US Vol RV Analytics Report Primer

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See Disclosure Appendix A1 on pp. 23-26 for the Analyst Certification and Other Important Disclosures

US Vol RV Analytics Report - Introduction

- Nomura's US Vol RV Analytics Report is a daily report focused specifically on the US rates volatility markets, designed by the Nomura Rates Strategy team with in-house pricing and analytical technology

- It consists of broad monitors of volatility market data presented in tables and charts along with option skew trackers and conditional curve trade sheets.

- Further enhancements and additions will be made to the report as our team continue its on-going work.

Report Structure by Section

- **Vol Monitor**

Tabulated Summary of Swaption Vol, Heatmaps of Swaption Vol and Implied Vol vs 20-day Realized Vol Ratio screened by z-scores, Implied vs Realized Vol Charts, Rate/Vol Correlation Heatmaps and Charts

- **Strike Skew**

Tabulated Measures of Strike Skew in Payer and Receiver Swaptions screened by z-scores, and Historical Time Series Plots of Skew

- **Conditional Curve Trades**

Costless conditional curve structures (payer/receiver steepeners/flatteners) screened by measures of vol pick-up

Vol Monitor – Swaption Vol Table

- Shows current implied basis point volatility in both annualized and daily terms, and corresponding changes in levels. 20-day max and min levels are also indicated.
- Realized basis point volatility levels over varying horizons from 10 to 180 days are also displayed for comparison against implied vol levels.
- Large daily/weekly/monthly moves in implied vol are also highlighted clearly on the table. A relative absence of such highlights in a row would indicate a comparatively range-bound market.

Largest movers on the day are highlighted.

Term/	Implied Basis Point Volatility (Annualized)						Implied Basis Point Volatility (Daily)						Realized Basis Point Volatility (Daily)					
Tenor	Current	1d Chg	1w Chg	1m Chg	20d High	20d Low	Current	1d Chg	1w Chg	1m Chg	20d High	20d Low	10d	20d	60d	90d	120d	180d
1m × 2y	80.64	(5.50)	5.25	14.25	86.14	56.64	5.09	(0.35)	0.33	0.90	5.43	3.57	4.27	3.77	4.91	4.30	4.08	3.81
1m × 5y	114.66	(7.25)	0.75	(2.00)	121.91	100.91	7.23	(0.46)	0.05	(0.13)	7.69	6.37	6.29	5.95	7.71	6.96	6.83	6.41
1m × 10y	110.66	(2.75)	(4.25)	(6.75)	119.16	105.66	6.98	(0.17)	(0.27)	(0.43)	7.52	6.67	5.84	6.14	7.87	7.15	7.40	6.97
1m × 30y	97.99	(2.75)	(12.25)	(9.25)	110.24	97.99	6.18	(0.17)	(0.77)	(0.58)	6.95	6.18	4.69	5.59	7.52	6.84	7.45	7.06
3m × 2y	84.87	(5.50)	5.25	10.00	90.37	64.37	5.35	(0.35)	0.33	0.63	5.70	4.06	4.87	4.35	5.70	4.99	4.74	4.38
3m × 5y	115.19	(6.75)	0.00	1.75	121.94	103.19	7.27	(0.43)	0.00	0.11	7.69	6.51	6.44	6.21	8.11	7.29	7.21	6.74
3m × 10y	111.44	(2.75)	(3.75)	(2.25)	117.44	107.69	7.03	(0.17)	(0.24)	(0.14)	7.41	6.79	5.87	6.27	8.07	7.33	7.61	7.15
3m × 30y	98.70	(2.75)	(10.25)	(3.50)	108.95	98.70	6.23	(0.17)	(0.65)	(0.22)	6.87	6.23	4.75	5.69	7.65	6.95	7.57	7.16
6m × 2y	94.76	(5.50)	9.25	9.50	100.26	75.51	5.98	(0.35)	0.58	0.60	6.32	4.76	5.99	5.25	6.79	5.93	5.63	5.19
6m × 5y	116.45	(6.75)	(1.25)	3.37	123.20	107.33	7.35	(0.43)	(0.08)	0.21	7.77	6.77	6.78	6.54	8.56	7.69	7.61	7.13
6m × 10y	114.20	(2.75)	(2.75)	1.38	118.70	110.08	7.20	(0.17)	(0.17)	0.09	7.49	6.94	6.05	6.45	8.31	7.53	7.84	7.37
6m × 30y	101.08	(2.75)	(8.50)	0.13	109.58	100.45	6.33	(0.17)	(0.54)	0.01	6.91	6.34	4.86	5.80	7.80	7.08	7.72	7.30
1y × 2y	114.00	(4.50)	10.00	13.50	118.50	94.00	7.19	(0.28)	0.63	0.85	7.48	5.93	7.37	6.50	8.63	7.60	7.30	6.77
1y × 5y	118.08	(5.75)	(1.50)	5.37	123.83	111.70	7.45	(0.36)	(0.09)	0.34	7.81	7.05	7.25	7.08	9.32	8.40	8.37	7.87
1y × 10y	115.58	(2.75)	(2.50)	4.12	119.08	110.95	7.29	(0.17)	(0.16)	0.26	7.51	7.00	6.27	6.74	8.73	7.92	8.27	7.80
1y × 30y	102.58	(2.75)	(5.50)	4.12	108.08	99.46	6.47	(0.17)	(0.35)	0.26	6.82	6.27	5.01	6.01	8.10	7.34	8.00	7.58
2y × 2y	123.55	(1.75)	7.25	9.00	125.30	110.30	7.79	(0.11)	0.46	0.57	7.90	6.96	8.23	7.61	10.14	9.19	9.10	8.55

Notes on Color Coding

Largest movers (1-day largest movers over 2 weeks; 1-week largest movers over 1 month; 1-month largest movers over 6 months)

Source: Nomura

Vol Monitor – Swaption Vol Surface Heatmap

- An alternative presentation of the swaption implied vol surface in a matrix format
- Cell highlights indicate relatively high/low 60-day Z-scores for the corresponding markets, which help us to gauge the richness/cheapness of current levels against recent history

This part of the surface is looking cheap relative to recent history

Swaption Vol Surface Heatmap

	3m	6m	1y	2y	3y	4y	5y	6y	7y	8y	9y	10y	15y	20y	25y	30y	35y	40y
1m	34.4	35.9	38.1	74.4	94.3	102.2	110.2	109.3	108.4	107.2	105.9	104.7	97.4	93.8	92.0	90.2	90.2	90.2
3m	24.6	31.4	44.0	76.6	96.3	104.1	111.9	111.4	110.8	109.8	108.7	107.7	100.7	97.2	95.4	93.7	93.7	93.7
6m	36.3	45.0	60.8	87.9	103.0	108.5	114.1	113.5	113.0	111.9	110.9	109.8	102.9	99.4	97.7	96.0	96.6	97.2
9m	51.6	61.0	77.8	98.8	108.9	111.9	115.0	114.4	113.8	112.8	111.8	110.7	103.9	100.5	98.8	97.0	97.2	97.5
1y	69.7	78.8	94.5	109.5	114.7	115.2	115.8	115.3	114.7	113.7	112.6	111.6	104.8	101.6	99.8	98.1	97.9	97.7
2y	121.0	120.2	115.5	115.5	116.1	116.4	116.6	115.7	114.8	114.1	113.4	112.7	104.7	100.9	99.5	98.2	97.7	97.3
3y	118.5	118.7	116.0	115.2	116.0	116.3	116.6	115.4	114.2	113.2	112.3	111.3	102.6	98.3	97.1	96.0	95.4	94.8
4y	119.6	119.3	116.0	115.1	115.0	115.0	114.9	113.7	112.6	111.5	110.4	109.3	100.2	95.9	94.5	93.2	92.4	91.7
5y	120.6	120.0	115.8	115.0	113.5	113.0	112.5	111.4	110.3	109.2	108.1	107.0	97.6	93.5	91.8	90.0	89.2	88.3
6y	117.7	116.8	112.3	111.5	110.3	109.9	109.5	108.3	107.2	106.1	104.9	103.8	94.4	90.3	88.6	86.9	86.1	85.2
7y	114.7	113.7	108.9	108.0	107.1	106.7	106.4	105.3	104.1	102.9	101.8	100.6	91.3	87.0	85.4	83.8	82.9	82.0
8y	111.2	110.3	105.7	105.0	103.8	103.4	103.0	101.9	100.7	99.5	98.4	97.2	88.2	84.1	82.6	81.0	80.2	79.3
9y	107.8	106.9	102.5	101.9	100.5	100.1	99.6	98.5	97.3	96.2	95.0	93.8	85.1	81.2	79.7	78.2	77.4	76.6
10y	104.3	103.5	99.3	98.9	97.3	96.7	96.2	95.1	93.9	92.8	91.6	90.5	82.1	78.4	76.9	75.5	74.7	74.0
15y	91.8	90.0	84.2	83.7	81.6	80.8	80.1	79.5	78.9	78.3	77.7	77.1	70.9	68.2	67.2	66.2	65.5	64.8
20y	77.6	77.0	73.9	73.4	71.2	70.5	69.7	69.4	69.1	68.8	68.5	68.2	63.7	61.4	60.1	58.9	58.6	58.3
25y	74.0	73.3	70.1	70.0	67.7	67.0	66.2	66.0	65.7	65.4	65.1	64.9	61.0	59.0	58.0	57.1	56.9	56.8
30y	70.5	69.6	66.3	66.5	64.2	63.5	62.7	62.5	62.2	62.0	61.8	61.5	58.3	56.6	55.9	55.2	55.2	55.2

Notes on Color Coding

60d Z-Score < -1.3	Neutral 60d Z-Score	60d Z-Score > 1.3

Source: Nomura

Vol Monitor – Implied vs Realized Vol Ratio Heatmap

- Another way of broadly looking at richness/cheapness of the implied vol surface is to compare it against realized vol. In our report, we look at implied vs 20-day realized vol ratios.
- Cell highlights are based on 60-day Z-scores of implied vs realized vol ratios in each market.
- A ratio greater than 1 indicates that implied vol is expensive to realized; a ratio less than 1 indicates that implied vol is cheap to realized.

This part of the surface is trading rich against realized vol.

Implied vs 20-Day Realized Vol Ratio Heatmap

	3m	6m	1y	2y	3y	4y	5y	6y	7y	8y	9y	10y	15y	20y	25y	30y	35y	40y
1m	5.63	5.64	1.11	0.99	1.03	1.03	1.07	1.09	1.10	1.12	1.14	1.16	1.16	1.17	1.17	1.15	1.15	1.15
3m	1.76	1.61	0.91	0.90	0.97	0.99	1.05	1.07	1.10	1.12	1.14	1.16	1.17	1.18	1.19	1.17	1.17	1.18
6m	1.14	0.99	0.84	0.87	0.96	0.97	1.03	1.06	1.09	1.11	1.14	1.16	1.17	1.19	1.19	1.18	1.19	1.20
9m	0.88	0.84	0.82	0.88	0.95	0.96	1.01	1.05	1.08	1.11	1.14	1.16	1.17	1.19	1.19	1.17	1.18	1.19
1y	0.79	0.79	0.82	0.90	0.91	0.94	0.98	1.02	1.05	1.09	1.12	1.14	1.15	1.17	1.18	1.16	1.16	1.16
2y	0.91	0.92	0.86	0.87	0.90	0.95	1.01	1.04	1.07	1.11	1.13	1.15	1.14	1.15	1.15	1.14	1.14	1.13
3y	0.94	0.93	0.83	0.87	0.94	1.01	1.05	1.08	1.11	1.13	1.15	1.16	1.13	1.12	1.12	1.10	1.10	1.09
4y	0.86	0.87	0.85	0.95	1.02	1.06	1.11	1.14	1.15	1.16	1.17	1.17	1.13	1.11	1.09	1.08	1.07	1.06
5y	1.06	1.07	1.02	1.11	1.10	1.15	1.17	1.19	1.19	1.20	1.20	1.19	1.13	1.10	1.07	1.05	1.04	1.03
6y	1.21	1.18	1.10	1.11	1.15	1.18	1.19	1.20	1.20	1.19	1.19	1.19	1.12	1.07	1.04	1.02	1.01	1.00
7y	1.11	1.08	1.03	1.14	1.16	1.18	1.20	1.19	1.19	1.18	1.18	1.17	1.09	1.04	1.01	0.99	0.98	0.97
8y	1.26	1.24	1.17	1.20	1.20	1.21	1.21	1.19	1.18	1.18	1.17	1.16	1.07	1.01	0.98	0.97	0.96	0.94
9y	1.25	1.20	1.12	1.17	1.17	1.17	1.16	1.15	1.14	1.14	1.13	1.13	1.03	0.96	0.94	0.93	0.92	0.91
10y	1.25	1.23	1.09	1.16	1.14	1.12	1.12	1.12	1.11	1.11	1.10	1.09	1.00	0.93	0.91	0.90	0.89	0.88
15y	1.14	1.11	0.94	1.05	1.03	1.02	1.01	1.01	1.00	0.99	0.98	0.96	0.85	0.82	0.82	0.81	0.81	0.80
20y	0.99	0.99	0.83	0.90	0.87	0.85	0.84	0.82	0.81	0.79	0.78	0.78	0.75	0.74	0.74	0.73	0.72	0.72
25y	0.85	0.78	0.69	0.74	0.70	0.70	0.70	0.71	0.72	0.73	0.73	0.74	0.73	0.73	0.72	0.71	0.71	0.71
30y	0.84	0.78	0.73	0.80	0.79	0.78	0.78	0.79	0.79	0.79	0.79	0.79	0.77	0.75	0.74	0.73	0.73	0.73

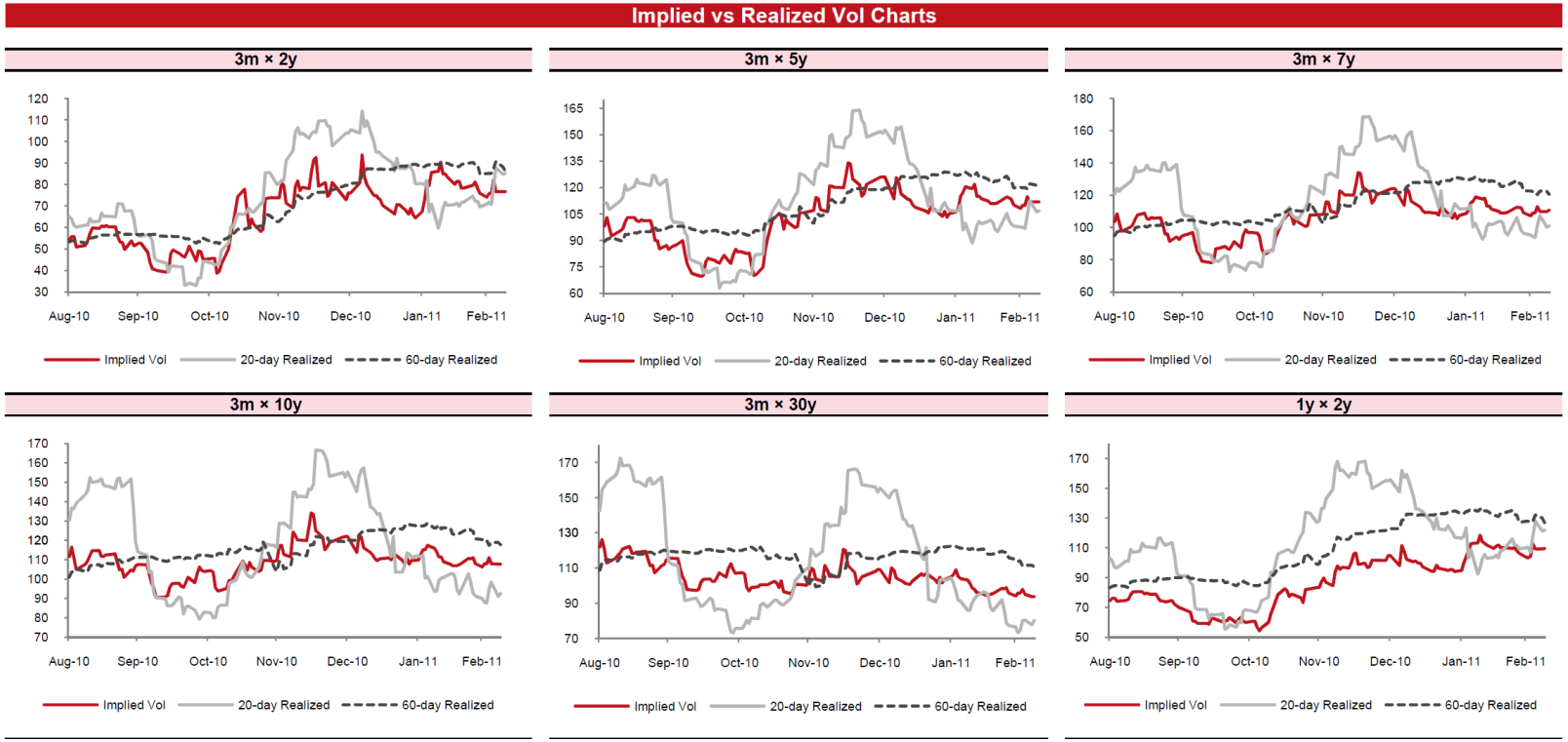
Notes on Color Coding

60d Z-Score < -1.3 | Neutral 60d Z-Score | 60d Z-Score > 1.3

Source: Nomura

Vol Monitor - Implied vs Realized Vol Charts

- A trend-based comparison of implied volatility against realized volatility for swaptions, using historical time series plots.
- We compare implied vol against 20-day and 60-day realized vol in annualized basis points.
- In this chart-based format, we can monitor the relative levels of implied and realized vols, as well as track any convergences/divergences in trends for each market.



Source: Nomura

Vol Monitor – Rate/Vol Correlation

- This section shows the 1-month correlation/beta of daily changes in rates and implied vol, and 1-mth realized volatility of implied vol for the swaption markets .
- Cell highlights on the heatmaps are based on 60-day Z-scores of these measures.
- High values point to the presence of a significant level of skew/one-sidedness in the markets.

Note: Correlation tracks only the directionality of rates against vol, while beta tracks both directionality of rates against vol, and the magnitude of this directionality. It thus follows that two markets with identical rate/vol correlations can in fact differ significantly in terms of beta.

1-mth Correlation (of daily changes in historical implied vol and daily changes in forward swap rates)

Term/Tenor	3m	6m	1y	2y	3y	4y	5y	6y	7y
3m	0.51	0.70	0.69	0.75	0.69	0.59	0.50	0.47	0.43
6m	0.49	0.67	0.80	0.81	0.71	0.59	0.42	0.41	0.39
1y	0.44	0.56	0.72	0.81	0.69	0.56	0.36	0.38	0.38
2y	0.74	0.75	0.64	0.61	0.53	0.50	0.47	0.43	0.38
5y	0.45	0.45	0.47	0.44	0.44	0.42	0.42	0.40	0.38
10y	0.28	0.26	0.21	0.24	0.27	0.30	0.31	0.32	0.32

1-mth Beta (of daily changes in historical implied vol and daily changes in forward swap rates)

Term/Tenor	3m	6m	1y	2y	3y	4y	5y	6y	7y
3m	0.85	0.90	0.66	0.41	0.29	0.23	0.19	0.16	0.14
6m	0.60	0.51	0.51	0.39	0.26	0.19	0.13	0.12	0.11
1y	0.28	0.26	0.25	0.21	0.20	0.14	0.09	0.08	0.08
2y	0.20	0.17	0.11	0.09	0.08	0.08	0.08	0.07	0.06
5y	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.05
10y	0.05	0.05	0.04	0.04	0.05	0.06	0.06	0.06	0.06

Current rate/vol beta in this part of the surface is comparatively low against recent history

1-mth Realized Vol of Implied Vol

Term/Tenor	3m	6m	1y	2y	3y	4y	5y	6y	7y
3m	1.43	1.55	2.82	2.84	2.58	2.47	2.44	2.20	2.02
6m	2.41	2.14	2.80	2.97	2.44	2.22	2.11	1.89	1.71
1y	3.48	2.86	2.49	2.85	2.17	1.87	1.72	1.55	1.41
2y	2.23	1.87	1.40	1.23	1.20	1.21	1.21	1.13	1.07
5y	0.91	0.91	0.90	0.94	0.86	0.85	0.85	0.82	0.80
10y	0.94	0.95	0.94	0.95	0.96	0.97	0.98	0.95	0.93

Notes on Color Coding

60d Z-Score < -1.3 | Neutral 60d Z-Score | 60d Z-Score > 1.3

Source: Nomura

Payer/Receiver Strike Skew Monitor

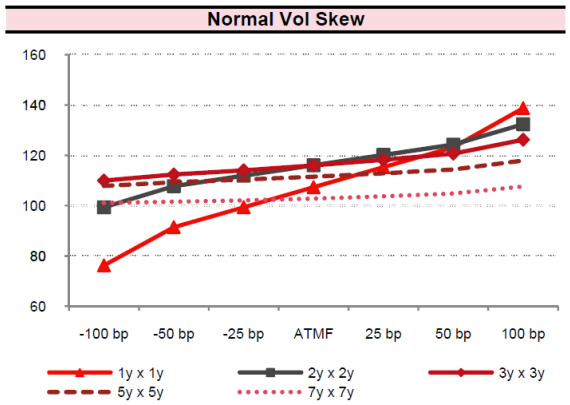
- Tracks the volatility skew (OTM - ATM implied vol) for swaptions, along with changes in its levels
- Large daily/weekly/monthly changes in skew are highlighted.
- The markets are also screened by cell highlights in the 3-month Z-score column.
- Data tables are also accompanied by historical time series chart plots of swaption skew.

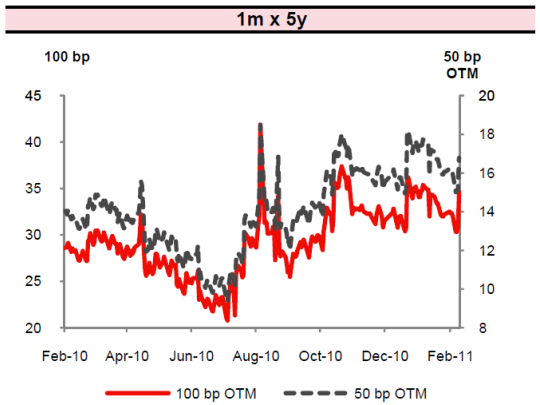
			100 bp OTM							50 bp OTM						
Payer Swaption	Reference ATM Strike	ATM Imp. Vol	Imp. Vol	Strike Skew	Change 1d	Change 1w	Change 1m	3m Avg	3m Z-Score	Imp. Vol	Strike Skew	Change 1d	Change 1w	Change 1m	3m Avg	3m Z-Score
1m x 3y	1.638	100.87	152.55	51.68	1.52	1.35	(1.34)	52.23	(0.3)	126.77	25.90	0.67	0.56	(0.92)	26.32	(0.4)
1m x 5y	2.587	117.25	151.86	34.61	3.84	2.27	(0.26)	32.81	1.2	134.03	16.78	1.56	0.65	(0.71)	16.30	0.6
1m x 10y	3.749	113.68	128.44	14.76	(5.14)	(7.05)	(10.99)	22.29	(3.1)	120.51	6.83	(2.36)	(3.47)	(5.68)	10.55	(2.8)
1m x 30y	4.446	100.23	96.38	(3.85)	1.12	(1.87)	(6.72)	1.83	(1.8)	97.45	(2.78)	1.40	(0.11)	(2.63)	(0.67)	(1.3)
3m x 3y	1.811	98.53	139.48	40.95	0.01	(0.81)	(2.12)	42.91	(1.2)	119.01	20.48	(0.11)	(0.58)	(1.36)	21.63	(1.3)
3m x 5y	2.736	114.94	143.92	28.99	0.46	(1.48)	(2.60)	30.22	(1.1)	129.02	14.08	(0.03)	(1.12)	(1.76)	15.01	(1.4)
3m x 10y	3.839	110.94	125.28	14.35	(4.21)	(6.31)	(8.87)	20.69	(3.2)	117.56	6.62	(1.97)	(3.17)	(4.61)	9.79	(2.9)
3m x 30y	4.488	97.95	94.09	(3.86)	0.84	(1.94)	(6.45)	1.64	(1.9)	95.17	(2.78)	1.03	(0.36)	(2.72)	(0.57)	(1.5)

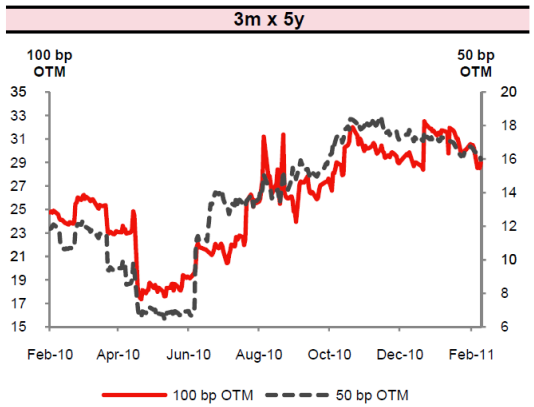
Notes on Color Coding

Largest Movers (1-day largest movers over 2 weeks; 1-week largest movers over 1 month; 1-month largest movers over 6 months)

60d Z-Score < -1 | Neutral 60d Z-Score | 60d Z-Score > 1







Source: Nomura

Trading the Curve

- The conventional way of expressing a curve view is either via bonds or swaps.
- In a steepener, we would sell the longer maturity bond and buy the shorter maturity bond, or pay fixed on the longer maturity swap, and receive fixed on the shorter maturity swap.
- In a flattener, we would buy the longer maturity and sell the shorter maturity bond, or receive fixed on the longer maturity swap, and pay fixed on the shorter maturity swap.

Type	Steepeners	Flatteners
Bonds	Buy shorter maturity bond Sell longer maturity bond	Sell shorter maturity bond Buy longer maturity bond
Swaps	Receive fixed on shorter maturity swap Pay fixed on longer maturity swap	Pay fixed on shorter maturity swap Receive fixed on longer maturity swap

- Alternatively, curve views can expressed in the conditional form through swaptions.

Structuring Conditional Curve Trades

- There are four possible types of conditional curve trades – payer (bearish) steepeners, payer flatteners, receiver (bullish) steepeners and receiver flatteners.

Type	Steepeners	Flatteners
Payer (Bearish)	Sell payer on short maturity tails Buy payer on long maturity tails	Buy payer on short maturity tails Sell payer on long maturity tails
Receiver (Bullish)	Buy receiver on short maturity tails Sell receiver on long maturity tails	Sell receiver on short maturity tails Buy receiver on long maturity tails

- For example, we expect the 3-month forward 2s5s swap curve to bull flatten. In this case, we would sell the 3m2y receiver and buy the 3m5y receiver.

Conditional Curve Trade Monitor

- Nomura Rates Strategy provides a set of duration-neutral, zero-cost conditional curve trades with accompanying technicals and analytics on a daily basis
- By convention, the buy leg is struck ATMF with a vega exposure of $100K.
- These trades are screened based on vol pickup, which is a gauge of the relative attractiveness of a conditional curve structure in the swaption space, against a conventional curve trade in the forward swap space.

	ATM			Forward Curve				ATMF Implied Vol Differential				Fwd-Spot Pickup		Vol Pickup		Vol Pickup	Delta ($k)	
Structure	Strike of Buy Leg	Strike of Sell Leg	Sell Leg Vega ($k)	Current	3m Z-Score	6m Z-Score	1y Z-Score	Current	3m Z-Score	6m Z-Score	1y Z-Score	Current	3m Z-Score	Current	3m Z-Score	to Risk Ratio	Buy Leg	Sell Leg
1m 1s2s Payer	0.462	1.049	179	45.7	0.2	1.0	0.5	35.3	1.7	1.8	1.9	3.6	1.1	13.0	1.9	1.0	964	581
3m 1s2s Payer	0.546	1.276	183	51.9	0.4	1.1	0.7	31.6	1.1	1.6	1.9	9.8	1.3	21.1	1.2	1.1	519	329
6m 1s2s Payer	0.730	1.544	180	58.1	0.6	1.2	1.0	26.0	1.1	1.5	2.1	16.0	1.5	23.2	1.2	1.1	307	222
1y 1s2s Payer	1.273	2.004	151	57.3	0.5	1.2	1.1	14.0	(0.2)	0.7	1.2	15.1	0.6	15.9	(0.5)	0.9	138	117
1m 2s3s Payer	0.919	1.498	155	52.0	0.3	1.0	0.8	19.6	(0.4)	0.3	1.0	0.2	(1.0)	5.8	(0.3)	0.9	482	404
3m 2s3s Payer	1.065	1.699	150	52.8	0.4	1.1	0.9	19.4	0.3	0.9	1.3	1.0	(0.2)	10.5	0.4	1.1	258	216
6m 2s3s Payer	1.312	1.945	141	52.0	0.2	1.0	0.9	14.8	0.2	0.5	1.1	0.2	(0.6)	11.3	0.2	1.0	159	139
1y 2s3s Payer	1.846	2.394	129	49.3	(0.4)	0.9	1.0	5.4	(0.4)	(0.9)	0.1	(2.6)	(0.5)	5.5	(0.4)	0.3	87	81
2y 2s3s Payer	2.885	3.293	115	40.0	(0.5)	0.0	0.7	0.6	(0.7)	(1.1)	(0.6)	(11.8)	(0.4)	0.8	(0.7)	0.0	40	39
1m 2s5s Payer	0.919	2.447	247	142.4	0.1	1.0	0.9	35.3	(0.9)	(0.6)	0.1	(0.4)	(1.1)	10.4	(0.8)	0.8	482	365
3m 2s5s Payer	1.065	2.668	228	141.7	0.1	1.0	1.0	34.8	(0.5)	(0.3)	0.4	(1.1)	(0.4)	18.5	(0.5)	1.0	258	194
6m 2s5s Payer	1.312	2.882	207	138.2	(0.2)	0.9	1.1	25.7	(0.8)	(1.3)	0.1	(4.6)	(0.5)	18.8	(0.9)	0.7	159	127
1y 2s5s Payer	1.846	3.176	174	126.5	(0.7)	0.7	1.2	6.8	(1.1)	(1.7)	(0.7)	(16.4)	(0.4)	6.5	(1.1)	0.2	87	78
2y 2s5s Payer	2.885	3.861	136	96.2	(0.4)	(0.3)	0.6	1.1	(0.7)	(1.2)	(0.7)	(46.6)	(0.3)	1.4	(0.7)	0.0	40	39
1m 2s10s Payer	0.919	3.631	377	263.0	0.0	0.9	1.2	30.3	(1.3)	(1.5)	(0.7)	(2.9)	(0.8)	8.2	(1.1)	0.3	482	385
3m 2s10s Payer	1.065	3.785	337	257.0	(0.0)	0.9	1.2	31.1	(0.8)	(1.2)	(0.4)	(8.8)	(0.3)	15.0	(0.9)	0.3	258	203
6m 2s10s Payer	1.312	3.910	292	245.4	(0.2)	0.8	1.3	21.9	(0.9)	(1.3)	(0.5)	(20.4)	(0.3)	14.5	(1.0)	0.2	159	131
1y 2s10s Payer	1.846	4.049	226	217.6	(0.3)	0.4	1.1	3.1	(1.1)	(1.5)	(0.9)	(48.2)	(0.3)	2.7	(1.1)	0.0	87	80
2y 2s10s Payer	2.885	4.434	158	158.3	(0.2)	(0.4)	0.5	(2.9)	(0.5)	(1.1)	(0.7)	(107.5)	(0.2)	(3.5)	(0.5)	(0.0)	40	39
1m 2s30s Payer	0.919	4.360	469	340.2	0.5	0.9	1.3	15.8	(1.3)	(1.5)	(1.2)	(5.1)	(0.7)	3.9	(1.2)	0.2	482	440
3m 2s30s Payer	1.065	4.432	412	329.6	0.5	0.8	1.3	17.1	(1.0)	(1.2)	(0.9)	(15.7)	(0.3)	7.2	(1.0)	0.3	258	236
6m 2s30s Payer	1.312	4.467	346	310.9	0.3	0.7	1.2	8.1	(1.0)	(1.3)	(0.9)	(34.4)	(0.3)	4.6	(1.0)	0.1	159	151
1y 2s30s Payer	1.846	4.460	253	269.4	0.1	0.1	0.8	(10.7)	(1.1)	(1.4)	(1.0)	(75.9)	(0.3)	(8.0)	(1.1)	(0.1)	87	90
2y 2s30s Payer	2.885	4.563	166	186.0	0.1	(0.5)	0.3	(17.4)	(0.4)	(1.0)	(0.7)	(159.3)	(0.2)	(18.2)	(0.4)	(0.2)	40	43

Source: Nomura

Conditional Curve Trades – Some Definitions Used

- **ATMF Implied Vol Differential** = Sell Leg Implied Vol – Buy Leg Implied Vol. A positive value implies that a curve trade struck ATMF for both legs has premium take-in at inception; a negative value implies a premium cost at inception.
- **Forward-Spot Pickup** = Difference between forward and spot swap curves. A positive value implies that the forward swap market offers a better entry level than the spot swap market for the same curve trade; a negative value implies a worse entry level than that of the spot swap market.
- **Vol Pick-up** = Difference between the struck curve levels in the swaptions space and the forward curve levels. A positive value points to a better entry level in swaptions than forward swaps; a negative number indicates a worse level.

Signals premium take-in/premium cost in a ATMF (not costless) conditional curve trade

Compares entry levels in forward and spot swap markets for the same curve trade

Compares entry levels in swaption and forward swaps markets for the same curve trade

	ATM			Forward Curve				ATMF Implied Vol Differential				Fwd-Spot Pickup		Vol Pickup		Vol Pickup	Delta ($k)	
Structure	Strike of Buy Leg	Strike of Sell Leg	Sell Leg Vega ($k)	Current	3m Z-Score	6m Z-Score	1y Z-Score	Current	3m Z-Score	6m Z-Score	1y Z-Score	Current	3m Z-Score	Current	3m Z-Score	to Risk Ratio	Buy Leg	Sell Leg
1m 1s2s Payer	0.462	1.049	179	45.7	0.2	1.0	0.5	35.3	1.7	1.8	1.9	3.6	1.1	13.0	1.9	1.0	964	581
3m 1s2s Payer	0.546	1.276	183	51.9	0.4	1.1	0.7	31.6	1.1	1.6	1.9	9.8	1.3	21.1	1.2	1.1	519	329
6m 1s2s Payer	0.730	1.544	180	58.1	0.6	1.2	1.0	26.0	1.1	1.5	2.1	16.0	1.5	23.2	1.2	1.1	307	222
1y 1s2s Payer	1.273	2.004	151	57.3	0.5	1.2	1.1	14.0	(0.2)	0.7	1.2	15.1	0.6	15.9	(0.5)	0.9	138	117
1m 2s3s Payer	0.919	1.498	155	52.0	0.3	1.0	0.8	19.6	(0.4)	0.3	1.0	0.2	(1.0)	5.8	(0.3)	0.9	482	404
3m 2s3s Payer	1.065	1.699	150	52.8	0.4	1.1	0.9	19.4	0.3	0.9	1.3	1.0	(0.2)	10.5	0.4	1.1	258	216
6m 2s3s Payer	1.312	1.945	141	52.0	0.2	1.0	0.9	14.8	0.2	0.5	1.1	0.2	(0.6)	11.3	0.2	1.0	159	139
1y 2s3s Payer	1.846	2.394	129	49.3	(0.4)	0.9	1.0	5.4	(0.4)	(0.9)	0.1	(2.6)	(0.5)	5.5	(0.4)	0.3	87	81

Source: Nomura

Identifying Optimal Curve Trades (1)

- Suppose we expect the 2s10s swap curve to flatten in the near term (in one month to three months' time) as rates sell off, and also feel that short-end vol could correspondingly rise more than the longer-end. In terms of trading this view, we have the following choices:

1) Pay fixed on spot 2-year swaps and receive fixed on spot 10-year swaps
2) Pay fixed on forward 2-year swaps and receive fixed on forward 10-year swaps
3) Enter into a payer (bearish) flattener, by buying forward 2-year payer swaptions and selling forward 10-year payer swaptions

- Since this is a bearish flattening view on the curve, we would refer to the payer flattener sheet of our vol analytics report to identify optimal conditional curve trades.

Identifying Optimal Curve Trades (2)

- First of all, we look at the z-scores of the forward 2s10s swap curve to compare current entry levels against recent trading history.
- The listed expiries for the 2s10s curve have 3-mth z-scores that are relatively close to zero, indicating a relatively fair level against history for our purposes of putting on a flattener trade.

	ATM			Forward Curve				ATMF Implied Vol Differential				Fwd-Spot Pickup		Vol Pickup		Vol Pickup to Risk	Delta ($k)	
Structure	Strike of Buy Leg	Strike of Sell Leg	Sell Leg Vega ($k)	Current	3m Z-Score	6m Z-Score	1y Z-Score	Current	3m Z-Score	6m Z-Score	1y Z-Score	Current	3m Z-Score	Current	3m Z-Score	Ratio	Buy Leg	Sell Leg
1m 1s2s Payer	0.462	1.049	179	45.7	0.2	1.0	0.5	35.3	1.7	1.8	1.9	3.6	1.1	13.0	1.9	1.0	964	581
3m 1s2s Payer	0.546	1.276	183	51.9	0.4	1.1	0.7	31.6	1.1	1.6	1.9	9.8	1.3	21.1	1.2	1.1	519	329
6m 1s2s Payer	0.730	1.544	180	58.1	0.6	1.2	1.0	26.0	1.1	1.5	2.1	16.0	1.5	23.2	1.2	1.1	307	222
1y 1s2s Payer	1.273	2.004	151	57.3	0.5	1.2	1.1	14.0	(0.2)	0.7	1.2	15.1	0.6	15.9	(0.5)	0.9	138	117
1m 2s3s Payer	0.919	1.498	155	52.0	0.3	1.0	0.8	19.6	(0.4)	0.3	1.0	0.2	(1.0)	5.8	(0.3)	0.9	482	404
3m 2s3s Payer	1.065	1.699	150	52.8	0.4	1.1	0.9	19.4	0.3	0.9	1.3	1.0	(0.2)	10.5	0.4	1.1	258	216
6m 2s3s Payer	1.312	1.945	141	52.0	0.2	1.0	0.9	14.8	0.2	0.5	1.1	0.2	(0.6)	11.3	0.2	1.0	159	139
1y 2s3s Payer	1.846	2.394	129	49.3	(0.4)	0.9	1.0	5.4	(0.4)	(0.9)	0.1	(2.6)	(0.5)	5.5	(0.4)	0.3	87	81
2y 2s3s Payer	2.885	3.293	115	40.0	(0.5)	0.0	0.7	0.6	(0.7)	(1.1)	(0.6)	(11.8)	(0.4)	0.8	(0.7)	0.0	40	39
1m 2s5s Payer	0.919	2.447	247	142.4	0.1	1.0	0.9	35.3	(0.9)	(0.6)	0.1	(0.4)	(1.1)	10.4	(0.8)	0.8	482	365
3m 2s5s Payer	1.065	2.668	228	141.7	0.1	1.0	1.0	34.8	(0.5)	(0.3)	0.4	(1.1)	(0.4)	18.5	(0.5)	1.0	258	194
6m 2s5s Payer	1.312	2.882	207	138.2	(0.2)	0.9	1.1	25.7	(0.8)	(1.3)	0.1	(4.6)	(0.5)	18.8	(0.9)	0.7	159	127
1y 2s5s Payer	1.846	3.176	174	126.5	(0.7)	0.7	1.2	6.8	(1.1)	(1.7)	(0.7)	(16.4)	(0.4)	6.5	(1.1)	0.2	87	78
2y 2s5s Payer	2.885	3.861	136	96.2	(0.4)	(0.3)	0.6	1.1	(0.7)	(1.2)	(0.7)	(46.6)	(0.3)	1.4	(0.7)	0.0	40	39
1m 2s10s Payer	0.919	3.631	377	263.0	0.0	0.9	1.2	30.3	(1.3)	(1.5)	(0.7)	(2.9)	(0.8)	8.2	(1.1)	0.3	482	385
3m 2s10s Payer	1.065	3.785	337	257.0	(0.0)	0.9	1.2	31.1	(0.8)	(1.2)	(0.4)	(8.8)	(0.3)	15.0	(0.9)	0.3	258	203
6m 2s10s Payer	1.312	3.910	292	245.4	(0.2)	0.8	1.3	21.9	(0.9)	(1.3)	(0.5)	(20.4)	(0.3)	14.5	(1.0)	0.2	159	131
1y 2s10s Payer	1.846	4.049	226	217.6	(0.3)	0.4	1.1	3.1	(1.1)	(1.5)	(0.9)	(48.2)	(0.3)	2.7	(1.1)	0.0	87	80
2y 2s10s Payer	2.885	4.434	158	158.3	(0.2)	(0.4)	0.5	(2.9)	(0.5)	(1.1)	(0.7)	(107.5)	(0.2)	(3.5)	(0.5)	(0.0)	40	39
1m 2s30s Payer	0.919	4.360	469	340.2	0.5	0.9	1.3	15.8	(1.3)	(1.5)	(1.2)	(5.1)	(0.7)	3.9	(1.2)	0.2	482	440
3m 2s30s Payer	1.065	4.432	412	329.6	0.5	0.8	1.3	17.1	(1.0)	(1.2)	(0.9)	(15.7)	(0.3)	7.2	(1.0)	0.3	258	236

3-mth Z-scores for the listed expiries for the 2s10s curve are relatively close to zero

Source: Nomura

Identifying Optimal Curve Trades (3)

- Next, we look at the ATMF implied vol differential and their z-scores.
- The positive values for the short expiries of 2s10s indicate a premium take-in for ATMF (non-costless) conditional structures, and positive vol pick-ups for zero-cost structures.
- The low 3-mth and 6-mth z-scores point to a general trend of convergence between 2-year implied vol and 10-year implied vol.
- Although the pace of convergence seems to be slowing (3-mth z-scores higher than 6-mth z-scores), the prevailing trend still appears to broadly aligned with our view for 2-year implied vol to rise faster than 10-year implied vol, in the event of bear flattening.

	ATM			Forward Curve				ATMF Implied Vol Differential				Fwd-Spot Pickup		Vol Pickup		Vol Pickup	Delta ($k)	
Structure	Strike of Buy Leg	Strike of Sell Leg	Sell Leg Vega ($k)	Current	3m Z-Score	6m Z-Score	1y Z-Score	Current	3m Z-Score	6m Z-Score	1y Z-Score	Current	3m Z-Score	Current	3m Z-Score	to Risk Ratio	Buy Leg	Sell Leg
1m 1s2s Payer	0.462	1.049	179	45.7	0.2	1.0	0.5	35.3	1.7	1.8	1.9	3.6	1.1	13.0	1.9	1.0	964	581
3m 1s2s Payer	0.546	1.276	183	51.9	0.4	1.1	0.7	31.6	1.1	1.6	1.9	9.8	1.3	21.1	1.2	1.1	519	329
6m 1s2s Payer	0.730	1.544	180	58.1	0.6	1.2	1.0	26.0	1.1	1.5	2.1	16.0	1.5	23.2	1.2	1.1	307	222
1y 1s2s Payer	1.273	2.004	151	57.3	0.5	1.2	1.1	14.0	(0.2)	0.7	1.2	15.1	0.6	15.9	(0.5)	0.9	138	117
1m 2s3s Payer	0.919	1.498	155	52.0	0.3	1.0	0.8	19.6	(0.4)	0.3	1.0	0.2	(1.0)	5.8	(0.3)	0.9	482	404
3m 2s3s Payer	1.065	1.699	150	52.8	0.4	1.1	0.9	19.4	0.3	0.9	1.3	1.0	(0.2)	10.5	0.4	1.1	258	216
6m 2s3s Payer	1.312	1.945	141	52.0	0.2	1.0	0.9	14.8	0.2	0.5	1.1	0.2	(0.6)	11.3	0.2	1.0	159	139
1y 2s3s Payer	1.846	2.394	129	49.3	(0.4)	0.9	1.0	5.4	(0.4)	(0.9)	0.1	(2.6)	(0.5)	5.5	(0.4)	0.3	87	81
2y 2s3s Payer	2.885	3.293	115	40.0	(0.5)	0.0	0.7	0.6	(0.7)	(1.1)	(0.6)	(11.8)	(0.4)	0.8	(0.7)	0.0	40	39
1m 2s5s Payer	0.919	2.447	247	142.4	0.1	1.0	0.9	35.3	(0.9)	(0.6)	0.1	(0.4)	(1.1)	10.4	(0.8)	0.8	482	365
3m 2s5s Payer	1.065	2.668	228	141.7	0.1	1.0	1.0	34.8	(0.5)	(0.3)	0.4	(1.1)	(0.4)	18.5	(0.5)	1.0	258	194
6m 2s5s Payer	1.312	2.882	207	138.2	(0.2)	0.9	1.1	25.7	(0.8)	(1.3)	0.1	(4.6)	(0.5)	18.8	(0.9)	0.7	159	127
1y 2s5s Payer	1.846	3.176	174	126.5	(0.7)	0.7	1.2	6.8	(1.1)	(1.7)	(0.7)	(16.4)	(0.4)	6.5	(1.1)	0.2	87	78
2y 2s5s Payer	2.885	3.861	136	96.2	(0.4)	(0.3)	0.6	1.1	(0.7)	(1.2)	(0.7)	(46.6)	(0.3)	1.4	(0.7)	0.0	40	39
1m 2s10s Payer	0.919	3.631	377	263.0	0.0	0.9	1.2	30.3	(1.3)	(1.5)	(0.7)	(2.9)	(0.8)	8.2	(1.1)	0.3	482	385
3m 2s10s Payer	1.065	3.785	337	257.0	(0.0)	0.9	1.2	31.1	(0.8)	(1.2)	(0.4)	(8.8)	(0.3)	15.0	(0.9)	0.3	258	203
6m 2s10s Payer	1.312	3.910	292	245.4	(0.2)	0.8	1.3	21.9	(0.9)	(1.3)	(0.5)	(20.4)	(0.3)	14.5	(1.0)	0.2	159	131
1y 2s10s Payer	1.846	4.049	226	217.6	(0.3)	0.4	1.1	3.1	(1.1)	(1.5)	(0.9)	(48.2)	(0.3)	2.7	(1.1)	0.0	87	80
2y 2s10s Payer	2.885	4.434	158	158.3	(0.2)	(0.4)	0.5	(2.9)	(0.5)	(1.1)	(0.7)	(107.5)	(0.2)	(3.5)	(0.5)	(0.0)	40	39
1m 2s30s Payer	0.919	4.360	469	340.2	0.5	0.9	1.3	15.8	(1.3)	(1.5)	(1.2)	(5.1)	(0.7)	3.9	(1.2)	0.2	482	440
3m 2s30s Payer	1.065	4.432	412	329.6	0.5	0.8	1.3	17.1	(1.0)	(1.2)	(0.9)	(15.7)	(0.3)	7.2	(1.0)	0.3	258	236

Source: Nomura

Low z-scores point to trend of convergence between short-end and long-end vol

Identifying Optimal Curve Trades (4)

- We then look at the forward-spot pick-up columns to compare entry levels in the forward swap space against those in the spot market.
- The pick-ups for the listed expiries for the 2s10s curve on our monitor are all negative, indicating that entry levels for forward swaps are worse than those in the spot market.
- Nonetheless we would still want to consider a conditional structure as it is generally less risky than a outright trade, in the event of adverse curve movements. We would therefore seek to minimize the negative pick-up against spot in our selection.
- The 3m expiry has one of the lowest negative pick-ups while having adequate time to expiry which fits our tactical trading horizon (the 1m expiry is likely to be too short for our purpose).

	ATM			Forward Curve				ATMF Implied Vol Differential				Fwd-Spot Pickup		Vol Pickup		Vol Pickup	Delta ($k)	
Structure	Strike of Buy Leg	Strike of Sell Leg	Sell Leg Vega ($k)	Current	3m Z-Score	6m Z-Score	1y Z-Score	Current	3m Z-Score	6m Z-Score	1y Z-Score	Current	3m Z-Score	Current	3m Z-Score	to Risk Ratio	Buy Leg	Sell Leg
1m 1s2s Payer	0.462	1.049	179	45.7	0.2	1.0	0.5	35.3	1.7	1.8	1.9	3.6	1.1	13.0	1.9	1.0	964	581
3m 1s2s Payer	0.546	1.276	183	51.9	0.4	1.1	0.7	31.6	1.1	1.6	1.9	9.8	1.3	21.1	1.2	1.1	519	329
6m 1s2s Payer	0.730	1.544	180	58.1	0.6	1.2	1.0	26.0	1.1	1.5	2.1	16.0	1.5	23.2	1.2	1.1	307	222
1y 1s2s Payer	1.273	2.004	151	57.3	0.5	1.2	1.1	14.0	(0.2)	0.7	1.2	15.1	0.6	15.9	(0.5)	0.9	138	117
1m 2s3s Payer	0.919	1.498	155	52.0	0.3	1.0	0.8	19.6	(0.4)	0.3	1.0	0.2	(1.0)	5.8	(0.3)	0.9	482	404
3m 2s3s Payer	1.065	1.699	150	52.8	0.4	1.1	0.9	19.4	0.3	0.9	1.3	1.0	(0.2)	10.5	0.4	1.1	258	216
6m 2s3s Payer	1.312	1.945	141	52.0	0.2	1.0	0.9	14.8	0.2	0.5	1.1	0.2	(0.6)	11.3	0.2	1.0	159	139
1y 2s3s Payer	1.846	2.394	129	49.3	(0.4)	0.9	1.0	5.4	(0.4)	(0.9)	0.1	(2.6)	(0.5)	5.5	(0.4)	0.3	87	81
2y 2s3s Payer	2.885	3.293	115	40.0	(0.5)	0.0	0.7	0.6	(0.7)	(1.1)	(0.6)	(11.8)	(0.4)	0.8	(0.7)	0.0	40	39
1m 2s5s Payer	0.919	2.447	247	142.4	0.1	1.0	0.9	35.3	(0.9)	(0.6)	0.1	(0.4)	(1.1)	10.4	(0.8)	0.8	482	365
3m 2s5s Payer	1.065	2.668	228	141.7	0.1	1.0	1.0	34.8	(0.5)	(0.3)	0.4	(1.1)	(0.4)	18.5	(0.5)	1.0	258	194
6m 2s5s Payer	1.312	2.882	207	138.2	(0.2)	0.9	1.1	25.7	(0.8)	(1.3)	0.1	(4.6)	(0.5)	18.8	(0.9)	0.7	159	127
1y 2s5s Payer	1.846	3.176	174	126.5	(0.7)	0.7	1.2	6.8	(1.1)	(1.7)	(0.7)	(16.4)	(0.4)	6.5	(1.1)	0.2	87	78
2y 2s5s Payer	2.885	3.861	136	96.2	(0.4)	(0.3)	0.6	1.1	(0.7)	(1.2)	(0.7)	(46.6)	(0.3)	1.4	(0.7)	0.0	40	39
1m 2s10s Payer	0.919	3.631	377	263.0	0.0	0.9	1.2	30.3	(1.3)	(1.5)	(0.7)	(2.9)	(0.8)	8.2	(1.1)	0.3	482	385
3m 2s10s Payer	1.065	3.785	337	257.0	(0.0)	0.9	1.2	31.1	(0.8)	(1.2)	(0.4)	(8.8)	(0.3)	15.0	(0.9)	0.3	258	203
6m 2s10s Payer	1.312	3.910	292	245.4	(0.2)	0.8	1.3	21.9	(0.9)	(1.3)	(0.5)	(20.4)	(0.3)	14.5	(1.0)	0.2	159	131
1y 2s10s Payer	1.846	4.049	226	217.6	(0.3)	0.4	1.1	3.1	(1.1)	(1.5)	(0.9)	(48.2)	(0.3)	2.7	(1.1)	0.0	87	80
2y 2s10s Payer	2.885	4.434	158	158.3	(0.2)	(0.4)	0.5	(2.9)	(0.5)	(1.1)	(0.7)	(107.5)	(0.2)	(3.5)	(0.5)	(0.0)	40	39
1m 2s30s Payer	0.919	4.360	469	340.2	0.5	0.9	1.3	15.8	(1.3)	(1.5)	(1.2)	(5.1)	(0.7)	3.9	(1.2)	0.2	482	440
3m 2s30s Payer	1.065	4.432	412	329.6	0.5	0.8	1.3	17.1	(1.0)	(1.2)	(0.9)	(15.7)	(0.3)	7.2	(1.0)	0.3	258	236

A flatter forward curve than spot necessitates a selection to minimize negative pickup

Source: Nomura

Identifying Optimal Curve Trades (5)

- Lastly, we look at the vol pick-up column to compare entry levels of zero-cost conditional trades in the swaption space against those of outright curve trades in the forward swap space.
- We can see that the 3-month and 6-month expiries offer a reasonable pick-up of 14-15bp for 2s10s flatteners; i.e. the entry level offered by the swaption market is 14-15bp better than the forward swap market. Thus, relative to forward swaps, a conditional curve trade seems more attractive.
- A 3m 2s10s conditional bearish flattener would thus seem to be the optimal trade to express our views over a one- to three –month horizon.

	ATM			Forward Curve				ATMF Implied Vol Differential				Fwd-Spot Pickup		Vol Pickup		Vol Pickup to Risk	Delta ($k)	
Structure	Strike of Buy Leg	Strike of Sell Leg	Sell Leg Vega ($k)	Current	3m Z-Score	6m Z-Score	1y Z-Score	Current	3m Z-Score	6m Z-Score	1y Z-Score	Current	3m Z-Score	Current	3m Z-Score	Ratio	Buy Leg	Sell Leg
1m 1s2s Payer	0.462	1.049	179	45.7	0.2	1.0	0.5	35.3	1.7	1.8	1.9	3.6	1.1	13.0	1.9	1.0	964	581
3m 1s2s Payer	0.546	1.276	183	51.9	0.4	1.1	0.7	31.6	1.1	1.6	1.9	9.8	1.3	21.1	1.2	1.1	519	329
6m 1s2s Payer	0.730	1.544	180	58.1	0.6	1.2	1.0	26.0	1.1	1.5	2.1	16.0	1.5	23.2	1.2	1.1	307	222
1y 1s2s Payer	1.273	2.004	151	57.3	0.5	1.2	1.1	14.0	(0.2)	0.7	1.2	15.1	0.6	15.9	(0.5)	0.9	138	117
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6m 2s3s Payer	1.312	1.945	141	52.0	0.2	1.0	0.9	14.8	0.2	0.5	1.1	0.2	(0.6)	11.3	0.2	1.0	159	139
1y 2s3s Payer	1.846	2.394	129	49.3	(0.4)	0.9	1.0	5.4	(0.4)	(0.9)	0.1	(2.6)	(0.5)	5.5	(0.4)	0.3	87	81
2y 2s3s Payer	2.885	3.293	115	40.0	(0.5)	0.0	0.7	0.6	(0.7)	(1.1)	(0.6)	(11.8)	(0.4)	0.8	(0.7)	0.0	40	39
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2y 2s5s Payer	2.885	3.861	136	96.2	(0.4)	(0.3)	0.6	1.1	(0.7)	(1.2)	(0.7)	(46.6)	(0.3)	1.4	(0.7)	0.0	40	39
1m 2s10s Payer	0.919	3.631	377	263.0	0.0	0.9	1.2	30.3	(1.3)	(1.5)	(0.7)	(2.9)	(0.8)	8.2	(1.1)	0.3	482	385
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1m 2s30s Payer	0.919	4.360	469	340.2	0.5	0.9	1.3	15.8	(1.3)	(1.5)	(1.2)	(5.1)	(0.7)	3.9	(1.2)	0.2	482	440
3m 2s30s Payer	1.065	4.432	412	329.6	0.5	0.8	1.3	17.1	(1.0)	(1.2)	(0.9)	(15.7)	(0.3)	7.2	(1.0)	0.3	258	236

3m and 6m swaption expiries for 2s10s show a pick-up of about 14-15 bps over the forward swap space

Source: Nomura

Glossary

Implied Basis Point Volatility

Also known as Implied Normalized Volatility. It is the market's best estimate of future volatility based on current option prices, defined as the standard deviation of the terminal distribution of the rate over a given time. We use this to compare volatility levels across different rate environments.

Realized Volatility

Also known sometimes as Historical Volatility. Unlike implied volatility, it describes the actual changes in the underlying, and it is defined as the standard deviation of daily changes over a given time. We compare implied volatility against realized volatility as a gauge of an option's richness/cheapness.

Correlation

A measure of how two securities move in relation to each other. The correlation coefficient ranges from -1 to 1, with 1 implying that both securities are always moving in the same direction, while -1 indicates that both securities are always moving in opposite directions. A value of 0 points to completely random and independent movements. Note that correlation is a measure of directionality only and not magnitude.

Glossary

Beta

Unlike correlation, beta measures how two securities move in relation to each other, with regards to both magnitude and direction. For example, if a security is always up by 4% when the other is up by 1%, the correlation coefficient would be 1, but the beta coefficient would be 4.

Z-score

Also known as standard score, this measures how far below/above the current market level is from the mean, in terms of the number of standard deviations. E.g. a 3-month z-score would measure how far the current level is away from the 3-month mean level. For highly mean-reverting markets, this is a useful way of gauging whether a market is trading too rich/too cheap in the near-term. Comparison of different z-scores set across varying time-frames (3-mth, 6-mth etc) would also help investors identify any shifts in trends over history.

Glossary

Strike Skew

The difference in implied volatilities between out-of-the-money (OTM) options and at-the-money (ATM) options, caused by imbalances in investors' demand for protection and market makers' capabilities to warehouse the risk.

Pickup

Profit realized by holding the conditional curve trade, assuming term structure remains constant and both swaption legs of the trade expire in-the-money (ITM).

Glossary

Delta

The approximate change in the option's price, given a 1 basis point change in the underlying rate.

Gamma

A second derivative of the option's price with respect to the underlying, it is the approximate change in delta, given a 1 basis point change in the underlying rate.

Vega

The approximate change in the option's price, given a 1% change in volatility of the underlying.

Theta

The sensitivity of the option's price to the passage of time, measured in dollar amount per day.

Disclosure Appendix A1

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