

## European Rates Watch

## EUR Vol – Lower as policy shift approaches

**Vol lower as policy shift approaches**

The dominant driver for the vol dynamic has been expectations for a June ECB cut and the collapse of the near-term uncertainty. Vol moved lower led by the ULC (Exhibit 13), in line with the dynamic we have seen ytd. The term structure continues to trade steep consistent with relatively low near-term uncertainty (Exhibit 16). The upper left side trades fair to marginally cheap to the upper right (Exhibit 17), which is expected as cuts start to be delivered. Left side cheapening likely to extend out to intermediate expiries only when the market extrapolates near-term cuts into a proper easing trajectory.

**Metrics of RV**

Implies look cheap on our RV metrics (Exhibit 26), and trade broadly cheap to delivered (Exhibit 23). Receivers trade over payers on short and intermediate expiries on the left side, but under payers elsewhere (Exhibit 37). Both payer and receiver skew look rich when the directionality with ATM and forwards is considered (Exhibit 35 and Exhibit 36).

Conditional bull-steepeners and bear-flatteners (which usually position for curve moves driven by shifting ECB expectations – dovish or hawkish, respectively) continue to give-up to the forwards (Exhibit 41 and Exhibit 43) driven by the still rich intermediates vol on the left side (reflecting some market reluctance to extrapolate near-term cuts into a proper policy easing trajectory).

**Curve dynamic and policy expectations**

The curve dynamic is contingent on the three inputs that define the policy trajectory: (1) the timing of the first ECB cut, (2) the policy trough, and (3) the pace of convergence towards that terminal point. Recent ECB communication collapsed the uncertainty around first of these inputs (baseline = June cut). Current curve levels are consistent with cuts towards a terminal rate just over 2.25%, with market convergence towards neutral implying around 70bp of cuts in each of 2024 and 2025.

**Scenario analysis** –scenario analysis on the latter two factors suggests that: (1) an instantaneous steepening move of the spot curve (2s5s & 2s10s) requires the market to price in a higher terminal rate (>2.25%) and/or more rapid cuts (closer to a one per meeting vs one per quarter); and (2) the market implies steeper curves vs spot in 6m time (both 2s5s & 2s10s) but the steepening may be more limited if terminal reprices lower (we would need to also price in a more rapid convergence to neutral - e.g., one cut per meeting - for the curve to end up steeper than fws with lower terminal).

**Trade recommendations**

We continue to favor: (1) 5y1y ATM-25/-100bp receiver spread (currently -0.5bp – see [Later but lower](#) report from 8 Feb '24); (2) receive 2y1y €str (currently -10bp – see [Cloudy with a chance of landing](#) report from 19 Nov '23). The analysis above supports also costless 6m fwd 2s5s bull flatteners at flat entry levels vs forwards. The risk on the position a bull steepening dynamic for the curve (more cuts) with potentially unlimited downside.

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**Refer to important disclosures on page 13 to 15. Analyst Certification on page 12. 12697895**

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RV – Relative Value

ST – Short term

CB – Central Bank

ULC – Upper left corner

URC – Upper right corner

LLC – Lower left corner

LRC – Lower right corner

ATM – At the money

ITM – In the money

OTM – Out of the money

CB - Central Bank

OIS – Overnight Index Swap

PC – principal component

TLTRO - targeted longer-term refinancing operations

PF – pension funds

For a list of open trade recommendations and trade recommendations closed in the last 12 months please see our [Global Rates Weekly](#).

Levels for indication purposes only as of Friday May 17<sup>th</sup>.

## Curves depend on 3 inputs... we know one, test other 2

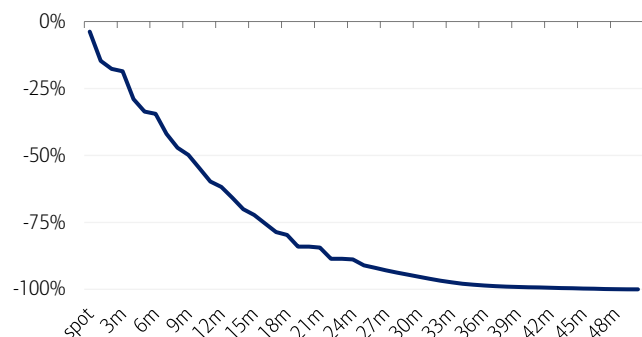
The three inputs that current determine the path for the 2s5s €str curve are: (1) the timing of the first ECB cut, (2) the end point of the cutting cycle, and (3) the pace of convergence towards that terminal point. With the ECB having all but guided towards a first rate cut in June, we run a scenario analysis on the other two factors to determine potential dynamics and ranges for the 2s5s and 2s10s curves, spot and 6m forward.

2y and 5y €str rates can be derived as the average of the 1m €str rate over the next 5y horizon, based on the derived ECB policy path. We then derive the 10y rate assuming a flat 5y5y-3y2y slope of 30bp.

**For pace of convergence towards terminal, we consider 3 scenarios.** Scenario (1) and (3) are simple: a regular pace of cuts, once per quarter and once per meeting respectively, starting in June. Scenario (2) however assumes a certain correlation between the terminal rate and the pace of cuts. We use the current market implied pace of convergence towards neutral as blueprint (Exhibit 1). The lower the terminal rate, the more cuts will be assumed for each of 2024 and 2025 (see Exhibit 2). Currently, the pace of convergence implies around the same number of cuts in 2025 as in the rest of 2024, i.e., a slowdown in cuts next year, rather than an acceleration.

### Exhibit 1: Current market implied convergence towards terminal

The market assumes that the ECB will reach terminal rate in just over 3y.

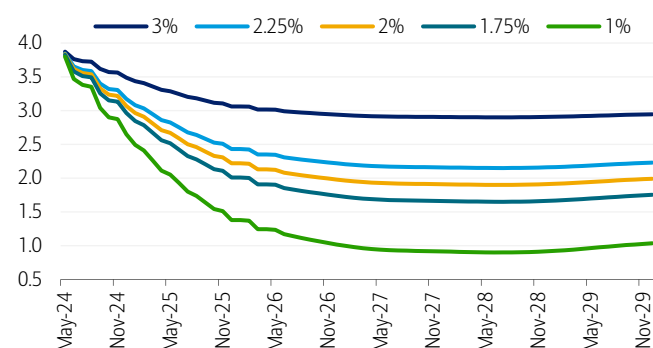


Source: BofA Global Research

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### Exhibit 2: Paths for €str with current speed of convergence to terminal

We derive the path for €str for the different terminal rate scenarios



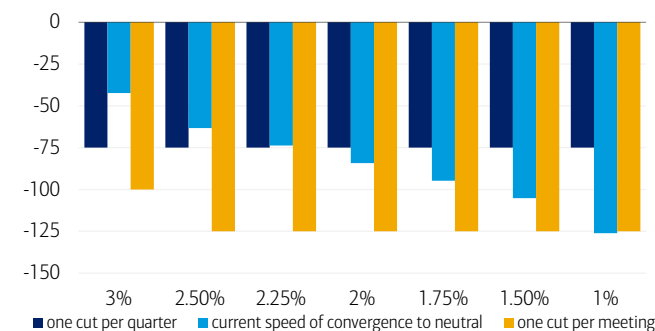
Source: BofA Global Research

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Current curve levels are consistent with cuts towards a terminal rate just over 2.25%, with market convergence towards neutral (scenario 2 on the speed) implying around 70bp of cuts in each of 2024 and 2025. Exhibit 3 and Exhibit 4 present the number of cuts implied in each scenario for 2024 and 2025 respectively.

### Exhibit 3: Number of cuts assumed for 2024 under different terminal rate scenarios and policy paths

Using the current speed of cuts implies more '24 cuts when terminal is low.

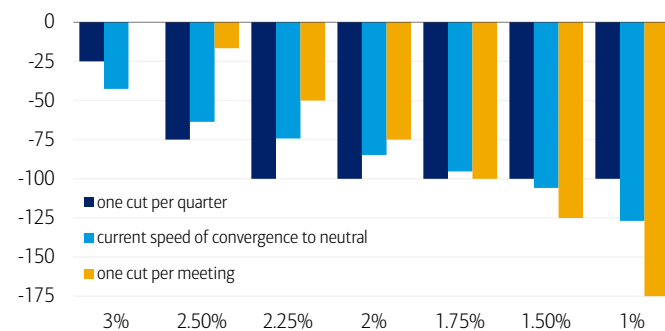


Source: BofA Global Research

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### Exhibit 4: Number of cuts assumed for 2025 under different terminal rate scenarios and policy paths

In several scenarios, cuts have to stop as terminal is reached in 2025



Source: BofA Global Research

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## Steepening beyond fwds necessitates higher terminal or much more rapid cuts

The results are presented in Exhibit 5 and Exhibit 6 for spot 2s5s and 2s10s curves, and in Exhibit 7 and Exhibit 8 for the curves around year-end (6m forward).

### Exhibit 5: Scenario analysis for spot 2s5s €str curve

For spot 2s5s to steepen immediately, from c.-42bp currently, we need to price in a higher terminal rate, or more rapid cuts (one per meeting)

Terminal ECB depo	3%	2.5%	2.25%	2%	1.75%	1.5%	1%
one cut <u>per quarter</u>	-14	-32	-44	-58	-72	-85	-108
Current speed of convergence to neutral	-25	-38	-44	-51	-57	-63	-76
one cut <u>per meeting</u>	-6	-15	-23	-28	-38	-44	-64

Source: BofA Global Research

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### Exhibit 6: Scenario analysis for spot 2s10s €str curve

For spot 2s10s to steepen without build-up of additional premia in 3y2y-5y5y, we need to price in a higher terminal rate, or more rapid pace of cuts.

Terminal ECB depo	3%	2.5%	2.25%	2%	1.75%	1.5%	1%
one cut <u>per quarter</u>	-3	-28	-43	-62	-81	-101	-137
Current speed of convergence to neutral	-20	-37	-46	-54	-63	-71	-89
one cut <u>per meeting</u>	6	-5	-16	-22	-36	-44	-70

Source: BofA Global Research

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### Exhibit 7: Scenario analysis for 6m fwd 2s5s €str curve

Market implies 2s5s will be steeper than spot in 6 months' time. But the steepening could be more limited if we reprice the terminal rate lower. We would need to also price in a more rapid convergence to neutral (e.g., one cut per meeting) for the curve to end up steeper than fwds with lower terminal.

Terminal ECB depo	3%	2.5%	2.25%	2%	1.75%	1.5%	1%
one cut <u>per quarter</u>	-3	-14	-22	-32	-44	-58	-85
Current speed of convergence to neutral	-15	-22	-26	-30	-33	-37	-45
one cut <u>per meeting</u>	0	-1	-4	-6	-12	-15	-28

Source: BofA Global Research

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### Exhibit 8: Scenario analysis for 6m fwd 2s10s €str curve

Market implies 2s10s will be steeper than spot in 6 months' time. But the steepening could be more limited if we reprice the terminal rate lower. We would need to also price in a more rapid convergence to neutral (e.g., one cut per meeting) for the curve to end up steeper than fwds with lower terminal

6m fwd 2s10s	3%	2.5%	2.25%	2%	1.75%	1.5%	1%
one cut <u>per quarter</u>	11	-3	-14	-28	-43	-62	-101
Current speed of convergence to neutral	-5	-15	-20	-25	-30	-35	-45
one cut <u>per meeting</u>	15	13	9	7	-1	-5	-22

Source: BofA Global Research

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## Levels and Recent Moves

Vol move lower over the last week led by the ULC (Exhibit 13), in line with the dynamic we have seen ytd. 3m Z-Scores show cheap vol virtually across the grid (Exhibit 10). The term structure continues to trade steep (Exhibit 16), and the upper left side fair to marginally cheap to the upper right (Exhibit 17).

### Current levels and recent history

#### Exhibit 9: ATM Normal Volatility Grid

82bp for 1y10y volatility

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	51	70	72	75	75	74	68
3M	55	72	73	77	76	76	70
6M	68	80	80	81	80	80	72
1Y	82	88	86	85	84	82	75
2Y	88	89	88	87	85	83	76
3Y	89	89	88	86	85	83	76
4Y	88	88	86	85	84	82	74
5Y	87	87	86	83	82	80	73
10Y	83	83	81	78	76	73	64
30Y	66	66	64	59	56	52	45

Source: BofA Global Research

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#### Exhibit 10: ATM Volatility Grid - 3m Z-Scores

Grid broadly cheap on 3m Z-Scores except on the ULC

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-0.6	-0.5	-0.5	-0.6	-0.7	-0.6	-0.8
3M	-1.3	-1.2	-1.2	-1.2	-1.3	-1.3	-1.3
6M	-1.3	-1.2	-1.3	-1.3	-1.5	-1.5	-1.8
1Y	-1.4	-1.2	-1.3	-1.5	-1.6	-1.7	-1.9
2Y	-1.4	-1.1	-1.2	-1.2	-1.4	-1.6	-1.8
3Y	-0.9	-0.9	-1.0	-1.1	-1.3	-1.6	-1.7
4Y	-0.9	-0.8	-0.9	-1.2	-1.4	-1.6	-1.5
5Y	-1.0	-0.9	-1.1	-1.4	-1.6	-1.8	-1.3
10Y	0.1	0.0	-0.2	-0.6	-0.8	-1.2	-0.1
30Y	1.0	1.1	0.9	0.6	0.5	0.2	0.9

Source: R BofA Global Research

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#### Exhibit 11: Changes in the EU vol grid year-to-date

Broad underperformance of EU vol led by the URC of the grid...

	1y	2y	3y	5y	7y	10y	30y
1m	-37	-38	-36	-32	-30	-28	-24
3m	-43	-36	-34	-30	-28	-26	-24
6m	-34	-27	-26	-23	-22	-21	-20
1y	-24	-20	-19	-17	-17	-16	-14
2y	-15	-12	-11	-11	-12	-12	-9
3y	-9	-8	-8	-8	-9	-9	-6
4y	-7	-6	-6	-7	-7	-8	-5
5y	-5	-5	-5	-5	-6	-6	-3
10y	-3	-3	-3	-2	-2	-2	0
15y	-1	-1	-1	0	-1	0	1
30y	0	0	0	0	0	1	1

Source: BofA Global Research

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#### Exhibit 12: Changes in the US vol grid year-to-date

... US vol underperformance more concentrated in left side and gamma

	1y	2y	3y	5y	7y	10y	30y
1m	-40	-32	-32	-29	-26	-24	-17
3m	-42	-31	-27	-24	-23	-23	-15
6m	-29	-19	-16	-14	-13	-12	-6
1y	-13	-11	-12	-8	-8	-8	-2
2y	-5	-6	-7	-6	-5	-5	1
3y	-4	-5	-5	-4	-3	-2	3
4y	-2	-3	-4	-2	-1	0	5
5y	-2	-2	-2	-1	0	1	6
10y	3	3	4	5	5	3	4
15y	4	5	5	6	6	4	5
30y	4	5	5	5	5	4	5

Source: BofA Global Research

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#### Exhibit 13: ATM Normal Volatility Grid - CoW

Vols underperforming further over the last week led by the ULC

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-2.0	-4.5	-3.3	-1.0	-1.7	-2.8	-3.1
3M	-7.6	-7.7	-6.5	-4.1	-4.2	-4.3	-4.5
6M	-5.1	-5.1	-4.8	-4.1	-4.2	-4.3	-4.2
1Y	-3.2	-3.8	-3.7	-3.3	-3.6	-4.1	-3.7
2Y	-3.9	-3.8	-3.3	-2.3	-2.5	-2.9	-2.6
3Y	-2.8	-2.4	-2.3	-2.0	-2.2	-2.5	-2.3
4Y	-2.4	-2.0	-2.0	-1.9	-2.1	-2.4	-2.3
5Y	-1.4	-1.5	-1.7	-2.1	-2.3	-2.7	-2.6
10Y	-0.2	-0.4	-0.5	-0.8	-1.1	-1.6	-1.0
30Y	0.4	0.5	0.3	0.0	-0.2	-0.4	0.0

Source: BofA Global Research

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#### Exhibit 14: ATM Straddle Premiums (indicative only)

5.5% straddle premiums for 1y10y

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.1%	0.3%	0.5%	0.8%	1.1%	1.4%	3.2%
3M	0.2%	0.5%	0.8%	1.4%	1.9%	2.6%	5.9%
6M	0.4%	0.9%	1.3%	2.1%	2.8%	3.9%	8.5%
1Y	0.6%	1.3%	1.9%	3.0%	4.1%	5.5%	12.2%
2Y	0.9%	1.8%	2.7%	4.3%	5.7%	7.7%	17.2%
3Y	1.1%	2.2%	3.2%	5.1%	6.8%	9.1%	20.5%
4Y	1.2%	2.4%	3.5%	5.6%	7.6%	10.2%	22.8%
5Y	1.3%	2.6%	3.8%	6.0%	8.1%	10.9%	24.4%
10Y	1.6%	3.1%	4.5%	6.9%	9.3%	12.3%	27.7%
30Y	1.4%	2.7%	3.9%	5.9%	7.7%	10.0%	23.0%

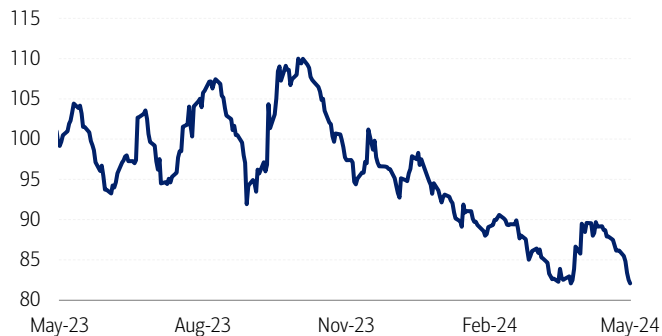
Source: BofA Global Research

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**Exhibit 15: 1y10y volatility**

Current level 82bp

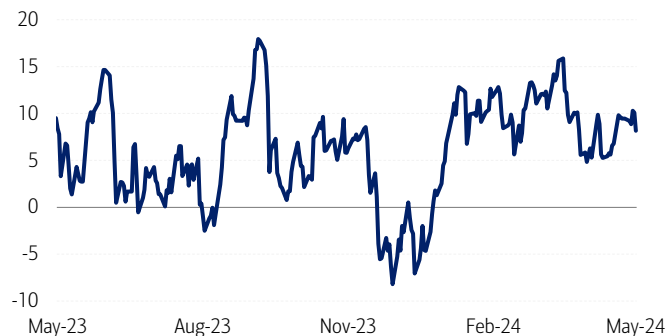


Source: BofA Global Research; Bloomberg

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**Exhibit 16: 1y10y vs. 1m10y Normal Volatility**

Vol term structure staying steep



Source: BofA Global Research; Bloomberg

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**Exhibit 17: 3m10y vs. 3m2y Normal Volatility**

Left side trading fair/marginally cheap vs right

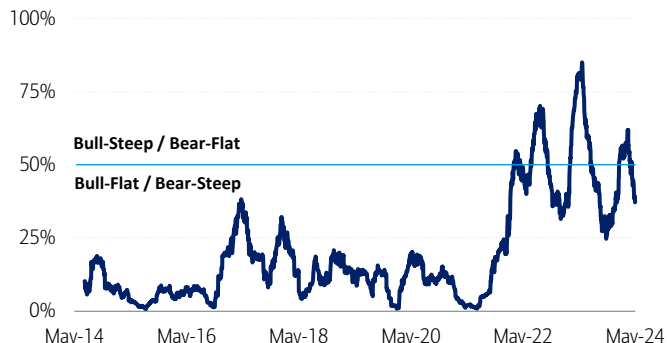


Source: BofA Global Research; Bloomberg

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**Exhibit 18: Frontend driving less of 2s10s curve directionality**

Front-end driving 37% of the 2s10s curve directionality over last 3m

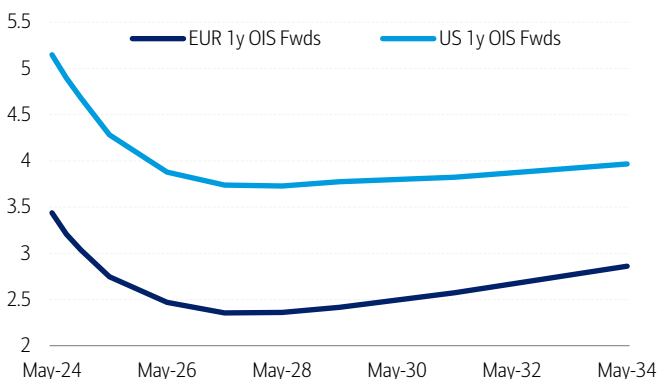


Source: BofA Global Research

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**Exhibit 19: Policy trajectory for the Fed and ECB**

Current pricing for the ECB vs Fed

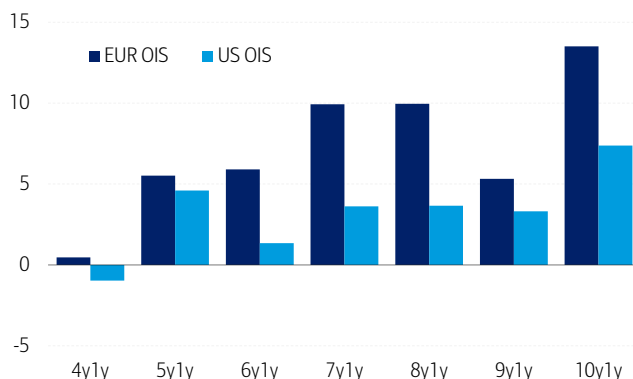


Source: BofA Global Research; Bloomberg

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**Exhibit 20: 1y roll for different forward received OIS positions**

Received position on EUR curve provide more significant rolldown



Source: BofA Global Research; Bloomberg

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## Ratios implied/delivered vol

Ratios of implied to delivered vol look broadly cheap for 21bd delivereds (Exhibit 23). For longer historical windows (63 business days) we see implieds cheap to delivereds on the right, fair on the left (Exhibit 24).

### Exhibit 21: Implied vs. Delivered (21d) Ratio

Ratios of Implied to 21d delivered broadly ~ 100% or lower

	1y	2y	3y	5y	7y	10y	30y
1m	110%	103%	97%	96%	95%	94%	99%
3m	93%	96%	93%	94%	95%	95%	100%
6m	90%	96%	96%	96%	97%	98%	103%
1y	91%	98%	99%	98%	99%	101%	107%
2y	100%	102%	98%	101%	101%	103%	110%

Source: BofA Global Research

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### Exhibit 22: Implied vs. Delivered (63d) Ratio

Ratios of Implied to 63d delivered broadly ~ 100% or lower

	1y	2y	3y	5y	7y	10y	30y
1m	117%	109%	102%	100%	98%	96%	96%
3m	93%	98%	96%	97%	97%	96%	98%
6m	93%	99%	99%	99%	100%	99%	101%
1y	95%	102%	102%	101%	101%	100%	104%
2y	102%	104%	101%	102%	101%	102%	106%

Source: BofA Global Research

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### Exhibit 23: 3m Z-Scores for Implied vs. Delivered (21d) Ratio

Ratios of implied/21d delivered cheap

	1y	2y	3y	5y	7y	10y	30y
1m	-1.1	-0.9	-0.9	-0.8	-0.8	-0.7	-0.7
3m	-1.1	-1.1	-1.1	-0.9	-0.8	-0.7	-0.7
6m	-1.0	-1.0	-0.9	-0.8	-0.8	-0.7	-0.7
1y	-1.0	-0.8	-0.8	-0.7	-0.7	-0.6	-0.6
2y	-0.7	-0.6	-0.6	-0.5	-0.5	-0.5	-0.4

Source: BofA Global Research

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### Exhibit 24: 3m Z-Scores for Implied vs. Delivered (63d) Ratio

Ratios of implied/63d delivered look cheap on the right, fair on the left

	1y	2y	3y	5y	7y	10y	30y
1m	0.9	0.6	0.3	-0.1	-0.9	-1.9	-2.2
3m	0.1	-0.2	-0.5	-0.9	-1.9	-2.8	-2.6
6m	0.4	0.1	-0.3	-1.1	-2.1	-2.6	-2.6
1y	-0.1	-0.2	-0.6	-1.8	-2.3	-2.5	-2.5
2y	-1.2	-0.9	-1.4	-1.8	-2.0	-2.1	-2.1

Source: BofA Global Research

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# Volatility Grid Relative Value

Vols looks cheap on Z-Scores broadly across the grid when the directionality of vols with forwards is taken into account in a PCA framework (with the right side cheaper than the left for shorter historical windows – Exhibit 26 – vs longer – Exhibit 30).

## PCA Z-SCORES

### Exhibit 25: 3m Z-Scores w/ PCA framework

Belly fair/rich vs wings

	1y	2y	3y	5y	7y	10y	30y
3m	-1.8	-0.2	0.9	1.7	1.8	0.8	-1.1
6m	-1.4	0.4	0.7	1.6	1.2	-0.3	-2.6
1y	-1.2	0.2	0.0	-0.9	-1.5	-1.8	-2.7
2y	0.3	1.3	1.6	2.1	1.0	-1.1	-2.1
5y	1.6	1.4	1.1	0.1	-0.5	-1.3	-0.8
10y	2.8	2.5	2.4	2.1	1.5	0.4	1.9

Source: BofA Global Research

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### Exhibit 26: 3m Z-Scores w/ PCA framework w/o rates directionality

Cheapness across the grid when directionality to fwds considered

	1y	2y	3y	5y	7y	10y	30y
3m	-0.9	-0.9	-0.9	-1.0	-1.4	-2.3	-2.9
6m	-0.9	-0.9	-1.0	-1.2	-1.6	-2.4	-3.4
1y	-1.1	-1.0	-1.2	-1.6	-1.9	-2.4	-3.2
2y	-1.2	-1.0	-1.1	-1.3	-1.7	-2.2	-3.0
5y	-0.9	-1.0	-1.2	-1.7	-2.0	-2.3	-2.9
10y	-0.3	-0.4	-0.6	-1.0	-1.4	-1.9	-0.9

Source: BofA Global Research

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### Exhibit 27: 6m Z-Scores w/ PCA framework

Short gamma slightly rich, but rest of grid fair/cheap

	1y	2y	3y	5y	7y	10y	30y
3m	-1.8	-0.4	0.7	1.0	0.8	0.3	-0.2
6m	-1.0	0.4	1.0	1.6	1.2	0.2	-1.4
1y	-0.8	0.6	0.4	-0.4	-1.8	-2.0	-3.2
2y	-0.4	0.2	0.2	0.1	-0.5	-1.2	-2.3
5y	0.3	0.3	0.1	-0.3	-0.6	-1.2	-1.1
10y	1.2	1.2	0.9	0.4	0.0	-0.6	0.2

Source: BofA Global Research

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### Exhibit 28: 6m Z-Scores w/ PCA framework w/o rates directionality

Cheapness across the grid when directionality to fwds considered

	1y	2y	3y	5y	7y	10y	30y
3m	-1.3	-1.1	-1.1	-0.9	-0.9	-0.9	-0.9
6m	-1.4	-1.1	-1.0	-0.9	-1.0	-1.0	-1.3
1y	-1.4	-1.0	-1.1	-1.3	-1.4	-1.5	-1.8
2y	-1.3	-1.0	-1.0	-1.1	-1.2	-1.4	-1.8
5y	-0.7	-0.6	-0.7	-1.0	-1.2	-1.5	-1.2
10y	0.1	0.0	-0.1	-0.3	-0.5	-0.8	0.0

Source: BofA Global Research

BofA GLOBAL RESEARCH

### Exhibit 29: 1y Z-Scores w/ PCA framework

Short gamma slightly rich (mainly 7-10y tails), but rest of grid fair/cheap

	1y	2y	3y	5y	7y	10y	30y
3m	-1.3	0.1	0.6	0.5	1.4	1.6	0.4
6m	-0.4	0.8	0.8	0.3	1.9	0.8	-1.0
1y	-0.1	0.5	0.4	-1.9	-1.3	-1.0	-1.9
2y	-0.6	-0.2	-0.2	-0.7	-1.1	-1.2	-1.5
5y	-0.1	0.1	-0.1	-0.9	-1.2	-1.6	-1.2
10y	0.2	0.1	0.0	-0.3	-0.6	-1.0	-0.6

Source: BofA Global Research

BofA GLOBAL RESEARCH

### Exhibit 30: 1y Z-Scores w/ PCA framework w/o rates directionality

Cheapness across the grid when directionality to fwds considered

	1y	2y	3y	5y	7y	10y	30y
3m	-2.4	-2.2	-2.1	-2.0	-1.9	-1.6	-1.5
6m	-2.4	-2.1	-2.1	-2.0	-2.0	-1.8	-1.8
1y	-2.3	-2.0	-2.1	-2.2	-2.3	-2.3	-2.2
2y	-2.2	-2.1	-2.1	-2.2	-2.3	-2.4	-2.3
5y	-2.1	-2.0	-2.1	-2.4	-2.5	-2.7	-1.5
10y	-1.0	-1.0	-1.1	-1.1	-1.1	-1.0	0.2

Source: BofA Global Research

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# Skew Relative Value

Receivers trade over payers on short and intermediate expiries on the left side, but under payers elsewhere (Exhibit 37). Both payers and receivers skew look rich when the directionality with ATM and forwards is considered (Exhibit 35 and Exhibit 36). Z-Scores show broadly fair/cheap payers vs receivers (Exhibit 38).

## Exhibit 31: Skew 25% delta

Rich receiver skew on the left side of the grid

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	1.7	2.0	1.5	0.5	0.2	-0.3	-0.1
3M	3.3	3.8	3.0	1.4	0.9	0.0	0.3
6M	4.0	4.1	3.2	1.4	0.8	0.0	0.5
1Y	4.6	4.2	3.3	1.5	1.0	0.3	1.1
2Y	-0.2	-0.4	-0.3	-0.1	-0.1	-0.2	0.9
5Y	-2.9	-2.9	-2.6	-2.0	-1.4	-0.4	0.5
10Y	-3.2	-3.2	-2.8	-2.1	-1.5	-0.7	0.5
30Y	-3.2	-3.3	-2.3	-0.6	0.1	0.8	0.5

Source: BoFA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 32: Skew 75% delta

Payer skew marginally rich on the right

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-1.1	-1.2	-0.7	0.4	0.8	1.3	1.1
3M	-1.5	-1.4	-0.5	1.3	2.0	2.9	2.4
6M	-1.4	-0.9	0.1	2.0	2.6	3.4	2.8
1Y	-0.1	0.7	1.5	3.0	3.5	4.2	3.3
2Y	4.5	4.8	4.6	4.4	4.7	5.2	4.1
5Y	8.2	8.1	7.8	7.1	6.8	6.4	4.9
10Y	8.4	8.3	7.8	6.9	6.5	5.8	4.4
30Y	8.5	8.5	7.3	5.2	4.8	4.3	3.1

Source: BoFA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 33: Breakeven Widths for Costless Receiver Ladders

83bp breakeven width for 1y10y receiver ladders

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	15	21	21	22	22	21	20
3M	32	41	41	41	40	39	36
6M	55	64	63	61	60	58	53
1Y	92	97	94	89	87	83	77
2Y	126	127	126	124	122	119	112
5Y	186	186	184	181	180	180	166
10Y	248	248	244	237	234	229	209

Source: BoFA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 34: Breakeven Widths for Costless Payer Ladders

92bp breakeven width for 1y10y payer ladders

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	14	20	20	22	22	22	20
3M	27	36	37	41	41	42	38
6M	48	57	59	62	62	63	57
1Y	83	90	90	92	92	92	82
2Y	139	142	140	137	136	135	121
5Y	238	238	233	223	219	213	187
10Y	326	325	315	297	287	272	236

Source: BoFA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 35: 3m Z-Score Receiver Skew (w/o fwds & ATM direction)

Receivers broadly fair/rich across the grid

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.0	0.2	0.0	0.1	-0.5	-0.1	-0.6
3M	0.9	1.9	1.6	0.8	0.8	1.5	1.6
6M	0.7	1.3	1.4	1.9	1.4	1.3	1.6
1Y	0.3	-0.1	0.0	0.6	0.0	-0.6	1.0
2Y	1.3	1.6	1.6	1.3	1.3	1.3	1.0
5Y	-0.6	-0.8	-0.5	0.3	0.7	0.9	0.1
10Y	-0.2	-0.1	0.1	0.6	0.9	1.2	0.6

Source: BoFA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 36: 3m Z-Score Payer Skew (w/o direction w/ fwds & ATM)

Payers broadly rich also when directionality with ATM & fwds considered

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.3	0.1	0.1	0.3	-0.1	-0.3	-0.2
3M	1.4	1.5	1.3	1.5	1.5	1.7	1.9
6M	0.9	1.6	1.7	1.5	1.8	2.0	1.4
1Y	0.6	0.1	0.0	-0.9	0.0	0.4	-1.1
2Y	1.3	1.6	1.8	1.5	1.7	1.4	1.0
5Y	2.2	2.3	2.3	2.3	2.2	2.0	2.0
10Y	-0.2	-0.1	0.1	0.6	0.9	1.2	0.6

Source: BoFA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 37: Ratio of Payer/Receiver BE widths for Costless Ladders

Ratios of breakeven widths < 100% only in the ULC

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	92%	93%	95%	100%	102%	105%	104%
3M	85%	88%	91%	100%	103%	108%	107%
6M	87%	89%	93%	102%	104%	109%	107%
1Y	90%	93%	96%	103%	106%	110%	107%
2Y	111%	111%	111%	110%	111%	113%	108%
5Y	128%	128%	126%	124%	122%	118%	113%
10Y	131%	131%	129%	125%	123%	119%	113%

Source: BoFA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 38: 3m Z-Score Ratio of Payer/Receiver Skew

Z-Scores show broadly fair/cheap payers vs receivers

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.3	0.4	-0.1	0.2	0.3	0.8	0.5
3M	-0.8	0.6	-0.9	0.0	-0.1	1.3	0.3
6M	0.7	-1.6	-1.0	-0.1	-1.2	-1.4	-3.6
1Y	-0.5	-1.0	-1.1	-0.6	-1.4	-0.6	-1.7
2Y	-1.7	-1.4	-1.8	0.1	-0.6	-1.5	-2.8
5Y	1.3	1.3	1.2	1.0	0.9	0.8	0.6
10Y	-0.1	-0.2	-0.4	-0.8	-1.3	-2.3	-1.1

Source: BoFA Global Research

BoFA GLOBAL RESEARCH





# Conditional Curve Trades

Rich intermediate vol on the left side vs right drives give-ups to forwards on costless conditional bull-steepeners and bear-flatteners (which usually position for curve moves driven by shifting ECB expectations – dovish or hawkish, respectively), and pick-ups in bull-flatteners and bear steepeners.

## Exhibit 39: Bull Flattener (pickup to forwards for ATM)

Buy longer maturity receiver, sell shorter maturity receiver

ATM	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	-2.1	-1.7	0.9	0.3	2.6	2.4
6M	-0.9	0.1	4.0	0.9	4.8	4.0
1Y	2.2	4.4	9.7	2.2	7.5	5.6
1.5Y	2.4	5.6	12.0	3.2	9.7	6.5
2Y	2.8	6.3	13.6	3.6	11.0	7.5

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 41: Bull Steepener (pickup to forwards for ATM)

Sell longer maturity receiver, buy shorter maturity receiver

ATM	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	2.1	1.7	-0.9	-0.3	-2.6	-2.4
6M	0.9	-0.1	-4.0	-0.9	-4.8	-4.0
1Y	-2.2	-4.4	-9.7	-2.2	-7.5	-5.6
1.5Y	-2.4	-5.6	-12.0	-3.2	-9.7	-6.5
2Y	-2.8	-6.3	-13.6	-3.6	-11.0	-7.5

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 43: Bear Flattener (pickup to forwards for ATM)

Sell longer maturity payer, buy shorter maturity payer

ATM	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	2.1	1.9	-0.9	-0.3	-2.8	-2.4
6M	0.9	-0.1	-4.0	-0.9	-5.0	-4.0
1Y	-2.2	-4.6	-10.1	-2.2	-7.9	-5.8
1.5Y	-2.4	-6.0	-12.4	-3.4	-10.1	-6.9
2Y	-3.0	-6.7	-14.2	-4.0	-11.4	-7.9

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 45: Bear Steepener (pickup to forwards for ATM)

Buy longer maturity payer, sell shorter maturity payer

ATM	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	-2.1	-1.9	0.9	0.3	2.8	2.4
6M	-0.9	0.1	4.0	0.9	5.0	4.0
1Y	2.2	4.6	10.1	2.2	7.9	5.8
1.5Y	2.4	6.0	12.4	3.4	10.1	6.9
2Y	3.0	6.7	14.2	4.0	11.4	7.9

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 40: Bull Flattener (pickup to forwards for -25bp OTM)

Buy longer maturity receiver, sell shorter maturity receiver

-25bp	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	-1.7	-0.1	3.6	1.3	5.0	3.8
6M	0.3	2.2	7.5	2.1	7.3	5.4
1Y	4.0	7.1	13.6	3.4	10.1	6.9
1.5Y	3.4	7.5	14.9	4.4	12.0	7.9
2Y	3.2	7.5	15.9	4.6	13.0	8.7

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 42: Bull Steepener (pickup to forwards for -25bp OTM)

Sell longer maturity receiver, buy shorter maturity receiver

-25bp	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	1.7	0.1	-3.6	-1.3	-5.0	-3.8
6M	-0.3	-2.2	-7.5	-2.1	-7.3	-5.4
1Y	-4.0	-7.1	-13.6	-3.4	-10.1	-6.9
1.5Y	-3.4	-7.5	-14.9	-4.4	-12.0	-7.9
2Y	-3.2	-7.5	-15.9	-4.6	-13.0	-8.7

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 44: Bear Flattener (pickup to forwards for +25bp OTM)

Sell longer maturity payer, buy shorter maturity payer

+25bp	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	5.6	6.3	1.7	0.7	-3.8	-4.4
6M	2.8	2.4	-3.8	-0.5	-6.5	-6.2
1Y	-1.9	-4.2	-11.6	-2.4	-10.1	-7.7
1.5Y	-2.6	-6.3	-14.9	-3.8	-12.6	-9.1
2Y	-3.6	-7.9	-17.3	-4.4	-14.0	-9.9

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 46: Bear Steepener (pickup to forwards for +25bp OTM)

Buy longer maturity payer, sell shorter maturity payer

+25bp	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	-5.6	-6.3	-1.7	-0.7	3.8	4.4
6M	-2.8	-2.4	3.8	0.5	6.5	6.2
1Y	1.9	4.2	11.6	2.4	10.1	7.7
1.5Y	2.6	6.3	14.9	3.8	12.6	9.1
2Y	3.6	7.9	17.3	4.4	14.0	9.9

Source: BofA Global Research

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# Forward Volatility

6m and 1y forward vols trade rich to ATM vol in gamma, cheap elsewhere (Exhibit 48 and Exhibit 49), Fwd vols >1y trade broadly cheap across the grid. On Z-Scores, however, richness broad base across forward vols (Exhibit 49 and Exhibit 50).

## Exhibit 47: 6m Forward Volatility

82.4bp for 6m fwd 1y10y

	1y	2y	5y	10y	30y
1m	70.6	84.9	82.6	81.9	75.4
3m	74.1	87.4	83.5	82.0	75.1
6m	74.9	86.4	84.8	82.1	75.6
1y	77.2	87.6	86.2	82.4	75.9
2y	90.5	90.3	86.2	82.5	75.6
5y	86.6	86.2	81.5	78.2	70.8
10y	80.8	80.6	75.4	70.8	62.8

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 48: 6m Fwd vol as % ATM

100% of ATM for 6m fwd 1y10y

	1y	2y	5y	10y	30y
1m	140%	121%	109%	111%	111%
3m	135%	122%	109%	108%	108%
6m	111%	109%	104%	103%	105%
1y	94%	100%	101%	100%	102%
2y	103%	101%	99%	99%	99%
5y	99%	99%	98%	97%	97%
10y	97%	97%	97%	97%	97%

Source: BofA Global Research

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## Exhibit 49: 3m Z-Score 6m Fwd vol % ATM

-0.3 Z-Score for 6m fwd 1y10y

	1y	2y	5y	10y	30y
1m	0.1	0.3	-0.5	-0.7	-0.4
3m	1.4	1.7	0.4	-0.5	-0.2
6m	0.9	1.1	0.2	-0.7	0.2
1y	-0.3	0.2	0.6	-0.3	0.5
2y	2.0	1.4	1.1	0.3	1.0
5y	1.2	2.1	1.3	0.5	1.4
10y	0.3	0.4	0.6	0.8	1.2

Source: BofA Global Research

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## Exhibit 50: 1y Forward Volatility

81.8bp for 1y fwd 1y10y

	1y	2y	5y	10y	30y
1m	56.4	74.0	82.5	80.3	75.4
3m	75.3	82.8	85.1	81.2	75.5
6m	73.9	84.3	85.5	81.5	75.6
1y	69.6	85.1	85.1	81.8	76.0
2y	89.7	89.4	85.3	81.9	75.1
5y	85.5	85.3	80.5	77.0	69.4
10y	80.1	79.9	74.6	69.9	61.5

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 51: 1y Fwd vol as % ATM

100% of ATM for 1y fwd 1y10y

	1y	2y	5y	10y	30y
1m	112%	106%	109%	109%	111%
3m	137%	116%	111%	107%	108%
6m	109%	106%	105%	102%	105%
1y	85%	97%	100%	100%	102%
2y	102%	100%	98%	98%	98%
5y	98%	98%	97%	96%	96%
10y	96%	97%	96%	96%	95%

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 52: 3m Z-Score 1y Fwd vol % ATM

0.7 Z-Score for 1y fwd 1y10y

	1y	2y	5y	10y	30y
1m	-0.5	-0.4	-0.3	-0.6	-0.4
3m	1.4	0.9	0.8	-0.1	0.0
6m	0.8	0.6	0.9	-0.1	0.8
1y	-0.7	0.6	2.0	0.7	1.8
2y	2.2	1.6	2.1	1.7	2.0
5y	0.9	1.6	2.3	1.6	2.1
10y	0.3	0.8	1.8	2.3	2.5

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 53: 2y Forward Volatility

80.0bp for 2y fwd 1y10y

	1y	2y	5y	10y	30y
1m	56.7	72.3	76.8	77.4	71.7
3m	83.9	84.4	81.2	79.5	72.4
6m	78.0	83.6	81.6	79.8	72.5
1y	59.5	78.9	80.8	80.0	73.0
2y	85.6	87.4	82.9	80.5	72.2
5y	84.3	84.5	79.3	75.4	66.3
10y	79.5	79.5	73.6	68.1	58.9

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 54: 2y Fwd vol as % ATM

97% of ATM for 2y fwd 1y10y

	1y	2y	5y	10y	30y
1m	112%	103%	102%	105%	105%
3m	153%	118%	106%	105%	104%
6m	115%	105%	101%	100%	100%
1y	72%	90%	95%	97%	98%
2y	97%	98%	96%	97%	95%
5y	97%	97%	95%	94%	91%
10y	96%	96%	95%	94%	91%

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 55: 3m Z-Score 2y Fwd vol % ATM

1.3 Z-Score for 2y fwd 1y10y

	1y	2y	5y	10y	30y
1m	-0.8	-0.6	-0.7	-0.8	-0.2
3m	1.2	0.9	0.6	0.0	0.6
6m	0.4	0.6	0.7	0.1	1.4
1y	0.0	0.6	1.4	1.3	1.9
2y	1.7	2.1	1.7	1.9	2.1
5y	0.7	1.7	2.7	2.2	2.4
10y	2.6	0.4	1.2	2.3	2.8

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 56: 3y Forward Volatility

78.8bp for 3y fwd 1y10y

	1y	2y	5y	10y	30y
1m	43.6	67.1	73.4	74.5	68.3
3m	83.2	85.2	80.9	78.6	70.0
6m	79.3	86.4	81.5	79.1	70.3
1y	61.3	81.0	79.6	78.8	70.6
2y	86.8	87.7	80.9	78.1	68.7
5y	83.3	83.5	78.0	73.5	63.5
10y	78.7	78.7	72.4	66.3	56.3

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 57: 3y Fwd vol as % ATM

96% of ATM for 3y fwd 1y10y

	1y	2y	5y	10y	30y
1m	86%	96%	97%	101%	100%
3m	152%	119%	106%	104%	101%
6m	117%	109%	100%	100%	97%
1y	74%	92%	94%	96%	94%
2y	99%	98%	93%	94%	90%
5y	96%	96%	94%	92%	87%
10y	95%	95%	93%	91%	87%

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 58: 3m Z-Score 3y Fwd vol % ATM

1.5 Z-Score for 3y fwd 1y10y

	1y	2y	5y	10y	30y
1m	-0.6	-0.2	-0.4	-0.7	0.1
3m	1.3	1.3	1.0	0.5	1.4
6m	0.9	1.2	1.2	0.7	2.1
1y	0.3	1.3	1.6	1.5	2.1
2y	1.4	1.8	1.4	1.5	1.9
5y	0.5	1.5	3.1	2.4	2.7
10y	2.5	2.5	2.5	2.7	2.8

Source: BofA Global Research

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## Notes

**Exhibit 18:** We classify the moves on the 2s10s or 5s30s curve every day in either one of these: bear flattening & bull steepening (where the 2y or 5y leg leads) or bear steepening & bull flattening (where the 10y or 30y leg leads). We sum each one of those columns over the last 2 or 3 months and divide by the absolute value of the curve moves to get a % index for each of the 4 different curve dynamics. We sum up the bear flattening + bull steepening indices into a new index - when this index = 0 the entire dynamic of the 2s10s or 5s30s curve is driven by the longer leg (10y or 30y leg respectively - corresponds to periods of forward guidance for example).

**Exhibit 25/27/29:** We calculate the principal components of the vol grid (the Eigen vectors of the covariance matrix) and take only the first 2/3 that represent around 90% of the variance in the data. We transpose the PCA transformation to recover vols from only these 2/3 components and obtain models for the vols. We calculate the residual of these models to the original series, and the Z-Score of these residuals.

**Exhibit 26/28/30:** Instead of taking the first 2/3 principal components of the vol grid and apply the transpose of the PCA transformation to them, we first regress each of these vol PCs on the PCs of rates and apply the transpose of the vol PCA transformation to these models for the vol PCs. This way we remove the directionality between vol and rates from the vol dynamic, and obtain a purer Z-Score RV signal on vol.

**Exhibit 33/34:** In a payer/receiver ladder one buys the ATM strike and then you sell ATM+/-x and ATM+/-2x. The position starts losing money when the forwards move past ATM+/-3x, which we call the downside breakeven on the payer/receiver ladder.

We calculate the x (gap between strikes) daily such that the premium one must pay for the payer/receiver ladder is zero (any vol structure that has unlimited downside can always be structured to be costless). These breakeven widths are therefore costless downside breakeven widths. When payer/receiver skew richens, this width increases - one needs to sell higher strikes ATM+/- (x+delta) and ATM+/-2(x+delta) to pay for the ATM strike bought. By looking at how these costless downside breakeven widths change over time one can measure how payer/receiver skew has richen/cheapen over time.

**Exhibit 35/36:** Skew is directional with forwards and with the level of vol. We regress the costless downside breakeven widths (for receivers and payers) on the forwards and ATM vol and look at the residuals of that regression to get a purer skew RV signal.

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