

US Rates Watch

Vol views – Perfect storm continues

Perfect storm for rates volatility persists

Rates volatility continues to be supported by: (1) uncertainty around the policy path, with recent Fed communication on the appropriateness of one or several 50bp hikes near-term lending further support to the left side of the grid; (2) newsflow around the geopolitical risks which have been reflected in higher gamma and deep inversions of the term structure of volatility (see Exhibit 7); and (3) the pricing of a significantly higher level of uncertainty around the outlook and potentially also some risk for a change in paradigm on longer term inflation, which have offered broad support for right side vol.

Generally one would expect left side vol to subside as the Fed starts to deliver on the policy path, particularly in the current context where the policy path is virtually fully priced in (Exhibit 1 shows a level of un-anchoring of 2yT vs fed funds similar to the one seen ahead of the '04 and '94 tightening cycles). However, recent comments on the appropriateness of 50bp moves continue to support left side vol (c.20-30 normals higher over the last week – see Table 1).

There is some propensity to compare current tightening expectations to the '94 tightening cycle. The Fed hiked aggressively from 3% to 6% in '94-'95, only to deliver 3 cuts subsequently (similarly to what is priced currently in the curve dynamic, with bull steepening at a 2-3y horizon – see [2s10s curve reflects recession risks](#)). The comparison may be slightly misguided. In '94 the spot 2s10s curve did not follow the forwards into an inversion. Yet, the degree of overshoot of neutral expected in this cycle is likely to drive a significant inversion of the curve (we expect 50bp inversion by year-end '22 - see [Fed fanning flames for fifty = further flattening](#)) with implications for the dynamic of rates and the broader economy (see [Curve inversions and late-cycle transitions](#)).

Higher recession risks implied by a Fed forced into a risk management approach on near-term inflation widen the range of outcomes medium term (see [Medium-term outcomes and trades](#)) and support right side vol. However, the right side of the grid has also been supported by higher risks of a shift in paradigm on longer term inflation, and the potential for an upgrade of the neutral rate view. The recent decoupling between the Fed's view on the neutral (proxied by the median of the longer run Fed dots) and 5y5y inflation is noteworthy (see Exhibit 2). It likely reflects the view for a persistence of the post-'14 regime and material structural downside forces on longer-run inflation for longer. However, record levels for 10y inflation breakevens (c.298bp closing on Friday) may reflect a market pricing a higher probability of a regime shift on inflation, which adds support for right side vol.

Volatility RV

Volatility looks rich on PCA Z-Scores, particularly around the LLC-URC axis when the directionality with rates is taken into account (see Table 8). Receiver skew looks cheap virtually across the grid (see Table 15), with the exception of 6m-1y expiries on the left side. Payer skew is fair/rich across the grid, with richness particularly evident in longer tails (see Table 16).

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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

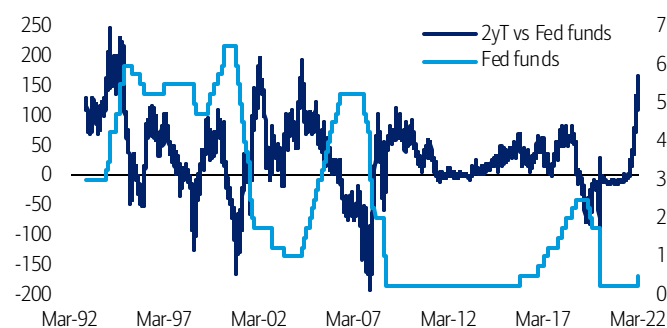
For a list of recent recommendations please see our [Global Rates Weekly](#)

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Timestamp: 28 March 2022 06:30AM EDT

Exhibit 1: 2yT cheapening vs fed funds

Fastest un-anchoring of 2yT vs fed funds since '04

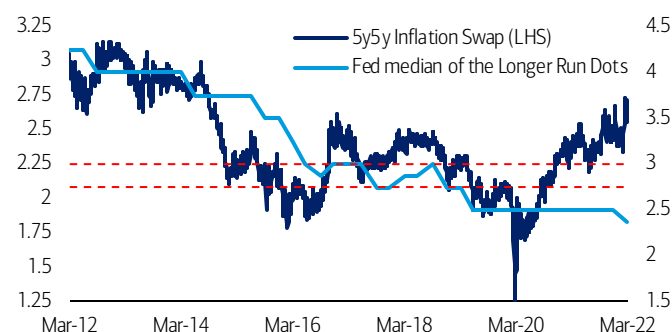


Source: BofA Global Research; Bloomberg

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Exhibit 2: 5y5y inflation vs neutral rate expectations

Recent decoupling of neutral view (median of LT Fed dot) vs. 5y5y inflation



Source: BofA Global Research; Bloomberg

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The persistent outperformance of the left vs. the right side (see Table 1 & Exhibit 6) continues to drive picks to the forwards in conditional bull flatteners & bear steepeners (which sell left side vol vs right side - Exhibit 9 & Exhibit 15), and gives to the forwards in conditional bull steepeners & bear flatteners (which buy left side vol vs right side - Exhibit 11 & Exhibit 13). Fwd vol continues to be discounted vs ATM (see Table 26) but look relatively fair across horizons (on Z-Scores for the ratio to fwd to ATM vol - see Table 27). Implieds look cheap vs 1m delivered (see Table 33) but rich vs 3m delivered on the right side and intermediate expiries on the left side (see Table 34).

Swaption volumes continue to be skewed towards payers (see Exhibit 19). Formosa issuance is running at 11.5bn ytd, vs 15bn over the same period in '21 (see Exhibit 25). Longer dated vega has been resilient to issuance (5y30y reaching 74.8bp, not seen since late-'16) driven by uncertainty and some potential for repricing the neutral rate view. We continue to like structural long vega positions in portfolios, but current levels are unattractive to add.

Trade recommendations

In [10yT yields vs. US macro fundamentals](#) we argued for a 10yT fair range of 2.05-2.7%, which creates scope for consolidation near-term. 10yT levels around 2.7% would imply a market trading significantly ahead of fundamentals, and neglecting geopolitical risks altogether. On a side note, while geopolitical risks should drive some richness to fundamentals, we see only c.10bp of downward pressure from risk sentiment in the recent 10yT dynamic, and that is more than offset by more than 40bp of upward pressure from supply/demand and monetary policy shocks.

A consolidation process may help fade some of the significant distortions on the grid. We fall short of recommending positions that leverage this fade just yet, however, given the persistence of high levels of uncertainty (not least of which around the regime for longer term inflation, which would imply a significant upgrade for the neutral rate view and the fair value range for rates)

Our bias continues to be to hedge against downside risks, a sooner than expect transition into a late cycle dynamic (see [Curve inversions and late-cycle transitions](#)), higher recession probabilities in early-'23, and deeply inverted curves at that horizon. We recommended recently buying [1y1y payers vs. selling 3y1y payers \(report\)](#), currently 7bp - risk a dovish Fed repricing near-term, and hawkish medium term, with potentially unlimited downside. We continue to like holding the position, although leveraging 50bp scenarios by shifting the long leg towards shorter expiry payers (around 6m) makes sense also. As discussed here: [18m fwd 2s10s bull flattener](#) continue to be attractive (currently 2bp - risk is a material dovish repricing of the Fed path near-term), although we acknowledge that selling vol anywhere on the grid under the current uncertainty is a difficult proposition, we continue to like the position.



Levels and Recent Moves

Exhibit 3: ATM Normal Volatility Grid

105.7bp for 1y10y volatility, above 100bp except on LRC

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	137.7	145.6	145.6	145.7	137.4	127.8	112.4
3M	133.0	143.3	142.5	140.3	131.3	121.0	107.1
6M	138.9	142.0	139.8	133.1	123.0	111.9	99.0
1Y	146.4	139.8	136.8	127.9	116.3	105.7	93.6
2Y	141.3	133.9	128.2	117.5	107.9	99.1	86.8
3Y	131.0	124.8	119.7	110.4	102.6	94.8	82.5
4Y	122.1	116.8	112.5	104.5	98.4	91.7	79.5
5Y	113.5	109.1	105.5	98.8	94.2	88.6	76.6
10Y	87.7	86.0	84.2	80.7	77.9	74.4	63.6
30Y	64.3	63.0	61.7	59.2	57.1	54.6	46.6

Source: BofA Global Research

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Exhibit 4: ATM Volatility Grid - 3m Z-Scores

Grid rich on 3m Z-Scores

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	1.5	1.8	2.0	2.6	2.6	2.6	3.1
3M	1.5	2.1	2.4	3.2	3.3	3.2	4.0
6M	1.8	2.3	2.5	3.3	3.3	3.2	4.0
1Y	2.3	2.4	2.5	3.3	3.1	2.8	3.1
2Y	2.8	3.0	3.0	3.0	2.8	2.5	2.5
3Y	3.0	3.1	3.0	3.0	2.8	2.4	2.4
4Y	3.0	3.1	3.0	3.0	2.8	2.5	2.4
5Y	3.0	3.0	3.0	2.9	2.7	2.5	2.4
10Y	2.9	2.8	2.8	2.7	2.5	2.4	2.3
30Y	3.0	2.9	2.8	2.7	2.6	2.4	2.3

Source: BofA Global Research

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Table 1: ATM Normal Volatility Grid - CoW

Belly outperformed on the grid over the last week

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	38.0	40.8	42.3	46.8	41.3	34.5	30.3
3M	27.8	36.8	37.4	39.2	33.9	27.4	24.2
6M	29.2	35.6	34.8	32.6	27.3	21.3	18.8
1Y	29.3	28.5	28.5	28.4	22.4	16.9	14.5
2Y	27.9	25.4	23.7	20.6	16.4	12.7	10.6
3Y	23.5	20.9	19.4	16.4	13.5	10.5	9.1
4Y	19.5	17.5	16.2	13.8	11.8	9.6	8.3
5Y	16.2	14.7	13.7	11.7	10.4	8.7	7.6
10Y	9.1	8.2	7.7	7.0	6.3	5.5	4.7
30Y	6.9	6.2	5.9	5.3	4.8	4.2	3.6

Source: BofA Global Research

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Table 2: ATM Straddle Premiums

7.2% straddle premiums for 1y10y

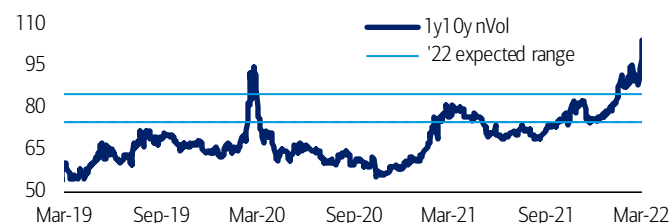
	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.3%	0.6%	0.9%	1.5%	2.0%	2.5%	5.4%
3M	0.5%	1.1%	1.6%	2.6%	3.3%	4.2%	9.0%
6M	0.8%	1.5%	2.2%	3.5%	4.4%	5.5%	11.7%
1Y	1.1%	2.1%	3.0%	4.6%	5.7%	7.2%	15.4%
2Y	1.5%	2.8%	3.9%	5.9%	7.4%	9.3%	19.8%
3Y	1.6%	3.1%	4.4%	6.6%	8.4%	10.6%	22.6%
4Y	1.7%	3.3%	4.7%	7.0%	9.1%	11.6%	24.6%
5Y	1.8%	3.3%	4.8%	7.3%	9.5%	12.3%	26.0%
10Y	1.7%	3.3%	4.8%	7.5%	9.9%	13.0%	28.0%
30Y	1.5%	2.8%	4.1%	6.5%	8.6%	11.6%	25.8%

Source: BofA Global Research

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Exhibit 5: 1y10y normal vol

Vol > 75-85bp top end of the expected range in '22

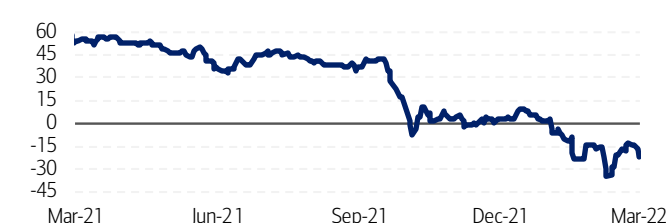


Source: BofA Global Research; Bloomberg

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Exhibit 6: 3m10y vs. 3m2y Normal Volatility

Left side vol continues to outperform the right side

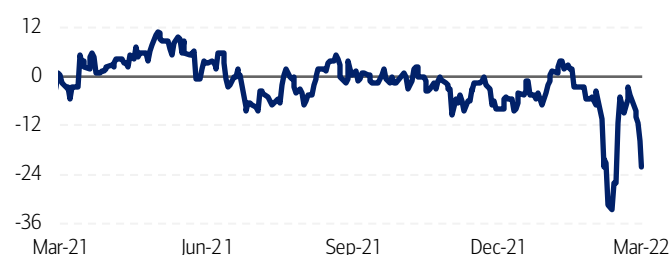


Source: BofA Global Research; Bloomberg

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Exhibit 7: 1y10y vs. 1m10y Normal Volatility

Back to extreme inversions of term structure of volatility



Source: BofA Global Research; Bloomberg

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Exhibit 8: 2s10s curve directionality 44% dictated by frontend

Un-anchoring of frontend since Oct-'21



Source: BofA Global Research

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Volatility Grid Relative Value

PCA Z-SCORES

Table 3: 3m Z-Scores w/ PCA framework

Some cheapness on left side on 3m Z-Scores

	1y	2y	3y	5y	7y	10y	30y
3m	-6.2	1.7	-1.0	-0.4	-3.5	-8.8	0.9
6m	-1.2	6.5	5.9	4.9	3.5	-1.0	3.1
1y	-4.4	-1.3	-0.9	6.9	5.2	3.4	3.5
2y	-1.8	-1.1	0.2	2.7	0.9	0.5	1.6
5y	-1.0	-1.5	-1.1	-0.1	-0.4	0.2	0.0
10y	-0.3	-1.9	-1.7	-0.9	-0.7	-0.5	-0.2

Source: BofA Global Research

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Table 5: 6m Z-Scores w/ PCA framework

Grid fair/ cheap almost across the grid, some richness in 5y and 7y

	1y	2y	3y	5y	7y	10y	30y
3m	0.4	-2.4	-2.5	2.5	1.8	-1.1	2.4
6m	2.4	1.1	-0.1	5.2	2.6	-1.7	1.7
1y	-0.8	-2.9	-2.3	8.4	4.0	0.2	-1.4
2y	-0.8	0.5	1.3	2.2	-0.2	-1.9	-0.6
5y	-0.4	-0.9	-1.1	-1.3	-2.1	-3.1	-1.6
10y	-0.9	-1.9	-2.2	-2.5	-2.6	-2.5	1.0

Source: BofA Global Research

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Table 7: 1y Z-Scores w/ PCA framework

Richness belly gamma and intermediates on right side on 1y Z-Scores

	1y	2y	3y	5y	7y	10y	30y
3m	-2.7	-3.7	0.2	5.6	4.3	2.5	1.1
6m	-5.2	-0.7	2.7	7.1	4.7	1.1	-0.5
1y	-0.3	0.0	1.8	7.5	3.0	-2.9	-3.0
2y	2.3	3.2	3.3	1.7	-1.9	-6.1	-5.8
5y	0.7	0.1	-1.0	-3.3	-5.0	-6.4	-5.9
10y	-3.5	-3.8	-4.3	-4.7	-4.6	-4.8	-4.5

Source: BofA Global Research

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Table 9: 3m Z-Scores w/ modified PCA framework...

Granular approach shows richness virtually across the grid...

	1y	2y	3y	5y	7y	10y	30y
1m	0.8	0.7	2.2	1.9	2.3	3.0	0.6
3m	2.3	3.2	1.7	0.8	1.7	2.5	1.2
6m	2.6	3.0	2.5	3.2	3.1	2.9	3.3
1y	3.1	2.8	3.2	4.5	5.5	2.9	2.9
2y	3.7	4.2	4.1	4.6	4.2	4.5	3.3
3y	2.6	0.9	1.5	2.1	0.6	1.1	2.5
4y	1.3	-0.9	0.5	2.5	0.6	1.4	1.5
5y	1.8	3.7	-0.2	0.8	1.6	2.3	1.7
10y	1.8	1.8	1.9	1.0	-0.2	0.6	1.1
15y	-0.1	-0.9	2.3	3.0	-0.6	-4.2	1.6
30y	3.2	3.0	0.6	0.8	1.8	2.2	-0.8

Source: BofA Global Research

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Table 4: 3m Z-Scores w/ PCA framework w/o rates directionality

Grid rich when directionality take into account

	1y	2y	3y	5y	7y	10y	30y
3m	0.6	2.7	3.4	5.6	5.3	4.8	5.9
6m	1.1	2.9	3.6	6.7	6.1	5.1	6.0
1y	2.2	2.7	3.6	7.0	5.7	4.2	4.1
2y	4.6	5.7	6.1	6.2	4.5	2.9	2.6
5y	5.4	5.5	5.6	4.9	3.9	2.9	2.1
10y	4.2	3.9	3.9	3.6	3.1	2.3	1.7

Source: BofA Global Research

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

Grid rich (particularly LL and UR) when directionality take into account

	1y	2y	3y	5y	7y	10y	30y
3m	-0.2	1.6	2.3	4.7	4.9	4.4	5.3
6m	0.4	1.9	2.6	5.2	5.0	4.2	5.2
1y	1.7	1.9	2.6	5.1	4.2	3.0	3.3
2y	3.2	4.0	4.1	4.2	3.3	2.1	1.7
5y	3.8	3.7	3.6	3.1	2.7	2.0	1.6
10y	3.4	2.8	2.7	2.5	2.2	1.7	1.8

Source: BofA Global Research

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Table 8: 1y Z-Scores w/ PCA framework w/o rates directionality

Richness on LLC and UPR when directionality removed

	1y	2y	3y	5y	7y	10y	30y
3m	-1.7	-0.9	-0.1	2.6	2.9	2.3	1.6
6m	-1.6	-0.7	0.5	2.8	2.6	1.7	1.0
1y	-0.7	-0.1	1.0	3.0	2.0	1.0	0.4
2y	1.6	2.4	2.6	2.3	1.3	0.2	-0.4
5y	2.4	2.2	1.7	0.9	0.4	-0.1	-0.4
10y	0.7	0.6	0.5	0.1	-0.1	-0.5	-0.6

Source: BofA Global Research

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Table 10: ...and w/o directionality with rates

...persisting as directionality with rates is removed

	1y	2y	3y	5y	7y	10y	30y
1m	0.7	2.0	2.4	1.9	2.4	3.0	0.6
3m	2.5	3.3	1.8	1.1	1.7	1.9	1.3
6m	2.7	3.0	2.5	3.3	3.9	3.1	2.5
1y	3.0	2.9	3.2	4.6	5.5	3.0	3.5
2y	3.7	4.1	4.3	4.6	4.4	4.4	3.7
3y	2.7	1.0	0.9	2.8	0.7	1.1	2.6
4y	1.1	0.8	0.7	2.2	0.6	1.6	1.5
5y	2.0	3.8	-0.3	1.3	1.5	1.4	1.7
10y	2.1	1.9	2.0	1.0	1.1	0.3	0.0
15y	-0.4	-1.0	2.5	3.2	-0.7	-2.8	2.4
30y	3.0	3.1	0.7	0.6	2.0	2.4	-0.8

Source: BofA Global Research

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Skew Relative Value

Table 11: Skew 25% delta

Receiver skew RV cheap on the LLC

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-4.6	-4.3	-3.9	-3.2	-2.4	-1.5	0.9
3M	-3.8	-3.7	-3.4	-2.9	-2.3	-1.6	1.5
6M	-3.9	-3.6	-3.3	-2.6	-1.9	-1.1	2.2
1Y	-5.7	-5.1	-4.8	-3.9	-2.9	-1.9	1.6
2Y	-6.6	-5.9	-5.2	-4.0	-2.7	-1.2	1.8
5Y	-8.8	-7.1	-5.8	-3.4	-2.1	-0.6	2.0
10Y	-3.5	-2.3	-1.4	0.3	0.9	1.6	2.7
30Y	-0.4	0.4	1.2	2.4	2.7	3.0	4.5

Source: BofA Global Research

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Table 12: Skew 75% delta

Payer skew RV shows richness virtually across the grid

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	6.8	6.7	6.3	5.7	4.8	3.8	1.2
3M	8.3	8.6	8.4	7.8	7.0	5.9	2.5
6M	10.6	10.5	10.1	9.2	8.1	6.8	3.0
1Y	13.3	12.5	12.0	10.7	9.4	8.0	4.0
2Y	13.9	12.9	12.1	10.6	9.0	7.3	3.8
5Y	14.7	13.3	12.2	10.0	8.8	7.3	4.1
10Y	11.2	10.3	9.4	7.7	7.0	6.2	3.9
30Y	11.1	10.2	9.3	7.8	7.2	6.4	4.1

Source: BofA Global Research

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Table 13: Breakeven Widths for Costless Receiver Ladders

102bp breakeven width for 1y10y receiver ladders

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	37	40	40	40	38	36	33
3M	64	70	69	69	65	60	56
6M	95	97	96	92	85	79	74
1Y	137	131	130	122	111	102	96
2Y	186	177	170	158	147	138	128
5Y	226	221	217	210	204	197	180
10Y	260	260	260	258	252	245	218

Source: BofA Global Research

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Table 14: Breakeven Widths for Costless Payer Ladders

123bp breakeven width for 1y10y payer ladders

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	43	46	45	45	42	39	33
3M	76	82	82	80	74	68	57
6M	115	118	115	109	100	90	75
1Y	176	168	163	152	137	123	102
2Y	245	231	220	200	180	162	134
5Y	334	316	300	272	255	234	190
10Y	364	349	335	309	295	278	226

Source: BofA Global Research

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Table 15: 3m Z-Score Receiver Skew (w/o direction w/ fwdts & ATM)

Cheapness across the grid except 6m-1y expiries on left side

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-1.1	-1.1	-1.2	-1.6	-1.8	-1.8	-1.9
3M	-0.4	-0.4	-0.6	-1.1	-1.5	-2.0	-1.9
6M	0.9	0.4	0.8	0.1	-0.3	-1.5	-1.8
1Y	0.8	0.7	1.6	0.8	-0.9	-2.1	-2.2
2Y	0.0	-0.4	-0.7	-1.5	-1.3	-0.7	-1.3
5Y	-1.6	-1.8	-1.8	-1.4	-1.3	-1.0	-1.2
10Y	-1.8	-1.7	-1.6	-0.5	-0.3	-0.1	-0.9

Source: BofA Global Research

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Table 16: 3m Z-Score Payer Skew (w/o direction w/ fwdts & ATM)

Payer skew fair to rich across the grid, particularly right side

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.8	1.1	1.1	1.2	1.1	1.1	1.0
3M	0.7	0.6	0.7	1.2	1.5	2.0	2.2
6M	0.1	-0.2	-0.1	0.3	0.6	1.2	2.0
1Y	-0.5	-0.4	-0.4	-0.1	-0.5	1.4	2.0
2Y	0.1	0.2	0.4	-0.2	0.0	-0.2	0.7
5Y	0.0	0.2	0.3	0.6	0.7	0.8	1.5
10Y	0.3	0.2	0.0	-0.8	-0.7	-0.5	2.1

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 17: Ratio of Payer/Receiver BE widths for Costless Ladders

Ratios of breakeven widths above 100% across the grid

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	117%	115%	114%	112%	110%	108%	101%
3M	119%	118%	117%	116%	114%	113%	102%
6M	122%	121%	120%	118%	118%	114%	102%
1Y	129%	128%	126%	124%	123%	120%	106%
2Y	132%	131%	129%	127%	122%	117%	104%
5Y	148%	143%	139%	130%	125%	119%	105%
10Y	140%	134%	129%	120%	117%	113%	104%

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 18: 3m Z-Score Ratio of Payer/Receiver Skew

Z-Scores show fair/rich payer skew except for intermediates on left side

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	1.0	0.8	0.9	0.8	0.8	0.6	0.7
3M	0.0	0.3	0.5	0.8	0.9	1.0	1.2
6M	-0.8	-0.6	-0.3	-0.1	0.5	0.1	1.2
1Y	-0.2	0.0	0.0	0.4	1.7	1.8	2.9
2Y	-0.8	-0.7	-0.4	0.4	0.0	0.2	2.1
5Y	3.3	3.7	4.0	4.1	3.9	3.3	4.6
10Y	3.1	3.4	3.9	1.5	1.0	0.5	1.6

Source: BofA Global Research

BofA GLOBAL RESEARCH

Conditional Curve Trades

Exhibit 9: Bull Flatteners (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	1.1	8.1	13.0	7.1	12.0	5.4
6M	4.6	15.1	21.4	10.8	17.3	6.9
1Y	8.5	23.3	31.3	15.7	24.1	9.1
1.5Y	12.8	29.2	39.2	17.5	28.0	11.2
2Y	16.5	33.7	45.0	18.5	30.6	13.2

Source: BofA Global Research

BoFA GLOBAL RESEARCH

Exhibit 11: 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	-1.1	-8.1	-13.0	-7.1	-12.0	-5.4
6M	-4.6	-15.1	-21.4	-10.8	-17.3	-6.9
1Y	-8.5	-23.3	-31.3	-15.7	-24.1	-9.1
1.5Y	-12.8	-29.2	-39.2	-17.5	-28.0	-11.2
2Y	-16.5	-33.7	-45.0	-18.5	-30.6	-13.2

Source: BofA Global Research

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Exhibit 13: Bear Flatteners (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	-1.3	-8.7	-13.2	-7.5	-12.2	-5.4
6M	-5.2	-16.3	-21.4	-11.8	-17.5	-6.9
1Y	-9.7	-25.7	-32.1	-17.3	-24.7	-9.3
1.5Y	-14.7	-31.9	-39.9	-19.4	-28.6	-11.6
2Y	-18.8	-36.6	-45.8	-20.2	-31.3	-13.4

Source: BofA Global Research

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Exhibit 15: Bear Steepener (pickup to forwards for ATM)

Buy longer maturity payer, sell shorter maturity payer

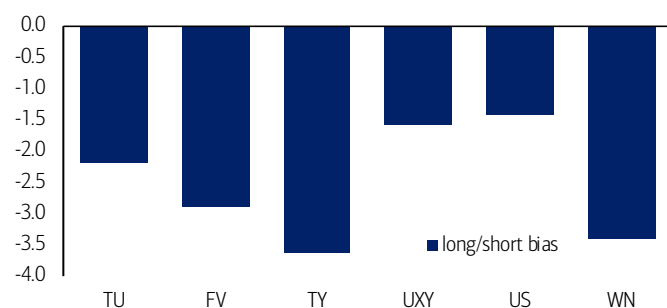
ATM	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	1.3	8.7	13.2	7.5	12.2	5.4
6M	5.2	16.3	21.4	11.8	17.5	6.9
1Y	9.7	25.7	32.1	17.3	24.7	9.3
1.5Y	14.7	31.9	39.9	19.4	28.6	11.6
2Y	18.8	36.6	45.8	20.2	31.3	13.4

Source: BofA Global Research

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Chart 1: Analysis of proxies for futures positioning

Short bias across the curve



Source: BofA Global Research

BoFA GLOBAL RESEARCH

Exhibit 10: Bull Flatteners (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	1.3	10.4	16.3	9.3	15.3	6.3
6M	5.6	18.3	25.5	13.4	20.8	7.9
1Y	9.7	27.1	36.0	18.3	27.6	10.1
1.5Y	14.4	32.9	43.8	19.8	31.3	12.4
2Y	18.3	37.4	49.7	20.6	33.9	14.4

Source: BofA Global Research

BoFA GLOBAL RESEARCH

Exhibit 12: 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	-1.3	-10.4	-16.3	-9.3	-15.3	-6.3
6M	-5.6	-18.3	-25.5	-13.4	-20.8	-7.9
1Y	-9.7	-27.1	-36.0	-18.3	-27.6	-10.1
1.5Y	-14.4	-32.9	-43.8	-19.8	-31.3	-12.4
2Y	-18.3	-37.4	-49.7	-20.6	-33.9	-14.4

Source: BofA Global Research

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Exhibit 14: Bear Flatteners (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	-1.9	-12.2	-19.0	-10.6	-17.7	-8.5
6M	-6.7	-21.0	-28.4	-15.3	-23.5	-10.3
1Y	-11.8	-31.2	-39.7	-21.2	-31.2	-12.8
1.5Y	-17.3	-37.8	-47.9	-23.3	-35.1	-15.1
2Y	-21.8	-42.5	-53.8	-24.1	-37.6	-16.9

Source: BofA Global Research

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Exhibit 16: Bear Steepener (pickup to forwards for +25bp OTM)

Buy longer maturity payer, sell shorter maturity payer

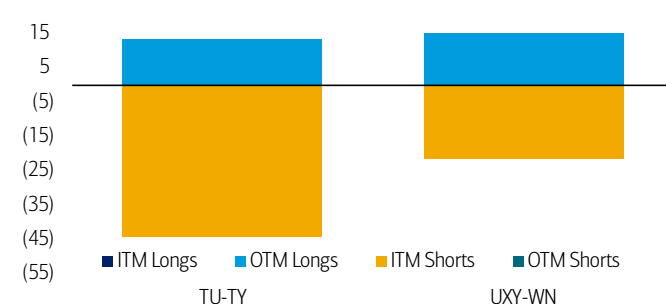
+25bp	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	1.9	12.2	19.0	10.6	17.7	8.5
6M	6.7	21.0	28.4	15.3	23.5	10.3
1Y	11.8	31.2	39.7	21.2	31.2	12.8
1.5Y	17.3	37.8	47.9	23.3	35.1	15.1
2Y	21.8	42.5	53.8	24.1	37.6	16.9

Source: BofA Global Research

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Chart 2: Proxies for futures positioning across the curve

Frontend ITM shorts may expose curve to bull steepening



Source: BofA Global Research

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Forward Volatility

Table 19: 6m Forward Volatility

94.1bp for 6m fwd 1y10y

	1y	2y	5y	10y	30y
1m	132.3	124.4	115.3	95.3	84.7
3m	135.2	126.9	117.0	96.0	85.3
6m	135.2	126.1	115.4	95.0	84.1
1y	134.7	126.5	112.5	94.1	82.1
2y	128.3	121.7	106.8	90.5	77.8
5y	106.2	102.4	91.9	82.5	70.4
10y	81.8	80.2	75.5	69.7	59.1

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 20: 6m Fwd vol as % ATM

95% of ATM for 6m fwd 1y10y

	1y	2y	5y	10y	30y
1m	108%	95%	91%	83%	84%
3m	110%	100%	94%	87%	87%
6m	105%	99%	97%	92%	92%
1y	100%	99%	96%	95%	94%
2y	98%	98%	98%	97%	95%
5y	99%	99%	99%	98%	96%
10y	98%	98%	98%	98%	97%

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 21: 3m Z-Score of 6m Fwd vol % ATM

0.1 Z-Score for 6m fwd 1y10y

	1y	2y	5y	10y	30y
1m	0.1	0.2	0.1	-0.3	-0.2
3m	0.3	0.3	0.1	-0.2	-0.2
6m	0.1	0.2	0.2	0.0	0.0
1y	0.4	0.3	0.2	0.1	0.1
2y	0.3	0.3	0.3	0.2	0.2
5y	0.3	0.3	0.3	0.2	0.2
10y	0.2	0.2	0.2	0.2	0.2

Source: BofA Global Research

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Table 22: 1y Forward Volatility

92.6bp for 1y fwd 1y10y

	1y	2y	5y	10y	30y
1m	137.9	128.7	114.2	95.4	82.3
3m	139.4	129.6	113.6	95.4	81.8
6m	138.8	129.0	112.4	94.8	80.9
1y	139.6	127.3	109.7	92.6	78.4
2y	124.9	119.5	105.4	89.5	75.6
5y	104.4	101.0	91.3	81.4	68.4
10y	80.5	78.9	74.3	68.4	57.5

Source: BofA Global Research

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Table 23: 1y Fwd vol as % ATM

94% of ATM for 1y fwd 1y10y

	1y	2y	5y	10y	30y
1m	112%	99%	90%	83%	82%
3m	113%	102%	91%	87%	84%
6m	108%	102%	94%	92%	89%
1y	104%	100%	94%	94%	90%
2y	96%	96%	97%	95%	92%
5y	98%	98%	98%	97%	94%
10y	96%	96%	96%	96%	94%

Source: BofA Global Research

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Table 24: 3m Z-Score of 1y Fwd vol % ATM

0.2 Z-Score for 1y fwd 1y10y

	1y	2y	5y	10y	30y
1m	0.3	0.3	0.2	-0.1	-0.2
3m	0.4	0.4	0.1	-0.1	-0.1
6m	0.3	0.4	0.2	0.1	0.0
1y	0.6	0.5	0.2	0.2	0.1
2y	0.3	0.3	0.3	0.3	0.2
5y	0.3	0.4	0.3	0.3	0.2
10y	0.2	0.2	0.2	0.2	0.2

Source: BofA Global Research

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Table 25: 2y Forward Volatility

92.0bp for 2y fwd 1y10y

	1y	2y	5y	10y	30y
1m	140.8	133.4	114.1	95.2	77.8
3m	140.9	132.0	113.5	94.5	77.4
6m	134.9	127.5	111.8	93.2	76.5
1y	132.6	124.3	110.1	92.0	75.7
2y	121.5	116.8	104.6	88.8	73.5
5y	100.7	98.3	89.3	79.2	65.2
10y	78.5	76.9	72.6	66.6	55.2

Source: BofA Global Research

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Table 26: 2y Fwd vol as % ATM

93% of ATM for 2y fwd 1y10y

	1y	2y	5y	10y	30y
1m	115%	102%	90%	83%	77%
3m	114%	104%	91%	86%	79%
6m	105%	100%	94%	91%	84%
1y	99%	97%	94%	93%	87%
2y	93%	94%	96%	95%	90%
5y	94%	95%	96%	94%	89%
10y	94%	94%	94%	93%	90%

Source: BofA Global Research

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Table 27: 3m Z-Score of 2y Fwd vol % ATM

0.4 Z-Score for 2y fwd 1y10y

	1y	2y	5y	10y	30y
1m	0.0	0.4	0.1	-0.1	-0.2
3m	0.0	0.4	0.1	0.0	-0.1
6m	0.1	0.4	0.2	0.2	0.1
1y	0.4	0.5	0.3	0.4	0.3
2y	0.2	0.3	0.4	0.4	0.4
5y	0.3	0.4	0.4	0.3	0.3
10y	0.2	0.2	0.2	0.2	0.2

Source: BofA Global Research

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Table 28: 3y Forward Volatility

91.3bp for 3y fwd 1y10y

	1y	2y	5y	10y	30y
1m	131.9	125.3	111.7	94.9	76.3
3m	137.6	127.5	112.0	94.8	76.3
6m	129.5	122.3	109.0	93.2	75.4
1y	125.4	118.4	106.2	91.3	74.2
2y	113.8	110.5	100.0	87.0	70.9
5y	96.2	94.4	86.7	76.8	61.9
10y	76.7	75.0	71.0	65.0	53.0

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 29: 3y Fwd vol as % ATM

92% of ATM for 3y fwd 1y10y

	1y	2y	5y	10y	30y
1m	108%	96%	88%	83%	76%
3m	112%	100%	90%	86%	78%
6m	101%	96%	91%	90%	83%
1y	93%	93%	91%	92%	85%
2y	87%	89%	92%	93%	86%
5y	90%	92%	93%	91%	85%
10y	91%	91%	92%	91%	87%

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 30: 3m Z-Score of 3y Fwd vol % ATM

0.4 Z-Score for 3y fwd 1y10y

	1y	2y	5y	10y	30y
1m	0.4	0.6	0.2	0.1	0.0
3m	0.2	0.5	0.1	0.1	0.0
6m	0.0	0.3	0.1	0.3	0.2
1y	0.1	0.3	0.2	0.4	0.3
2y	0.2	0.3	0.3	0.5	0.5
5y	0.2	0.3	0.4	0.3	0.2
10y	0.3	0.3	0.2	0.2	0.2

Source: BofA Global Research

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Ratios implied/delivered

Table 31: Implied vs. Delivered (21d) Ratio

Ratios < 100% virtually across the grid vs 1m delivered

	1y	2y	3y	5y	7y	10y	30y
1m	103%	87%	82%	82%	82%	82%	83%
3m	83%	79%	77%	77%	77%	77%	78%
6m	73%	73%	72%	72%	71%	70%	72%
1y	71%	69%	69%	69%	68%	67%	68%
2y	69%	67%	66%	67%	66%	65%	63%

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 32: Implied vs. Delivered (63d) Ratio

Ratios > 100% in gamma and short/intermediates on left side

	1y	2y	3y	5y	7y	10y	30y
1m	133%	120%	118%	119%	117%	116%	117%
3m	112%	112%	111%	112%	110%	109%	111%
6m	102%	105%	105%	104%	102%	99%	102%
1y	102%	101%	101%	100%	96%	94%	96%
2y	102%	98%	96%	94%	92%	90%	89%

Source: BofA Global Research

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Table 33: 3m Z-Scores for Implied vs. Delivered (21d) Ratio

Cheapness across the grid vs 1m history ...

	1y	2y	3y	5y	7y	10y	30y
1m	-0.6	-0.8	-1.0	-1.0	-1.1	-1.1	-1.1
3m	-0.8	-0.9	-1.1	-1.1	-1.1	-1.2	-1.2
6m	-0.9	-1.0	-1.1	-1.2	-1.3	-1.4	-1.3
1y	-1.0	-1.2	-1.4	-1.3	-1.4	-1.5	-1.4
2y	-1.3	-1.4	-1.4	-1.3	-1.4	-1.4	-1.4

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 34: 3m Z-Scores for Implied vs. Delivered (63d) Ratio

... richness vs 3m history on right side and intermediates on left side

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

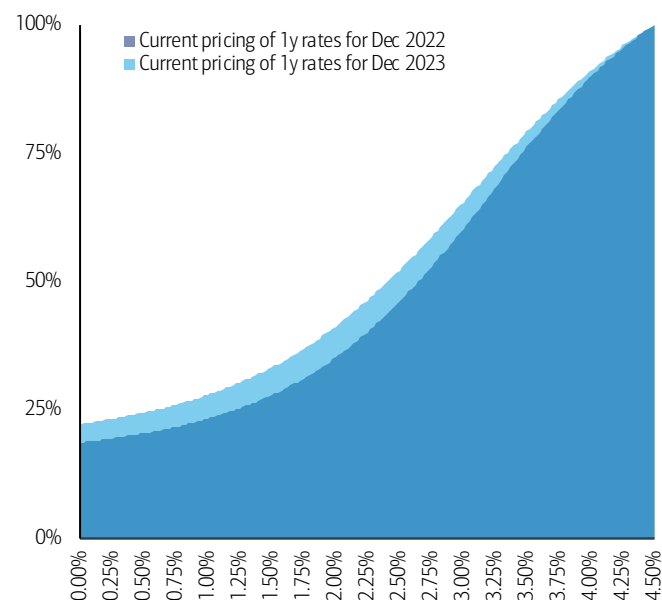
Source: BofA Global Research

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Rates probability distributions

Exhibit 17: CDF for 1y rates at end-2022 and end-2023

1y rate cumulative distribution functions

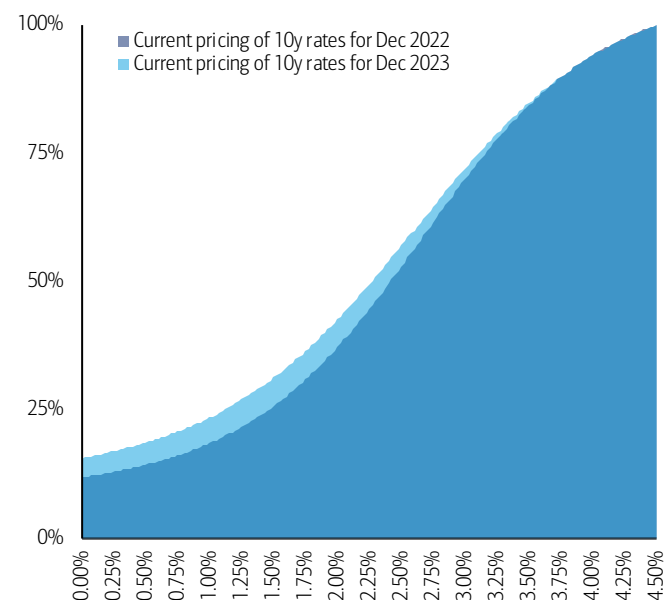


Source: BofA Global Research

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Exhibit 18: CDF for 10y rates at end-2022 and end-2023

10y rate cumulative distribution functions



Source: BofA Global Research

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Trade activity

Exhibit 19: 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		470		200	300	370	1900		164	3404
1m	9600	2940	720		1990	380	6187	620	2495	24932
3m	200	460	160		1300	100	4071	315	1282	7888
6m	5960	460	100	1	367	4	2440	30	530	9892
1y	9600	830	480		3180		2276		641	17007
2y	10200	460				36	200		15	10911
3Y	4000		200	60	340				160	4760
4Y		250					170		77	497
5Y		330			880		666		386	2562
7Y					240			580		820
10Y	1000				48		270	61	169	1548
20Y										
30Y										
	40560	6200	1660	261	8681	854	18180	1606	5919	84221

Source: BofA Global Research; SDR; Bloomberg

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Exhibit 20: 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	35	496	265	50	100	18	500		50	1514
1m	1100	500	75		2520	510	2891	1595	790	9981
3m	900	1670			1005	100	2011		78	5764
6m	6260	145			758		1081	36	1256	9536
1y	11201	1845	240		480		3722	15	410	17913
2y	12700	460			2061		244			15466
3Y	1000	50	240	60	2635		214		200	4399
4Y	2100	250					170		77	2597
5Y		330			240		796		368	1984
7Y								56		56
10Y	1000				222		540	61	140	1963
20Y										
30Y										
	36296	5746	820	110	10021	628	12169	1763	3369	71173

Source: BofA Global Research; SDR; Bloomberg

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Exhibit 21: 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		113	163
1m	1000	50			200		1280		75	2605
3m	250	400			780		2295			3725
6m	8000	750			557		1430			10737
1y	2110	155	226	680	300		1655		246	5372
2y	700	680		30	200		587	254	253	2704
3Y	300	100	200		200		345		155	1300
4Y	1500						100		273	1873
5Y					130		675	50	444	1299
7Y		1130			60		260	156	220	1826
10Y	150						1234	622	195	2201
20Y							250			250
30Y										
	14010	3265	426	710	2427		10161	1082	1974	34055

Source: BofA Global Research; SDR; Bloomberg

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Formosa issuance

Exhibit 22: 2021 Formosa issuance (\$m)

37.7bn total issuance for the year

	2	5	7	10	15	20	25	30
1				958	30			220
2				284	45			
3					130			125
4					90			
5						50		19855
7								
10								920
15								
20								
25								
30								15000

Source: BofA Global Research, Bloomberg

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Exhibit 23: 2022 Formosa issuance YTD (\$m)

11.5bn issuance YTD

	2	5	7	10	15	20	25	30
1			30	388	20			
2				310				
3								125
4				35	30			
5						125	80	10032
7								
10								315
15								
20								
25								
30								

Source: BofA Global Research, Bloomberg

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Exhibit 24: Formosa issuance (\$m) since 2014

Peak issuance concentrated on the 5y30y tenor

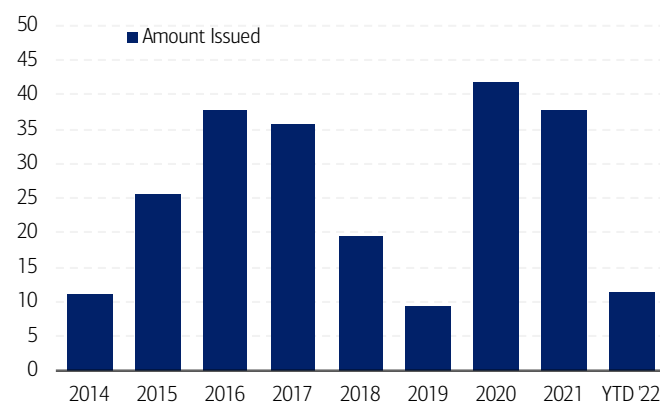
	2	5	7	10	15	20	25	30
1		205	30	1866	492	840		18274
2				748	45	1485		22177
3					130	240	225	15661
4				35	120	25	275	2441
5					400	1452	353	131319
7								5624
10								5336
15								
20								
25								
30								20500

Source: BofA Global Research, Bloomberg

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Exhibit 25: Total issuance per year since 2014 (\$bn)

11.5bn issuance YTD '22



Source: BofA Global Research, Bloomberg

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Notes

Exhibit 6: 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).

Tables 3/5/7: 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.

Tables 4/6/8: 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.

Table 13/14: In a payer/receiver ladder one buys the ATM strike and then you sell ATM+/-x and ATM+/-2x. In the terminal payoff diagram 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 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+/- (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.

Table 15/16: 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.

For more details please see [US Rates Volatility](#) and/or [A Rates Strategist Toolkit](#).

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