

# US Rates Watch

## US Vol – Steady as rates consolidate

### Recent dynamic of rates and volatility

The recent dynamic of rates (25bp retracement since late-Dec of the 120bp rally in 10yT yields seen between mid-Oct and end-Dec) and volatility (relatively steady in the recent selloff) suggest a market biased towards near-term consolidation around fundamental fair value levels (which we see c.4-4.1% for 10yT yields).

### Other arguments for consolidation

Other arguments for consolidation range from: (1) relatively low conviction levels which cap the potential for significant excursions away from fundamental fair values; (2) likely relatively anchored policy expectations near term at c100-125bp worth of insurance cuts over the next year and a horizon for the first cut c.3m; (3) potential overdone slowdown expectations expressed in the recent dynamic of breakevens; and (4) the dynamic of cross-market correlations under expectations for the outlook relatively bounded between soft landing and steady resilience scenarios.

### Soft landing priced in yields almost to perfection

Current yield levels seem to reflect baseline expectations of soft landing, with 10yT trading in the 4-4.25% range consistent with these scenarios, and 3y1y OIS forwards around neutral rate expectations c.3%. Volatility is likely to continue to trade relatively steady in this context, with 1y10y vol expected c.100-115bp in 1H24 under a baseline soft landing view.

### A range of potential outcomes

The easy part of the rally is done now that yields have recoupled to fundamentals, and we favor a relatively neutral stance on duration, trading the range with a bullish bias (i.e., buying on dips). Our baseline view for '24 is soft landing, and we see that priced almost to perfection currently by the market. However, medium-term there continues to be a wide range of outcomes around this baseline that we believe should be hedged.

We favor discretized range of outcomes for the outlook: hard landing scenarios favor 2s10s cap spreads and 5s30s steepeners (belly outperformance); soft landing favors receiver spreads in the belly and short left side vs right side vol; scenarios of steady resilience favor costless payer ladders in the belly and 5s30s steepeners (back-end underperformance); and reacceleration scenarios favor out of the money payer spreads in 1-2y tails.

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ULC – Upper left corner

URC – Upper right corner

LLC – Lower left corner

LRC – Lower right corner

ITM – In the money

OTM – Out of the money

GFC – Great Financial crisis

c. – circa (approximately)

CDF – Cumulative Distribution Function

PDF – Probability Density Function

BE – Inflation Breakevens

For a list of open and closed trades over the last 12 months, please see our latest [Global Rates Weekly report](#).

All levels as of January 5<sup>th</sup>.

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## Recent dynamic of rates and volatility

10yT yields rallied c.120bp from mid-October to end-December, with the 2s10c curve bull flattening by c.30bp over that period. The volatility grid moved broadly directionally with the rates dynamic in the rally (see Exhibit 1 and Exhibit 11) suggesting a process of normalization of rates levels (a recoupling of yield levels back to fundamentals as we argued in [Nibble at 5%](#)) rather than a risk-off dynamic.

By early-December the market had exhausted the easy part of the rally (as we argued in [Easy rally likely done](#)) as yields recoupled to fundamental (see [Monthly rates models](#)). The bullish dynamic overshoot fundamental slightly over December (by c.25bp in 10yT) but yields retraced that overshoot back to fundamentals since end-December as the macro backdrop remained relatively anchored. Vols stayed relatively steady in the recent selloff (see Exhibit 2), reflecting a market biased towards near-term consolidation.

### Exhibit 1: Moves on the vol grid over the Oct-Dec rates rally

Vol cheapened broadly as 10yT rallied 120bp and the 2s10s curve flattened 30bp (between mid-October and end-December) ...

	1y	2y	3y	5y	7y	10y	30y
1m	23	7	-1	-14	-22	-28	-43
3m	17	7	0	-10	-16	-21	-33
6m	4	-5	-11	-16	-19	-22	-32
1y	-12	-17	-18	-24	-24	-24	-30
2y	-23	-24	-23	-25	-24	-24	-25
3y	-25	-25	-23	-24	-24	-23	-23
4y	-22	-23	-23	-24	-23	-22	-22
5y	-21	-21	-21	-22	-21	-20	-20
10y	-14	-14	-15	-16	-16	-14	-15
30y	-9	-9	-9	-10	-11	-9	-9

Source: BofA Global Research

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### Exhibit 2: Moves on the vol grid over the recent 25bp 10yT selloff

But reacting slowly to the recent 25bp selloff in 10yT and c.10bp steepening of the curve (since end-December)

	1y	2y	3y	5y	7y	10y	30y
1m	-6	0	2	3	4	5	5
3m	-12	-9	-7	-5	-3	-2	1
6m	-6	-4	-3	-2	0	1	2
1y	-2	-2	-1	0	1	2	3
2y	-1	0	0	1	2	3	3
3y	-1	-1	0	2	2	3	3
4y	1	1	1	2	2	3	3
5y	1	2	2	3	3	3	3
10y	2	2	2	3	3	2	2
30y	2	2	2	2	2	2	2

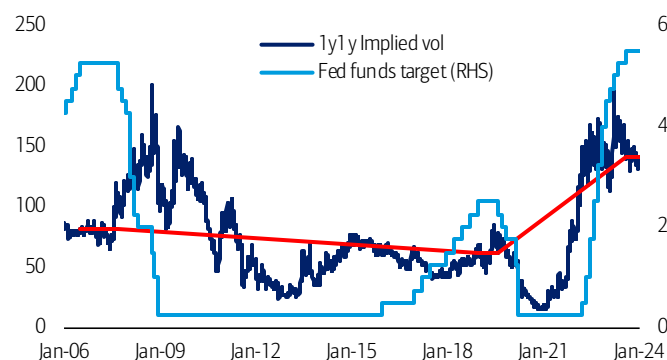
Source: BofA Global Research

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Currently, 10yT yields trade fair to fundamental fair value (c.4-4.1%) and 1y10y vol seems fair vs our expectations for 1H24 (we see fair values c.100-115bp – see [Global Rates Vol in '24](#)). Gamma trades slightly rich vs. intermediates (see Exhibit 13 – we recommend fading inversion of more than 10bp for the 1m10y vs 1y10y vol spread), and the left side continues to trade rich to the left side. While some richness of the left side vs the right side of the grid can be attributed to policy uncertainty and the potential repricing of neutral rate expectations higher in the post-covid period, we continue to think the recent richness looks excessive and favor shorting left side vs the right side vol (see Exhibit 3).

### Exhibit 3: Implied 1y1y vol (currently c.135bp) vs Fed funds

Implied vol levels at the left side of the grid (tied to uncertainty around Fed policy) have sustained relatively high levels vs sub-100bp over recent periods with a Fed on-hold at the peak of tightening (in '06-07 and '18-19 – red)

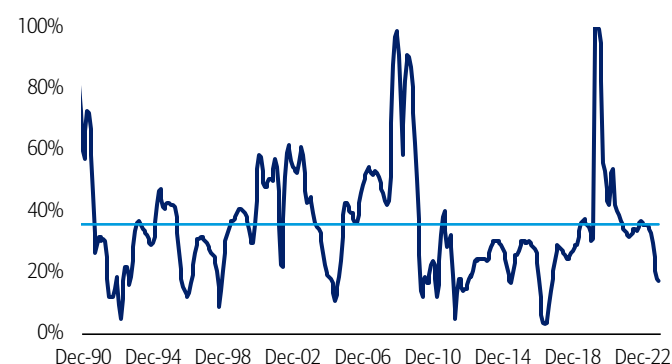


Source: BofA Global Research, Bloomberg

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### Exhibit 4: Level of conviction around the outlook likely still around the lower levels since late '16/'17.

Low conviction likely to support market consolidation around fundamentals fair value levels



Source: BofA Global Research

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## Arguments for consolidation

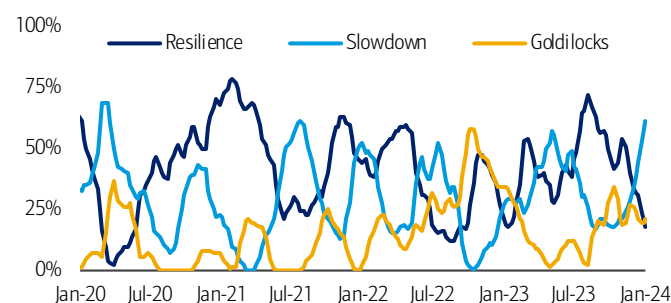
Conviction around the outlook continues to be low (Exhibit 4) with fundamentals relatively anchored, and these should cap the potential for material excursions from fair values near-term (see [10yT – expectations for near term dynamic](#)). We favor a relatively neutral duration stance and trading the range with a bullish bias (buying on dips, particularly beyond 4.25-4.5% for 10yT, seems attractive in our view).

Significantly in this context, the frequency of slowdown moves in the dynamic of breakevens (bull tightening of breakevens = lower yields and tighter breakevens) over the last couple of months seems to be reaching peak levels (see Exhibit 5). Normally over the cycle bull tightening + bear widening frequencies account for 75-80% of the dynamic of breakevens. Periods where one of the dynamics reaches these sorts of peak frequencies can be seen as a slightly contrarian indicator (i.e., currently suggesting some scope to fade rich territory vs fundamentals near-term).

From a policy perspective also, we see market expectations likely relatively anchored around 100-125bp of cuts for '24 near-term, with the timing of the first cut at a c.3m horizon (see Exhibit 6). These are likely to keep implied vols relatively steady around current levels with a bias towards lower left vs the right side, and some re-steepening of the term structure of volatility (we continue to see 1m10y vs 1y10y spread levels fair in the -5 to +5bp range).

### Exhibit 5: Decomposition of 10y breakeven dynamic

Slowdown moves (bull tightening) dominating the dynamic in last 2m

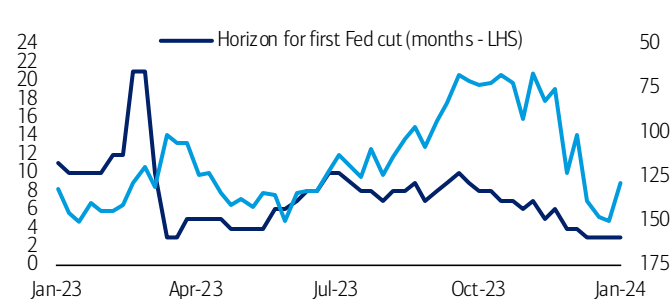


Source: BofA Global research

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### Exhibit 6: Pricing of Fed policy

Cuts priced at 3m horizon, with c.5 cuts expected in '24



Source: BofA Global research

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Finally, our baseline view for an outlook bounded by soft landing and steady resilience scenarios also lends support for consolidation around fundamental levels near-term (see [10yT – expectations for near term dynamic](#)). These scenarios are generally marked by relatively flat or positive correlations between bond and equity returns. The dynamic of correlations is more likely to shift back into negative territory only as 3y1y OIS dips towards 2.5-3% or below (i.e., as the market prices higher harder landing odds). The implications of this expected dynamic of correlations are significant, and broadly suggest some degree of under-allocation to duration as long as the consensus remains centered on soft-landing, which lends some support to the consolidation view for USTs around fundamental fair value levels near-term.

## A range of potential outcomes

We favor discretized range of outcomes for the outlook. We see four potential scenarios (see [Postcard from Tokyo](#)):

- **Hard landing** – Data recouples to the downside, cuts are frontloaded, the curve bull steepens (likely first in 5s30s and closer to the first cut in 2s10s). 10yT yields are likely to reach 3.25% ( $\pm 25$ bp) which we view as closer to the steady state over the cycle. On the policy trajectory, the Fed is priced to cut below the neutral, i.e., 3y1y forwards trade below c.2.75-3% in these scenarios. In this scenario, we would favor 2s10s cap spreads and 5s30s steepeners (outperformance of belly on the curve near).

- **Soft landing** – 10yT recouples to c.4-4.25% levels as monetary policy lags unfold. US growth converges to levels > 0 but < potential (likely slightly higher than the 1.75% levels suggested by the Fed SEP). The policy cuts are seen as “insurance” type cuts in this context, and the Fed is seen as cutting to the neutral c.3% at horizons c.2-3y. In this case, we would favor 3y1y receiver spreads & short left vs right side vol.
- **Steady resilience** – US growth stays steady at or slightly above potential, but inflation expectations continue to be anchored. Fed stays on hold. Significant levels of uncertainty continue to drive some pricing of Fed cuts at a 1y horizon, and in that context 10yT yields trade at a slight premium to frontend yields (i.e., peak 10yT yields c.5-5.25%). In this scenario, we would favor costless payer ladders in the belly 5-10y tails, with expiries 3-6m.
- **Re-acceleration** – The economy either re-accelerates or stays resilient but sees a recoupling of inflation to growth fundamentals. Either of these is likely to drive a full pricing out of Fed cuts from the curve, and potentially the pricing in of hike expectations. 10yT likely push beyond c.5.5% in this context.

It is difficult to estimate where yields peak in these scenarios. If neutral rate expectations revert to the pre-GFC regime (c.4-4.25%) and the economy stays in the post Volcker regime where it is enough for the Fed to tighten 200bp vs. the neutral to land the economy, then one can expect peak policy rates c. 6.25%. For the 10yT, the conviction that the Fed must slowdown the economy drives the pricing of cuts medium term. In practical terms, this means that it is difficult for 10yT yields to trade at a discount to the frontend also in this context (i.e., 10yT < c.6.25%). In this scenario, we would favor OTM payer spreads (e.g., atm+25bp/atm+50bp) in 1y-2y tails with expiries in the 3-6m context (see [Too many CB cuts priced?](#)).

# Levels and Recent Moves

## Exhibit 7: ATM Normal Volatility Grid

110bp for 1y10y volatility on Friday's close

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	111	132	130	127	122	116	97
3M	114	128	126	123	118	114	95
6M	127	130	126	121	117	112	95
1Y	134	129	126	118	114	110	94
2Y	123	121	118	114	110	106	92
3Y	118	115	113	109	106	102	88
4Y	112	111	109	105	102	98	85
5Y	109	107	105	101	98	95	82
10Y	91	90	88	84	82	79	69
30Y	65	64	63	61	59	55	50

Source: BofA Global Research

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## Exhibit 8: ATM Volatility Grid - 3m Z-Scores

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

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	1.2	0.7	0.2	-0.6	-0.9	-1.0	-1.1
3M	0.5	0.0	-0.4	-1.4	-1.3	-1.1	-1.1
6M	0.1	-0.9	-1.2	-1.5	-1.2	-0.9	-0.9
1Y	-1.4	-1.2	-1.2	-1.2	-1.0	-0.8	-0.8
2Y	-1.4	-1.3	-1.2	-1.0	-0.8	-0.6	-0.6
3Y	-1.2	-1.1	-1.0	-0.8	-0.7	-0.5	-0.5
4Y	-1.1	-1.0	-0.9	-0.7	-0.7	-0.5	-0.5
5Y	-0.9	-0.7	-0.7	-0.6	-0.6	-0.5	-0.5
10Y	-0.6	-0.5	-0.5	-0.5	-0.5	-0.6	-0.6
30Y	-0.6	-0.6	-0.6	-0.7	-0.7	-0.7	-0.8

Source: BofA Global Research

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## Exhibit 9: ATM Normal Volatility Grid - CoW

Underperformance led by the left side last week

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-3.0	-5.0	-3.7	-2.4	-0.7	1.0	1.1
3M	-11.1	-9.8	-6.7	-3.8	-2.2	-0.6	0.1
6M	-6.1	-5.8	-3.8	-2.0	-0.6	0.7	1.2
1Y	-3.2	-2.2	-1.4	-0.6	0.5	1.5	1.5
2Y	-1.2	-0.9	-0.3	0.8	1.7	2.6	2.8
3Y	-0.9	-0.1	0.4	1.5	2.2	3.0	3.1
4Y	-0.8	0.0	0.6	1.7	2.2	3.0	3.0
5Y	0.1	0.9	1.4	2.3	2.6	3.0	3.0
10Y	1.0	1.4	1.7	2.1	2.2	2.2	2.3
30Y	1.7	1.7	1.6	1.6	1.5	1.4	1.3

Source: BofA Global Research

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## Exhibit 10: ATM Straddle Premiums (indicative only)

7.0% straddle premiums for 1y10y

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.2%	0.6%	0.8%	1.3%	1.7%	2.2%	4.0%
3M	0.4%	1.0%	1.4%	2.2%	2.9%	3.7%	6.9%
6M	0.7%	1.4%	2.0%	3.0%	3.9%	5.1%	9.7%
1Y	1.0%	1.9%	2.7%	4.1%	5.3%	7.0%	13.3%
2Y	1.2%	2.4%	3.5%	5.4%	7.0%	9.2%	17.8%
3Y	1.4%	2.7%	3.9%	6.1%	8.0%	10.5%	20.4%
4Y	1.5%	2.9%	4.2%	6.5%	8.6%	11.2%	21.9%
5Y	1.6%	3.0%	4.4%	6.8%	9.0%	11.7%	23.0%
10Y	1.6%	3.0%	4.3%	6.7%	8.8%	11.5%	23.5%
30Y	1.0%	2.0%	2.9%	4.5%	6.0%	7.8%	19.3%

Source: BofA Global Research

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## Exhibit 11: 1y10y vol dynamic since the COVID recession

100-115bp more likely in 1H24, and 85-100bp more likely in 2H24



Source: BofA Global Research; Bloomberg

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## Exhibit 12: 3m10y vs. 3m2y Normal Volatility

Left side cheapened slightly vs right side over the last week



Source: BofA Global Research; Bloomberg

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## Exhibit 13: 1y10y vs. 1m10y normal volatility

Vol term structure staying slightly inverted

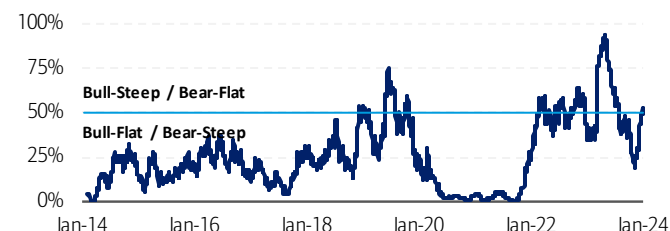


Source: BofA Global Research; Bloomberg

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## Exhibit 14: 2s10s curve directionality only 52% frontend driven

Frontend increase degree of freedom in recent weeks



Source: BofA Global Research

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# Volatility Grid Relative Value

## PCA Z-SCORES

### Exhibit 15: 3m Z-Scores w/ PCA framework

Intermediate expiries in the belly look fair/cheap on 3m Z-Scores

	1y	2y	3y	5y	7y	10y	30y
3m	1.8	-0.9	-1.1	-1.6	-1.3	-1.7	-2.1
6m	2.3	0.4	-0.8	-1.7	-1.7	-0.3	-1.6
1y	0.7	0.6	-0.5	-1.9	-1.4	1.4	-0.1
2y	-1.6	-2.3	-2.8	-1.2	0.3	3.6	3.2
5y	-0.1	1.1	1.4	2.4	2.8	3.2	3.3
10y	1.7	2.4	2.6	3.0	3.0	2.6	2.3

Source: BofA Global Research

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### Exhibit 17: 6m Z-Scores w/ PCA framework

Cheapness only in short expiries on the right side

	1y	2y	3y	5y	7y	10y	30y
3m	0.9	-0.1	0.1	-1.1	-1.2	-0.2	-2.4
6m	0.8	0.2	0.5	-0.9	-1.4	-1.3	-1.7
1y	0.4	0.7	0.5	-1.5	-0.2	1.1	0.5
2y	-1.6	-1.8	-1.7	-0.1	1.6	3.3	2.2
5y	0.3	0.9	1.2	1.9	2.2	1.0	1.1
10y	1.7	2.0	2.0	1.7	1.8	1.6	1.5

Source: BofA Global Research

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### Exhibit 19: 1y Z-Scores w/ PCA framework

Cheapness only in short expiries in the belly and right side

	1y	2y	3y	5y	7y	10y	30y
3m	0.4	-0.7	-0.3	-0.9	-0.3	-0.2	-0.7
6m	1.3	-0.4	-0.3	-1.8	-1.2	-0.9	-0.9
1y	1.6	0.7	0.3	-0.7	-1.2	-0.4	0.0
2y	-1.2	-1.3	-1.1	0.0	1.2	0.4	1.9
5y	-1.0	-0.4	-0.2	0.2	1.3	2.5	2.1
10y	2.2	2.4	2.4	2.2	2.2	2.1	1.8

Source: BofA Global Research

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### Exhibit 21: 3m Z-Scores w/ modified PCA framework ...

Grid broadly fair to cheap

	1y	2y	3y	5y	7y	10y	30y
1m	-0.2	-0.6	-0.4	0.1	-0.8	-1.0	0.2
3m	-0.4	-0.9	-0.6	-0.5	-1.4	-1.6	1.7
6m	-0.6	-1.5	-0.2	-0.2	-0.4	-0.4	-0.9
1y	-1.6	-1.5	1.0	-1.2	-0.2	-0.1	-0.3
2y	-1.1	-0.9	-0.9	-0.9	0.4	-1.9	-0.3
3y	-0.9	0.9	-0.3	-0.8	0.4	1.1	-0.7
4y	-1.0	0.7	-1.7	-1.2	0.7	0.2	-0.4
5y	0.0	-1.0	0.5	-0.1	-0.7	-1.5	-1.4
10y	2.1	-1.3	0.1	0.7	0.7	0.1	0.5
15y	1.7	-0.4	1.1	-1.2	-1.2	0.3	-1.1
30y	0.3	2.1	0.9	1.2	-0.4	0.1	1.6

Source: BofA Global Research

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### Exhibit 16: 3m Z-Scores w/ PCA framework w/o rates directionality

Cheap vol in short and intermediate expiries in left side and belly

	1y	2y	3y	5y	7y	10y	30y
3m	-0.6	-1.3	-1.3	-1.4	-1.1	-0.7	-0.8
6m	-0.9	-1.3	-1.3	-1.5	-0.9	-0.4	-0.3
1y	-1.6	-1.3	-1.1	-1.1	-0.4	0.2	0.2
2y	-1.8	-1.7	-1.0	-0.3	0.3	0.8	0.8
5y	0.0	0.3	0.5	0.8	1.0	1.2	1.2
10y	0.8	0.9	1.0	1.2	1.2	1.2	1.2

Source: BofA Global Research

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### Exhibit 18: 6m Z-Scores w/ PCA framework w/o rates directionality

Cheap vol in short and intermediate expiries in left side and belly

	1y	2y	3y	5y	7y	10y	30y
3m	-0.6	-1.0	-0.9	-1.1	-1.0	-0.5	-0.8
6m	-0.6	-0.9	-0.8	-1.0	-0.9	-0.6	-0.5
1y	-0.7	-0.6	-0.7	-0.8	-0.5	0.1	0.0
2y	-1.0	-1.0	-0.8	-0.4	0.1	0.6	0.8
5y	-0.2	0.2	0.3	0.6	0.8	0.6	1.0
10y	1.0	1.1	1.1	1.2	1.4	1.4	1.7

Source: BofA Global Research

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### Exhibit 20: 1y Z-Scores w/ PCA framework w/o rates directionality

Grid broadly fair/cheap when directionality is considered except for LRC

	1y	2y	3y	5y	7y	10y	30y
3m	-0.9	-1.1	-1.1	-1.3	-1.2	-1.1	-1.1
6m	-0.9	-1.2	-1.2	-1.5	-1.4	-1.2	-1.0
1y	-1.0	-1.3	-1.3	-1.5	-1.5	-1.1	-0.8
2y	-1.6	-1.7	-1.6	-1.4	-1.1	-0.8	-0.3
5y	-1.5	-1.2	-1.1	-0.9	-0.6	-0.2	0.1
10y	0.0	0.1	0.1	-0.1	0.0	0.0	0.3

Source: BofA Global Research

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### Exhibit 22: ... and w/o directionality with rates

Grid broadly fair/cheap when directionality is considered

	1y	2y	3y	5y	7y	10y	30y
1m	0.1	-0.5	-0.8	0.2	-0.9	-1.0	0.0
3m	-0.2	-1.0	-0.6	-0.7	-1.3	-1.6	1.7
6m	-0.6	-1.2	-0.2	-0.5	-0.7	-0.5	-1.1
1y	-1.3	-1.8	1.0	-0.6	-0.1	-0.1	-0.2
2y	-1.1	-0.8	-1.0	-1.0	0.4	-1.8	-0.3
3y	-0.9	1.0	-1.5	-1.4	-0.2	1.5	-1.0
4y	-1.5	1.3	-1.3	-1.2	1.0	-1.1	-0.5
5y	0.1	-0.9	0.1	-0.3	-0.8	-1.6	-1.3
10y	2.2	-0.7	0.3	0.6	0.3	-0.2	0.7
15y	1.1	0.0	1.0	-1.6	-1.3	0.3	-1.1
30y	0.8	2.3	0.9	2.1	-1.1	-0.1	1.9

Source: BofA Global Research

BofA GLOBAL RESEARCH

# Skew Relative Value

## Exhibit 23: Skew 25% delta

Receivers rich for short expiries on the left/belly on 3m Z-Scores

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	7.7	7.0	5.6	2.9	1.1	-0.6	-0.5
3M	14.4	13.0	11.0	6.9	4.2	1.3	0.7
6M	16.9	13.4	11.4	6.5	3.8	0.5	0.1
1Y	11.4	9.5	7.7	3.6	1.6	-1.4	-1.4
2Y	-0.1	0.0	-0.2	-2.0	-2.7	-3.9	-2.8
5Y	-4.5	-4.4	-4.2	-5.2	-5.4	-5.8	-4.1
10Y	-4.2	-3.8	-3.6	-4.5	-4.7	-5.1	-3.6
30Y	-5.9	-5.4	-4.6	-5.0	-5.0	-5.4	-6.5

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 24: Skew 75% delta

Payers Cheap on short expiries on left/belly on 3m Z-Scores

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-11.2	-10.5	-8.2	-4.8	-2.6	-0.4	-0.2
3M	-13.7	-11.3	-8.4	-3.2	-0.3	2.7	2.6
6M	-13.1	-8.7	-6.0	-0.2	2.6	5.6	5.1
1Y	-4.8	-2.7	-0.6	3.6	5.4	7.8	6.9
2Y	7.2	6.9	7.5	8.6	9.2	9.9	7.9
5Y	14.0	12.9	12.9	13.1	13.0	12.6	9.9
10Y	15.2	14.9	14.7	14.5	14.1	13.5	10.6
30Y	16.2	16.0	15.7	15.7	15.5	13.9	11.4

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 25: Breakeven Widths for Costless Receiver Ladders

108bp breakeven width for 1y10y receiver ladders

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	38	44	42	40	37	34	28
3M	75	79	77	69	64	59	49
6M	119	114	108	96	88	81	68
1Y	160	151	143	126	117	108	93
2Y	175	172	168	157	150	141	123
5Y	227	224	220	208	201	192	169
10Y	265	261	256	241	233	221	198

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 26: Breakeven Widths for Costless Payer Ladders

141bp breakeven width for 1y10y payer ladders

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	28	34	34	35	35	34	28
3M	48	56	57	60	60	60	51
6M	77	83	83	86	87	88	76
1Y	126	125	125	126	125	127	109
2Y	196	191	190	187	184	182	155
5Y	321	310	305	299	293	283	235
10Y	420	413	406	393	383	367	305

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 27: 3m Z-Score Receiver Skew (w/o fwds & ATM direction)

Receivers cheap in intermediates, rich for short expiries

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.7	0.7	0.7	0.7	0.7	0.6	0.5
3M	0.5	1.3	1.4	0.1	0.2	0.3	-1.3
6M	-0.2	-0.8	-0.7	-0.1	-0.8	-0.7	-0.5
1Y	-0.2	-0.5	-0.6	-0.5	-0.2	-0.5	-0.6
2Y	-1.1	-1.2	-1.5	-1.2	-0.5	0.0	-0.2
5Y	-0.6	0.7	0.9	1.2	1.2	1.4	0.1
10Y	0.4	1.2	1.3	1.5	1.5	1.5	1.3

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 28: 3m Z-Score Payer Skew (w/o direction w/ fwds & ATM)

Payer skew rich broadly across the grid

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

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 29: Ratio of Payer/Receiver BE widths for Costless Ladders

Ratios of breakeven widths < 100% for short and intermediate expiries on the left side and belly

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	73%	78%	81%	89%	95%	101%	100%
3M	64%	71%	75%	86%	94%	103%	104%
6M	65%	73%	77%	90%	98%	109%	111%
1Y	79%	83%	88%	100%	107%	118%	118%
2Y	112%	111%	113%	120%	123%	129%	126%
5Y	141%	138%	139%	144%	146%	147%	139%
10Y	159%	158%	159%	164%	165%	166%	154%

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 30: 3m Z-Score Ratio of Payer/Receiver Skew

3m Z-Scores show rich payer over receiver skew only for intermediate expiries on the left side

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-0.5	-1.3	-1.9	-1.1	-1.0	-0.9	-0.9
3M	-0.2	-0.8	-1.5	-1.0	-0.9	-1.0	-0.7
6M	1.1	1.1	0.5	-0.7	-0.5	-0.6	-0.5
1Y	1.4	1.3	1.2	-0.1	-0.6	-0.5	-0.5
2Y	1.9	1.8	1.8	0.5	-0.3	-0.2	-0.4
5Y	1.0	0.1	0.0	-0.2	0.1	-0.1	0.2
10Y	0.1	-0.4	-0.5	-0.5	-0.5	-0.6	-0.5

Source: BofA Global Research

BofA GLOBAL RESEARCH

# Conditional Curve Trades

## Exhibit 31: 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	5.4	11.4	3.6	9.9	6.7
6M	4.8	9.1	16.9	4.8	13.0	8.7
1Y	8.5	14.2	23.9	6.5	17.1	11.2
1.5Y	8.3	14.7	26.7	7.1	19.6	13.0
2Y	7.1	14.2	27.4	7.5	21.4	14.4

Source: BofA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 33: 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	-5.4	-11.4	-3.6	-9.9	-6.7
6M	-4.8	-9.1	-16.9	-4.8	-13.0	-8.7
1Y	-8.5	-14.2	-23.9	-6.5	-17.1	-11.2
1.5Y	-8.3	-14.7	-26.7	-7.1	-19.6	-13.0
2Y	-7.1	-14.2	-27.4	-7.5	-21.4	-14.4

Source: BofA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 35: 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	-1.9	-5.4	-11.8	-3.6	-10.1	-6.9
6M	-4.6	-9.7	-17.7	-5.0	-13.6	-9.1
1Y	-8.3	-15.3	-26.1	-7.1	-18.7	-12.4
1.5Y	-8.7	-16.7	-29.4	-8.3	-22.0	-14.7
2Y	-7.9	-16.5	-31.0	-8.9	-24.1	-16.3

Source: BofA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 37: 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	1.9	5.4	11.8	3.6	10.1	6.9
6M	4.6	9.7	17.7	5.0	13.6	9.1
1Y	8.3	15.3	26.1	7.1	18.7	12.4
1.5Y	8.7	16.7	29.4	8.3	22.0	14.7
2Y	7.9	16.5	31.0	8.9	24.1	16.3

Source: BofA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 39: Analysis of proxies for futures positioning

Long bias in the belly



Source: BofA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 32: 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	4.8	10.8	19.2	6.7	15.7	9.9
6M	8.3	15.1	24.7	7.9	18.5	11.4
1Y	11.6	19.4	31.2	9.3	22.0	13.8
1.5Y	10.6	19.0	32.5	9.5	23.9	15.3
2Y	8.7	17.3	32.1	9.3	24.7	16.3

Source: BofA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 34: 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	-4.8	-10.8	-19.2	-6.7	-15.7	-9.9
6M	-8.3	-15.1	-24.7	-7.9	-18.5	-11.4
1Y	-11.6	-19.4	-31.2	-9.3	-22.0	-13.8
1.5Y	-10.6	-19.0	-32.5	-9.5	-23.9	-15.3
2Y	-8.7	-17.3	-32.1	-9.3	-24.7	-16.3

Source: BofA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 36: 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	-0.3	-3.4	-12.8	-3.0	-12.6	-9.9
6M	-3.6	-8.1	-19.2	-4.6	-16.1	-12.0
1Y	-8.3	-15.3	-28.8	-7.1	-21.4	-15.3
1.5Y	-8.9	-17.3	-32.9	-8.5	-25.1	-17.7
2Y	-8.5	-17.7	-34.9	-9.5	-27.8	-19.4

Source: BofA Global Research

BoFA GLOBAL RESEARCH

## Exhibit 38: Bear Steepener (pickup to forwards for +25bp OTM)

Buy longer maturity payer, sell shorter maturity payer

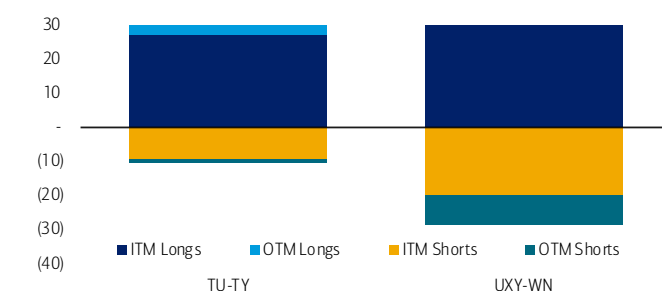
+25bp	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	0.3	3.4	12.8	3.0	12.6	9.9
6M	3.6	8.1	19.2	4.6	16.1	12.0
1Y	8.3	15.3	28.8	7.1	21.4	15.3
1.5Y	8.9	17.3	32.9	8.5	25.1	17.7
2Y	8.5	17.7	34.9	9.5	27.8	19.4

Source: BofA Global Research

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## Exhibit 40: Proxies for futures positioning across the curve

Backend OTM shorts may drive bull flattening of the curve



Source: BofA Global Research

BoFA GLOBAL RESEARCH



# Forward Volatility

## Exhibit 41: 6m Forward Volatility

106.2bp for 6m fwd 1y10y

	1y	2y	5y	10y	30y
1m	141.2	134.4	123.4	112.0	95.6
3m	136.8	130.1	120.6	109.7	94.3
6m	137.3	129.8	119.0	108.1	93.3
1y	130.4	125.9	116.5	106.2	91.9
2y	122.0	119.3	111.0	101.5	88.4
5y	106.6	104.7	98.1	91.0	79.9
10y	87.1	85.4	80.5	75.4	68.1

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 42: 6m Fwd vol as % ATM

96% of ATM for 6m fwd 1y10y

	1y	2y	5y	10y	30y
1m	119%	96%	91%	92%	94%
3m	114%	99%	95%	95%	97%
6m	105%	98%	96%	95%	97%
1y	97%	96%	97%	96%	97%
2y	98%	98%	97%	96%	97%
5y	97%	97%	96%	96%	98%
10y	96%	96%	96%	96%	100%

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 43: 3m Z-Score 6m Fwd vol % ATM

0.9 Z-Score for 6m fwd 1y10y

	1y	2y	5y	10y	30y
1m	-1.4	-1.3	-0.9	0.0	0.9
3m	-1.4	-1.0	-0.6	0.6	1.7
6m	-1.2	-0.9	-0.4	0.7	1.4
1y	-0.2	-0.8	0.3	0.9	1.3
2y	0.1	1.0	1.1	1.1	1.1
5y	1.1	1.1	1.0	1.0	0.6
10y	0.4	0.5	1.0	0.7	-1.8

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 44: 1y Forward Volatility

101.9bp for 1y fwd 1y10y

	1y	2y	5y	10y	30y
1m	131.5	122.6	114.5	103.9	89.8
3m	131.1	123.5	115.7	105.3	91.0
6m	127.0	120.9	114.5	104.2	90.2
1y	121.4	117.6	111.7	101.9	88.7
2y	115.1	112.9	106.8	97.4	84.9
5y	103.1	101.5	94.8	87.8	77.4
10y	84.9	83.2	78.4	73.5	66.7

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 45: 1y Fwd vol as % ATM

92% of ATM for 1y fwd 1y10y

	1y	2y	5y	10y	30y
1m	111%	87%	85%	85%	88%
3m	110%	94%	91%	91%	94%
6m	97%	91%	92%	92%	93%
1y	90%	90%	93%	92%	94%
2y	92%	93%	93%	92%	93%
5y	94%	94%	93%	92%	94%
10y	93%	93%	93%	94%	98%

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 46: 3m Z-Score 1y Fwd vol % ATM

0.5 Z-Score for 1y fwd 1y10y

	1y	2y	5y	10y	30y
1m	-1.6	-1.5	-1.1	-0.5	0.7
3m	-1.4	-1.2	-0.6	0.5	1.6
6m	-1.4	-1.3	-0.4	0.6	1.3
1y	-1.0	-1.4	-0.2	0.5	1.1
2y	-0.3	0.6	0.6	0.7	0.8
5y	0.9	0.8	0.6	0.5	0.2
10y	0.4	0.4	0.7	0.3	-1.7

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 47: 2y Forward Volatility

93.8bp for 2y fwd 1y10y

	1y	2y	5y	10y	30y
1m	107.4	109.7	105.5	96.4	84.1
3m	109.0	110.4	105.1	95.9	83.6
6m	111.1	110.7	104.6	95.0	82.7
1y	113.0	110.5	103.6	93.8	81.4
2y	108.0	106.4	100.5	91.0	79.3
5y	98.9	97.1	89.7	82.9	73.0
10y	81.8	80.0	75.6	70.8	64.5

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 48: 2y Fwd vol as % ATM

85% of ATM for 2y fwd 1y10y

	1y	2y	5y	10y	30y
1m	91%	78%	78%	79%	83%
3m	91%	84%	83%	83%	86%
6m	85%	83%	84%	84%	86%
1y	84%	84%	86%	85%	86%
2y	87%	87%	88%	86%	87%
5y	90%	90%	88%	87%	89%
10y	90%	90%	90%	90%	95%

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 49: 3m Z-Score 2y Fwd vol % ATM

0.3 Z-Score for 2y fwd 1y10y

	1y	2y	5y	10y	30y
1m	-1.5	-1.5	-1.1	-0.2	0.8
3m	-1.3	-1.1	-0.5	0.6	1.3
6m	-1.0	-0.9	-0.2	0.7	1.1
1y	-0.1	-0.3	0.1	0.3	0.6
2y	0.4	1.0	0.6	0.2	0.1
5y	0.6	0.3	-0.2	-0.2	-1.0
10y	0.2	0.2	0.5	0.2	-1.8

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 50: 3y Forward Volatility

90.7bp for 3y fwd 1y10y

	1y	2y	5y	10y	30y
1m	103.0	104.3	99.8	91.2	79.0
3m	103.6	104.9	100.4	91.7	79.3
6m	104.2	105.0	99.9	91.1	78.7
1y	107.3	106.2	99.8	90.7	78.2
2y	106.9	103.1	98.0	89.1	77.2
5y	95.0	93.0	86.0	79.5	69.5
10y	79.3	77.7	73.8	68.8	63.0

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Exhibit 51: 3y Fwd vol as % ATM

82% of ATM for 3y fwd 1y10y

	1y	2y	5y	10y	30y
1m	87%	74%	74%	75%	78%
3m	87%	79%	79%	79%	82%
6m	80%	79%	81%	80%	82%
1y	79%	81%	83%	82%	83%
2y	86%	85%	86%	84%	84%
5y	86%	86%	84%	84%	85%
10y	87%	87%	88%	88%	92%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

-0.2 Z-Score for 3y fwd 1y10y

	1y	2y	5y	10y	30y
1m	-1.5	-1.5	-1.2	-0.7	0.4
3m	-1.3	-0.9	-0.5	0.2	1.1
6m	-1.2	-0.8	-0.2	0.1	0.7
1y	-0.4	0.0	0.2	-0.2	0.2
2y	1.4	1.5	1.6	0.5	0.2
5y	0.5	0.3	-0.2	-0.2	-1.0
10y	0.0	0.0	0.3	0.0	-1.8

Source: BofA Global Research

BofA GLOBAL RESEARCH

## Ratios implied/delivered

### Exhibit 53: Implied vs. Delivered (21d) Ratio

Ratios of Implied to 21d delivered still > 100% for short gamma across the grid and broadly for 7-10 tails

	1y	2y	3y	5y	7y	10y	30y
1m	105%	103%	104%	109%	109%	111%	103%
3m	87%	94%	97%	102%	104%	106%	101%
6m	86%	90%	94%	99%	102%	104%	100%
1y	86%	92%	97%	99%	101%	103%	99%
2y	97%	101%	103%	103%	104%	104%	98%

Source: BofA Global Research

BofA GLOBAL RESEARCH

### Exhibit 54: Implied vs. Delivered (63d) Ratio

Ratios of Implied to 63d delivered < 100% virtually across the grid

	1y	2y	3y	5y	7y	10y	30y
1m	119%	105%	98%	97%	96%	95%	86%
3m	98%	93%	91%	91%	91%	91%	85%
6m	90%	88%	87%	87%	88%	89%	84%
1y	83%	83%	84%	84%	85%	86%	82%
2y	81%	83%	83%	84%	84%	85%	80%

Source: BofA Global Research

BofA GLOBAL RESEARCH

### Exhibit 55: 3m Z-Scores for Implied vs. Delivered (21d) Ratio

Ratios of implied/21d delivered rich on the right side of the grid

	1y	2y	3y	5y	7y	10y	30y
1m	0.3	0.2	0.5	0.9	1.2	1.5	1.1
3m	-0.5	-0.1	0.3	1.0	1.3	1.7	1.3
6m	-0.4	-0.1	0.3	1.0	1.5	1.8	1.5
1y	-0.2	0.2	0.7	1.4	1.8	2.0	1.7
2y	0.9	1.4	1.8	2.0	2.1	2.1	1.9

Source: BofA Global Research

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### Exhibit 56: 3m Z-Scores for Implied vs. Delivered (63d) Ratio

Ratios of implied/63d cheap on 3m Z-Scores

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

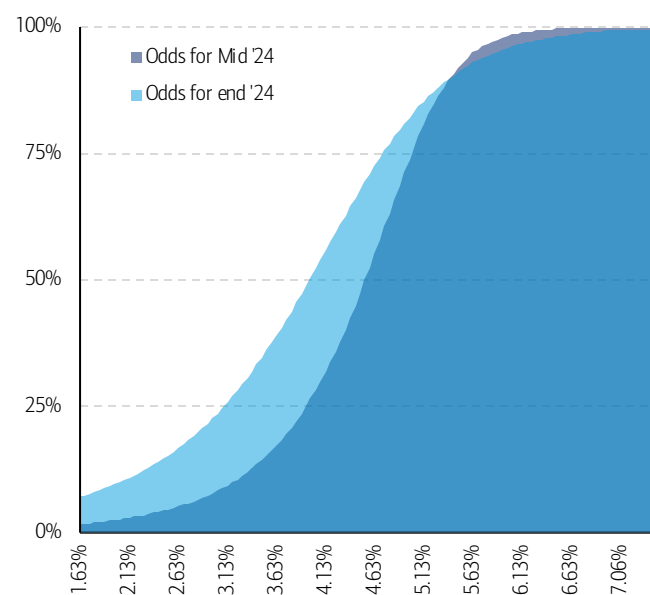
Source: BofA Global Research

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## Rates probability distributions

### Exhibit 57: CDF for 1y SOFR rates at mid-24 and end-24

1y rate cumulative distribution functions

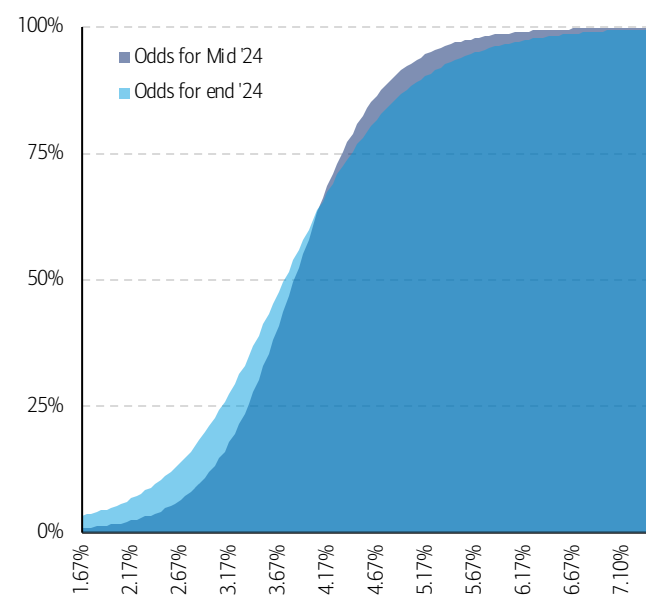


Source: BofA Global Research

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### Exhibit 58: CDF for 10y SOFR rates at mid-24 and end-24

10y rate cumulative distribution functions



Source: BofA Global Research

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# Trade activity

## Exhibit 59: Payer volumes over the last week (\$m notional)

Demand for payers over the last week

Payers	1y	2y	3Y	4Y	5Y	7Y	10Y	20Y	30Y	
<1m	5080				440		520			6175
1m	4960	1600	240		1020	340	1761		240	11291
3m	7530	3130	671		2730	30	3454	10	1494	24217
6m	7646	690		84	440		906	795	437	12469
1y	6284	240	400	400	530	175	1414		536	9979
2y	2200					13	408	25	221	2867
3Y	250			480		241	451	68	50	1540
4Y						110	350	54		514
5Y						140	801	100	75	1116
7Y						170	100	104	175	549
10Y					50		369	313	195	927
20Y							240			240
30Y										
	33950	5660	1311	964	5210	1219	10774	1469	3423	71884

Source: BofA Global Research; SDR; Bloomberg

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## Exhibit 60: Receiver volumes over the last week (\$m notional)

Demand for payers over the last week

Receivers	1y	2y	3Y	4Y	5Y	7Y	10Y	20Y	30Y	
<1m	1100			5	200		420			1745
1m	3870	100	244		770		2139		180	9103
3m	5890	1950	145		1240	200	2592	10	600	16694
6m	5026	1360	680	480	200		835	75	187	10812
1y	8713	700			2210	255	1800		1005	14683
2y	1153		960				408	25	146	2692
3Y	250			480		241	451	68	50	1540
4Y						110	180	54		344
5Y						140	751	100	75	1066
7Y						170	100	104	25	399
10Y					50		363	313	195	921
20Y							240			240
30Y										
	26002	4110	2030	965	4670	1116	10279	749	2463	60240

Source: BofA Global Research; SDR; Bloomberg

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## Exhibit 61: Straddle volumes over the last week (\$m notional)

Demand for payers over the last week

Straddles	1y	2y	3Y	4Y	5Y	7Y	10Y	20Y	30Y	
<1m					100		113			213
1m	920	130			460		433			1943
3m	920								50	970
6m					200		100		158	458
1y	1000	340					35		64	1439
2y							200			200
3Y										
4Y								40		40
5Y							50			50
7Y						170				170
10Y										
20Y										
30Y										
	2840	470			760	170	931	40	272	5483

Source: BofA Global Research; SDR; Bloomberg

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## Formosa issuance

### Exhibit 62: 2023 Formosa issuance (\$m)

2.6bn total issuance for the year '23

	2	5	7	10	15	20	25	30
1	29	17						
2				370				
3		40		60				
4		205		565				
5				135		30	15	
7								
10								25
15								
20								
25								
30								1,000

Source: BofA Global Research, Bloomberg

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### Exhibit 63: 2024 Formosa issuance YTD (\$m)

Very limited issuance YTD

	2	5	7	10	15	20	25	30
1	-							
2								
3				120				
4								
5		-	-	-	-	-	-	-
7		-	-	-	-	-	-	-
10		-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-
25	-	-	-	-	-	-	-	-
30	-	-	-	-	-	-	-	-

Source: BofA Global Research, Bloomberg

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### Exhibit 64: Formosa issuance (\$m) since 2014

Peak issuance concentrated on the 5y30y tenor

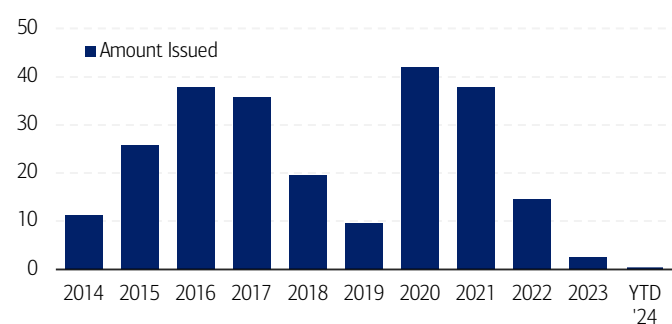
	2	5	7	10	15	20	25	30
1	29	222	75	1033	462	840		18054
2		40		1164		1485		22177
3		40		290	20	240	225	15536
4		220		744	50	25	275	2441
5				155	445	1527	368	111658
7			30					5624
10				2000				4489
15								
20								
25								
30								6500

Source: BofA Global Research, Bloomberg

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### Exhibit 65: Total issuance per year since 2014 (\$bn)

Very limited Formosa issuance YTD (c.\$2.44bn)



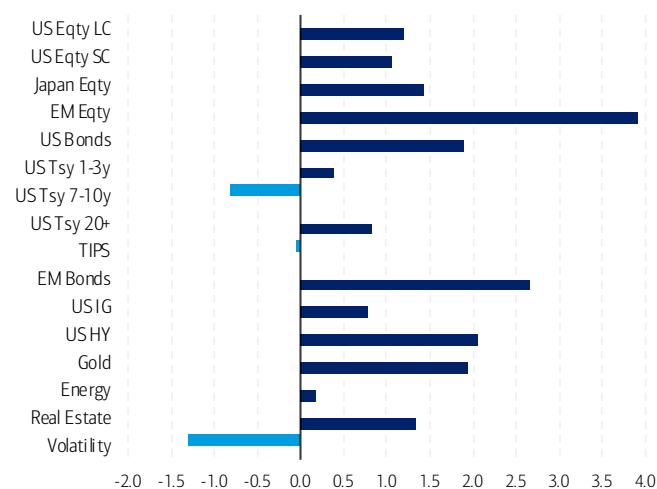
Source: BofA Global Research, Bloomberg

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## Allocation bias from ETF flows

### Exhibit 66: Allocation bias from ETF flows – week ending 1/5/24

Risk supported as UST shift to short bias in belly

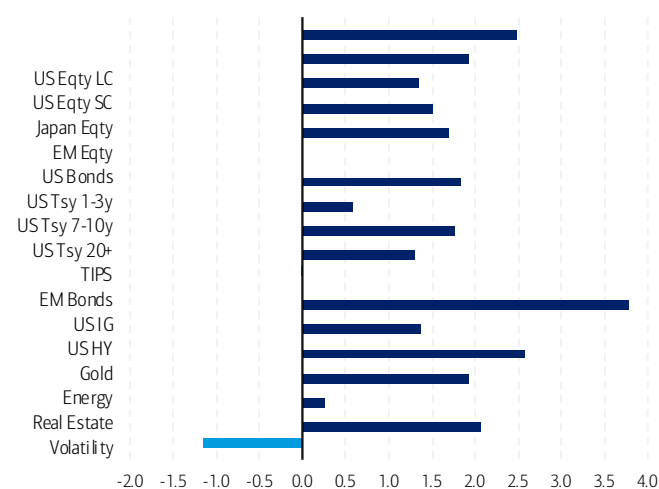


Source: BofA Global Research

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### Exhibit 67: Allocation bias from ETF flows – week ending 12/29/23

Broad risk on sentiment



Source: BofA Global Research

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# Notes

**Exhibit 14:** 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 15/17/19:** 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 16/18/20:** 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 principal components 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 25/26:** In a payer/receiver ladder one buys the ATM strike and then you sell  $ATM \pm x$  and  $ATM \pm 2x$ . In the terminal payoff diagram the position starts losing money when the forwards move past  $ATM \pm 3x$ , which we call the downside breakeven on the payer/receiver ladder.

We calculate the  $x$  (gap between strikes) daily such that the premium one has to 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  $ATM \pm (x + \Delta)$  and  $ATM \pm 2(x + \Delta)$  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 27/28:** 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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