

US Rates Viewpoint

US Vol – soft-landing scenarios and vol

Soft-landing scenarios now the baseline ...

Our US economists upgraded their outlook, away from expectations for a mild recession in '24 and toward a soft landing view (see [We see a soft landing for the US economy](#)), with growth likely to dip below potential but remaining positive throughout the forecast horizon. Risks are still skewed to the downside. Drivers for downside risks include tightening of bank lending standards and the potential impact on consumer spending and business activity. However, they also see upside risks from a potential fading of geopolitical risks and some evidence that potential growth is increasing. On balance, they assign 40-45% probability to the baseline, 35-40% to pessimistic scenarios, and only 10-15% to more optimistic scenarios.

... implications for the rates outlook ...

In our note on [Yield revisions following improved outlook](#), we look at the implications of this upgrade to the macroeconomic outlook for the rates and curve dynamic. We see US rates higher for longer but still broadly in the context of the recent ranges (4% forecast for 10yT by end '23), with moderation of the steepening bias on the curve to reflect shallower expectations for policy easing in '24. In line with the balance of risks for macroeconomic outlook, we see the balance of risks around these forecasts biased to the downside.

Against this backdrop, we note that the recent bearish momentum may reflect material odds of a mini cycle dynamic vs the soft-landing scenarios that our economists see as core. We like to fade some of that perceived exuberance and position for re-alignment with soft landing scenarios through receiver spreads in the belly that leverage a potential repricing of medium-term forwards back toward the neutral rate attractor (which we see in the 2.75-3% range).

... and the dynamic of the volatility grid

Our views on volatility are little changed by these revisions to the outlook. We continue to see: (1) a balance of risks skewed to the downside; (2) 1y10y fair around 110bp; (3) long vega positions attractive as a macro hedge; and (4) potential for the left side of the grid to underperform vs. the right side. On the latter, going into '23 we saw underperformance of the left side as the main mechanism for that normalization as the Fed shifted to an on-hold stance. Soft landing scenarios allow for the right side of the grid to play a significant role in that normalization also by supporting right side vol.

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Abbreviations:

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 – Global Financial Crisis

c. – circa (approximately)

CDF – Cumulative Distribution Function

PDF – Probability Density Function

BE – Inflation Breakevens

For a list of recent recommendations please see our [Global Rates Weekly](#).

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Rates dynamic in a soft-landing scenario

We see US rates higher for longer but still broadly in the context of the recent ranges (4% forecast for 10yT by end '23), with moderation of the steepening bias on the curve to reflect shallower expectations for policy easing in '24. In line with the balance of risks to the macroeconomic outlook, we see the balance of risks to these forecasts biased to the downside.

The analysis of the 10y breakeven dynamic suggests that the market is now pricing c.50% probability to soft-landing or outright expansion scenarios from here – the later akin to the mini cycles we saw over the last cycle – and less than 40% probability to slowdown scenarios (see Exhibit 1).

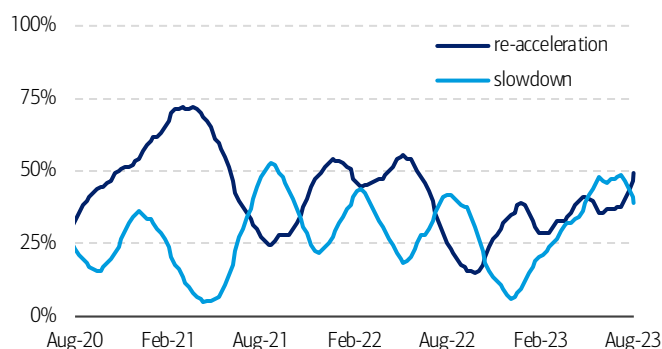
Soft landing vs more optimistic mini cycle type scenarios...

As the market priced a more resilient economy, it faded the '24 and '25 cuts in the Fed policy trajectory (see Exhibit 2), leading to a relatively un-orthodox steepening dynamic on the curve in a late cycle dynamic (see Exhibit 14).

In soft landing scenarios, we expect the trough in the policy trajectory to still correspond to where the market believes the neutral to be. That being the case, the recent dynamic suggests an upgrade of the neutral rate view from c.2.75-3% to c.3.4% currently.

Exhibit 1: Probability of soft landing + expansion scenarios vs slowdown

c.50% odds of soft landing + expansion vs <40% for slowdown scenarios

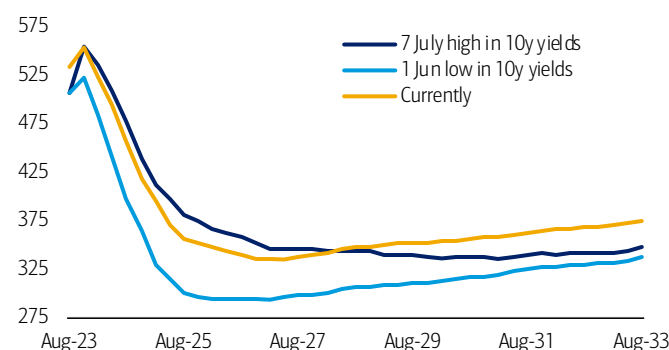


Source: BofA Global Research

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Exhibit 2: Shift in policy trajectory in the recent selloff

Market fading cuts priced in policy trajectory in '24 and '25



Source: BofA Global Research

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In mini-cycle scenarios, however, the steepening becomes more structural and the policy trough less of a reflection of the neutral rate view. To untangle the probabilities of mini-cycle type vs. soft landing scenarios in the context of the recent bearish dynamic, we look at our global yield framework. In this framework, 10yT moved from 15bp rich to global yields by mid-July to 15bp cheap currently (see Exhibit 3).

The natural bias in this framework is for USTs to trade cheap to global yields early in the cycle, and fair to rich late in the cycle. If we assume that in soft landing scenarios the potential for 10yT to cheapen vs global yields is relatively capped, as much as 50% of the recent bearish dynamic may be assigned to higher likelihood of mini-cycle type scenarios, significantly higher than the 10-15% probability assigned to more optimistic scenarios by our economists. The recent bearish momentum may therefore be slightly overdone in this context.

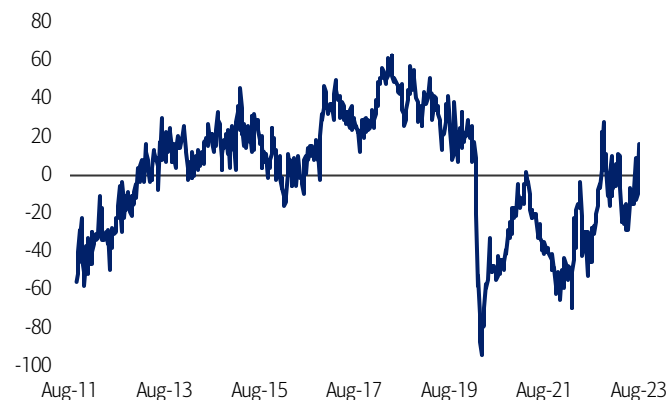
... and more pessimistic landing scenarios harder

On the other side of the spectrum of outcomes (to which our economists assign 35-40% probability) are recession scenarios that range from mild (most likely in our economists' view) to harder landing. These contain the potential to push yields towards their steady state c.3-3.25%, as inflation is more likely to recouple to growth fundamentals and support a pick-up of duration demand (i.e., a mean reversion of inflation and demand shocks in our framework for the decomposition of the 10y dynamic – see Exhibit 4).



Exhibit 3: Residual of 10yT yields in our global yield framework

10yT moved from c.15bp rich to global yields mid-July to c.15bp cheap now

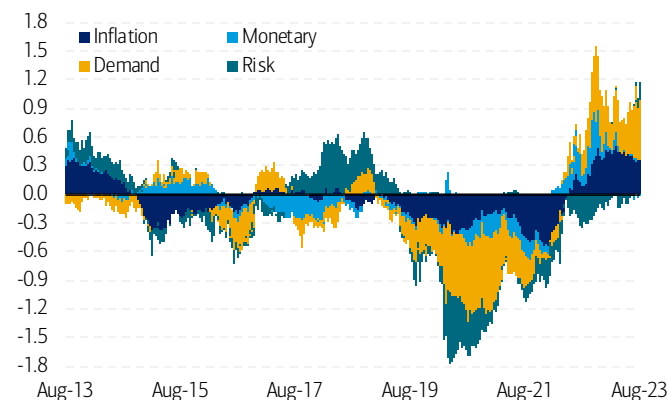


Source: BofA Global Research

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Exhibit 4: Decomposition of the 10yT dynamic

Inflation and demand shocks drive the bulk of the cheapness to steady state



Source: BofA Global Research

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Implications for the grid dynamic

In our outlook for volatility in '23 (see [2023 Volatility – Embracing the Pivot](#)) we saw 1y10y implied vol (the benchmark point on the grid and representative of the first principal component of the grid dynamic) fair in the 100-120bp range, with a bias towards the lower half of the range by end '23 (c.100-110bp – see Exhibit 11).

The revisions to the macro backdrop and rates views noted above do not change our expectations for the 1y10y vol range but are likely to keep levels closer to the midpoint (110bp) or slightly higher near term. The downside bias in the balance of risks along with a tightening of the range of outcomes for the Fed in soft landing scenarios drives a downward bias on volatility, and that is likely to offset the directional pressure from a slightly higher consolidation range for yield levels near term (around 4% for 10yT).

The left side of the vol grid is likely to continue to normalize vs the right toward flat levels (i.e., for the 3m10y vs 3m2y vol spread, currently -17bp – see Exhibit 12). In soft landing scenarios this normalization is supported by both: (1) downward pressure on the left side of the grid as the Fed moves into an on-hold stance and introduces forward guidance; and (2) support for right side in the context of a relatively high level of uncertainty and high data dispersion near-term. In our volatility outlook for '23 we had assigned a more significant weight to the front-end dynamic (downward pressure on the left side) as a driver for this normalization.

We continue to see fair value for gamma vs intermediates (1m10y vs 1y10y vol spread) between -5bp and +5bp. In the recent past, periods of significant systematic short gamma selling saw steepening of the term structure of volatility to c.10-15bp. A still relatively high data dispersion expected under soft landing scenarios, along with high uncertainty, is likely to cap more significant cheapening of gamma vs intermediates.

Positioning

The implications for the volatility grid dynamic from the recent upward revision of the US macroeconomic outlook support most of our recent recommendations:

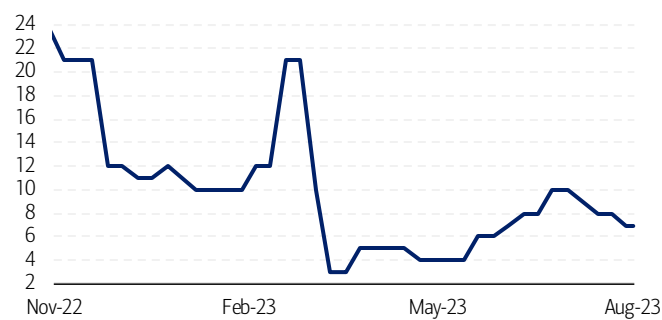
- Short bias on volatility, particularly on the left side of the grid vs the right side. We continue to see fairer levels of 1y10y vs 1y1y volatility in the -20bp to -30bp range (currently -35bp, see [Rates roadmap for a Fed on hold](#)).
- Directionally, we continue to favor receiver spreads in the belly to leverage the downside skew in the balance of risks (i.e., our economists view for roughly 35-40% probability of more pessimistic scenarios) and the potential for the market to reprice those forwards lower toward the neutral rate attractor (3y1y SOFR rates are 30bp higher from the late June levels).

- On the curve, as the Fed anchors the front end (once its shift to an on-hold policy stance – see Exhibit 5), the curve dynamic should be biased toward bull flattening and bear steepening moves. Soft landing scenarios should leave the breakdown between these two modes relatively even, while mini-cycle type scenarios support a higher frequency of bear steepening moves.

The bias for the 2s10s curve over the last 2m, however, has been clearly skewed toward bear steepening (see Exhibit 6). To some extent this supports our view for material probabilities assigned by the market to more optimistic mini-cycle type scenarios vs soft landing. Conditional 2s10s bear steepeners with expiries around 6m pick up to the forwards and leverage the richness of the left side vs the right side of the grid. They are an attractive as a hedge for the persistence of a more significant tilt towards a mini-cycle type dynamic. The position is exposed to bear flattening scenarios (higher Fed terminal) with potentially unlimited downside, but current levels allow for some cushion for those adverse scenarios (c.15bp – see Exhibit 37).

Exhibit 5: Pricing of the first full rate cut

First rate cut priced fully at a 7m horizon currently



Source: BofA Global Research

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- We think long vega positions continue to be attractive as a macro hedge for portfolios. We continue to like adding to these positions at levels c.70bp for 5y30y. Formosa issuance has been low (see Exhibit 65) year-to-date, and it is likely to continue to be low in 2H. That limits the downward pressure on the LRC of the grid and allows for some positive convexity in the payoff profiles of long vega exposures, where vols get bid on better fundamentals directionally with yields, and potentially also on risk-off moves as Bermudan books adjust their hedges in swaption space.
- Broadly, soft-landing scenarios support selling of gamma vs intermediates on inversions like the ones we are seeing currently (see Exhibit 13). We like to fade inversions of more than -5bp for 1y10y vs 1m10y. Short gamma may become a more significant theme with the Fed on hold under forward guidance.

Exhibit 6: Breakdown of the recent 2s10s dynamic between frontend drive moves (bull steepening and bear flattening) and belly/backend driven moves (bull flattening and bear steepening)

Frontend still driving 37% of the curve dynamic over the last month. Bear steepening dynamic has dominated, accounting for c.48% over the last month, and 78% over the last couple of weeks.

	bull-Steep	bear-Flat	bull-Flat	bear-Steep
2w	16%	0%	6%	78%
1m	16%	21%	16%	48%
2m	15%	27%	19%	39%
3m	13%	35%	20%	32%

Source: BofA Global Research

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Levels and Recent Moves

Exhibit 7: ATM Normal Volatility Grid

113bp for 1y10y volatility on Friday's close

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	92	133	136	132	122	115	97
3M	108	135	136	134	126	118	100
6M	127	143	140	131	124	116	99
1Y	148	144	138	127	120	113	97
2Y	137	132	128	120	114	108	91
3Y	129	123	120	113	108	103	87
4Y	121	117	114	108	104	98	84
5Y	115	112	109	104	100	95	81
10Y	91	89	87	83	81	78	67
30Y	63	62	61	58	56	54	49

Source: BofA Global Research

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

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

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-1.5	-1.4	-1.1	-0.6	-0.1	0.5	1.3
3M	-1.3	-1.6	-1.3	-0.5	0.3	0.9	1.8
6M	-1.4	-1.4	-1.1	-0.4	0.4	1.0	1.9
1Y	-1.2	-0.6	-0.2	0.4	1.0	1.4	2.4
2Y	-0.1	0.4	0.6	1.1	1.3	1.7	2.4
3Y	1.0	1.0	1.1	1.3	1.6	2.0	2.7
4Y	1.4	1.5	1.6	1.9	2.1	2.3	2.9
5Y	2.0	2.1	2.1	2.3	2.4	2.5	3.2
10Y	2.2	2.6	2.5	2.4	2.4	2.6	2.9
30Y	1.5	1.9	2.0	2.1	1.5	2.1	2.7

Source: R BofA Global Research

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Exhibit 9: ATM Normal Volatility Grid - CoW

Right side leading the outperformance over the last week

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	3.8	-3.6	0.3	4.1	8.6	13.0	21.8
3M	6.8	-3.3	-1.0	3.0	6.5	10.0	16.6
6M	3.5	0.3	0.6	0.8	4.3	7.9	12.1
1Y	-0.5	0.3	1.6	2.8	4.8	6.7	10.6
2Y	1.1	0.6	1.7	4.1	4.8	5.5	8.3
3Y	3.6	2.7	2.7	2.5	3.6	4.7	7.5
4Y	4.0	3.6	3.7	4.0	4.5	4.9	7.0
5Y	4.5	4.4	4.4	4.5	4.7	4.9	6.7
10Y	3.5	3.8	3.8	3.6	3.6	3.5	3.4
30Y	1.5	1.8	1.7	1.7	1.6	1.5	1.5

Source: BofA Global Research

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Exhibit 10: ATM Straddle Premiums (indicative only)

7.1% straddle premiums for 1y10y

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.2%	0.6%	0.9%	1.4%	1.7%	2.2%	4.1%
3M	0.4%	1.0%	1.5%	2.4%	3.1%	3.9%	7.3%
6M	0.7%	1.5%	2.2%	3.3%	4.2%	5.3%	10.1%
1Y	1.1%	2.1%	3.0%	4.4%	5.6%	7.1%	13.6%
2Y	1.4%	2.6%	3.7%	5.6%	7.2%	9.2%	17.6%
3Y	1.5%	2.9%	4.1%	6.3%	8.1%	10.4%	20.0%
4Y	1.6%	3.0%	4.4%	6.7%	8.6%	11.1%	21.4%
5Y	1.6%	3.1%	4.5%	6.9%	9.0%	11.6%	22.6%
10Y	1.5%	2.9%	4.2%	6.5%	8.6%	11.2%	22.6%
30Y	1.0%	1.9%	2.7%	4.3%	5.7%	7.5%	18.3%

Source: BofA Global Research

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Exhibit 11: 1y10y vol dynamic since the COVID recession

Rich 1y10y vol vs. c.100-120bp expected range for 2023

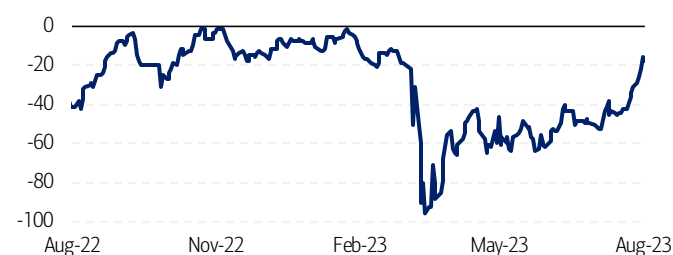


Source: BofA Global Research; Bloomberg

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Exhibit 12: 3m10y vs. 3m2y normal volatility

Left side continued to cheapened vs right side over the last week

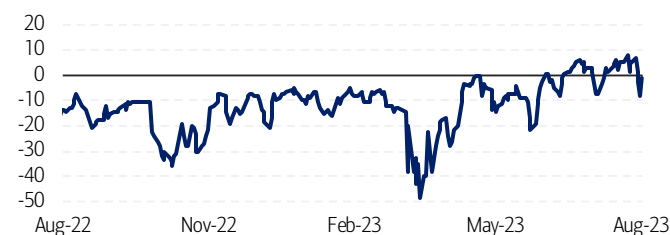


Source: BofA Global Research; Bloomberg

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Exhibit 13: 1y10y vs. 1m10y normal volatility

Vol term structure back to slight inversion

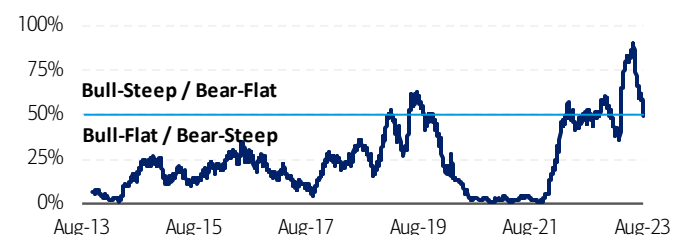


Source: BofA Global Research; Bloomberg

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Exhibit 14: 2s10s curve directionality only 37% frontend driven

Frontend continues to lose 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

Belly and intermediates on the left cheap on 3m Z-Scores

	1y	2y	3y	5y	7y	10y	30y
3m	3.1	3.6	-2.8	-2.1	-0.1	1.6	2.9
6m	0.9	-2.3	-3.3	-3.3	-0.6	2.0	2.4
1y	-2.0	-2.3	-2.2	-3.4	-2.2	1.7	4.2
2y	-1.8	-1.8	-1.9	-1.2	-0.6	1.0	5.1
5y	0.8	0.9	1.3	2.4	3.4	4.4	5.8
10y	2.0	2.9	2.8	2.4	2.7	2.9	3.2

Source: BofA Global Research

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

Belly and intermediates on the left cheap on 6m Z-Scores

	1y	2y	3y	5y	7y	10y	30y
3m	1.6	-1.8	-2.8	-1.7	-1.7	-1.6	0.4
6m	3.1	0.5	-1.1	-1.2	-0.4	-0.2	1.4
1y	1.6	0.7	-0.3	-0.4	0.5	1.0	3.1
2y	-0.8	-0.3	-0.3	0.0	0.8	1.4	2.5
5y	2.1	2.3	2.4	2.6	3.0	3.2	4.0
10y	1.9	2.7	2.5	1.7	2.0	1.9	1.9

Source: BofA Global Research

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

Cheapness on short expiries for 7-10y tails on 1y Z-Scores

	1y	2y	3y	5y	7y	10y	30y
3m	-1.0	0.3	0.7	0.2	-0.9	-1.4	-0.5
6m	1.0	0.6	1.2	-0.1	-1.0	-2.2	-0.2
1y	0.4	-1.2	-1.8	0.0	0.0	-0.8	0.6
2y	0.3	0.0	-0.1	-0.4	0.0	0.1	1.2
5y	1.2	1.3	1.4	1.6	1.7	1.8	3.1
10y	1.3	1.8	1.7	1.4	1.5	1.6	2.4

Source: BofA Global Research

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

Grid broadly fair to cheap with focus of richness in given tenors

	1y	2y	3y	5y	7y	10y	30y
1m	0.6	-0.5	-0.6	0.6	-0.7	-0.7	-0.2
3m	-0.8	-0.3	-1.3	-0.5	-0.4	-0.6	2.3
6m	-1.0	-0.4	-0.3	-0.4	-0.4	-0.6	0.0
1y	-0.6	-0.8	1.8	-0.4	-1.0	0.5	-0.1
2y	-0.3	-0.6	-0.4	-0.2	0.1	-1.3	0.2
3y	0.0	1.0	-0.9	-1.3	0.0	-1.9	0.8
4y	-0.6	1.0	0.1	-0.7	1.6	0.3	-0.9
5y	0.5	0.1	-0.5	-0.2	-0.8	-0.1	-0.5
10y	2.3	1.0	-1.2	1.2	0.4	-0.8	-0.4
15y	0.1	-0.5	2.3	-1.3	0.6	1.6	-0.6
30y	0.5	0.9	0.6	-1.4	-4.4	0.1	1.6

Source: BofA Global Research

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

Left side and belly cheap when directionality is considered

	1y	2y	3y	5y	7y	10y	30y
3m	-1.5	-2.0	-2.3	-2.1	-1.6	-1.1	0.5
6m	-1.7	-2.1	-2.2	-2.2	-1.6	-1.0	0.2
1y	-2.1	-2.1	-1.9	-2.0	-1.6	-0.9	0.8
2y	-1.9	-1.8	-1.8	-1.5	-1.3	-0.9	0.7
5y	-0.7	-0.6	-0.5	-0.2	0.0	0.3	1.8
10y	0.0	0.7	0.6	0.4	0.5	0.7	1.5

Source: BofA Global Research

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

Left side and belly cheap when directionality is considered

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

Source: BofA Global Research

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

Grid broadly cheap when directionality is considered

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

Source: BofA Global Research

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

Grid broadly fair to cheap with focus of richness in given tenors

	1y	2y	3y	5y	7y	10y	30y
1m	-0.5	-0.6	-0.8	0.6	-1.2	-0.9	-0.3
3m	-0.5	-1.0	-1.2	0.3	-0.3	-0.7	2.4
6m	-0.9	-0.5	-0.2	-0.6	-0.7	-0.5	-0.5
1y	-0.7	-0.7	1.8	-0.8	-0.7	0.5	-0.1
2y	-0.3	-0.6	-0.2	-0.4	0.4	-1.3	0.3
3y	0.2	1.1	0.2	-1.2	-0.3	-1.6	0.5
4y	-0.4	1.2	0.3	-0.8	1.8	-0.3	-0.6
5y	0.1	-0.1	-0.3	-0.2	-0.4	-0.4	-0.6
10y	2.4	0.9	-0.9	1.2	-0.1	-0.4	-0.9
15y	-0.2	-0.3	2.5	-2.0	-0.3	1.5	-0.7
30y	0.7	1.0	0.6	-0.9	-4.9	-0.5	1.4

Source: BofA Global Research

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Skew Relative Value

Exhibit 23: Skew 25% delta

Receiver skew cheap on the right side on 3m Z-Scores

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	8.4	8.6	6.4	1.0	-0.9	-1.5	-2.0
3M	12.8	12.9	9.8	2.6	0.3	-1.5	-2.1
6M	15.9	14.0	10.3	3.1	0.6	-1.8	-2.1
1Y	12.4	9.2	6.6	0.4	-1.9	-3.4	-2.2
2Y	-4.0	-4.1	-4.1	-4.7	-4.8	-4.9	-2.4
5Y	-9.2	-8.2	-6.7	-6.2	-5.7	-5.1	-2.4
10Y	-5.8	-5.1	-4.6	-4.6	-4.4	-4.5	-2.5
30Y	-0.7	-0.5	0.0	-0.2	-0.8	-1.0	-0.5

Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 24: Skew 75% delta

Payer skew rich broadly across the grid except short gamma and ULC

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-7.1	-8.6	-5.8	0.1	1.6	2.6	3.0
3M	-12.2	-10.4	-6.2	1.9	4.0	5.4	5.4
6M	-12.4	-8.7	-3.9	3.6	5.8	7.6	7.0
1Y	-6.4	-2.4	0.7	6.7	8.3	9.3	7.4
2Y	9.7	9.9	10.1	10.2	10.1	10.2	7.0
5Y	15.8	15.2	14.3	13.7	12.8	12.2	8.2
10Y	14.9	14.5	14.3	13.9	13.5	13.1	8.1
30Y	13.4	13.2	13.0	12.7	11.6	11.3	7.8

Source: BofA Global Research

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Exhibit 25: Breakeven Widths for Costless Receiver Ladders

108bp breakeven width for 1y10y receiver ladders

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	32	45	44	40	35	33	28
3M	71	84	81	71	64	59	49
6M	118	126	115	99	89	81	68
1Y	177	165	153	129	118	108	94
2Y	186	179	173	160	150	141	124
5Y	228	223	221	211	204	195	173
10Y	256	253	249	238	231	220	198

Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 26: Breakeven Widths for Costless Payer Ladders

134bp breakeven width for 1y10y payer ladders

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	24	36	37	39	37	36	31
3M	46	61	65	71	69	66	57
6M	77	93	96	99	97	95	82
1Y	138	141	141	142	139	134	113
2Y	223	218	213	202	194	186	152
5Y	347	335	324	309	294	280	222
10Y	415	405	398	384	372	359	273

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Receiver skew cheap on the right when directionality accounted for

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-0.4	0.0	0.2	0.1	0.3	0.0	-0.4
3M	0.3	-0.6	-0.8	-1.3	-1.5	-0.9	-0.9
6M	-0.2	-0.3	-0.4	-0.7	-1.3	-1.0	-0.2
1Y	0.7	0.5	-0.9	-0.6	-1.0	-0.1	-0.7
2Y	0.7	1.0	0.2	-0.7	-1.5	-0.4	-0.6
5Y	0.3	-1.1	-1.1	-0.2	-0.3	-0.3	-1.1
10Y	-0.3	-0.5	-0.7	-0.6	-0.7	-0.9	-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 n the right when directionality accounted for

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-0.5	-0.3	0.0	0.4	0.4	0.4	0.3
3M	0.0	0.6	0.3	0.8	0.9	0.7	0.5
6M	-0.1	0.3	0.7	1.6	1.4	1.1	0.9
1Y	-0.5	-0.1	0.4	1.2	1.5	1.5	2.0
2Y	0.1	0.2	0.8	1.2	1.2	0.9	0.9
5Y	-0.1	1.0	0.7	-0.5	0.2	0.6	1.7
10Y	-0.3	-0.3	0.0	-0.2	-0.2	-0.2	-0.4

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Ratios of breakeven widths > 100% except on the ULC

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	73%	80%	84%	99%	105%	107%	110%
3M	65%	73%	80%	100%	107%	112%	117%
6M	66%	74%	83%	100%	109%	117%	120%
1Y	78%	85%	92%	110%	118%	124%	120%
2Y	120%	121%	123%	126%	129%	131%	123%
5Y	152%	150%	146%	146%	144%	144%	129%
10Y	162%	160%	160%	161%	161%	163%	138%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Rich payer virtually across the grid, and particularly on the right

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	1.1	1.6	1.3	1.3	1.7	1.6	2.0
3M	0.9	1.5	1.8	1.6	1.7	1.8	3.0
6M	1.2	1.0	1.9	1.9	2.4	2.1	3.2
1Y	-0.8	-0.2	0.4	3.5	3.8	3.9	4.9
2Y	-1.1	-0.4	0.8	6.4	5.9	5.7	6.6
5Y	-0.5	-0.6	-0.8	0.3	0.9	1.7	2.1
10Y	1.2	0.9	1.1	1.0	0.9	0.8	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	0.7	6.5	12.2	6.0	11.8	6.5
6M	6.5	13.6	20.8	7.7	15.5	8.5
1Y	12.6	21.4	31.3	10.1	21.0	11.6
1.5Y	13.0	23.3	35.8	11.4	24.9	14.2
2Y	12.4	23.9	38.6	12.4	27.8	16.5

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	-0.7	-6.5	-12.2	-6.0	-11.8	-6.5
6M	-6.5	-13.6	-20.8	-7.7	-15.5	-8.5
1Y	-12.6	-21.4	-31.3	-10.1	-21.0	-11.6
1.5Y	-13.0	-23.3	-35.8	-11.4	-24.9	-14.2
2Y	-12.4	-23.9	-38.6	-12.4	-27.8	-16.5

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	-0.7	-6.9	-13.2	-6.3	-12.8	-6.9
6M	-6.5	-14.7	-22.6	-8.5	-17.1	-9.5
1Y	-13.4	-24.1	-34.3	-11.4	-23.1	-13.0
1.5Y	-14.6	-27.1	-39.6	-13.4	-27.6	-16.1
2Y	-14.4	-27.8	-42.5	-14.6	-31.0	-18.5

Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 37: Bear Steepener (pickup to forwards for ATM)

Buy longer maturity payer, sell shorter maturity payer

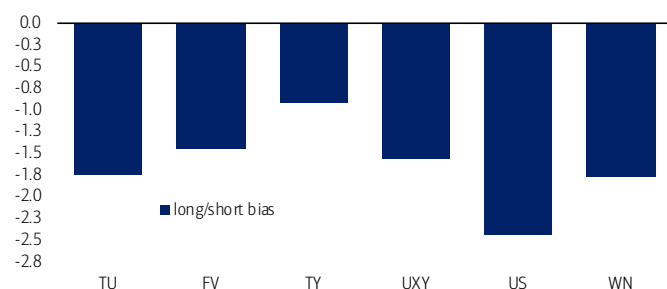
ATM	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	0.7	6.9	13.2	6.3	12.8	6.9
6M	6.5	14.7	22.6	8.5	17.1	9.5
1Y	13.4	24.1	34.3	11.4	23.1	13.0
1.5Y	14.6	27.1	39.6	13.4	27.6	16.1
2Y	14.4	27.8	42.5	14.6	31.0	18.5

Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 39: Analysis of proxies for futures positioning

Short bias across the curve



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	4.0	12.6	20.4	9.3	17.5	9.3
6M	10.8	20.4	29.4	11.0	21.0	11.2
1Y	16.7	27.8	39.2	13.0	25.7	14.0
1.5Y	16.1	28.4	42.3	13.8	29.0	16.3
2Y	14.2	27.4	43.7	14.2	31.5	18.5

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	-4.0	-12.6	-20.4	-9.3	-17.5	-9.3
6M	-10.8	-20.4	-29.4	-11.0	-21.0	-11.2
1Y	-16.7	-27.8	-39.2	-13.0	-25.7	-14.0
1.5Y	-16.1	-28.4	-42.3	-13.8	-29.0	-16.3
2Y	-14.2	-27.4	-43.7	-14.2	-31.5	-18.5

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	2.8	-4.6	-13.8	-7.3	-16.3	-9.7
6M	-5.0	-14.4	-24.9	-9.5	-20.6	-12.2
1Y	-13.4	-25.3	-38.4	-12.8	-27.2	-16.3
1.5Y	-15.3	-29.4	-44.8	-15.1	-32.5	-19.6
2Y	-15.9	-31.2	-48.7	-16.5	-36.2	-22.2

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

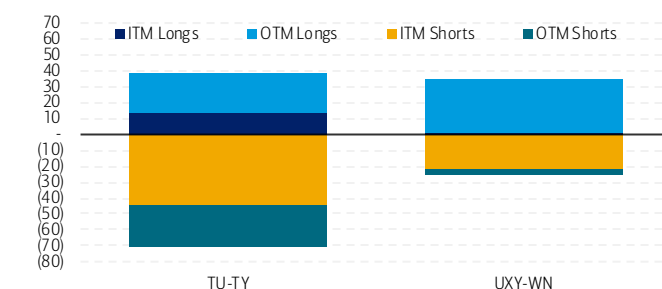
+25bp	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	-2.8	4.6	13.8	7.3	16.3	9.7
6M	5.0	14.4	24.9	9.5	20.6	12.2
1Y	13.4	25.3	38.4	12.8	27.2	16.3
1.5Y	15.3	29.4	44.8	15.1	32.5	19.6
2Y	15.9	31.2	48.7	16.5	36.2	22.2

Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 40: Proxies for futures positioning across the curve

Frontend OTM shorts may put bull steepening pressure on the curve



Source: BofA Global Research

BofA GLOBAL RESEARCH



Forward Volatility

Exhibit 41: 6m Forward Volatility

110.0bp for 6m fwd 1y10y

	1y	2y	5y	10y	30y
1m	133.8	138.4	127.2	112.8	96.2
3m	141.8	140.0	128.2	113.4	96.0
6m	153.2	143.5	127.2	112.2	94.8
1y	138.0	138.5	124.7	110.0	92.3
2y	137.1	131.8	117.4	103.9	87.2
5y	112.3	108.9	100.4	90.7	77.9
10y	86.9	85.1	79.6	74.6	66.0

Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 42: 6m Fwd vol as % ATM

97% of ATM for 6m fwd 1y10y

	1y	2y	5y	10y	30y
1m	146%	104%	97%	98%	99%
3m	131%	104%	96%	96%	96%
6m	121%	100%	97%	97%	96%
1y	94%	96%	98%	97%	95%
2y	100%	99%	98%	96%	95%
5y	97%	97%	96%	95%	96%
10y	96%	96%	95%	96%	99%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

-0.1 Z-Score for 6m fwd 1y10y

	1y	2y	5y	10y	30y
1m	1.6	1.9	0.7	-0.3	-0.6
3m	1.3	2.3	1.0	-0.2	-0.3
6m	1.5	2.0	1.2	0.1	-0.1
1y	1.2	1.1	0.5	-0.1	-0.2
2y	0.7	0.3	-0.3	-0.2	0.0
5y	-0.7	-0.7	-0.7	-0.6	-0.2
10y	-0.5	-0.3	-0.7	-0.9	0.5

Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 44: 1y Forward Volatility

105.0bp for 1y fwd 1y10y

	1y	2y	5y	10y	30y
1m	147.4	141.5	127.7	111.0	91.8
3m	138.4	138.0	126.4	109.9	90.8
6m	137.9	136.6	124.6	108.4	89.4
1y	135.7	132.4	120.4	105.0	86.5
2y	130.9	125.7	112.9	99.4	83.2
5y	107.3	104.5	96.3	86.7	74.2
10y	83.9	82.2	76.9	72.1	63.7

Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 45: 1y Fwd vol as % ATM

93% of ATM for 1y fwd 1y10y

	1y	2y	5y	10y	30y
1m	160%	106%	97%	97%	94%
3m	128%	102%	95%	93%	91%
6m	109%	95%	95%	93%	90%
1y	92%	92%	95%	93%	89%
2y	96%	95%	94%	92%	91%
5y	93%	93%	92%	91%	92%
10y	93%	92%	92%	93%	95%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

-0.1 Z-Score for 1y fwd 1y10y

	1y	2y	5y	10y	30y
1m	1.7	1.6	0.9	0.1	-0.4
3m	1.3	1.6	0.8	-0.1	-0.5
6m	1.3	1.2	0.9	0.1	-0.3
1y	0.8	0.7	0.4	-0.1	-0.6
2y	0.9	0.4	-0.4	-0.2	-0.2
5y	-0.6	-0.6	-0.6	-0.8	-0.5
10y	-0.6	-0.2	-1.1	-1.5	0.4

Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 47: 2y Forward Volatility

95.3bp for 2y fwd 1y10y

	1y	2y	5y	10y	30y
1m	116.6	111.8	105.2	93.4	78.0
3m	118.0	112.9	106.1	94.1	78.7
6m	121.2	114.9	107.2	94.8	79.2
1y	125.8	117.3	108.2	95.3	79.8
2y	117.9	112.9	105.4	91.7	76.9
5y	101.2	99.1	90.9	81.7	69.4
10y	79.9	78.0	73.5	69.0	60.7

Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 48: 2y Fwd vol as % ATM

84% of ATM for 2y fwd 1y10y

	1y	2y	5y	10y	30y
1m	127%	84%	80%	82%	80%
3m	109%	84%	79%	80%	79%
6m	96%	80%	82%	82%	80%
1y	85%	81%	85%	84%	83%
2y	86%	85%	88%	85%	84%
5y	88%	88%	87%	86%	86%
10y	88%	88%	88%	89%	91%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

-0.2 Z-Score for 2y fwd 1y10y

	1y	2y	5y	10y	30y
1m	2.0	1.8	0.6	-0.2	-0.6
3m	1.8	2.2	0.7	-0.3	-0.6
6m	1.9	2.0	0.8	-0.1	-0.4
1y	1.7	1.3	0.0	-0.2	-0.5
2y	1.5	0.6	0.4	0.1	-0.1
5y	0.0	0.2	-0.5	-0.9	-1.2
10y	-1.2	-0.5	-1.8	-2.4	0.0

Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 50: 3y Forward Volatility

91.1bp for 3y fwd 1y10y

	1y	2y	5y	10y	30y
1m	106.2	107.1	102.1	88.0	71.9
3m	111.0	110.4	103.6	89.5	73.4
6m	116.5	113.1	104.8	90.4	74.1
1y	125.0	116.1	105.9	91.1	74.8
2y	113.7	109.3	101.5	88.4	74.1
5y	95.1	92.9	85.4	76.5	64.7
10y	76.7	75.1	70.9	67.0	58.5

Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 51: 3y Fwd vol as % ATM

81% of ATM for 3y fwd 1y10y

	1y	2y	5y	10y	30y
1m	116%	80%	77%	77%	74%
3m	103%	82%	78%	76%	73%
6m	92%	79%	80%	78%	75%
1y	85%	80%	83%	81%	77%
2y	83%	83%	85%	82%	81%
5y	82%	83%	82%	80%	80%
10y	85%	85%	85%	86%	88%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

0.6 Z-Score for 3y fwd 1y10y

	1y	2y	5y	10y	30y
1m	1.8	1.9	1.4	-0.1	-0.8
3m	1.8	2.3	1.9	0.0	-0.8
6m	1.9	2.2	2.1	0.5	-0.5
1y	2.1	1.8	1.7	0.6	-0.3
2y	2.0	1.9	1.4	0.8	0.2
5y	-0.2	-0.1	-1.0	-1.8	-1.7
10y	-1.6	-1.0	-2.9	-2.3	-0.2

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% virtually across the grid

	1y	2y	3y	5y	7y	10y	30y
1m	128%	107%	97%	94%	91%	92%	99%
3m	110%	97%	91%	92%	92%	94%	101%
6m	94%	91%	88%	88%	89%	91%	100%
1y	84%	82%	83%	83%	85%	88%	97%
2y	76%	79%	81%	83%	85%	87%	92%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Ratios of Implied to 63d delivered >100% for gamma and right side

	1y	2y	3y	5y	7y	10y	30y
1m	108%	109%	105%	105%	105%	110%	125%
3m	101%	101%	100%	104%	107%	111%	128%
6m	92%	98%	98%	100%	104%	109%	126%
1y	90%	92%	95%	98%	102%	107%	123%
2y	90%	94%	96%	101%	104%	109%	119%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Ratios of implied/21d delivered cheaper on the right side

	1y	2y	3y	5y	7y	10y	30y
1m	-0.3	-0.7	-0.9	-1.0	-1.1	-1.1	-1.2
3m	-0.1	-0.7	-0.9	-1.1	-1.2	-1.2	-1.4
6m	-0.2	-0.6	-0.9	-1.2	-1.3	-1.4	-1.6
1y	-0.5	-0.8	-1.0	-1.3	-1.5	-1.7	-1.7
2y	-1.4	-1.5	-1.6	-1.8	-1.9	-2.0	-1.9

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Ratios of implied/63d delivered rich across the grid

	1y	2y	3y	5y	7y	10y	30y
1m	1.2	1.1	1.0	0.9	1.0	1.2	1.5
3m	1.5	1.0	0.9	1.0	1.2	1.3	1.4
6m	1.4	1.2	1.1	0.9	1.0	1.0	1.2
1y	1.3	1.1	1.0	0.7	0.7	0.7	1.0
2y	0.2	0.2	0.1	0.1	0.2	0.3	0.7

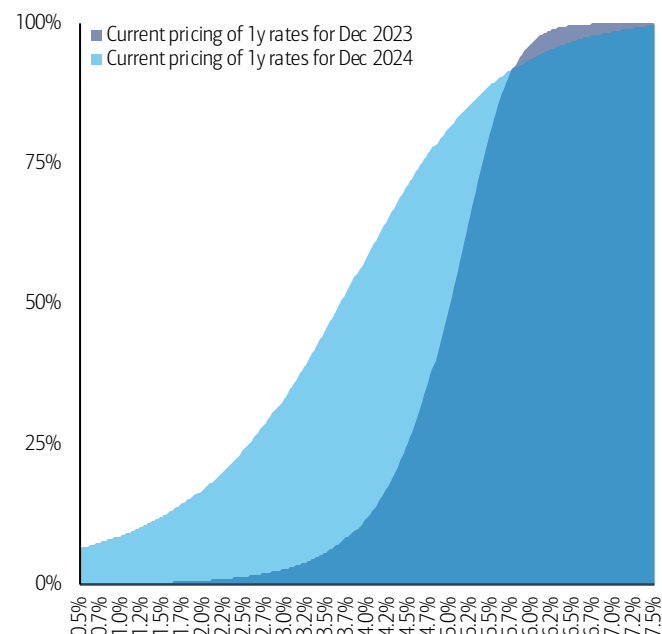
Source: BofA Global Research

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Rates probability distributions

Exhibit 57: CDF for 1y SOFR rates at end-2023 and end-2024

1y rate cumulative distribution functions

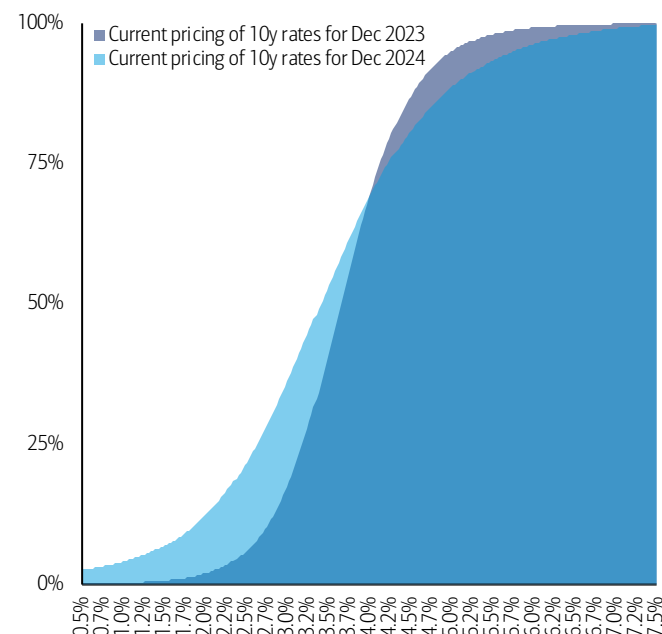


Source: BofA Global Research

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Exhibit 58: CDF for 10y SOFR rates at end-2023 and end-2024

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					250		882			3797
1m	1485	7450	332	200	2780	232	8353		1016	25753
3m	8450	4800		300	1734		5525	135	1308	26682
6m	9322	620	100	240	2612		1669	25	795	16852
1y	8453	8121	540		600	610	2204	898	999	22425
2y		2138	720	100	310		985	93	212	4558
3Y			160		750		1085	240	220	2455
4Y		300			100	170	565	140	25	1300
5Y		73				100	830	80	75	1158
7Y		200					120	150		470
10Y					175		1053	590	280	2098
20Y					100		125	75	240	540
30Y										
	27710	23702	1852	840	9411	1112	23397	2426	5170	108088

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					300		592			7832
1m	1410	4040	240	200	2160	60	4685		1173	15328
3m	910	2840		300	1100	50	5187	180	1083	14243
6m	5505	750	1339	240	2440		1497	25	720	13510
1y	3869	7395	540		600		1869	898	425	15596
2y		1922		100	310		1130	93	101	3656
3Y			160		750		815	240	220	2185
4Y		300		55		170	665	100		1290
5Y		73				100	722	80	175	1150
7Y		200					27	150		377
10Y					175		1173	590		1938
20Y					100		125	75	240	540
30Y										
	11694	17520	2279	895	7935	380	18488	2431	4137	77646

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									50	50
1m		340					301		120	761
3m		250					100			350
6m	460	100			390		245		110	1305
1y	500		10		100				115	725
2y					100				25	125
3Y							90			140
4Y							200	120		320
5Y										
7Y							75		113	188
10Y										
20Y										
30Y										
	960	690	10		590		1011	120	533	3964

Source: BofA Global Research; SDR, Bloomberg

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Formosa issuance

Exhibit 62: 2022 Formosa issuance (\$m)

14.8bn total issuance for the year '22

	2	5	7	10	15	20	25	30
1			75	513	20			
2		40		640				
3				110	20			125
4		15		179	50			
5				20	45	220	80	10,226
7			30					
10				2,000				363
15								
20								
25								
30								

Source: BofA Global Research, Bloomberg

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Exhibit 63: 2023 Formosa issuance YTD (\$m)

Very limited issuance YTD

	2	5	7	10	15	20	25	30
1								
2				340				
3		40						
4		205		240				
5				135		15	15	
7								
10								25
15								
20								
25								
30								1000

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		205	75	1033	462	840		18054
2		40		1134		1485		22177
3		40		110	20	240	225	15536
4		220		419	50	25	275	2441
5				155	445	1512	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.\$2.02bn)



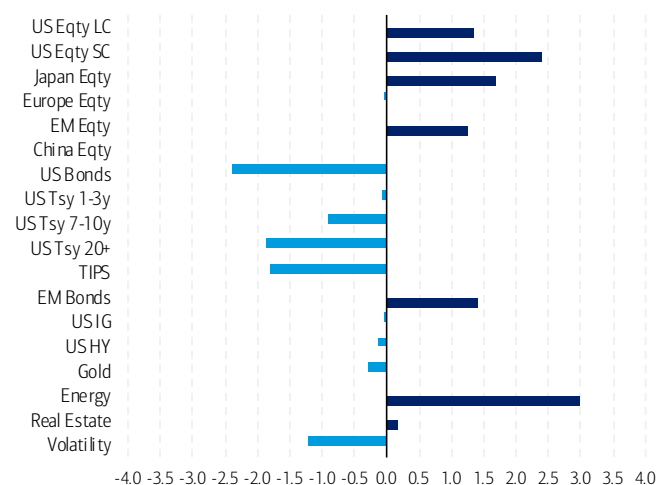
Source: BofA Global Research, Bloomberg

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Allocation bias from ETF flows

Exhibit 66: Allocation bias from ETF flows – week ending 8/4

Short equity vol decreased as short duration bias increased

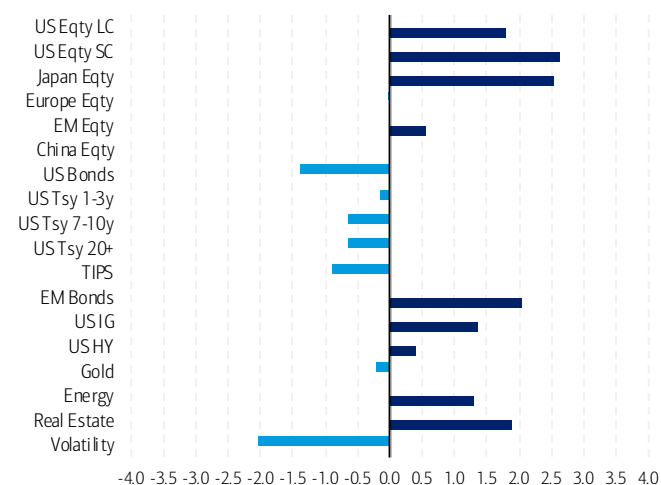


Source: BofA Global Research

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Exhibit 67: Allocation bias from ETF flows – week ending 7/28

Risk on bias suggested by proxies of position obtained from ETFs



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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