

US Rates Watch

Vol views – A look at the left field

Scope for the duration selloff...

The 10yT sold off 35bp since early December. It has surpassed the levels reached in the 1Q21 selloff, and is now at levels not since Jan '20, just as the COVID pandemic was starting to make headlines.

In [Drivers and scope for the duration selloff](#) we looked at some of the catalysts for this move, and argued for limited scope for further upside in yields near term. We see yields capped by a number of factors, including: (1) a high sensitivity of risky assets to bond yields that may create negative feedback loops between the two asset classes (particularly in the 1.75-2% range for 10yT - see [Does a rising tide sink some boats?](#); (2) relatively balanced portfolio allocation profiles which seem to be typical of periods in the cycle characterized by major policy changes - see [USTs and the '22 allocation backdrop](#); (3) relatively attractive FX-hedged pickups in USTs vs other DM yields (between 60-80bp for EUR, JPY and GBP investors); (4) the persistence of some degree of decoupling of USTs with the Developed Market (DM) component of global yields; and (6) a limited scope for a further terminal re-pricing near term (beyond the 1.75-2% range - see [Practical neutral rate: a limit to US yields](#)).

The latter two drivers are linked to a large extent. The lagging beta of 10yT to the DM component of global yields was helped by the anchoring of the terminal rate view around the 1.5-1.75% range as the market priced in a more hawkish Fed (one that may sacrifice the growth outlook to fight inflation). In this context, we can understand the recent bearish move as a catchup of 10yT to the DM component, particularly given some normalization of the terminal rate into the 1.75-2% range. However, as noted above, we see the scope for a terminal repricing > 2% near-term relatively capped, and in fact recommended closing the [pay 7y1y OIS recommendation](#) as it reached our 1.8% target.

At the frontend, the potential for more significant repricing is also starting to look rather limited. A quarterly hike schedule starting in March implies c.87.5bp pricing for the 2yT ($25 * (21+18+15+12+9+6+3)/24 = 87.5$) to which we can add c.10bp to get a near-term cap around 97.5bp. A further selloff from here implies a more aggressive path from the 25bp/quarter pace. 2yT will continue to move higher, but in a more mechanical fashion with the passage of time. Some consolidation in yields near-term and may help fade recent dislocations in the volatility grid (see [Dislocations galore](#)).

... and a look at the left field

Near-term consolidation is hardly exciting view. Looking out at longer term horizons, however, we can see few scenarios that we believe are significantly underpriced, particularly at the 1-2y horizon: (1) consensus seems to be for inflation to fade from the early '22 peak to reach low-3% or 2% handles by end-'22, scenarios where higher inflation persist for longer seem significantly out-of-consensus; (2) the market acknowledges the risky assets sensitivity to bond yield, but scenario where the economy as a whole has a higher sensitivity to tightening, and where recession probabilities increase as the Fed reaches 1.75-2% for fed funds, seem underpriced. We believe it is worth to focus some attention on downside hedges in vol space at a 1-2y horizon.

BofA Securities does and seeks to do business with issuers covered in its research reports. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of this report. Investors should consider this report as only a single factor in making their investment decision. Refer to important disclosures on page 11 to 12. Analyst Certification on page 10. 12371535

Timestamp: 18 January 2022 06:30AM EST

18 January 2022

Rates Research
United States

Bruno Braizinha, CFA
Rates Strategist
BofAS
bruno.braizinha@bofa.com

Anna (Caiyi) Zhang
Rates Strategist
BofAS
cai yi.zhang@bofa.com

US Rates Research
BofAS
+1 646 855 8846

ULC – Upper left corner

URC – Upper right corner

LLC – Lower left corner

LRC – Lower right corner

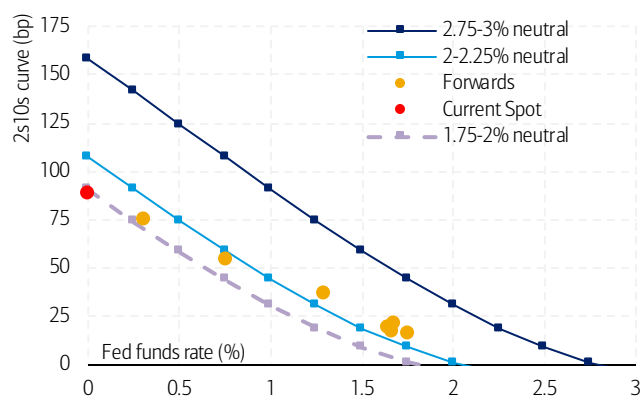
ITM – In the money

OTM – Out of the money

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

Exhibit 1: 2s10s flattening path contingent on terminal/neutral view

Fwds suggest curve flirting with inversion with fed funds <2%, at 18-24m horizon with a quarterly hike schedule

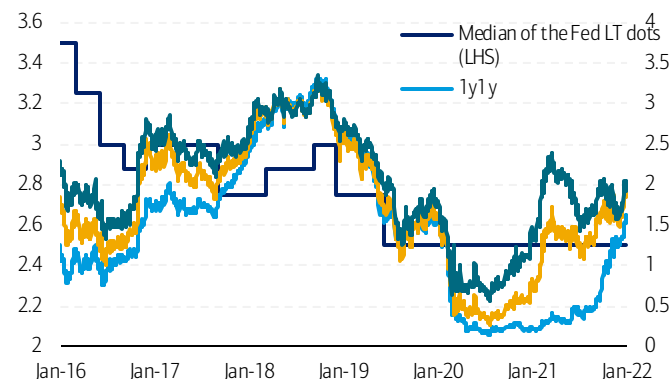


Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 2: Dispersion of forwards collapses in the transition between the mid- and late-cycle dynamic

Dispersion collapsed in 1H18 as market transitioned into a late-cycle dynamic, and dispersion is collapsing again recently



Source: BofA Global Research

BofA GLOBAL RESEARCH

Significantly also in this context, the evolution of the current cycle seems a lot more compressed than what we have seen in recent cycles. It took 5 years from the recession in the last cycle for the Fed to start tapering asset purchases, and 7 years to liftoff. We are two years into the current cycle with taper well under way, the Fed likely to liftoff rates in 1Q, and QT likely to start by year-end.

From a yield curve perspective, the flatness of fwds (see Exhibit 1) may indicate a shift from a mid- to a late-cycle dynamic well within the strategic asset allocation horizon of portfolios, and potentially one of the shortest cycles in recent history (as we noted in [The curve, the “rock” and the “hard place”](#)). A look at the dispersion of forwards helps further illustrate this point (see Exhibit 2). The dispersion of forwards collapsed in 1H18 as market transitioned into a late-cycle dynamic, and is collapsing again recently as the Fed turns hawkish and the terminal rate stays relatively anchored.

One position that fits with this rationale is to scale into 2y10y receiver spreads with strikes atm-25bp/atm-75bp (c.1.3-1.8% at current levels), financed by selling 2y10y payers atm+75bp. The position is costless (indicative) and has positive carry of 6bp/y. The trade positions for a terminal rate still relatively anchored under 2.25-2.5% (our economists view is for a 2.5% terminal in line with the Fed's own view), and headwinds to growth forming over the next two years. The risk to the trade is a 10y rate selloff beyond the payer strike (c.2.8% currently), with potentially unlimited downside.

Levels and Recent Moves

Exhibit 3: ATM Normal Volatility Grid

78.4bp for 1y10y volatility

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	61.8	76.2	78.9	81.5	82.8	82.8	80.3
3M	62.3	76.7	78.9	81.1	81.9	81.9	79.4
6M	66.6	76.4	78.3	80.2	80.2	80.2	77.8
1Y	79.4	80.2	80.1	79.9	79.1	78.4	74.4
2Y	83.1	83.1	81.0	78.8	77.8	76.9	71.1
3Y	83.5	82.2	80.7	78.7	77.0	75.3	68.9
4Y	81.5	80.3	79.2	77.5	75.9	74.0	67.0
5Y	79.2	78.1	77.4	76.2	74.5	72.5	64.9
10Y	70.3	69.3	68.7	67.6	66.3	64.7	56.9
30Y	52.3	51.5	51.1	50.3	49.3	48.1	42.3

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Grid broadly fair on 3m Z-Scores

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.9	0.1	0.1	0.1	0.4	0.4	-0.2
3M	0.5	0.1	0.1	0.2	0.4	0.4	-0.2
6M	0.2	-0.1	0.0	0.1	0.3	0.3	0.0
1Y	0.4	0.0	0.0	0.1	0.1	0.2	-0.3
2Y	-0.2	0.0	-0.1	-0.3	-0.1	0.1	-0.3
3Y	-0.2	0.0	0.0	0.0	0.0	0.1	-0.1
4Y	-0.3	-0.2	-0.1	-0.1	0.1	0.2	0.0
5Y	-0.5	-0.4	-0.3	-0.1	0.0	0.2	0.1
10Y	-0.3	-0.3	-0.2	0.1	0.3	0.4	0.2
30Y	-0.6	-0.5	-0.4	-0.3	-0.2	0.0	-0.1

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 1: ATM Normal Volatility Grid - CoW

Left side outperformed on the grid over the last week

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	5.6	5.3	4.1	3.0	0.9	0.9	0.1
3M	5.5	5.7	4.1	2.5	0.9	0.9	0.0
6M	4.5	3.2	2.4	1.6	0.4	0.4	0.4
1Y	5.1	3.2	2.1	1.0	0.8	0.6	0.6
2Y	1.6	1.6	1.1	0.5	0.7	0.9	0.8
3Y	1.9	1.9	1.5	1.0	1.0	1.0	1.3
4Y	1.4	1.6	1.4	1.2	1.1	1.1	1.4
5Y	0.9	1.3	1.3	1.3	1.2	1.2	1.4
10Y	0.7	1.0	1.0	1.0	0.9	0.9	0.8
30Y	0.8	1.0	1.0	1.0	1.0	1.0	0.8

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 2: ATM Straddle Premiums

5.6% straddle premiums for 1y10y

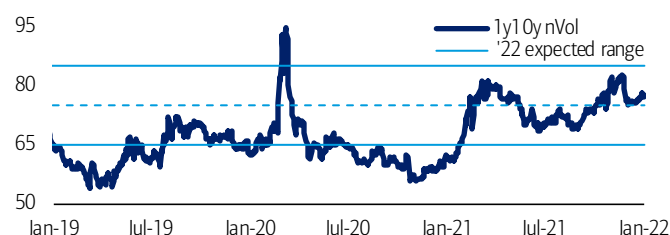
	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.1%	0.3%	0.5%	0.9%	1.2%	1.7%	4.1%
3M	0.2%	0.6%	0.9%	1.5%	2.1%	2.9%	7.1%
6M	0.4%	0.8%	1.3%	2.1%	2.9%	4.0%	9.8%
1Y	0.6%	1.2%	1.8%	3.0%	4.1%	5.6%	13.2%
2Y	0.9%	1.8%	2.6%	4.1%	5.6%	7.6%	17.6%
3Y	1.1%	2.1%	3.1%	4.9%	6.6%	9.0%	20.6%
4Y	1.2%	2.4%	3.4%	5.5%	7.4%	10.0%	22.7%
5Y	1.3%	2.5%	3.7%	6.0%	8.0%	10.8%	24.3%
10Y	1.5%	2.9%	4.2%	6.8%	9.2%	12.4%	28.1%
30Y	1.4%	2.7%	3.9%	6.4%	8.6%	11.8%	28.0%

Source: BofA Global Research

BofA GLOBAL RESEARCH

Exhibit 5: 1y10y normal vol

65-85bp expected range in '22 (we favor the top half of the range)



Source: BofA Global Research; Bloomberg

BofA GLOBAL RESEARCH

Exhibit 6: 3m10y vs. 3m2y Normal Volatility

Left side vol still relatively flat to right side vol



Source: BofA Global Research; Bloomberg

BofA GLOBAL RESEARCH

Exhibit 7: 1y10y vs. 1m10y Normal Volatility

Term structure of volatility back to inverted ahead of policy communication

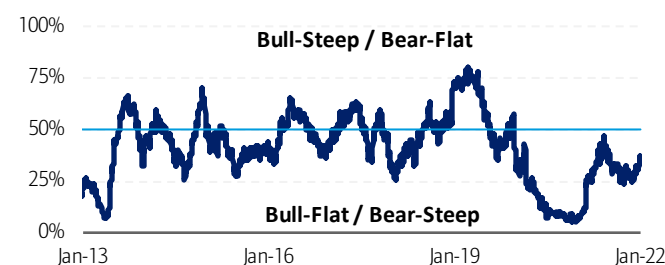


Source: BofA Global Research; Bloomberg

BofA GLOBAL RESEARCH

Exhibit 8: 5s30s curve directionality 31% dictated by belly

Backend continues to lead vs belly (flattening dynamic)



Source: BofA Global Research

BofA GLOBAL RESEARCH



Volatility Grid Relative Value

PCA Z-SCORES

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

Some richness in 7-10y tails, left side shows some cheapness

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

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Some richness in 7-10y tails, left side shows some cheapness

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

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Grid broadly fair on 1y Z-Scores

	1y	2y	3y	5y	7y	10y	30y
3m	1.2	-0.2	-0.6	-0.2	0.3	0.6	0.0
6m	0.5	-1.6	-1.0	-0.3	0.4	0.8	0.2
1y	0.4	0.7	-0.7	-0.3	0.3	0.8	0.1
2y	0.0	-0.3	-0.5	-0.4	0.3	0.7	0.0
5y	-0.3	-0.3	-0.2	0.3	0.3	0.5	0.4
10y	0.0	-0.1	0.0	0.2	0.3	0.3	0.3

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Granular approach continues to show richness on the left side...

	1y	2y	3y	5y	7y	10y	30y
1m	1.1	0.9	0.9	-0.7	0.4	1.6	-0.4
3m	2.5	3.1	1.7	-0.1	0.0	-0.1	-0.2
6m	1.9	1.8	1.5	1.0	1.0	-0.1	-0.1
1y	1.5	1.5	1.9	1.6	1.7	1.0	-0.3
2y	1.2	0.8	1.2	0.9	0.1	0.9	-0.4
3y	0.6	-0.1	0.3	1.0	-0.5	1.8	3.2
4y	0.3	-0.2	-0.6	-0.3	-0.8	1.6	2.6
5y	0.1	2.0	0.3	-0.1	-0.7	-0.8	-0.5
10y	1.3	1.7	0.9	0.8	-0.2	-1.4	-1.1
15y	-0.8	0.0	-0.7	2.1	-0.8	-0.4	0.2
30y	-0.4	-0.2	-0.7	1.5	2.5	2.3	-0.4

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Grid fair when directionality take into account

	1y	2y	3y	5y	7y	10y	30y
3m	-0.4	-0.4	-0.4	-0.5	-0.4	-0.4	-0.6
6m	-0.9	-0.6	-0.4	-0.2	0.1	-0.2	0.0
1y	-0.1	-0.2	-0.2	-0.1	0.0	0.1	-0.1
2y	-0.2	0.0	-0.2	-0.3	-0.1	0.2	-0.2
5y	-0.4	-0.2	-0.1	0.0	0.2	0.3	0.3
10y	-0.4	-0.2	-0.1	0.2	0.4	0.6	0.4

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Left side cheapness more obvious when directionality take into account

	1y	2y	3y	5y	7y	10y	30y
3m	-2.2	-2.5	-2.4	-1.6	-0.7	-0.3	-0.7
6m	-3.0	-2.8	-2.6	-1.6	-1.0	-0.6	-0.7
1y	-2.6	-2.6	-2.6	-2.0	-1.7	-1.3	-1.2
2y	-2.6	-2.4	-2.5	-2.5	-2.1	-1.6	-1.3
5y	-2.4	-2.2	-2.1	-1.9	-1.7	-1.3	-0.7
10y	-1.8	-1.5	-1.3	-0.9	-0.6	-0.2	-0.1

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Left side cheapness more obvious when directionality take into account

	1y	2y	3y	5y	7y	10y	30y
3m	-1.4	-3.0	-3.3	-2.7	-2.0	-1.4	-1.4
6m	-2.5	-3.8	-3.6	-2.8	-2.2	-1.7	-1.5
1y	-3.6	-3.8	-3.4	-2.9	-2.6	-2.0	-1.5
2y	-3.3	-2.9	-2.9	-2.7	-2.4	-2.0	-1.5
5y	-2.6	-2.6	-2.5	-2.1	-1.9	-1.6	-1.2
10y	-1.9	-1.8	-1.7	-1.5	-1.3	-1.1	-0.9

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

... persisting even as directionality with rates is removed

	1y	2y	3y	5y	7y	10y	30y
1m	0.4	0.8	1.3	-0.6	0.7	1.5	-0.4
3m	2.5	3.0	1.5	0.0	0.2	0.4	-0.3
6m	1.9	1.8	1.5	0.5	0.7	0.2	0.3
1y	1.5	1.5	1.9	1.6	1.5	0.9	-0.1
2y	1.2	0.9	1.2	0.8	0.2	0.9	0.3
3y	0.7	-0.1	0.3	0.8	-0.5	1.7	3.2
4y	-0.5	-0.3	-0.1	0.1	-0.9	1.6	1.9
5y	0.2	2.4	-0.2	0.0	-0.5	-0.2	-0.8
10y	1.3	1.7	0.8	0.6	-0.7	-0.4	-0.9
15y	-0.9	-0.3	-0.9	2.2	-0.5	-1.0	0.3
30y	-0.4	-0.8	-0.8	1.3	2.6	2.8	-0.9

Source: BofA Global Research

BofA GLOBAL RESEARCH



Skew Relative Value

Table 11: Skew 25% delta

Receiver skew RV relatively rich on the left side

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-0.4	-0.4	-0.4	-0.8	-0.8	-0.7	1.1
3M	-0.2	-0.4	-0.5	-1.1	-1.0	-0.8	1.9
6M	-0.1	-0.5	-0.6	-0.9	-0.9	-0.8	2.1
1Y	-1.2	-1.1	-1.2	-1.5	-1.4	-1.4	1.6
2Y	-3.9	-3.7	-3.4	-3.0	-2.3	-1.4	1.5
5Y	-4.9	-4.1	-3.4	-2.1	-1.3	-0.3	1.9
10Y	-1.4	-1.1	-0.9	-0.4	-0.1	0.4	1.7
30Y	1.6	1.8	1.9	2.2	2.3	2.5	3.8

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 12: Skew 75% delta

Payer skew RV shows some richness in left side extending to right

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	1.8	2.1	2.0	2.2	2.1	2.1	0.2
3M	3.6	3.7	3.6	3.7	3.6	3.4	1.0
6M	5.5	5.1	4.9	4.5	4.6	4.6	1.7
1Y	6.4	6.1	5.8	5.3	5.2	5.2	2.2
2Y	9.2	8.7	8.0	6.9	6.3	5.5	2.5
5Y	9.3	8.6	8.0	6.9	6.2	5.2	2.5
10Y	6.4	6.1	5.9	5.5	5.1	4.6	2.6
30Y	7.0	6.7	6.5	6.1	5.7	5.2	3.1

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 13: Breakeven Widths for Costless Receiver Ladders

76bp breakeven width for 1y10y receiver ladders

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	18	22	23	23	23	23	24
3M	31	38	39	40	41	41	42
6M	46	53	55	55	56	55	58
1Y	78	79	78	77	77	76	77
2Y	109	109	107	105	105	106	105
5Y	161	161	162	163	162	162	154
10Y	216	215	214	213	211	208	191

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 14: Breakeven Widths for Costless Payer Ladders

90bp breakeven width for 1y10y payer ladders

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	19	23	24	25	25	25	23
3M	35	43	43	45	45	45	41
6M	55	61	62	63	63	63	58
1Y	93	94	92	91	90	90	79
2Y	148	145	139	133	129	125	108
5Y	226	219	214	205	197	187	157
10Y	268	262	258	251	244	235	196

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Receiver skew rich in intermediate expiries

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-0.6	-0.8	-0.4	-0.3	0.1	-0.3	0.1
3M	-0.2	-0.3	-0.2	-0.1	0.4	-0.5	-0.2
6M	-0.2	-0.2	0.1	0.8	1.5	0.3	-0.6
1Y	0.3	0.3	0.2	1.1	1.4	1.1	-0.8
2Y	1.4	1.5	1.8	2.4	2.5	2.0	2.1
5Y	1.2	1.3	1.4	1.5	1.7	1.9	2.0
10Y	-0.3	-0.5	-0.4	-0.3	-0.2	-0.1	0.0

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Payer skew cheapness mostly in longer expiries, particularly on right side

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.0	-0.1	-0.2	-0.5	-0.6	-0.1	0.2
3M	0.2	0.3	0.1	-0.3	-1.0	-1.2	-0.8
6M	0.3	0.1	-0.1	-1.3	-1.6	-1.5	-1.2
1Y	-0.1	0.0	-0.2	-1.4	-1.6	-1.6	-1.6
2Y	-0.9	-1.1	-1.7	-2.2	-2.0	-1.3	-1.7
5Y	-0.9	-1.0	-1.1	-1.5	-1.7	-2.0	-2.0
10Y	-1.1	-1.1	-1.2	-1.3	-1.3	-1.4	-1.2

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Ratios of payer / receiver breakeven widths broadly above 100%

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	107%	107%	105%	107%	106%	106%	98%
3M	112%	111%	110%	112%	111%	110%	98%
6M	119%	115%	114%	114%	113%	114%	100%
1Y	120%	119%	118%	118%	118%	118%	102%
2Y	136%	132%	130%	126%	123%	118%	103%
5Y	141%	136%	133%	125%	121%	116%	102%
10Y	124%	122%	121%	118%	116%	113%	103%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Z-Scores for the ratios shows broad payer cheapness vs receivers

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-1.9	-1.8	-2.0	-1.8	-1.9	-0.6	-0.8
3M	-1.8	-1.8	-1.8	-1.6	-1.6	-1.6	-1.1
6M	-1.7	-1.8	-1.9	-2.3	-2.5	-2.0	-1.0
1Y	-1.8	-1.8	-1.8	-2.1	-2.1	-2.0	-1.6
2Y	-2.1	-2.3	-2.4	-2.7	-2.6	-2.0	-2.2
5Y	-1.3	-1.4	-1.6	-1.8	-1.9	-1.8	-1.8
10Y	-1.3	-1.3	-1.3	-1.3	-1.2	-1.2	-1.0

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	-1.7	-2.1	-1.1	-0.3	0.7	0.9
6M	-2.1	-2.1	-0.9	0.1	1.3	1.3
1Y	0.3	1.5	4.4	1.3	4.2	3.0
1.5Y	3.0	4.6	9.1	1.7	6.2	4.6
2Y	4.4	6.5	12.6	2.1	8.3	6.2

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	1.7	2.1	1.1	0.3	-0.7	-0.9
6M	2.1	2.1	0.9	-0.1	-1.3	-1.3
1Y	-0.3	-1.5	-4.4	-1.3	-4.2	-3.0
1.5Y	-3.0	-4.6	-9.1	-1.7	-6.2	-4.6
2Y	-4.4	-6.5	-12.6	-2.1	-8.3	-6.2

Source: BofA Global Research

BofA GLOBAL RESEARCH

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	1.9	2.2	1.1	0.3	-0.7	-0.9
6M	2.2	2.2	0.9	-0.1	-1.3	-1.3
1Y	-0.3	-1.5	-4.4	-1.3	-4.2	-3.0
1.5Y	-3.4	-5.0	-9.3	-1.9	-6.2	-4.6
2Y	-5.2	-7.1	-12.8	-2.2	-8.3	-6.3

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Buy longer maturity payer, sell shorter maturity payer

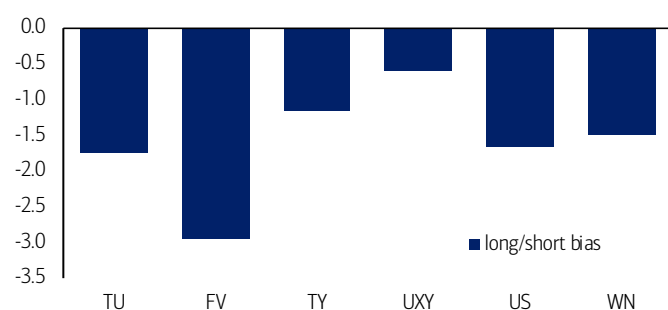
ATM	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	-1.9	-2.2	-1.1	-0.3	0.7	0.9
6M	-2.2	-2.2	-0.9	0.1	1.3	1.3
1Y	0.3	1.5	4.4	1.3	4.2	3.0
1.5Y	3.4	5.0	9.3	1.9	6.2	4.6
2Y	5.2	7.1	12.8	2.2	8.3	6.3

Source: BofA Global Research

BofA GLOBAL RESEARCH

Chart 1: Analysis of proxies for futures positioning

Short bias still significant at the frontend of 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	-2.4	-3.0	-3.4	-0.7	-0.7	-0.1
6M	-2.8	-3.0	-2.8	-0.1	0.3	0.3
1Y	0.3	1.9	4.4	1.5	4.0	2.4
1.5Y	3.4	5.0	9.5	1.7	6.0	4.2
2Y	5.0	6.7	13.0	1.9	8.1	6.3

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	2.4	3.0	3.4	0.7	0.7	0.1
6M	2.8	3.0	2.8	0.1	-0.3	-0.3
1Y	-0.3	-1.9	-4.4	-1.5	-4.0	-2.4
1.5Y	-3.4	-5.0	-9.5	-1.7	-6.0	-4.2
2Y	-5.0	-6.7	-13.0	-1.9	-8.1	-6.3

Source: BofA Global Research

BofA GLOBAL RESEARCH

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	2.8	3.2	0.1	0.3	-2.4	-2.8
6M	2.8	3.0	-0.7	0.1	-3.4	-3.4
1Y	-0.5	-2.2	-7.5	-1.7	-6.9	-5.6
1.5Y	-4.6	-7.1	-13.6	-2.6	-9.5	-7.3
2Y	-6.7	-9.9	-17.9	-3.4	-12.2	-9.1

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Buy longer maturity payer, sell shorter maturity payer

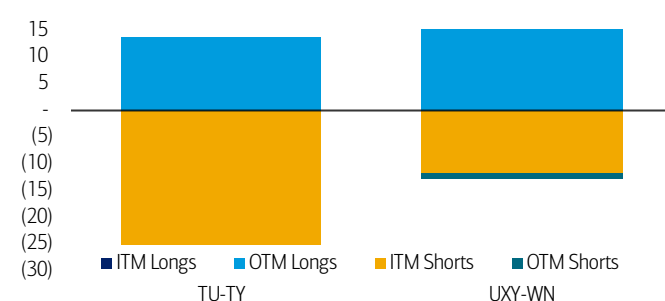
+25bp	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	-2.8	-3.2	-0.1	-0.3	2.4	2.8
6M	-2.8	-3.0	0.7	-0.1	3.4	3.4
1Y	0.5	2.2	7.5	1.7	6.9	5.6
1.5Y	4.6	7.1	13.6	2.6	9.5	7.3
2Y	6.7	9.9	17.9	3.4	12.2	9.1

Source: BofA Global Research

BofA GLOBAL RESEARCH

Chart 2: Proxies for futures positioning across the curve

Frontend ITM short expose curve to bull steepening



Source: BofA Global Research

BofA GLOBAL RESEARCH



Forward Volatility

Table 19: 6m Forward Volatility

73.8bp for 6m fwd 1y10y

	1y	2y	5y	10y	30y
1m	71.7	73.6	76.1	74.8	72.2
3m	74.8	74.6	75.3	73.8	70.7
6m	80.3	78.3	75.9	73.9	70.0
1y	78.5	79.8	75.0	73.8	69.2
2y	80.1	79.3	75.1	73.0	67.1
5y	75.7	74.7	73.4	70.1	62.2
10y	68.4	67.4	65.9	63.0	55.1

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 20: 6m Fwd vol as % ATM

94% of ATM for 6m fwd 1y10y

	1y	2y	5y	10y	30y
1m	116%	97%	93%	90%	90%
3m	120%	97%	93%	90%	89%
6m	121%	103%	95%	92%	90%
1y	99%	100%	94%	94%	93%
2y	96%	95%	95%	95%	94%
5y	96%	96%	96%	97%	96%
10y	97%	97%	97%	97%	97%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

0.4 Z-Score for 6m fwd 1y10y

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

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 22: 1y Forward Volatility

72.1bp for 1y fwd 1y10y

	1y	2y	5y	10y	30y
1m	72.9	77.2	71.5	71.2	67.6
3m	71.8	77.9	71.5	71.5	67.8
6m	77.3	80.6	72.6	72.2	67.7
1y	80.7	80.7	72.9	72.1	66.2
2y	80.1	78.2	74.5	71.3	65.0
5y	74.6	73.7	72.3	68.9	60.4
10y	67.4	66.4	64.9	62.0	53.8

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 23: 1y Fwd vol as % ATM

92% of ATM for 1y fwd 1y10y

	1y	2y	5y	10y	30y
1m	118%	101%	88%	86%	84%
3m	115%	102%	88%	87%	85%
6m	116%	105%	90%	90%	87%
1y	102%	101%	91%	92%	89%
2y	96%	94%	95%	93%	91%
5y	94%	94%	95%	95%	93%
10y	96%	96%	96%	96%	94%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

0.7 Z-Score for 1y fwd 1y10y

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

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 25: 2y Forward Volatility

70.0bp for 2y fwd 1y10y

	1y	2y	5y	10y	30y
1m	86.4	84.0	75.1	71.2	64.3
3m	85.7	82.8	75.1	70.4	64.1
6m	82.5	81.5	75.8	70.3	64.1
1y	77.6	80.1	75.8	70.0	63.7
2y	81.3	79.7	75.5	70.4	62.7
5y	73.4	72.3	70.3	66.9	57.6
10y	65.6	64.5	63.3	60.3	51.7

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 26: 2y Fwd vol as % ATM

89% of ATM for 2y fwd 1y10y

	1y	2y	5y	10y	30y
1m	140%	110%	92%	86%	80%
3m	138%	108%	93%	86%	81%
6m	124%	107%	94%	88%	82%
1y	98%	100%	95%	89%	86%
2y	98%	96%	96%	92%	88%
5y	93%	93%	92%	92%	89%
10y	93%	93%	94%	93%	91%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

1.0 Z-Score for 2y fwd 1y10y

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

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 28: 3y Forward Volatility

71.2bp for 3y fwd 1y10y

	1y	2y	5y	10y	30y
1m	83.0	81.2	78.0	71.7	63.0
3m	82.4	80.7	77.0	71.5	63.1
6m	81.2	80.9	77.2	71.9	63.0
1y	79.3	79.5	76.1	71.2	62.0
2y	77.4	75.9	74.7	69.7	59.9
5y	72.4	71.3	69.4	65.8	55.4
10y	63.9	62.8	61.9	58.7	49.8

Source: BofA Global Research

BofA GLOBAL RESEARCH

Table 29: 3y Fwd vol as % ATM

91% of ATM for 3y fwd 1y10y

	1y	2y	5y	10y	30y
1m	134%	106%	96%	87%	79%
3m	132%	105%	95%	87%	79%
6m	122%	106%	96%	90%	81%
1y	100%	99%	95%	91%	83%
2y	93%	91%	95%	91%	84%
5y	91%	91%	91%	91%	85%
10y	91%	91%	92%	91%	88%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

0.9 Z-Score for 3y fwd 1y10y

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

Source: BofA Global Research

BofA GLOBAL RESEARCH

Ratios implied/delivered

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

Ratios > 100% in virtually across the grid except for LRC

	1y	2y	3y	5y	7y	10y	30y
1m	183%	167%	150%	130%	117%	109%	107%
3m	163%	161%	146%	126%	114%	108%	105%
6m	147%	141%	133%	117%	107%	102%	102%
1y	136%	127%	119%	105%	98%	95%	95%
2y	114%	109%	100%	90%	88%	88%	89%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Ratios > 100% concentrated on ULC

	1y	2y	3y	5y	7y	10y	30y
1m	157%	119%	109%	101%	98%	95%	95%
3m	129%	110%	103%	98%	95%	93%	93%
6m	103%	97%	95%	92%	90%	89%	90%
1y	90%	88%	87%	85%	84%	83%	85%
2y	85%	84%	81%	78%	78%	79%	79%

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Richness on left side vs 1m history ...

	1y	2y	3y	5y	7y	10y	30y
1m	0.6	1.2	1.3	0.7	0.4	0.4	0.5
3m	0.8	1.4	1.5	0.8	0.5	0.5	0.5
6m	1.3	1.4	1.3	0.7	0.4	0.4	0.5
1y	1.8	1.5	1.2	0.5	0.3	0.4	0.5
2y	1.2	1.0	0.6	0.2	0.3	0.4	0.6

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

... But cheapness across the grid on 3m history

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

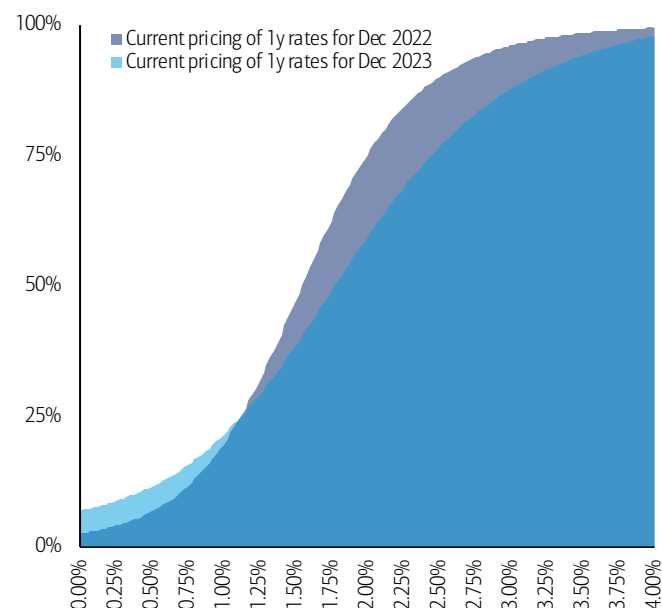
Source: BofA Global Research

BofA GLOBAL RESEARCH

Rates probability distributions

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

1y rate cumulative distribution functions

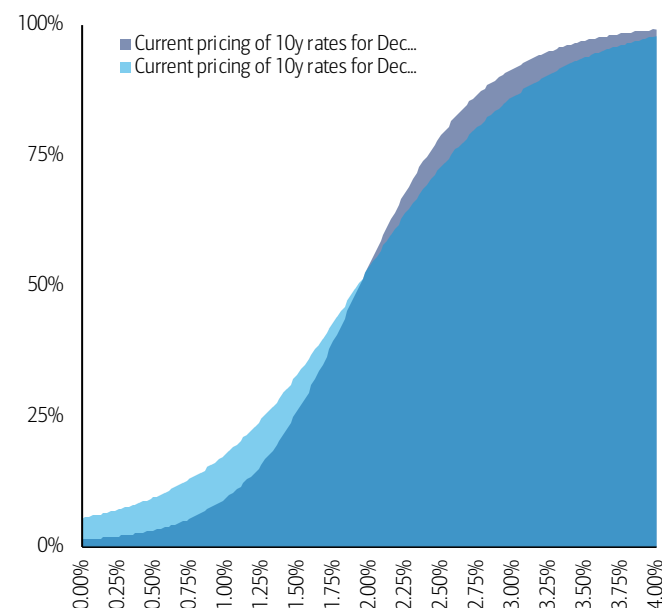


Source: BofA Global Research

BofA GLOBAL RESEARCH

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

10y rate cumulative distribution functions



Source: BofA Global Research

BofA GLOBAL RESEARCH



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					390		980			1370
1m	1000	350	1020		5045	1070	6042	30	240	14797
3m	1000	1582		25	5210	520	3769	476	714	13296
6m	500		960		1080	25	1128	35	25	3753
1y	3100	898			1567		2817	524	1393	10299
2y	1100	1520			510		1403		604	5136
3Y		460		6	106		258			830
4Y		660			96		42		3	801
5Y					692		652		1181	2525
7Y							1		120	121
10Y							861	100	38	999
20Y										
30Y										
	6700	5470	1980	31	14696	1615	17954	1165	4318	53929

Source: BofA Global Research; SDR; Bloomberg

BofA GLOBAL RESEARCH

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	10	125	305	20	190		470			1120
1m	1500	200	1020		3130	510	2881		270	9511
3m		500			1435	340	2310	664	1210	6459
6m	750	750	240		720		1883	35	420	4798
1y		2263	70		441		1732	201	1236	5943
2y		1815	75	20	240		671		554	3374
3Y		460		6			200			666
4Y							0		3	3
5Y					400		550	100	513	1563
7Y							1		120	121
10Y							771	100	38	909
20Y										
30Y										
	2260	6113	1710	46	6556	850	11470	1100	4364	34469

Source: BofA Global Research; SDR; Bloomberg

BofA GLOBAL RESEARCH

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							29			29
1m		200					1546		375	2121
3m		1210			1020		1715		335	4280
6m		2820					1443		270	4533
1y	2000	2360			611		1532		230	6733
2y	1870	940			655		1063		298	4826
3Y		300	80		209		268		40	897
4Y		150			190		336		44	720
5Y		100			687		582		350	1719
7Y							350			350
10Y	500	150					895	40		1585
20Y										
30Y										
	4370	8230	80		3372		9759	40	1942	27793

Source: BofA Global Research; SDR; Bloomberg

BofA GLOBAL RESEARCH



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

BofA GLOBAL RESEARCH

Exhibit 23: 2021 Formosa issuance YTD (\$m)

5.5bn issuance YTD

	2	5	7	10	15	20	25	30
1				108	20			
2				65				
3								125
4								
5						125		5070
7								
10								
15								
20								
25								
30								

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

Peak issuance concentrated on the 5y30y tenor

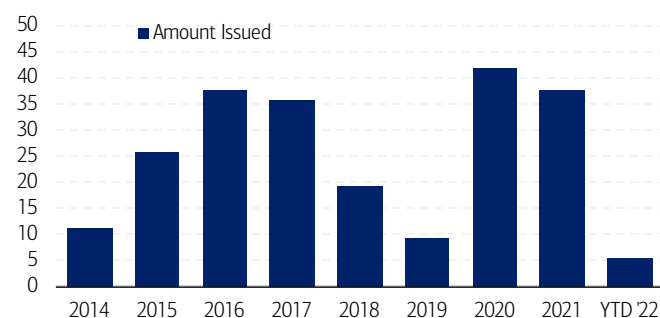
	2	5	7	10	15	20	25	30
1		205		1586	492	840		18274
2				503	45	1485		22177
3					130	240	225	15661
4					90	25	275	2441
5					400	1452	273	126357
7								5624
10								5021
15								
20								
25								
30								20500

Source: BofA Global Research

BofA GLOBAL RESEARCH

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

5.5bn issuance YTD '22



Source: BofA Global Research

BofA GLOBAL RESEARCH

Analyst Certification

I, Bruno Braizinha, CFA, hereby certify that the views expressed in this research report accurately reflect my personal views about the subject securities and issuers. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or view expressed in this research report.



Disclosures

Important Disclosures

BofA Global Research personnel (including the analyst(s) responsible for this report) receive compensation based upon, among other factors, the overall profitability of Bank of America Corporation, including profits derived from investment banking. The analyst(s) responsible for this report may also receive compensation based upon, among other factors, the overall profitability of the Bank's sales and trading businesses relating to the class of securities or financial instruments for which such analyst is responsible. BofA Securities fixed income analysts regularly interact with sales and trading desk personnel in connection with their research, including to ascertain pricing and liquidity in the fixed income markets.

Other Important Disclosures

Prices are indicative and for information purposes only. Except as otherwise stated in the report, for the purpose of any recommendation in relation to: 1) an equity security, the price referenced is the publicly traded price of the security as of close of business on the day prior to the date of the report or, if the report is published during intraday trading, the price referenced is indicative of the traded price as of the date and time of the report; or 2) a debt security (including equity preferred and CDS), prices are indicative as of the date and time of the report and are from various sources including BofA Securities trading desks.

The date and time of completion of the production of any recommendation in this report shall be the date and time of dissemination of this report as recorded in the report timestamp.

This report may refer to fixed income securities or other financial instruments that may not be offered or sold in one or more states or jurisdictions, or to certain categories of investors, including retail investors. Readers of this report are advised that any discussion, recommendation or other mention of such instruments is not a solicitation or offer to transact in such instruments. Investors should contact their BofA Securities representative or Merrill Global Wealth Management financial advisor for information relating to such instruments.

Rule 144A securities may be offered or sold only to persons in the U.S. who are Qualified Institutional Buyers within the meaning of Rule 144A under the Securities Act of 1933, as amended. SECURITIES OR OTHER FINANCIAL INSTRUMENTS DISCUSSED HEREIN MAY BE RATED BELOW INVESTMENT GRADE AND SHOULD THEREFORE ONLY BE CONSIDERED FOR INCLUSION IN ACCOUNTS QUALIFIED FOR SPECULATIVE INVESTMENT.

Recipients who are not institutional investors or market professionals should seek the advice of their independent financial advisor before considering information in this report in connection with any investment decision, or for a necessary explanation of its contents.

The securities or other financial instruments discussed in this report may be traded over-the-counter. Retail sales and/or distribution of this report may be made only in states where these instruments are exempt from registration or have been qualified for sale.

Officers of BofAS or one or more of its affiliates (other than research analysts) may have a financial interest in securities of the issuer(s) or in related investments.

This report, and the securities or other financial instruments discussed herein, may not be eligible for distribution or sale in all countries or to certain categories of investors, including retail investors.

Refer to [BofA Global Research policies relating to conflicts of interest](#).

"BofA Securities" includes BofA Securities, Inc. ("BofAS") and its affiliates. Investors should contact their BofA Securities representative or Merrill Global Wealth Management financial advisor if they have questions concerning this report or concerning the appropriateness of any investment idea described herein for such investor. "BofA Securities" is a global brand for BofA Global Research.

Information relating to Non-US affiliates of BofA Securities and Distribution of Affiliate Research Reports:

BofAS and/or Merrill Lynch, Pierce, Fenner & Smith Incorporated ("MLPF&S") may in the future distribute, information of the following non-US affiliates in the US (short name: legal name, regulator): Merrill Lynch (South Africa): Merrill Lynch South Africa (Pty) Ltd., regulated by The Financial Service Board; MLI (UK): Merrill Lynch International, regulated by the Financial Conduct Authority (FCA) and the Prudential Regulation Authority (PRA); BofASE (France): BofA Securities Europe SA is authorized by the Autorité de Contrôle Prudentiel et de Résolution (ACPR) and regulated by the ACPR and the Autorité des Marchés Financiers (AMF). Note that BofA Securities Europe SA has registered address at 51 rue la Boétie, 75008 Paris, is registered under no. 842 602 690 RCS Paris, and its share capital can be found on [BofASE's disclaimer webpage](#); BofA Europe (Milan): Bank of America Europe Designated Activity Company, Milan Branch, regulated by the Bank of Italy, the European Central Bank (ECB) and the Central Bank of Ireland (CBI); BofA Europe (Frankfurt): Bank of America Europe Designated Activity Company, Frankfurt Branch regulated by BaFin, the ECB and the CBI; BofA Europe (Madrid): Bank of America Europe Designated Activity Company, Sucursal en España, regulated by the Bank of Spain, the ECB and the CBI; Merrill Lynch (Australia): Merrill Lynch Equities (Australia) Limited, regulated by the Australian Securities and Investments Commission; Merrill Lynch (Hong Kong): Merrill Lynch (Asia Pacific) Limited, regulated by the Hong Kong Securities and Futures Commission (HKSF); Merrill Lynch (Singapore): Merrill Lynch (Singapore) Pte Ltd, regulated by the Monetary Authority of Singapore (MAS); Merrill Lynch (Canada): Merrill Lynch Canada Inc, regulated by the Investment Industry Regulatory Organization of Canada; Merrill Lynch (Mexico): Merrill Lynch Mexico, SA de CV, Casa de Bolsa, regulated by the Comisión Nacional Bancaria y de Valores; Merrill Lynch (Argentina): Merrill Lynch Argentina SA, regulated by Comisión Nacional de Valores; BofAS Japan: BofA Securities Japan Co., Ltd, regulated by the Financial Services Agency; Merrill Lynch (Seoul): Merrill Lynch International, LLC Seoul Branch, regulated by the Financial Supervisory Service; Merrill Lynch (Taiwan): Merrill Lynch Securities (Taiwan) Ltd., regulated by the Securities and Futures Bureau; BofAS India: BofA Securities India Limited, regulated by the Securities and Exchange Board of India (SEBI); Merrill Lynch (Indonesia): PT Merrill Lynch Sekuritas Indonesia, regulated by Otoritas Jasa Keuangan (OJK); Merrill Lynch (Israel): Merrill Lynch Israel Limited, regulated by Israel Securities Authority; Merrill Lynch (Russia): OOO Merrill Lynch Securities, Moscow, regulated by the Central Bank of the Russian Federation; Merrill Lynch (DIFC): Merrill Lynch International (DIFC Branch), regulated by the Dubai Financial Services Authority (DFSA); Merrill Lynch (Brazil): Merrill Lynch S.A. Corretora de Títulos e Valores Mobiliários, regulated by Comissão de Valores Mobiliários; Merrill Lynch KSA Company: Merrill Lynch Kingdom of Saudi Arabia Company, regulated by the Capital Market Authority.

This information: has been approved for publication and is distributed in the United Kingdom (UK) to professional clients and eligible counterparties (as each is defined in the rules of the FCA and the PRA) by MLI (UK), which is authorized by the PRA and regulated by the FCA and the PRA - details about the extent of our regulation by the FCA and PRA are available from us on request; has been approved for publication and is distributed in the European Economic Area (EEA) by BofASE (France), which is authorized by the ACPR and regulated by the ACPR and the AMF; has been considered and distributed in Japan by BofAS Japan, a registered securities dealer under the Financial Instruments and Exchange Act in Japan, or its permitted affiliates; is issued and distributed in Hong Kong by Merrill Lynch (Hong Kong) which is regulated by HKSF; is issued and distributed in Taiwan by Merrill Lynch (Taiwan); is issued and distributed in India by BofAS India; and is issued and distributed in Singapore to institutional investors and/or accredited investors (each as defined under the Financial Advisers Regulations) by Merrill Lynch (Singapore) (Company Registration No 198602883D). Merrill Lynch (Singapore) is regulated by MAS. Merrill Lynch Equities (Australia) Limited (ABN 65 006 276 795), AFS License 235132 (MLEA) distributes this information in Australia only to 'Wholesale' clients as defined by s.761G of the Corporations Act 2001. With the exception of Bank of America N.A., Australia Branch, neither MLEA nor any of its affiliates involved in preparing this information is an Authorised Deposit-Taking Institution under the Banking Act 1959 nor regulated by the Australian Prudential Regulation Authority. No approval is required for publication or distribution of this information in Brazil and its local distribution is by Merrill Lynch (Brazil) in accordance with applicable regulations. Merrill Lynch (DIFC) is authorized and regulated by the DFSA. Information prepared and issued by Merrill Lynch (DIFC) is done so in accordance with the requirements of the DFSA conduct of business rules. BofA Europe (Frankfurt) distributes this information in Germany and is regulated by BaFin, the ECB and the CBI. BofA Securities entities, including BofA Europe and BofASE (France), may outsource/delegate the marketing and/or provision of certain research services or aspects of research services to other branches or members of the BofA Securities group. You may be contacted by a different BofA Securities entity acting for and on behalf of your service provider where permitted by applicable law. This does not change your service provider. Please refer to the [Electronic Communications Disclaimers](#) for further information.

This information has been prepared and issued by BofAS and/or one or more of its non-US affiliates. The author(s) of this information may not be licensed to carry on regulated activities in your jurisdiction and, if not licensed, do not hold themselves out as being able to do so. BofAS and/or MLPF&S is the distributor of this information in the US and accepts full responsibility for information distributed to BofAS and/or MLPF&S clients in the US by its non-US affiliates. Any US person receiving this information and wishing to effect any transaction in any security discussed herein should do so through BofAS and/or MLPF&S and not such foreign affiliates. Hong Kong recipients of this information should contact Merrill Lynch (Asia Pacific) Limited in



respect of any matters relating to dealing in securities or provision of specific advice on securities or any other matters arising from, or in connection with, this information. Singapore recipients of this information should contact Merrill Lynch (Singapore) Pte Ltd in respect of any matters arising from, or in connection with, this information. For clients that are not accredited investors, expert investors or institutional investors Merrill Lynch (Singapore) Pte Ltd accepts full responsibility for the contents of this information distributed to such clients in Singapore.

General Investment Related Disclosures:

Taiwan Readers: Neither the information nor any opinion expressed herein constitutes an offer or a solicitation of an offer to transact in any securities or other financial instrument. No part of this report may be used or reproduced or quoted in any manner whatsoever in Taiwan by the press or any other person without the express written consent of BofA Securities. This document provides general information only, and has been prepared for, and is intended for general distribution to, BofA Securities clients. Neither the information nor any opinion expressed constitutes an offer or an invitation to make an offer, to buy or sell any securities or other financial instrument or any derivative related to such securities or instruments (e.g., options, futures, warrants, and contracts for differences). This document is not intended to provide personal investment advice and it does not take into account the specific investment objectives, financial situation and the particular needs of, and is not directed to, any specific person(s). This document and its content do not constitute, and should not be considered to constitute, investment advice for purposes of ERISA, the US tax code, the Investment Advisers Act or otherwise. Investors should seek financial advice regarding the appropriateness of investing in financial instruments and implementing investment strategies discussed or recommended in this document and should understand that statements regarding future prospects may not be realized. Any decision to purchase or subscribe for securities in any offering must be based solely on existing public information on such security or the information in the prospectus or other offering document issued in connection with such offering, and not on this document.

Securities and other financial instruments referred to herein, or recommended, offered or sold by BofA Securities, are not insured by the Federal Deposit Insurance Corporation and are not deposits or other obligations of any insured depository institution (including, Bank of America, N.A.). Investments in general and, derivatives, in particular, involve numerous risks, including, among others, market risk, counterparty default risk and liquidity risk. No security, financial instrument or derivative is suitable for all investors. Digital assets are extremely speculative, volatile and are largely unregulated. In some cases, securities and other financial instruments may be difficult to value or sell and reliable information about the value or risks related to the security or financial instrument may be difficult to obtain. Investors should note that income from such securities and other financial instruments, if any, may fluctuate and that price or value of such securities and instruments may rise or fall and, in some cases, investors may lose their entire principal investment. Past performance is not necessarily a guide to future performance. Levels and basis for taxation may change.

BofA Securities is aware that the implementation of the ideas expressed in this report may depend upon an investor's ability to "short" securities or other financial instruments and that such action may be limited by regulations prohibiting or restricting "shortselling" in many jurisdictions. Investors are urged to seek advice regarding the applicability of such regulations prior to executing any short idea contained in this report.

This report may contain a trading idea or recommendation which highlights a specific identified near-term catalyst or event impacting a security, issuer, industry sector or the market generally that presents a transaction opportunity, but does not have any impact on the analyst's particular "Overweight" or "Underweight" rating (which is based on a three month trade horizon). Trading ideas and recommendations may differ directionally from the analyst's rating on a security or issuer because they reflect the impact of a near-term catalyst or event.

Foreign currency rates of exchange may adversely affect the value, price or income of any security or financial instrument mentioned in this report. Investors in such securities and instruments effectively assume currency risk.

BofAS or one of its affiliates is a regular issuer of traded financial instruments linked to securities that may have been recommended in this report. BofAS or one of its affiliates may, at any time, hold a trading position (long or short) in the securities and financial instruments discussed in this report.

BofA Securities, through business units other than BofA Global Research, may have issued and may in the future issue trading ideas or recommendations that are inconsistent with, and reach different conclusions from, the information presented herein. Such ideas or recommendations may reflect different time frames, assumptions, views and analytical methods of the persons who prepared them, and BofA Securities is under no obligation to ensure that such other trading ideas or recommendations are brought to the attention of any recipient of this information.

In the event that the recipient received this information pursuant to a contract between the recipient and BofAS for the provision of research services for a separate fee, and in connection therewith BofAS may be deemed to be acting as an investment adviser, such status relates, if at all, solely to the person with whom BofAS has contracted directly and does not extend beyond the delivery of this report (unless otherwise agreed specifically in writing by BofAS). If such recipient uses the services of BofAS in connection with the sale or purchase of a security referred to herein, BofAS may act as principal for its own account or as agent for another person. BofAS is and continues to act solely as a broker-dealer in connection with the execution of any transactions, including transactions in any securities referred to herein.

Copyright and General Information:

Copyright 2022 Bank of America Corporation. All rights reserved. iQDatabase® is a registered service mark of Bank of America Corporation. This information is prepared for the use of BofA Securities clients and may not be redistributed, retransmitted or disclosed, in whole or in part, or in any form or manner, without the express written consent of BofA Securities. BofA Global Research information is distributed simultaneously to internal and client websites and other portals by BofA Securities and is not publicly-available material. Any unauthorized use or disclosure is prohibited. Receipt and review of this information constitutes your agreement not to redistribute, retransmit, or disclose to others the contents, opinions, conclusion, or information contained herein (including any investment recommendations, estimates or price targets) without first obtaining express permission from an authorized officer of BofA Securities.

Materials prepared by BofA Global Research personnel are based on public information. Facts and views presented in this material have not been reviewed by, and may not reflect information known to, professionals in other business areas of BofA Securities, including investment banking personnel. BofA Securities has established information barriers between BofA Global Research and certain business groups. As a result, BofA Securities does not disclose certain client relationships with, or compensation received from, such issuers. To the extent this material discusses any legal proceeding or issues, it has not been prepared as nor is it intended to express any legal conclusion, opinion or advice. Investors should consult their own legal advisers as to issues of law relating to the subject matter of this material. BofA Global Research personnel's knowledge of legal proceedings in which any BofA Securities entity and/or its directors, officers and employees may be plaintiffs, defendants, co-defendants or co-plaintiffs with or involving issuers mentioned in this material is based on public information. Facts and views presented in this material that relate to any such proceedings have not been reviewed by, discussed with, and may not reflect information known to, professionals in other business areas of BofA Securities in connection with the legal proceedings or matters relevant to such proceedings.

This information has been prepared independently of any issuer of securities mentioned herein and not in connection with any proposed offering of securities or as agent of any issuer of any securities. None of BofAS or any of its affiliates or their research analysts has any authority whatsoever to make any representation or warranty on behalf of the issuer(s). BofA Global Research policy prohibits research personnel from disclosing a recommendation, investment rating, or investment thesis for review by an issuer prior to the publication of a research report containing such rating, recommendation or investment thesis.

Any information relating to the tax status of financial instruments discussed herein is not intended to provide tax advice or to be used by anyone to provide tax advice. Investors are urged to seek tax advice based on their particular circumstances from an independent tax professional.

The information herein (other than disclosure information relating to BofA Securities and its affiliates) was obtained from various sources and we do not guarantee its accuracy. This information may contain links to third-party websites. BofA Securities is not responsible for the content of any third-party website or any linked content contained in a third-party website. Content contained on such third-party websites is not part of this information and is not incorporated by reference. The inclusion of a link does not imply any endorsement by or any affiliation with BofA Securities. Access to any third-party website is at your own risk, and you should always review the terms and privacy policies at third-party websites before submitting any personal information to them. BofA Securities is not responsible for such terms and privacy policies and expressly disclaims any liability for them.

All opinions, projections and estimates constitute the judgment of the author as of the date of publication and are subject to change without notice. Prices also are subject to change without notice. BofA Securities is under no obligation to update this information and BofA Securities ability to publish information on the subject issuer(s) in the future is subject to applicable quiet periods. You should therefore assume that BofA Securities will not update any fact, circumstance or opinion contained herein.

Certain outstanding reports or investment opinions relating to securities, financial instruments and/or issuers may no longer be current. Always refer to the most recent research report relating to an issuer prior to making an investment decision.

In some cases, an issuer may be classified as Restricted or may be Under Review or Extended Review. In each case, investors should consider any investment opinion relating to such issuer (or its security and/or financial instruments) to be suspended or withdrawn and should not rely on the analyses and investment opinion(s) pertaining to such issuer (or its securities and/or financial instruments) nor should the analyses or opinion(s) be considered a solicitation of any kind. Sales persons and financial advisors affiliated with BofAS or any of its affiliates may not solicit purchases of securities or financial instruments that are Restricted or Under Review and may only solicit securities under Extended Review in accordance with firm policies.

Neither BofA Securities nor any officer or employee of BofA Securities accepts any liability whatsoever for any direct, indirect or consequential damages or losses arising from any use of this information.

