility grid. Those values, in bpVol terms, are shown in the table. A swaption that has endured movements that are relatively less (more) than what the PCA prescribes will be cheap (rich). This evaluation is based on the last 6 months of bpVol data.