



04 March 2019

Views and flows

In our previous edition of Vol Views, we argued that the Treasury curve was pricing the sum of all fears (see [here](#)), and that risk reward started to be skewed towards some normalization of yields. With some of these fears fading, yields did manage to push slightly higher with the backend leading the way, and given our view for 10yT fair value around 2.85%, we think there is still some scope for slightly higher yields. Flows followed the move in volatility space with gamma on the right side leading the way higher on the grid (see Table 3) and bouncing from levels close to multi-cycle lows.

Relative value

The Fed shift towards quasi-forward guidance changed the curve and volatility grid dynamic. We can see that clearly in the curve directionality (Chart 4), and in the performance of 3m10y vs 3m2y volatility (Chart 2). We expect this new regime to persist near term. Volatility looks fair across gamma on 1m PCA z-scores when the directionality with rates is removed (see Table 6), but continues to look cheap across the grid for longer historical windows (see Table 7 and Table 8).

Payer skew richened relative to receiver skew on short expiries in the belly of the grid (see Table 18 and Table 22). Although we expect this to persist near term, from a cycle perspective receiver skew should continue to trade rich relative to payer skew, and we should continue to see persistent sub-100% ratios in Table 21.

On conditional curves, bull steepeners and bear flatteners give up to the forwards virtually across the grid (except vs. the frontend - see Table 25 and Table 27), while bull flatteners and bear steepeners vs. the frontend show pickups that are somewhat attractive in the context of recent history (see Table 23 and Table 29).

With the recent move in right side gamma, we saw forward volatility on the right side of the grid cheapening slightly relative to ATM volatility and on 3m z-scores (Table 32).

Trade recommendations

The 5s10s curve is at steepness levels not seen since early 2018, with the curve moves over the last month clearly biased towards bear-steepening (46% if we apply the same curve directionality methodology as in Chart 4 to the 5s10s curve). Although we see scope for further steepening in a bearish scenario, a bullish scenario may skew the dynamic towards bull flattening. We like to express this view by buying 3m10y receiver spreads atm/atm-25bp, financed by selling 3m5y receivers atm-6bp (costless indicative) and locking in an entry level for flatteners of 22bp, a pickup of 6bp to the forwards and 7bp to spot. The position is slightly short the market and short vol at inception. Carry is positive by roughly 2.5bp/m. Risks to the trade are losses in a bull steepening scenario where the market prices Fed cuts at the 3m horizon. Given that we recommend selling the low strike receiver on the 10y leg, the trade is also exposed to a selloff in 10y rates below that strike (2.52% currently), even in a bull flattening scenario.

Rates Research
United States

Bruno Braizinha, CFA
Rates Strategist
MLPF&S
bruno.braizinha@baml.com

Carol Zhang
Rates Strategist
MLPF&S
carol.zhang@baml.com

Sphia Salim
Rates Strategist
MLI (UK)
sphia.salim@baml.com

US Rates Research
MLI (UK)
+1 646 855 8846

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

BofA Merrill Lynch 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 8 to 9. Analyst Certification on page 7.

11971937

Timestamp: 04 March 2019 03:17PM EST

Levels and Recent Moves

Table 1: ATM Normal Volatility Grid

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	23.9	42.4	48.8	51.6	52.1	51.6	47.1
3M	27.8	44.8	51.6	54.5	54.6	54.1	49.8
6M	36.1	49.1	54.4	56.7	56.7	56.2	52.1
1Y	52.2	59.0	60.7	61.4	60.8	60.2	55.7
2Y	65.3	67.3	66.7	66.1	65.1	64.0	58.6
3Y	69.8	70.2	69.2	67.8	66.7	65.4	59.5
4Y	72.1	72.1	71.2	69.0	67.8	66.5	60.2
5Y	72.9	72.5	71.6	69.4	68.1	66.7	60.0
10Y	69.1	68.7	68.0	66.4	65.0	63.5	57.0
15Y	63.6	63.2	62.7	61.5	60.2	58.9	54.4
30Y	52.1	51.8	51.7	51.3	50.4	49.5	49.7

Source: BofA Merrill Lynch Global Research

Table 2: ATM Volatility Grid - 3m Z-Scores

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-1.2	-1.2	-1.1	-1.0	-0.9	-0.9	-0.9
3M	-1.2	-1.3	-1.2	-1.2	-1.0	-1.0	-0.9
6M	-1.4	-1.5	-1.4	-1.3	-1.2	-1.1	-1.0
1Y	-1.4	-1.5	-1.4	-1.3	-1.2	-1.1	-1.0
2Y	-1.4	-1.5	-1.4	-1.4	-1.3	-1.2	-1.2
3Y	-1.5	-1.6	-1.6	-1.6	-1.5	-1.4	-1.4
4Y	-1.5	-1.6	-1.6	-1.7	-1.6	-1.4	-1.4
5Y	-1.6	-1.6	-1.7	-1.7	-1.7	-1.5	-1.5
10Y	-1.9	-1.9	-2.0	-2.1	-2.0	-1.9	-1.9
15Y	-1.4	-1.3	-1.4	-1.6	-1.3	-0.9	0.1
30Y	0.0	0.0	0.2	0.9	1.0	1.6	2.0

Source: BofA Merrill Lynch Global Research

Table 3: ATM Normal Volatility Grid - CoW

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-0.1	-0.3	0.3	0.6	1.1	1.1	1.0
3M	1.2	0.3	1.0	1.2	1.4	1.4	1.1
6M	-0.5	-0.7	0.2	0.6	0.6	0.6	0.6
1Y	0.0	-0.1	0.4	0.6	0.7	0.7	0.5
2Y	0.3	0.3	0.3	0.3	0.3	0.4	0.0
3Y	0.0	0.0	0.0	0.0	0.1	0.1	-0.1
4Y	0.0	0.0	0.0	0.0	0.1	0.1	-0.1
5Y	0.0	0.0	0.0	0.0	0.1	0.2	0.0
10Y	-0.6	-0.6	-0.6	-0.6	-0.4	-0.3	-0.3
30Y	0.7	0.7	0.7	0.7	0.8	0.9	0.8

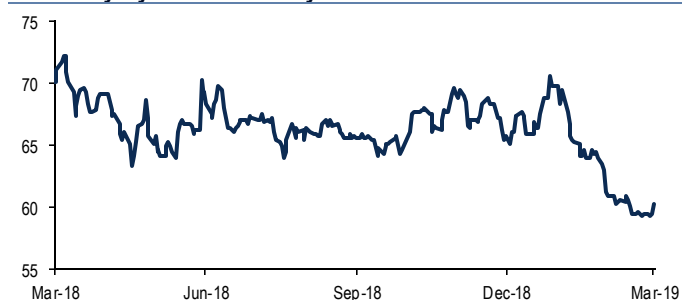
Source: BofA Merrill Lynch Global Research

Table 4: ATM Straddle Premiums

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.1%	0.2%	0.3%	0.6%	0.8%	1.0%	2.2%
3M	0.1%	0.3%	0.6%	1.0%	1.4%	1.9%	4.0%
6M	0.2%	0.5%	0.9%	1.5%	2.0%	2.7%	5.8%
1Y	0.4%	0.9%	1.4%	2.2%	3.0%	4.0%	8.6%
2Y	0.7%	1.4%	2.0%	3.3%	4.4%	5.9%	12.4%
3Y	0.9%	1.7%	2.5%	4.0%	5.4%	7.2%	15.1%
4Y	1.0%	2.0%	2.9%	4.6%	6.2%	8.3%	17.2%
5Y	1.1%	2.2%	3.2%	5.1%	6.8%	9.0%	18.7%
10Y	1.3%	2.6%	3.8%	6.0%	7.9%	10.6%	22.1%
30Y	1.0%	2.0%	2.9%	4.7%	6.2%	8.4%	20.1%

Source: BofA Merrill Lynch Global Research

Chart 1: 1y10y Normal Volatility



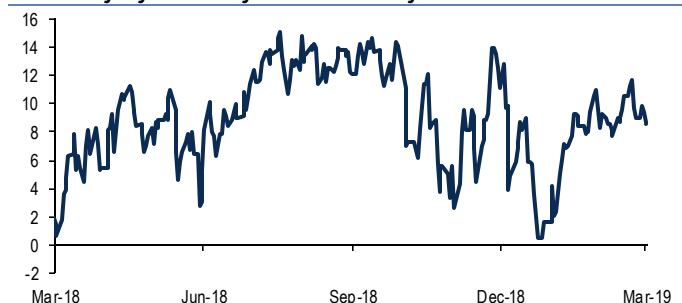
Source: BofA Merrill Lynch Global Research, Bloomberg

Chart 2: 3m10y vs. 3m2y Normal Volatility



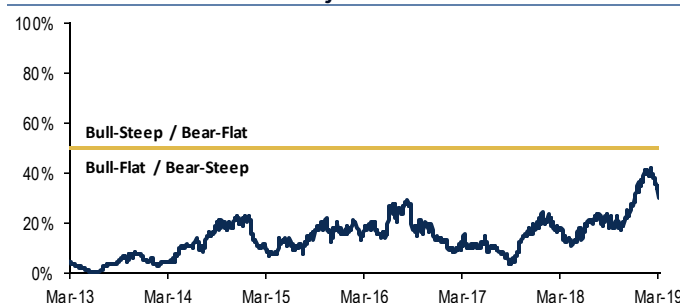
Source: BofA Merrill Lynch Global Research, Bloomberg

Chart 3: 1y10y vs. 1m10y Normal Volatility



Source: BofA Merrill Lynch Global Research, Bloomberg

Chart 4: 2s10s curve directionality



Source: BofA Merrill Lynch Global Research

Volatility Grid Relative Value

PCA Z-SCORES

Table 5: 3m Z-Scores w/ PCA framework

	1y	2y	3y	5y	7y	10y	30y
3m	-0.5	0.4	1.3	0.5	0.8	0.0	-1.0
6m	-0.9	-0.7	-0.7	0.3	0.4	-0.2	-1.0
1y	0.2	0.1	0.5	0.7	0.5	0.7	-0.6
2y	0.8	0.9	1.1	1.8	0.6	2.0	-1.3
5y	0.5	0.6	-0.6	-1.0	-0.4	-0.1	-0.9
10y	-0.5	-1.0	-1.2	-1.5	-1.2	-0.7	-0.8

Source: BofA Merrill Lynch Global Research

Table 6: 3m Z-Scores w/ PCA framework w/o rates directionality

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

Source: BofA Merrill Lynch Global Research

Table 7: 6m Z-Scores w/ PCA framework

	1y	2y	3y	5y	7y	10y	30y
3m	1.6	1.1	1.5	1.5	1.8	1.9	1.6
6m	-1.4	-2.1	-0.7	0.5	1.2	1.2	1.5
1y	0.0	-0.3	-0.1	-0.2	0.0	0.9	1.2
2y	-0.5	-1.1	-1.2	-1.4	-1.2	-0.2	0.1
5y	-1.8	-1.8	-2.0	-2.5	-2.1	-1.6	-1.0
10y	-2.2	-2.2	-2.3	-2.7	-2.4	-2.0	-1.5

Source: BofA Merrill Lynch Global Research

Table 8: 6m Z-Scores w/ PCA framework w/o rates directionality

	1y	2y	3y	5y	7y	10y	30y
3m	-1.5	-1.7	-1.5	-1.4	-1.2	-1.2	-1.1
6m	-1.9	-2.0	-1.9	-1.8	-1.7	-1.6	-1.5
1y	-1.7	-1.8	-1.8	-1.9	-1.8	-1.7	-1.6
2y	-1.9	-2.0	-2.0	-2.1	-2.0	-1.9	-1.9
5y	-2.4	-2.4	-2.4	-2.6	-2.5	-2.4	-2.2
10y	-2.8	-2.8	-2.9	-3.1	-2.9	-2.7	-2.5

Source: BofA Merrill Lynch Global Research

Table 9: 1y Z-Scores w/ PCA framework

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

Source: BofA Merrill Lynch Global Research

Table 10: 1y Z-Scores w/ PCA framework w/o rates directionality

	1y	2y	3y	5y	7y	10y	30y
3m	-2.7	-2.1	-2.0	-1.5	-1.5	-1.4	-1.5
6m	-2.6	-2.4	-2.3	-2.0	-2.0	-1.7	-1.7
1y	-2.1	-2.1	-2.2	-2.4	-2.1	-1.8	-1.7
2y	-2.1	-2.6	-2.9	-2.4	-2.3	-1.9	-2.0
5y	-2.8	-2.7	-2.7	-2.7	-2.5	-2.2	-1.9
10y	-1.8	-1.6	-1.6	-1.7	-1.4	-1.1	-0.7

Source: BofA Merrill Lynch Global Research

IMPLIED/DELIVERED RATIOS

Table 11: Implied vs. Delivered (21d) Ratio

	1y	2y	3y	5y	7y	10y	30y
1m	94%	102%	101%	101%	103%	105%	109%
3m	87%	97%	102%	103%	105%	109%	115%
6m	87%	94%	99%	103%	106%	110%	118%
1y	91%	97%	102%	108%	112%	117%	126%
2y	103%	112%	113%	119%	123%	128%	134%

Source: BofA Merrill Lynch Global Research

Table 12: Implied vs. Delivered (63d) Ratio

	1y	2y	3y	5y	7y	10y	30y
1m	60%	72%	74%	79%	84%	88%	99%
3m	56%	69%	74%	81%	86%	91%	104%
6m	58%	68%	74%	82%	88%	94%	107%
1y	67%	74%	80%	88%	94%	100%	115%
2y	79%	89%	92%	101%	106%	112%	123%

Source: BofA Merrill Lynch Global Research

Table 13: 3m Z-Scores for Implied vs. Delivered (21d) Ratio

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

Source: BofA Merrill Lynch Global Research

Table 14: 3m Z-Scores for Implied vs. Delivered (63d) Ratio

	1y	2y	3y	5y	7y	10y	30y
1m	-1.0	-1.0	-1.0	-1.1	-1.0	-1.0	-1.0
3m	-1.0	-1.1	-1.1	-1.1	-1.1	-1.1	-1.0
6m	-1.1	-1.2	-1.1	-1.2	-1.2	-1.2	-1.1
1y	-1.1	-1.1	-1.1	-1.2	-1.2	-1.2	-1.1
2y	-1.2	-1.2	-1.3	-1.3	-1.3	-1.3	-1.0

Source: BofA Merrill Lynch Global Research

Skew Relative Value

Table 15: Skew 25% delta

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	1.9	2.8	3.0	2.8	2.4	1.7	1.8
3M	4.0	5.2	4.8	3.3	3.0	2.4	2.7
6M	5.3	5.5	5.4	4.2	4.0	3.6	2.8
1Y	7.1	6.7	5.9	4.2	3.8	3.1	2.6
2Y	6.0	5.8	5.2	3.9	3.5	2.8	2.6
5Y	3.6	3.5	3.2	2.6	2.5	2.3	2.4
10Y	2.4	2.5	2.7	3.0	3.1	3.3	3.3
30Y	4.6	4.6	4.8	5.1	5.2	5.4	5.3

Source: BofA Merrill Lynch Global Research

Table 16: Skew 75% delta

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	-1.1	-1.3	-1.2	-0.8	-0.4	0.3	0.1
3M	-3.3	-3.3	-2.1	-0.1	0.3	0.9	0.3
6M	-3.6	-2.3	-1.8	-0.4	-0.2	0.2	0.8
1Y	-4.4	-3.0	-2.2	-0.3	0.1	0.7	1.0
2Y	-2.8	-2.4	-1.6	-0.1	0.3	1.0	0.9
5Y	1.0	1.2	1.5	2.1	2.2	2.3	1.8
10Y	4.6	4.5	4.3	3.8	3.6	3.3	2.7
30Y	7.2	7.1	6.9	6.5	6.2	5.9	5.5

Source: BofA Merrill Lynch Global Research

Table 17: Breakeven Widths for Costless Receiver Ladders

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	8.2	14.1	16.1	16.8	16.7	16.1	14.8
3M	19.3	29.2	31.7	31.3	30.7	30.3	28.2
6M	35.8	44.6	47.9	47.2	46.7	46.0	41.7
1Y	70.5	74.5	73.9	71.3	69.1	67.1	61.7
2Y	111.8	113.7	110.6	104.5	102.0	98.8	90.5
5Y	180.7	179.2	175.7	167.9	164.4	160.4	145.9
10Y	233.9	233.5	232.5	229.6	225.7	222.2	202.1

Source: BofA Merrill Lynch Global Research

Table 18: Breakeven Widths for Costless Payer Ladders

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	6.5	11.8	13.7	14.8	15.1	15.3	13.8
3M	11.8	20.3	24.5	27.7	28.2	28.5	25.6
6M	22.0	32.6	36.9	40.4	40.7	40.7	38.6
1Y	45.9	54.6	57.7	61.6	61.8	62.4	58.4
2Y	86.2	90.0	90.9	93.6	93.3	93.5	86.2
5Y	167.9	168.0	167.3	165.1	162.7	160.3	142.6
10Y	249.9	247.9	244.0	235.4	226.9	220.5	196.3

Source: BofA Merrill Lynch Global Research

Table 19: 3m Z-Score for Receiver Skew (w/o directionality with forwards and ATM)

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.2	0.0	-0.5	-0.3	-0.7	-0.8	-0.3
3M	0.2	-0.9	-2.1	-2.5	-2.6	-2.8	-0.6
6M	0.8	0.0	-1.0	-1.7	-1.3	0.0	0.5
1Y	0.8	0.1	-1.1	-1.1	-2.5	-0.9	-0.2
2Y	0.5	0.4	0.1	-0.9	0.1	-0.3	0.1
5Y	-0.8	-1.0	-1.0	-0.8	-0.6	-0.2	-0.2
10Y	-0.7	-0.7	-0.7	-0.8	-0.8	-0.8	-1.9

Source: BofA Merrill Lynch Global Research

Table 20: 3m Z-Score for Payer Skew (w/o directionality with forwards and ATM)

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	0.1	0.3	0.4	0.4	0.4	0.5	0.0
3M	-0.9	-0.1	-0.1	0.6	0.9	2.0	-0.6
6M	-0.3	0.5	1.1	2.0	2.0	1.3	0.7
1Y	-0.6	0.5	1.1	1.7	1.6	0.8	-0.1
2Y	-1.0	-0.7	-0.6	0.3	-0.2	-0.7	-0.6
5Y	0.4	0.4	0.4	0.4	0.3	0.1	-0.2
10Y	-0.4	-0.3	-0.2	0.0	-1.0	-0.7	0.0

Source: BofA Merrill Lynch Global Research

Table 21: Ratio of Payer/Receiver BE widths for Costless Ladders

	1Y	2Y	3Y	5Y	7Y	10Y	30Y
1M	80%	84%	85%	88%	91%	95%	94%
3M	61%	70%	77%	89%	92%	94%	91%
6M	61%	73%	77%	86%	87%	89%	93%
1Y	65%	73%	78%	86%	89%	93%	95%
2Y	77%	79%	82%	90%	91%	95%	95%
5Y	93%	94%	95%	98%	99%	100%	98%
10Y	107%	106%	105%	103%	101%	99%	97%

Source: BofA Merrill Lynch Global Research

Table 22: 3m Z-Score Ratio of Payer/Receiver Skew

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

Source: BofA Merrill Lynch Global Research

Conditional Curve Trades

Table 23: Bull Flattener (pickup to forwards for ATM)

ATM	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	-4.4	-4.2	-2.2	0.1	1.9	1.7
6M	-4.9	-4.3	-1.8	0.3	2.6	2.2
1Y	-2.1	-1.1	2.6	0.9	4.4	3.6
1.5Y	-0.2	1.5	6.2	1.7	6.3	4.8
2Y	1.5	3.8	9.5	2.2	8.1	6.0

Source: BofA Merrill Lynch Global Research

Table 24: Bull Flattener (pickup to forwards for -25bp OTM)

-25bp	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	-5.5	-3.8	-0.7	1.3	4.2	3.0
6M	-6.1	-4.7	0.1	1.1	5.4	4.4
1Y	-0.9	1.5	6.5	2.1	7.3	5.4
1.5Y	1.3	4.3	10.5	3.0	9.3	6.5
2Y	3.0	6.3	13.6	3.6	11.0	7.7

Source: BofA Merrill Lynch Global Research

Table 25: Bull Steepener (pickup to forwards for ATM)

ATM	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	4.4	4.2	2.2	-0.1	-1.9	-1.7
6M	4.9	4.3	1.8	-0.3	-2.6	-2.2
1Y	2.1	1.1	-2.6	-0.9	-4.4	-3.6
1.5Y	0.2	-1.5	-6.2	-1.7	-6.3	-4.8
2Y	-1.5	-3.8	-9.5	-2.2	-8.1	-6.0

Source: BofA Merrill Lynch Global Research

Table 26: Bull Steepener (pickup to forwards for -25bp OTM)

-25bp	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	5.5	3.8	0.7	-1.3	-4.2	-3.0
6M	6.1	4.7	-0.1	-1.1	-5.4	-4.4
1Y	0.9	-1.5	-6.5	-2.1	-7.3	-5.4
1.5Y	-1.3	-4.3	-10.5	-3.0	-9.3	-6.5
2Y	-3.0	-6.3	-13.6	-3.6	-11.0	-7.7

Source: BofA Merrill Lynch Global Research

Table 27: Bear Flattener (pickup to forwards for ATM)

ATM	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	4.0	4.0	2.1	-0.1	-1.9	-1.7
6M	4.3	4.1	1.7	-0.3	-2.4	-2.3
1Y	1.9	0.9	-2.4	-0.9	-4.4	-3.4
1.5Y	0.2	-1.4	-6.1	-1.7	-6.2	-4.6
2Y	-1.3	-3.6	-9.3	-2.2	-7.9	-5.8

Source: BofA Merrill Lynch Global Research

Table 28: Bear Flattener (pickup to forwards for +25bp OTM)

+25bp	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	15.4	17.3	11.4	0.9	-3.2	-3.8
6M	9.9	10.1	6.6	-0.1	-3.0	-3.0
1Y	4.8	4.2	-0.7	-0.5	-5.2	-4.6
1.5Y	1.9	0.4	-5.7	-1.5	-7.5	-6.0
2Y	-0.5	-2.6	-9.9	-2.2	-9.5	-7.3

Source: BofA Merrill Lynch Global Research

Table 29: Bear Steepener (pickup to forwards for ATM)

ATM	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	-4.0	-4.0	-2.1	0.1	1.9	1.7
6M	-4.3	-4.1	-1.7	0.3	2.4	2.3
1Y	-1.9	-0.9	2.4	0.9	4.4	3.4
1.5Y	-0.2	1.4	6.1	1.7	6.2	4.6
2Y	1.3	3.6	9.3	2.2	7.9	5.8

Source: BofA Merrill Lynch Global Research

Table 30: Bear Steepener (pickup to forwards for +25bp OTM)

+25bp	2/5s	2/10s	2/30s	5/10s	5/30s	10/30s
3M	-15.4	-17.3	-11.4	-0.9	3.2	3.8
6M	-9.9	-10.1	-6.6	0.1	3.0	3.0
1Y	-4.8	-4.2	0.7	0.5	5.2	4.6
1.5Y	-1.9	-0.4	5.7	1.5	7.5	6.0
2Y	0.5	2.6	9.9	2.2	9.5	7.3

Source: BofA Merrill Lynch Global Research

Forward Volatility

Table 31: 6m Forward Volatility

	1y	2y	5y	10y	30y
1m	45.9	53.1	59.5	60.0	56.7
3m	54.3	58.9	61.9	61.5	57.6
6m	57.1	61.6	63.5	62.7	58.6
1y	57.4	63.4	65.1	63.8	59.2
2y	68.5	70.2	68.5	66.4	60.7
5y	74.2	73.7	70.5	67.7	60.7
10y	69.1	68.8	66.7	63.7	57.2

Source: BofA Merrill Lynch Global Research

Table 32: 6m fwd vol as % ATM

	1y	2y	5y	10y	30y
1m	192%	125%	115%	116%	120%
3m	196%	132%	114%	114%	116%
6m	158%	125%	112%	112%	112%
1y	110%	107%	106%	106%	106%
2y	105%	104%	104%	104%	104%
5y	102%	102%	102%	102%	101%
10y	100%	100%	100%	100%	100%

Source: BofA Merrill Lynch Global Research

Table 33: 3m Z-Scores of 6m fwd vol % ATM

	1y	2y	5y	10y	30y
1m	1.1	0.6	0.4	0.5	0.8
3m	1.2	1.0	0.4	0.5	0.8
6m	1.7	1.5	0.9	0.9	0.9
1y	1.0	-0.9	0.0	0.6	0.7
2y	-1.8	-1.3	-0.6	0.1	0.4
5y	0.8	0.8	0.7	0.8	0.9
10y	1.6	1.6	1.5	1.5	1.4

Source: BofA Merrill Lynch Global Research

Table 34: 1y Forward Volatility

	1y	2y	5y	10y	30y
1m	57.3	62.6	64.1	63.0	58.7
3m	61.4	65.5	65.6	63.9	59.1
6m	62.8	67.0	66.7	64.8	59.7
1y	64.3	69.1	68.3	66.3	60.8
2y	71.9	72.6	70.0	67.4	61.2
5y	74.6	74.2	70.8	68.0	60.8
10y	69.0	68.7	66.7	63.6	57.2

Source: BofA Merrill Lynch Global Research

Table 35: 1y fwd vol as % ATM

	1y	2y	5y	10y	30y
1m	240%	148%	124%	122%	125%
3m	221%	146%	120%	118%	119%
6m	174%	136%	118%	115%	115%
1y	123%	117%	111%	110%	109%
2y	110%	108%	106%	105%	104%
5y	102%	102%	102%	102%	101%
10y	100%	100%	100%	100%	100%

Source: BofA Merrill Lynch Global Research

Table 36: 3m Z-Scores of 1y fwd vol % ATM

	1y	2y	5y	10y	30y
1m	1.2	1.0	0.7	0.7	0.8
3m	1.2	1.0	0.5	0.6	0.7
6m	1.7	1.5	0.7	0.8	0.7
1y	0.5	-1.2	-0.2	0.6	0.5
2y	-1.0	-0.6	-0.6	-0.3	0.1
5y	0.8	0.9	0.5	0.8	0.8
10y	1.8	1.8	1.7	1.7	1.7

Source: BofA Merrill Lynch Global Research

Table 37: 2y Forward Volatility

	1y	2y	5y	10y	30y
1m	34.6	56.7	63.8	64.6	60.6
3m	72.6	73.5	70.2	67.7	61.6
6m	72.2	73.6	70.1	67.5	61.4
1y	69.0	73.6	70.2	67.6	61.3
2y	76.8	77.3	72.1	69.0	61.9
5y	74.3	74.0	70.7	68.0	60.3
10y	68.5	68.2	66.4	63.3	56.8

Source: BofA Merrill Lynch Global Research

Table 38: 2y fwd vol as % ATM

	1y	2y	5y	10y	30y
1m	145%	134%	124%	125%	129%
3m	261%	164%	129%	125%	124%
6m	200%	150%	124%	120%	118%
1y	132%	125%	114%	112%	110%
2y	118%	115%	109%	108%	106%
5y	102%	102%	102%	102%	100%
10y	99%	99%	100%	100%	100%

Source: BofA Merrill Lynch Global Research

Table 39: 3m Z-Scores of 2y fwd vol % ATM

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

Source: BofA Merrill Lynch Global Research

Table 40: 3y Forward Volatility

	1y	2y	5y	10y	30y
1m		38.0	59.5	62.9	59.5
3m	69.5	75.2	72.0	69.3	62.3
6m	73.6	78.4	73.3	70.2	62.7
1y	74.9	79.7	73.6	70.3	62.6
2y	78.5	78.5	73.0	69.7	61.6
5y	73.7	73.6	70.3	67.7	59.3
10y	67.5	67.3	65.8	62.6	56.2

Source: BofA Merrill Lynch Global Research

Table 41: 3y fwd vol as % ATM

	1y	2y	5y	10y	30y
1m		90%	115%	122%	126%
3m	250%	168%	132%	128%	125%
6m	204%	160%	129%	125%	120%
1y	143%	135%	120%	117%	112%
2y	120%	117%	110%	109%	105%
5y	101%	102%	101%	101%	99%
10y	98%	98%	99%	99%	99%

Source: BofA Merrill Lynch Global Research

Table 42: 3m Z-Scores of 3y fwd vol % ATM

	1y	2y	5y	10y	30y
1m		-1.1	-0.8	-0.2	0.5
3m	1.1	1.1	0.1	0.3	0.7
6m	1.6	1.6	0.4	0.6	0.8
1y	1.5	1.4	-0.2	0.1	0.6
2y	0.9	0.8	-0.8	-0.7	0.2
5y	0.5	0.7	0.1	0.6	0.9
10y	2.2	2.2	2.1	2.1	2.1

Source: BofA Merrill Lynch Global Research

Table 43: 5y Forward Volatility

	1y	2y	5y	10y	30y
1m		41.4	61.7	64.0	58.8
3m	67.1	72.7	73.0	69.8	61.3
6m	71.2	75.2	74.1	70.3	61.5
1y	73.0	77.0	74.7	70.4	61.5
2y	76.3	78.7	74.2	69.6	60.8
5y	71.4	71.3	68.0	66.0	56.7
10y	64.5	64.3	63.7	60.5	54.1

Source: BofA Merrill Lynch Global Research

Table 44: 5y fwd vol as % ATM

	1y	2y	5y	10y	30y
1m		98%	120%	124%	125%
3m	242%	163%	134%	129%	123%
6m	197%	153%	131%	125%	118%
1y	140%	131%	122%	117%	111%
2y	117%	117%	112%	109%	104%
5y	98%	98%	98%	99%	94%
10y	93%	93%	96%	95%	95%

Source: BofA Merrill Lynch Global Research

Table 45: 3m Z-Scores of 5y fwd vol % ATM

	1y	2y	5y	10y	30y
1m		-0.1	-0.3	0.0	0.5
3m	0.9	1.0	0.2	0.2	0.6
6m	1.3	1.4	0.5	0.4	0.7
1y	1.1	1.4	0.3	0.3	0.7
2y	1.2	1.4	0.3	0.4	0.8
5y	0.6	0.8	0.2	0.6	0.8
10y	2.4	2.3	2.1	2.1	2.0

Source: BofA Merrill Lynch Global Research

Options Risk Statement

Potential Risk at Expiry & Options Limited Duration Risk

Unlike owning or shorting a stock, employing any listed options strategy is by definition governed by a finite duration. The most severe risks associated with general options trading are total loss of capital invested and delivery/assignment risk... all of which can occur in a short period.

Investor suitability

The use of standardized options and other related derivatives instruments are considered unsuitable for many investors. Investors considering such strategies are encouraged to become familiar with the "Characteristics and Risks of Standardized Options" (an OCC authored white paper on options risks). U.S. investors should consult with a FINRA Registered Options Principal.

For detailed information regarding the risks involved with investing in listed options:

<http://www.theocc.com/about/publications/character-risks.jsp>

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 Merrill Lynch 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 Merrill Lynch 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: (i) 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 (ii) 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 Bank of America Merrill Lynch 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 that may not be offered or sold in one or more states or jurisdictions. Readers of this report are advised that any discussion, recommendation or other mention of such securities is not a solicitation or offer to transact in such securities. Investors should contact their BofA Merrill Lynch representative or Merrill Lynch Global Wealth Management financial advisor for information relating to fixed income securities.

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 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 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 securities are exempt from registration or have been qualified for sale.

Officers of MLPF&S 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 discussed herein, may not be eligible for distribution or sale in all countries or to certain categories of investors.

BofA Merrill Lynch Global Research policies relating to conflicts of interest are described at <https://rsch.baml.com/coi>

'BofA Merrill Lynch' includes Merrill Lynch, Pierce, Fenner & Smith Incorporated ('MLPF&S') and its affiliates. Investors should contact their BofA Merrill Lynch representative or Merrill Lynch 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 Merrill Lynch' and 'Merrill Lynch' are each global brands for BofA Merrill Lynch Global Research.

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

MLPF&S distributes, or 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); BAML DAC (Milan): Bank of America Merrill Lynch International DAC, Milan Branch, regulated by the Bank of Italy, the European Central Bank (ECB) and the Central Bank of Ireland (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; Merrill Lynch (Japan): Merrill Lynch Japan Securities 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; DSP Merrill Lynch (India): DSP Merrill Lynch Limited, regulated by the Securities and Exchange Board of India; 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 (Spain): Merrill Lynch Capital Markets Espana, S.A.S.V., regulated by Comisión Nacional del Mercado De Valores; Merrill Lynch (Brazil): Bank of America Merrill Lynch Banco Múltiplo S.A., 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 Merrill Lynch (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 DSP Merrill Lynch (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. Bank of America N.A., Australian Branch (ARBN 064 874 531), AFS License 412901 (BANA Australia) and Merrill Lynch Equities (Australia) Limited (ABN 65 006 276 795), AFS License 235132 (MLEA) distribute this information in Australia only to 'Wholesale' clients as defined by s.761G of the Corporations Act 2001. With the exception of BANA Australia, 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. Bank of America Merrill Lynch International DAC, Frankfurt Branch (BAML DAC (Frankfurt)) distributes this information in Germany and is regulated by BaFin, the ECB and the CBI.

This information has been prepared and issued by MLPF&S 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. MLPF&S is the distributor of this information in the US and accepts full responsibility for information distributed to 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 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.

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 Merrill Lynch.

This document provides general information only, and has been prepared for, and is intended for general distribution to, BofA Merrill Lynch 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 Merrill Lynch, 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. 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.

Futures and options are not appropriate for all investors. Such financial instruments may expire worthless. Before investing in futures or options, clients must receive the appropriate risk disclosure documents. Investment strategies explained in this report may not be appropriate at all times. Costs of such strategies do not include commission or margin expenses.

BofA Merrill Lynch 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.

UK Readers: The protections provided by the U.K. regulatory regime, including the Financial Services Scheme, do not apply in general to business coordinated by BofA Merrill Lynch entities located outside of the United Kingdom.

MLPF&S or one of its affiliates is a regular issuer of traded financial instruments linked to securities that may have been recommended in this report. MLPF&S 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 Merrill Lynch, through business units other than BofA Merrill Lynch 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 Merrill Lynch 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 MLPF&S for the provision of research services for a separate fee, and in connection therewith MLPF&S may be deemed to be acting as an investment adviser, such status relates, if at all, solely to the person with whom MLPF&S has contracted directly and does not extend beyond the delivery of this report (unless otherwise agreed specifically in writing by MLPF&S). If such recipient uses the services of MLPF&S in connection with the sale or purchase of a security referred to herein, MLPF&S may act as principal for its own account or as agent for another person. MLPF&S 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 © 2019 Bank of America Corporation. All rights reserved. iQprofile™, iQmethod™ are service marks of Bank of America Corporation. iQdatabase® is a registered service mark of Bank of America Corporation. This information is prepared for the use of BofA Merrill Lynch 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 Merrill Lynch. BofA Merrill Lynch Global Research information is distributed simultaneously to internal and client websites and other portals by BofA Merrill Lynch 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 Merrill Lynch.

Materials prepared by BofA Merrill Lynch 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 Merrill Lynch, including investment banking personnel. BofA Merrill Lynch has established information barriers between BofA Merrill Lynch Global Research and certain business groups. As a result, BofA Merrill Lynch 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 Merrill Lynch Global Research personnel's knowledge of legal proceedings in which any BofA Merrill Lynch 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 Merrill Lynch 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 MLPF&S, 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 Merrill Lynch 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 Merrill Lynch 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 Merrill Lynch 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 Merrill Lynch. 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 Merrill Lynch 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 Merrill Lynch is under no obligation to update this information and BofA Merrill Lynch's ability to publish information on the subject issuer(s) in the future is subject to applicable quiet periods. You should therefore assume that BofA Merrill Lynch 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 MLPF&S 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 Merrill Lynch nor any officer or employee of BofA Merrill Lynch accepts any liability whatsoever for any direct, indirect or consequential damages or losses arising from any use of this information.