

# US Rates Watch

## Vol views – left side on fire

### Left side vol on fire

The market has priced the first order impact of supply chain disruptions as lower growth, and the second order impact a more hawkish Fed that is forced to counter inflationary pressures and hence reinforces the lower growth view (as it chokes the recovery in the process). These pressure the curve flatter not only through lower backend yields (terminal rate expectations under pressure) but also higher frontend yields (hikes get prices in). On the vol grid, they imply a significant outperformance of the left vs. the right side (see Exhibit 1 for the grid moves since the Sep FOMC meeting). The normal early cycle dynamic of higher inflation expectations = backend driven selloff as it inject term premium and inflation risk premium on the curve, is less than an afterthought.

In forwards the 1y2y led the bearish dynamic since the Sep FOMC meeting, with a 40bp move (see Exhibit 2). We can't help but wonder about the limits to this dynamic:

- While there is a demand and liquidity driven components to the recent inflationary pressures, with too much cash chasing too few assets, there is also a significant contribution from real logistical problems in global supply chains. Tighter monetary policy may counter the former, but is unlikely to be able to address the latter.
- The recent repricing has been exacerbated by the broadening of supply chain disruptions into the energy complex. The sensitivity of longer term inflation expectations (measured by backend breakevens) to the energy complex is generally low. The oil complex is the most volatile component of the basket, but also generally seen as more transitory impact on inflation. One should expect to see a more significant impact in backend yields only when the inflation view shifts from transitory to more persistent - as it happened in 2014 on the downside where we saw a pickup of backend breakevens and oil correlations after the commodities rout as the market priced a lower inflation regime for longer. There is a high threshold for a supply driven energy complex shock to drive such a shift in longer term inflation expectations, as we argued in [USTs and the 2022 allocation backdrop](#).

The recent knee-jerk pricing of a sooner than expected Fed liftoff (first hike priced for Sep 22 with two by end-22 with 69% probability - Exhibit 3) and aggressive ramp up (5 hikes priced in by end-23 - Exhibit 4), is perhaps somewhat excessive in this context. Particularly as this "stagflation" configuration seems to be the most challenging for central banks (see [Stagflation, no. Stagflation, yes](#)). Fed officials have shown no interest in pushing back against the recent repricing. Yet a recent economic bulletin from the Kansas City Fed is noteworthy in this context as it argues that "normalizing the balance sheet before raising the funds rate might forestall yield curve inversion and, in turn, support economic stability"<sup>1</sup>, an added risk to the recent repricing.

Below we show the usual set of RV monitors for volatility, including RV across the four main rotations of the grid: (1) broad under/out-performance, (2) gamma vs intermediates and vega, (3) left side vs right side; and (4) steeper/flatter skew.

<sup>1</sup> <https://www.kansascityfed.org/documents/8443/eb21diltssstedmangulatil014.pdf>

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Timestamp: 18 October 2021 11:41AM EDT

18 October 2021

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ULC – upper left corner  
URC – upper right corner  
LRC – lower right corner  
LRC – lower right corner

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**Exhibit 1: Moves on the US vol grid since the Sep FOMC meeting**

Left side leading the outperformance

|            | 1y   | 2y   | 3y   | 5y   | 7y   | 10y  | 30y |
|------------|------|------|------|------|------|------|-----|
| <b>1m</b>  | 10.8 | 22.9 | 15.2 | 10.9 | 12.9 | 10.5 | 9.1 |
| <b>3m</b>  | 13.3 | 17.4 | 14.1 | 11.7 | 9.7  | 5.5  | 6.3 |
| <b>6m</b>  | 16.9 | 17.4 | 15.0 | 11.5 | 5.4  | 4.2  | 6.6 |
| <b>1y</b>  | 21.3 | 19.0 | 7.7  | 10.7 | 6.9  | 4.1  | 4.5 |
| <b>2y</b>  | 14.0 | 9.1  | 9.2  | 6.6  | 4.9  | 3.0  | 2.9 |
| <b>3y</b>  | 7.1  | 5.0  | 6.4  | 3.7  | 3.3  | 3.1  | 2.2 |
| <b>4y</b>  | 6.1  | 4.9  | 4.1  | 3.8  | 3.1  | 2.9  | 2.2 |
| <b>5y</b>  | 4.2  | 3.4  | 3.7  | 3.6  | 2.8  | 2.3  | 1.6 |
| <b>10y</b> | 1.7  | 2.2  | 1.2  | 2.0  | 0.9  | 1.4  | 0.7 |
| <b>15y</b> | 0.1  | 0.7  | 2.3  | 1.5  | 1.8  | 1.3  | 1.1 |
| <b>30y</b> | 9.0  | 7.2  | 6.7  | 3.9  | 7.7  | 8.4  | 3.7 |

Source: BofA Global Research

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**Exhibit 2: Moves in forwards since the Sep FOMC meeting**

1y2y leading the bearish dynamic in fwd space

|            | 1y   | 2y   | 3y   | 5y   | 7y   | 10y  | 30y  |
|------------|------|------|------|------|------|------|------|
| <b>1m</b>  | 11.1 | 26.2 | 30.2 | 29.3 | 29.2 | 28.2 | 24.0 |
| <b>3m</b>  | 15.4 | 31.5 | 32.2 | 28.2 | 27.3 | 28.6 | 24.3 |
| <b>6m</b>  | 24.2 | 31.2 | 34.1 | 29.9 | 28.2 | 29.8 | 24.4 |
| <b>1y</b>  | 39.7 | 39.7 | 38.0 | 31.5 | 30.7 | 27.7 | 26.1 |
| <b>2y</b>  | 37.3 | 36.8 | 31.4 | 27.7 | 27.7 | 28.0 | 24.2 |
| <b>3y</b>  | 31.3 | 28.5 | 28.0 | 25.5 | 25.8 | 26.0 | 23.4 |
| <b>4y</b>  | 22.2 | 23.8 | 24.3 | 27.8 | 26.0 | 24.9 | 23.0 |
| <b>5y</b>  | 26.4 | 29.6 | 31.3 | 27.8 | 28.4 | 22.7 | 22.8 |
| <b>10y</b> | 23.0 | 24.6 | 22.7 | 22.3 | 22.1 | 22.1 | 22.7 |
| <b>15y</b> | 21.4 | 21.4 | 21.4 | 21.4 | 21.4 | 21.5 | 18.8 |
| <b>30y</b> | 20.4 | 20.4 | 20.3 | 20.4 | 20.4 | 20.4 | 8.9  |

Source: BofA Global Research

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**Exhibit 3: Hike probabilities currently priced in**

Two hikes priced in for 2022, 5 hikes in 2023

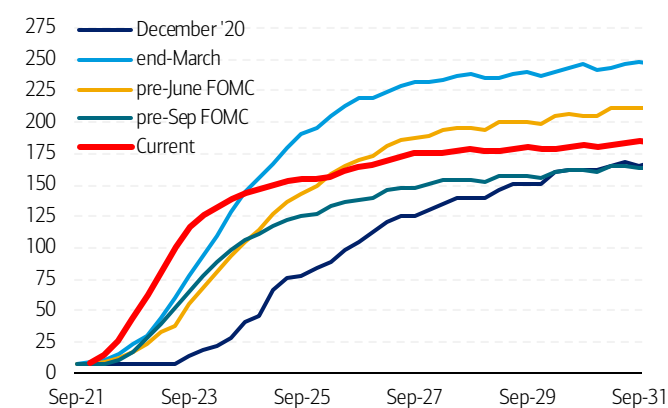
| Dates         | > 25bp | > 50bp | > 75bp | > 100bp | > 125bp | > 150bp | > 175bp |
|---------------|--------|--------|--------|---------|---------|---------|---------|
| <b>Dec-21</b> | 2%     | 0%     | 0%     | 0%      | 0%      | 0%      | 0%      |
| <b>Mar-22</b> | 17%    | 1%     | 0%     | 0%      | 0%      | 0%      | 0%      |
| <b>Jun-22</b> | 48%    | 9%     | 1%     | 0%      | 0%      | 0%      | 0%      |
| <b>Sep-22</b> | 79%    | 38%    | 10%    | 1%      | 0%      | 0%      | 0%      |
| <b>Dec-22</b> | 93%    | 69%    | 34%    | 11%     | 2%      | 0%      | 0%      |
| <b>Mar-23</b> | 99%    | 92%    | 68%    | 36%     | 13%     | 3%      | 0%      |
| <b>Jun-23</b> | 100%   | 96%    | 80%    | 52%     | 23%     | 7%      | 1%      |
| <b>Sep-23</b> | 100%   | 98%    | 88%    | 67%     | 40%     | 17%     | 5%      |
| <b>Dec-23</b> | 100%   | 99%    | 93%    | 77%     | 53%     | 29%     | 12%     |
| <b>Mar-24</b> | 100%   | 99%    | 94%    | 82%     | 61%     | 37%     | 18%     |
| <b>Jun-24</b> | 100%   | 99%    | 95%    | 83%     | 63%     | 39%     | 19%     |
| <b>Sep-24</b> | 100%   | 99%    | 96%    | 85%     | 67%     | 44%     | 23%     |
| <b>Dec-24</b> | 100%   | 100%   | 97%    | 89%     | 73%     | 51%     | 30%     |

Source: BofA Global Research

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**Exhibit 4: Different stages of repricing of Fed path over the last year**

Aggressive frontend repricing since the Sep FOMC meeting



Source: BofA Global Research

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**Trade recommendations**

We recommended tactical steepeners in 2s10s over the summer, to fade downside breakout of the 110-155bp range we see as fair value with the Fed at the zero lower bound. We argued for conservative targets on the position, around 125-130bp. We hit the target range in the late-Sep/early-Oct steepening move, and faded the highs in the recent frontend led dynamic. We are more agnostic on the curve at these levels.

In a recent note (see [USTs and the 2022 allocation backdrop](#)) we argued for fading the recent flatness of the curve in long dated forwards (4y fwd 2s30s bear steepeners with an inverted -10bp entry level on the curve, which also leans against the recent left side led outperformance of the grid - currently 0bp), positioning for an underperformance of the belly medium term (18m7y costless payer ladders with max upside in the 2.3-2.6% range and 3% downside breakeven - currently 0bp); structural long 5y30y vega positions with entry levels in the 60-62bp range; and fading the recent Fed repricing by buying 1y2y receivers atm+15bp financed by selling 1y2y payers atm+25bp (currently 0bp).



# Levels and Recent Moves

## Exhibit 5: ATM Normal Volatility Grid

74bp for 1y10y volatility

|     | 1Y   | 2Y   | 3Y   | 5Y   | 7Y   | 10Y  | 30Y  |
|-----|------|------|------|------|------|------|------|
| 1M  | 26.7 | 40.1 | 50.6 | 67.0 | 70.4 | 74.8 | 75.6 |
| 3M  | 28.5 | 45.0 | 54.4 | 67.4 | 69.6 | 73.2 | 74.0 |
| 6M  | 37.5 | 53.3 | 61.9 | 69.2 | 70.3 | 73.2 | 72.8 |
| 1Y  | 56.0 | 67.4 | 71.1 | 73.8 | 74.0 | 74.2 | 71.2 |
| 2Y  | 75.6 | 75.6 | 75.7 | 75.9 | 74.9 | 74.0 | 68.8 |
| 3Y  | 78.7 | 77.9 | 77.1 | 76.0 | 74.7 | 73.5 | 66.8 |
| 4Y  | 78.9 | 78.1 | 77.2 | 75.9 | 74.3 | 72.6 | 65.3 |
| 5Y  | 78.5 | 77.7 | 76.9 | 75.5 | 73.7 | 71.5 | 63.7 |
| 10Y | 69.9 | 69.2 | 68.5 | 67.2 | 65.7 | 64.0 | 56.0 |
| 30Y | 53.5 | 53.0 | 52.4 | 51.4 | 50.3 | 49.0 | 42.8 |

Source: BofA Global Research

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## Exhibit 6: ATM Volatility Grid - 3m Z-Scores

Left side rich on Z-scores supported by hawkish Fed repricing

|     | 1Y  | 2Y  | 3Y  | 5Y  | 7Y   | 10Y  | 30Y |
|-----|-----|-----|-----|-----|------|------|-----|
| 1M  | 5.2 | 5.0 | 3.9 | 1.5 | 0.3  | 0.3  | 0.3 |
| 3M  | 4.7 | 4.7 | 4.0 | 1.8 | -0.1 | -0.1 | 0.1 |
| 6M  | 4.7 | 4.1 | 3.5 | 2.0 | 0.2  | 0.2  | 0.3 |
| 1Y  | 4.4 | 3.6 | 3.2 | 2.8 | 2.3  | 1.5  | 0.6 |
| 2Y  | 3.4 | 2.8 | 2.7 | 2.5 | 2.1  | 1.7  | 0.9 |
| 3Y  | 2.5 | 2.4 | 2.3 | 2.2 | 2.1  | 1.9  | 1.0 |
| 4Y  | 2.2 | 2.2 | 2.3 | 2.3 | 2.3  | 2.4  | 1.4 |
| 5Y  | 2.2 | 2.1 | 2.2 | 2.3 | 2.4  | 2.6  | 1.4 |
| 10Y | 2.8 | 2.9 | 3.0 | 2.6 | 2.3  | 1.6  | 0.1 |
| 30Y | 2.8 | 3.0 | 3.0 | 2.6 | 2.2  | 1.4  | 0.7 |

Source: BofA Global Research

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## Table 1: ATM Normal Volatility Grid - CoW

Left side outperformance vs right

|     | 1Y   | 2Y   | 3Y   | 5Y  | 7Y   | 10Y  | 30Y  |
|-----|------|------|------|-----|------|------|------|
| 1M  | 10.0 | 13.6 | 10.1 | 4.7 | -1.0 | -1.1 | -1.1 |
| 3M  | 10.7 | 13.1 | 9.5  | 4.5 | -1.1 | -1.2 | -1.2 |
| 6M  | 11.8 | 11.0 | 7.3  | 4.1 | -0.8 | -0.8 | -0.8 |
| 1Y  | 12.7 | 10.2 | 6.1  | 3.2 | 1.4  | -0.2 | -0.2 |
| 2Y  | 7.5  | 3.9  | 2.5  | 1.2 | 0.4  | -0.3 | -0.3 |
| 3Y  | 2.9  | 2.1  | 1.6  | 0.9 | 0.6  | 0.2  | 0.2  |
| 4Y  | 2.1  | 1.7  | 1.4  | 1.0 | 0.8  | 0.6  | 0.5  |
| 5Y  | 1.0  | 1.0  | 1.0  | 1.0 | 0.8  | 0.6  | 0.5  |
| 10Y | 0.4  | 0.4  | 0.4  | 0.4 | 0.4  | 0.4  | 0.3  |
| 30Y | 0.4  | 0.4  | 0.4  | 0.4 | 0.4  | 0.4  | 0.3  |

Source: BofA Global Research

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## Table 2: ATM Straddle Premiums

5.4% straddle premiums for 1y10y

|     | 1Y   | 2Y   | 3Y   | 5Y   | 7Y   | 10Y   | 30Y   |
|-----|------|------|------|------|------|-------|-------|
| 1M  | 0.1% | 0.2% | 0.3% | 0.7% | 1.1% | 1.5%  | 3.9%  |
| 3M  | 0.1% | 0.4% | 0.6% | 1.3% | 1.8% | 2.7%  | 6.8%  |
| 6M  | 0.2% | 0.6% | 1.0% | 1.9% | 2.6% | 3.8%  | 9.4%  |
| 1Y  | 0.4% | 1.1% | 1.7% | 2.8% | 3.9% | 5.4%  | 12.9% |
| 2Y  | 0.8% | 1.7% | 2.5% | 4.0% | 5.5% | 7.5%  | 17.4% |
| 3Y  | 1.0% | 2.1% | 3.0% | 4.9% | 6.6% | 8.9%  | 20.5% |
| 4Y  | 1.2% | 2.3% | 3.4% | 5.5% | 7.4% | 10.0% | 22.7% |
| 5Y  | 1.3% | 2.6% | 3.8% | 6.0% | 8.1% | 10.9% | 24.4% |
| 10Y | 1.5% | 2.9% | 4.3% | 6.9% | 9.3% | 12.6% | 28.2% |
| 30Y | 1.4% | 2.8% | 4.1% | 6.6% | 9.0% | 12.3% | 28.5% |

Source: BofA Global Research

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## Exhibit 7: 1y10y normal vol

70-80bp expected range in 2021

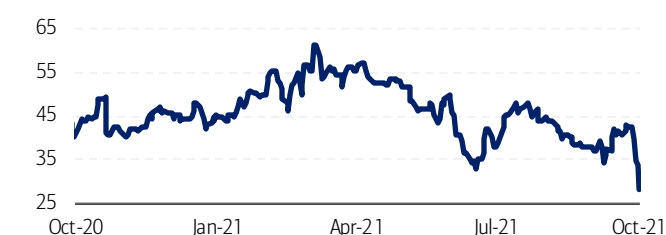


Source: BofA Global Research, Bloomberg

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## Exhibit 8: 3m10y vs. 3m2y Normal Volatility

Left side vol outperforming right since early August



Source: BofA Global Research, Bloomberg

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## Exhibit 9: 1y10y vs. 1m10y Normal Volatility

Term structure of volatility relatively flat

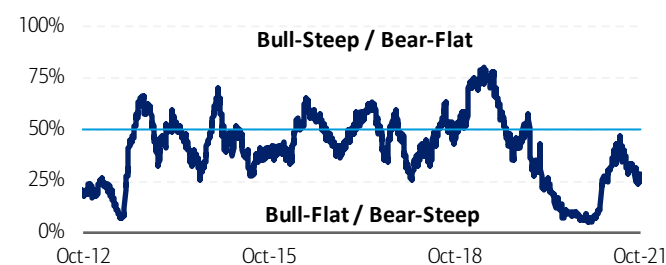


Source: BofA Global Research, Bloomberg

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## Exhibit 10: 5s30s curve directionality 31% dictated by belly

Backend regaining significance vs belly since early July



Source: BofA Global Research

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# Volatility Grid Relative Value

## PCA Z-SCORES

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

Belly looks cheap (5-10y tails) and left side rich...

|     | 1y   | 2y   | 3y   | 5y   | 7y   | 10y  | 30y |
|-----|------|------|------|------|------|------|-----|
| 3m  | 3.2  | 3.8  | -0.5 | -3.8 | -3.3 | -3.4 | 3.0 |
| 6m  | 4.9  | 0.6  | -2.7 | -2.1 | -4.0 | -3.7 | 5.4 |
| 1y  | 6.6  | 3.0  | -0.4 | -1.0 | -3.3 | -2.7 | 4.9 |
| 2y  | 0.9  | -5.9 | -7.0 | -0.7 | -1.8 | -2.2 | 2.4 |
| 5y  | -3.1 | -2.5 | -2.5 | -1.8 | -0.4 | 2.1  | 2.0 |
| 10y | 2.4  | 0.2  | 0.7  | 1.4  | 1.9  | 2.6  | 4.4 |

Source: BofA Global Research

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

Belly looks cheap (5-10y tails) and left side rich...

|     | 1y   | 2y   | 3y   | 5y   | 7y   | 10y  | 30y  |
|-----|------|------|------|------|------|------|------|
| 3m  | 1.6  | 0.1  | 0.5  | 1.0  | -2.6 | -2.8 | -1.7 |
| 6m  | 2.0  | -3.5 | -2.4 | 2.5  | -2.5 | -3.1 | -0.1 |
| 1y  | 4.5  | 0.7  | 0.4  | -0.1 | -0.5 | 1.3  | 3.0  |
| 2y  | 2.2  | -1.4 | -1.6 | -1.2 | -2.1 | -2.5 | 3.7  |
| 5y  | -1.0 | -2.6 | -2.1 | 0.2  | 2.1  | 0.1  | 1.9  |
| 10y | 3.4  | 3.3  | 3.1  | 2.5  | 2.5  | 1.8  | 2.2  |

Source: BofA Global Research

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

Left side richness vs belly persists at 1y horizon

|     | 1y  | 2y   | 3y   | 5y   | 7y   | 10y  | 30y |
|-----|-----|------|------|------|------|------|-----|
| 3m  | 0.7 | -0.8 | 1.2  | -0.8 | -1.9 | -0.8 | 0.7 |
| 6m  | 2.4 | -6.1 | 0.3  | -1.6 | -2.4 | -1.8 | 0.5 |
| 1y  | 0.4 | 3.2  | 1.7  | -0.3 | 0.3  | 0.0  | 1.9 |
| 2y  | 1.6 | -0.9 | -0.9 | -0.9 | 0.1  | 0.6  | 2.4 |
| 5y  | 0.2 | 0.3  | 0.6  | 0.1  | 0.3  | 0.2  | 0.4 |
| 10y | 0.2 | 0.3  | 0.3  | 0.5  | 0.5  | 0.8  | 0.5 |

Source: BofA Global Research

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

Grid left side rich vs flat to cheap right side...

|     | 1y   | 2y   | 3y   | 5y   | 7y   | 10y  | 30y  |
|-----|------|------|------|------|------|------|------|
| 1m  | 2.0  | 1.8  | 1.7  | -1.0 | 0.8  | 0.7  | -0.6 |
| 3m  | 2.9  | 3.3  | 1.4  | 1.2  | 0.9  | 0.2  | -1.2 |
| 6m  | 2.4  | 2.5  | 1.8  | 1.3  | 0.7  | 0.0  | 0.4  |
| 1y  | 2.5  | 2.4  | 1.8  | 1.4  | 1.1  | 0.9  | -0.3 |
| 2y  | 1.8  | 1.0  | 1.2  | 0.9  | 0.8  | 1.0  | 0.1  |
| 3y  | 1.1  | -0.3 | 1.0  | 0.9  | -1.2 | 1.4  | 2.6  |
| 4y  | 0.7  | 0.8  | 1.3  | 0.9  | -1.1 | 1.0  | 1.2  |
| 5y  | 0.5  | 1.7  | 0.9  | 0.2  | 0.6  | 0.2  | -1.1 |
| 10y | 0.3  | 1.0  | 0.8  | 0.9  | 0.1  | -0.3 | -0.6 |
| 15y | 0.4  | -0.4 | -1.7 | 1.3  | -0.4 | -0.6 | 0.5  |
| 30y | -1.4 | -0.6 | -0.9 | 1.5  | 2.7  | 1.1  | 0.6  |

Source: BofA Global Research

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

... ULC richness more significant when directionality taken into account

|     | 1y   | 2y   | 3y   | 5y   | 7y  | 10y | 30y |
|-----|------|------|------|------|-----|-----|-----|
| 3m  | 4.9  | 5.0  | 3.6  | 1.8  | 1.3 | 1.3 | 2.1 |
| 6m  | 6.1  | 4.1  | 2.7  | 1.9  | 1.0 | 1.0 | 1.9 |
| 1y  | 6.2  | 4.1  | 2.7  | 2.2  | 1.5 | 0.9 | 2.2 |
| 2y  | 3.4  | 1.4  | 1.2  | 1.6  | 0.8 | 0.2 | 1.9 |
| 5y  | -1.4 | -1.6 | -1.4 | -0.5 | 0.6 | 1.9 | 2.6 |
| 10y | 2.2  | 1.9  | 2.3  | 2.6  | 2.9 | 3.1 | 3.5 |

Source: BofA Global Research

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

... ULC richness more significant when directionality taken into account

|     | 1y  | 2y  | 3y  | 5y  | 7y   | 10y  | 30y |
|-----|-----|-----|-----|-----|------|------|-----|
| 3m  | 2.4 | 1.7 | 1.6 | 1.2 | -0.1 | -0.1 | 0.0 |
| 6m  | 2.9 | 0.8 | 0.6 | 1.8 | 0.0  | 0.1  | 0.6 |
| 1y  | 3.5 | 2.7 | 2.2 | 1.6 | 1.2  | 1.5  | 1.3 |
| 2y  | 3.4 | 1.5 | 1.5 | 1.2 | 0.9  | 0.5  | 1.8 |
| 5y  | 1.2 | 0.7 | 1.0 | 1.4 | 1.7  | 1.1  | 1.7 |
| 10y | 2.9 | 3.0 | 2.9 | 2.5 | 2.4  | 1.7  | 1.8 |

Source: BofA Global Research

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

... belly cheapness much more obvious on 1y horizon

|     | 1y   | 2y   | 3y   | 5y   | 7y   | 10y  | 30y |
|-----|------|------|------|------|------|------|-----|
| 3m  | 1.8  | 0.5  | -1.2 | -2.1 | -2.5 | -1.0 | 0.6 |
| 6m  | 2.0  | -1.1 | -2.2 | -2.6 | -2.7 | -1.5 | 0.2 |
| 1y  | 0.6  | -0.4 | -2.0 | -2.5 | -1.9 | -0.9 | 0.6 |
| 2y  | -1.9 | -2.9 | -2.9 | -2.7 | -1.8 | -0.7 | 0.6 |
| 5y  | -1.8 | -1.6 | -1.3 | -0.9 | -0.6 | -0.4 | 0.0 |
| 10y | -0.4 | -0.3 | -0.2 | -0.1 | 0.0  | 0.3  | 0.3 |

Source: BofA Global Research

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

... even as directionality removed

|     | 1y   | 2y   | 3y   | 5y   | 7y   | 10y  | 30y  |
|-----|------|------|------|------|------|------|------|
| 1m  | 2.1  | 1.9  | 1.6  | -1.1 | 0.9  | 1.0  | -0.6 |
| 3m  | 3.0  | 3.4  | 1.2  | 0.9  | 0.7  | 0.6  | -1.4 |
| 6m  | 2.9  | 2.4  | 2.0  | 1.0  | 0.6  | 0.0  | 0.1  |
| 1y  | 2.8  | 2.3  | 1.7  | 1.2  | 0.9  | 0.8  | -0.2 |
| 2y  | 1.8  | 1.0  | 1.1  | 0.8  | 0.7  | 1.1  | -0.2 |
| 3y  | 1.0  | -0.3 | 1.0  | 1.0  | -0.5 | 1.4  | 2.7  |
| 4y  | 0.7  | 0.9  | 1.0  | 1.0  | -1.3 | 1.3  | 1.3  |
| 5y  | 0.1  | 1.8  | 0.7  | 0.5  | 0.2  | 1.1  | -0.4 |
| 10y | 0.5  | 0.8  | 1.0  | 1.1  | 0.0  | -0.4 | -1.1 |
| 15y | 0.0  | -0.4 | -1.7 | 1.7  | -0.5 | -0.5 | 0.4  |
| 30y | -1.2 | -0.3 | -0.9 | 1.5  | 2.5  | 1.3  | 0.7  |

Source: BofA Global Research

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# Skew Relative Value

**Table 11: Skew 25% delta**

Receiver skew RV relatively fair in gamma space

|     | 1Y    | 2Y   | 3Y   | 5Y   | 7Y   | 10Y  | 30Y |
|-----|-------|------|------|------|------|------|-----|
| 1M  | -2.0  | -2.7 | -2.8 | -2.3 | -1.5 | 0.0  | 1.3 |
| 3M  | -3.6  | -4.6 | -4.5 | -3.5 | -2.3 | -0.5 | 1.7 |
| 6M  | -5.7  | -6.6 | -6.3 | -4.6 | -3.3 | -1.4 | 1.7 |
| 1Y  | -9.2  | -9.4 | -8.3 | -5.8 | -4.2 | -2.1 | 1.1 |
| 2Y  | -11.4 | -9.4 | -7.8 | -5.1 | -3.7 | -1.8 | 1.1 |
| 5Y  | -6.2  | -5.3 | -4.5 | -3.3 | -2.2 | -0.7 | 1.6 |
| 10Y | -1.5  | -1.3 | -1.0 | -0.6 | -0.2 | 0.3  | 1.7 |
| 30Y | 1.5   | 1.7  | 1.9  | 2.2  | 2.4  | 2.7  | 4.0 |

Source: BofA Global Research

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**Table 12: Skew 75% delta**

Payer skew RV rich on the ULC

|     | 1Y   | 2Y   | 3Y   | 5Y  | 7Y  | 10Y | 30Y |
|-----|------|------|------|-----|-----|-----|-----|
| 1M  | 2.5  | 3.5  | 3.8  | 3.7 | 3.0 | 1.8 | 0.1 |
| 3M  | 4.9  | 6.4  | 6.9  | 6.4 | 5.5 | 4.2 | 1.4 |
| 6M  | 7.6  | 8.8  | 8.9  | 7.4 | 6.6 | 5.3 | 2.4 |
| 1Y  | 11.1 | 11.9 | 11.1 | 8.7 | 7.6 | 6.0 | 2.8 |
| 2Y  | 14.2 | 12.6 | 11.1 | 8.4 | 7.2 | 5.6 | 2.7 |
| 5Y  | 11.6 | 10.5 | 9.6  | 7.8 | 6.8 | 5.5 | 2.8 |
| 10Y | 6.4  | 6.1  | 5.9  | 5.5 | 5.1 | 4.5 | 2.5 |
| 30Y | 7.2  | 6.9  | 6.7  | 6.2 | 5.8 | 5.3 | 3.1 |

Source: BofA Global Research

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**Table 13: Breakeven Widths for Costless Receiver Ladders**

71bp breakeven width for 1y10y receiver ladders

|     | 1Y  | 2Y  | 3Y  | 5Y  | 7Y  | 10Y | 30Y |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 1M  | 7   | 10  | 13  | 18  | 19  | 21  | 22  |
| 3M  | 12  | 19  | 24  | 31  | 33  | 37  | 39  |
| 6M  | 21  | 31  | 37  | 44  | 46  | 50  | 54  |
| 1Y  | 44  | 54  | 59  | 65  | 67  | 71  | 73  |
| 2Y  | 85  | 88  | 91  | 97  | 98  | 101 | 101 |
| 5Y  | 154 | 156 | 156 | 158 | 158 | 158 | 150 |
| 10Y | 214 | 213 | 212 | 211 | 208 | 205 | 189 |

Source: BofA Global Research

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**Table 14: Breakeven Widths for Costless Payer Ladders**

87bp breakeven width for 1y10y payer ladders

|     | 1Y  | 2Y  | 3Y  | 5Y  | 7Y  | 10Y | 30Y |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 1M  | 9   | 14  | 17  | 21  | 22  | 22  | 22  |
| 3M  | 21  | 31  | 36  | 41  | 41  | 42  | 39  |
| 6M  | 43  | 54  | 60  | 62  | 61  | 60  | 55  |
| 1Y  | 88  | 100 | 100 | 95  | 92  | 87  | 77  |
| 2Y  | 164 | 154 | 147 | 135 | 128 | 122 | 105 |
| 5Y  | 242 | 232 | 224 | 209 | 199 | 187 | 155 |
| 10Y | 266 | 262 | 258 | 250 | 242 | 233 | 193 |

Source: BofA Global Research

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

Receiver skew rich for intermediates in left side/belly

|     | 1Y   | 2Y   | 3Y   | 5Y   | 7Y   | 10Y  | 30Y  |
|-----|------|------|------|------|------|------|------|
| 1M  | -0.9 | -0.5 | -0.1 | 0.1  | -0.1 | 0.4  | 0.3  |
| 3M  | -0.6 | 0.5  | 0.3  | 0.5  | 0.8  | 1.1  | 1.1  |
| 6M  | -0.7 | -0.6 | 0.4  | 1.5  | 0.9  | 0.7  | 2.0  |
| 1Y  | 0.1  | 0.2  | 0.8  | 1.0  | 0.8  | -0.4 | -0.1 |
| 2Y  | 2.0  | 1.4  | 1.7  | 2.0  | 1.4  | -0.8 | -0.9 |
| 5Y  | 2.7  | 2.7  | 2.8  | 2.8  | 2.2  | 0.1  | -0.3 |
| 10Y | -0.2 | 0.3  | -0.5 | -1.8 | -2.3 | -2.6 | -2.3 |

Source: BofA Global Research

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

Payer skew cheap for intermediates in left side/belly

|     | 1Y   | 2Y   | 3Y   | 5Y   | 7Y   | 10Y  | 30Y  |
|-----|------|------|------|------|------|------|------|
| 1M  | 0.1  | -0.1 | 0.5  | 0.7  | 0.5  | 0.4  | -0.1 |
| 3M  | 0.9  | 0.9  | 0.6  | 0.2  | 1.3  | 0.8  | 0.4  |
| 6M  | 0.8  | 1.1  | 0.6  | -0.4 | 0.0  | 0.4  | -0.1 |
| 1Y  | 0.6  | 0.3  | -0.5 | -1.2 | -1.0 | -0.6 | -0.3 |
| 2Y  | -1.7 | -0.4 | -0.9 | -1.2 | -1.2 | 0.6  | 0.0  |
| 5Y  | -1.9 | -2.2 | -2.3 | -2.5 | -2.1 | 0.1  | -0.5 |
| 10Y | -0.2 | -0.7 | 0.0  | 0.5  | 0.2  | -0.5 | -1.1 |

Source: BofA Global Research

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**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  | 135% | 133% | 127% | 118% | 112% | 104% | 97%  |
| 3M  | 178% | 160% | 149% | 132% | 124% | 113% | 99%  |
| 6M  | 205% | 174% | 161% | 140% | 131% | 120% | 102% |
| 1Y  | 201% | 185% | 170% | 146% | 136% | 123% | 105% |
| 2Y  | 192% | 175% | 162% | 140% | 131% | 120% | 104% |
| 5Y  | 157% | 149% | 143% | 133% | 127% | 118% | 104% |
| 10Y | 124% | 123% | 121% | 119% | 116% | 113% | 102% |

Source: BofA Global Research

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

Z-Scores for the ratios show payer cheap vs receivers on the left side

|     | 1Y   | 2Y   | 3Y   | 5Y   | 7Y   | 10Y  | 30Y  |
|-----|------|------|------|------|------|------|------|
| 1M  | -1.6 | -1.5 | -1.5 | -1.2 | -1.4 | -1.3 | -1.2 |
| 3M  | -1.5 | -1.5 | -1.5 | -1.1 | -1.0 | -0.2 | -0.9 |
| 6M  | -1.4 | -1.6 | -1.5 | -1.2 | -1.3 | -0.6 | -1.2 |
| 1Y  | -1.7 | -1.8 | -1.8 | -1.8 | -1.4 | 0.1  | -0.2 |
| 2Y  | -2.2 | -1.9 | -2.0 | -2.1 | -1.9 | 1.5  | 0.5  |
| 5Y  | -0.6 | -0.7 | -0.7 | -0.6 | -0.4 | 0.1  | -0.8 |
| 10Y | -0.5 | -0.4 | -0.3 | -0.3 | -0.2 | -0.2 | 0.1  |

Source: BofA Global Research

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# Conditional Curve Trades

**Table 19: 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   | -9.3 | -12.8 | -13.8 | -2.2  | -2.6  | -0.3   |
| 6M   | -8.7 | -11.8 | -12.2 | -2.2  | -2.1  | 0.3    |
| 1Y   | -4.6 | -5.2  | -3.0  | -0.3  | 2.1   | 2.2    |
| 1.5Y | -2.1 | -1.5  | 2.4   | 0.7   | 4.6   | 3.8    |
| 2Y   | -0.3 | 1.7   | 7.3   | 1.9   | 7.5   | 5.6    |

Source: BofA Global Research

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**Table 21: 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   | 9.3  | 12.8  | 13.8  | 2.2   | 2.6   | 0.3    |
| 6M   | 8.7  | 11.8  | 12.2  | 2.2   | 2.1   | -0.3   |
| 1Y   | 4.6  | 5.2   | 3.0   | 0.3   | -2.1  | -2.2   |
| 1.5Y | 2.1  | 1.5   | -2.4  | -0.7  | -4.6  | -3.8   |
| 2Y   | 0.3  | -1.7  | -7.3  | -1.9  | -7.5  | -5.6   |

Source: BofA Global Research

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**Table 23: 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   | 11.6 | 14.2  | 13.8  | 2.4   | 2.6   | 0.3    |
| 6M   | 11.2 | 13.6  | 12.4  | 2.4   | 2.1   | -0.3   |
| 1Y   | 6.0  | 6.0   | 3.0   | 0.3   | -2.1  | -2.4   |
| 1.5Y | 2.6  | 1.7   | -2.4  | -0.7  | -4.6  | -4.0   |
| 2Y   | 0.3  | -1.9  | -7.3  | -2.2  | -7.7  | -5.8   |

Source: BofA Global Research

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**Table 25: Bear Steepener (pickup to forwards for ATM)**

Buy longer maturity payer, sell shorter maturity payer

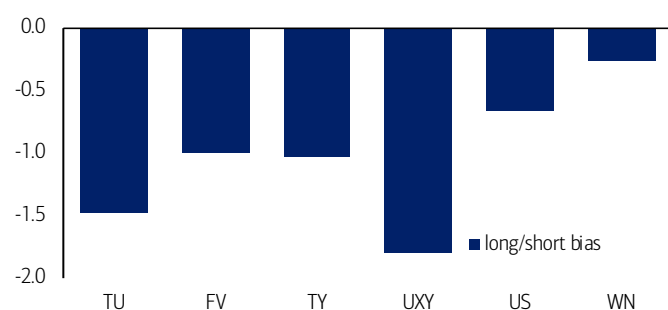
| ATM  | 2/5s  | 2/10s | 2/30s | 5/10s | 5/30s | 10/30s |
|------|-------|-------|-------|-------|-------|--------|
| 3M   | -11.6 | -14.2 | -13.8 | -2.4  | -2.6  | -0.3   |
| 6M   | -11.2 | -13.6 | -12.4 | -2.4  | -2.1  | 0.3    |
| 1Y   | -6.0  | -6.0  | -3.0  | -0.3  | 2.1   | 2.4    |
| 1.5Y | -2.6  | -1.7  | 2.4   | 0.7   | 4.6   | 4.0    |
| 2Y   | -0.3  | 1.9   | 7.3   | 2.2   | 7.7   | 5.8    |

Source: BofA Global Research

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**Chart 1: Analysis of proxies for futures positioning**

Back to a short bias across the curve



Source: BofA Global Research

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**Table 20: 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    | -22.9 | -36.6 | -42.3 | -6.5  | -9.3  | -2.1   |
| 6M    | -17.1 | -26.1 | -31.2 | -5.4  | -7.7  | -1.7   |
| 1Y    | -8.5  | -11.6 | -11.0 | -2.2  | -1.1  | 1.3    |
| 1.5Y  | -4.8  | -6.0  | -3.0  | -0.9  | 2.4   | 3.2    |
| 2Y    | -2.2  | -1.5  | 4.0   | 0.9   | 6.3   | 5.6    |

Source: BofA Global Research

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**Table 22: 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    | 22.9 | 36.6  | 42.3  | 6.5   | 9.3   | 2.1    |
| 6M    | 17.1 | 26.1  | 31.2  | 5.4   | 7.7   | 1.7    |
| 1Y    | 8.5  | 11.6  | 11.0  | 2.2   | 1.1   | -1.3   |
| 1.5Y  | 4.8  | 6.0   | 3.0   | 0.9   | -2.4  | -3.2   |
| 2Y    | 2.2  | 1.5   | -4.0  | -0.9  | -6.3  | -5.6   |

Source: BofA Global Research

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**Table 24: 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    | 19.2 | 20.6  | 16.7  | 2.2   | 0.5   | -1.5   |
| 6M    | 14.4 | 15.7  | 11.8  | 1.9   | -0.5  | -2.1   |
| 1Y    | 5.2  | 3.4   | -1.9  | -1.3  | -6.0  | -4.8   |
| 1.5Y  | 0.7  | -2.1  | -8.5  | -2.6  | -8.9  | -6.5   |
| 2Y    | -2.1 | -6.0  | -13.8 | -4.2  | -12.2 | -8.5   |

Source: BofA Global Research

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**Table 26: Bear Steepener (pickup to forwards for +25bp OTM)**

Buy longer maturity payer, sell shorter maturity payer

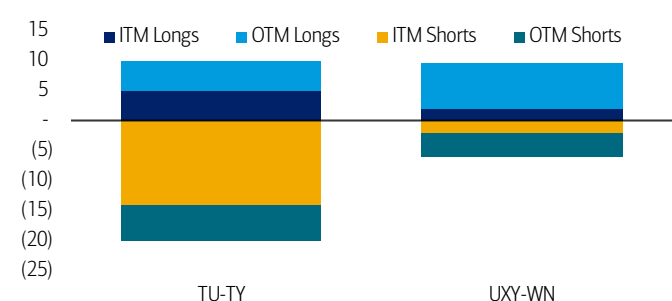
| +25bp | 2/5s  | 2/10s | 2/30s | 5/10s | 5/30s | 10/30s |
|-------|-------|-------|-------|-------|-------|--------|
| 3M    | -19.2 | -20.6 | -16.7 | -2.2  | -0.5  | 1.5    |
| 6M    | -14.4 | -15.7 | -11.8 | -1.9  | 0.5   | 2.1    |
| 1Y    | -5.2  | -3.4  | 1.9   | 1.3   | 6.0   | 4.8    |
| 1.5Y  | -0.7  | 2.1   | 8.5   | 2.6   | 8.9   | 6.5    |
| 2Y    | 2.1   | 6.0   | 13.8  | 4.2   | 12.2  | 8.5    |

Source: BofA Global Research

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**Chart 2: Proxies for futures positioning across the curve**

Frontend ITM longs expose curve to bull steepening



Source: BofA Global Research

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# Forward Volatility

**Table 27: 6m Forward Volatility**

70.7bp for 6m fwd 1y10y

|     | 1y   | 2y   | 5y   | 10y  | 30y  |
|-----|------|------|------|------|------|
| 1m  | 41.8 | 57.2 | 67.5 | 69.9 | 69.1 |
| 3m  | 46.5 | 61.4 | 69.1 | 70.4 | 68.6 |
| 6m  | 53.7 | 65.3 | 70.7 | 70.9 | 67.9 |
| 1y  | 58.4 | 65.6 | 70.5 | 70.7 | 67.2 |
| 2y  | 70.1 | 70.2 | 72.2 | 71.0 | 65.4 |
| 5y  | 74.5 | 74.3 | 72.8 | 69.6 | 61.5 |
| 10y | 68.0 | 67.4 | 65.6 | 62.5 | 54.3 |

Source: BofA Global Research

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**Table 28: 6m Fwd vol as % ATM**

95% of ATM for 6m fwd 1y10y

|     | 1y   | 2y   | 5y   | 10y | 30y |
|-----|------|------|------|-----|-----|
| 1m  | 157% | 142% | 101% | 93% | 91% |
| 3m  | 163% | 136% | 103% | 96% | 93% |
| 6m  | 143% | 122% | 102% | 97% | 93% |
| 1y  | 104% | 97%  | 95%  | 95% | 94% |
| 2y  | 93%  | 93%  | 95%  | 96% | 95% |
| 5y  | 95%  | 96%  | 96%  | 97% | 97% |
| 10y | 97%  | 97%  | 98%  | 98% | 97% |

Source: BofA Global Research

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**Table 29: 3m Z-Score of 6m Fwd vol % ATM**

0.5 Z-Score for 6m fwd 1y10y

|     | 1y   | 2y   | 5y   | 10y  | 30y  |
|-----|------|------|------|------|------|
| 1m  | 0.4  | -0.1 | 0.6  | 0.4  | -0.1 |
| 3m  | 1.2  | 0.7  | 1.2  | 1.0  | 0.2  |
| 6m  | 1.2  | 1.6  | 1.4  | 1.1  | 0.0  |
| 1y  | -0.2 | 0.5  | 0.6  | 0.5  | 0.0  |
| 2y  | -2.4 | -0.5 | 0.8  | 0.6  | -0.1 |
| 5y  | 2.1  | 2.1  | 1.6  | 0.6  | -0.2 |
| 10y | 0.4  | 0.2  | -0.4 | -0.9 | -1.0 |

Source: BofA Global Research

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**Table 30: 1y Forward Volatility**

69.1bp for 1y fwd 1y10y

|     | 1y   | 2y   | 5y   | 10y  | 30y  |
|-----|------|------|------|------|------|
| 1m  | 53.6 | 61.7 | 66.4 | 68.2 | 66.0 |
| 3m  | 52.7 | 61.1 | 66.1 | 68.2 | 65.9 |
| 6m  | 59.8 | 64.2 | 67.5 | 68.7 | 65.6 |
| 1y  | 65.5 | 65.7 | 69.3 | 69.1 | 64.5 |
| 2y  | 70.0 | 70.3 | 70.7 | 69.6 | 63.2 |
| 5y  | 73.6 | 73.5 | 72.1 | 68.5 | 59.9 |
| 10y | 67.1 | 66.5 | 64.7 | 61.5 | 53.1 |

Source: BofA Global Research

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**Table 31: 1y Fwd vol as % ATM**

93% of ATM for 1y fwd 1y10y

|     | 1y   | 2y   | 5y  | 10y | 30y |
|-----|------|------|-----|-----|-----|
| 1m  | 201% | 154% | 99% | 91% | 87% |
| 3m  | 185% | 136% | 98% | 93% | 89% |
| 6m  | 159% | 120% | 98% | 94% | 90% |
| 1y  | 117% | 98%  | 94% | 93% | 91% |
| 2y  | 93%  | 93%  | 93% | 94% | 92% |
| 5y  | 94%  | 95%  | 96% | 96% | 94% |
| 10y | 96%  | 96%  | 96% | 96% | 95% |

Source: BofA Global Research

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**Table 32: 3m Z-Score of 1y Fwd vol % ATM**

0.3 Z-Score for 1y fwd 1y10y

|     | 1y   | 2y   | 5y   | 10y  | 30y  |
|-----|------|------|------|------|------|
| 1m  | 0.2  | -0.4 | 0.3  | 0.4  | -0.1 |
| 3m  | 0.7  | -0.1 | 0.3  | 0.8  | 0.2  |
| 6m  | -1.0 | -0.8 | 0.3  | 0.8  | 0.2  |
| 1y  | -3.2 | -4.1 | -0.5 | 0.3  | 0.1  |
| 2y  | -3.3 | -0.7 | 0.3  | 0.6  | 0.1  |
| 5y  | 1.0  | 1.2  | 1.6  | 0.5  | -0.1 |
| 10y | 0.1  | 0.0  | -0.3 | -0.9 | -0.7 |

Source: BofA Global Research

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**Table 33: 2y Forward Volatility**

68.1bp for 2y fwd 1y10y

|     | 1y   | 2y   | 5y   | 10y  | 30y  |
|-----|------|------|------|------|------|
| 1m  | 77.5 | 71.0 | 68.5 | 67.0 | 61.3 |
| 3m  | 75.2 | 70.0 | 68.3 | 67.3 | 61.5 |
| 6m  | 76.7 | 71.7 | 69.0 | 67.8 | 61.3 |
| 1y  | 74.8 | 71.9 | 69.6 | 68.1 | 61.0 |
| 2y  | 74.1 | 73.3 | 71.8 | 68.8 | 60.9 |
| 5y  | 73.7 | 73.2 | 71.2 | 66.9 | 57.4 |
| 10y | 65.4 | 64.8 | 63.2 | 59.8 | 51.1 |

Source: BofA Global Research

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**Table 34: 2y Fwd vol as % ATM**

92% of ATM for 2y fwd 1y10y

|     | 1y   | 2y   | 5y   | 10y | 30y |
|-----|------|------|------|-----|-----|
| 1m  | 290% | 177% | 102% | 90% | 81% |
| 3m  | 264% | 156% | 101% | 92% | 83% |
| 6m  | 204% | 134% | 100% | 93% | 84% |
| 1y  | 134% | 107% | 94%  | 92% | 86% |
| 2y  | 98%  | 97%  | 95%  | 93% | 89% |
| 5y  | 94%  | 94%  | 94%  | 94% | 90% |
| 10y | 94%  | 94%  | 94%  | 94% | 91% |

Source: BofA Global Research

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**Table 35: 3m Z-Score of 2y Fwd vol % ATM**

0.7 Z-Score for 2y fwd 1y10y

|     | 1y   | 2y   | 5y   | 10y  | 30y  |
|-----|------|------|------|------|------|
| 1m  | -4.0 | -3.3 | -0.2 | 0.3  | -0.2 |
| 3m  | -2.2 | -3.0 | 0.2  | 0.8  | 0.2  |
| 6m  | -3.7 | -3.0 | 0.2  | 0.9  | 0.2  |
| 1y  | -3.3 | -2.4 | 0.0  | 0.7  | 0.2  |
| 2y  | -1.3 | 0.2  | 0.8  | 1.2  | 0.7  |
| 5y  | 1.1  | 1.3  | 1.2  | 0.0  | -0.3 |
| 10y | 0.1  | 0.0  | -0.1 | -0.6 | -0.3 |

Source: BofA Global Research

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**Table 36: 3y Forward Volatility**

69.8bp for 3y fwd 1y10y

|     | 1y   | 2y   | 5y   | 10y  | 30y  |
|-----|------|------|------|------|------|
| 1m  | 74.0 | 74.2 | 71.1 | 67.7 | 60.2 |
| 3m  | 78.7 | 77.7 | 73.3 | 69.1 | 61.2 |
| 6m  | 77.8 | 78.1 | 73.9 | 69.5 | 61.3 |
| 1y  | 79.2 | 78.6 | 74.7 | 69.8 | 61.1 |
| 2y  | 77.6 | 76.5 | 74.7 | 69.1 | 59.6 |
| 5y  | 72.9 | 72.2 | 69.7 | 65.5 | 55.3 |
| 10y | 64.0 | 63.4 | 62.1 | 58.7 | 49.7 |

Source: BofA Global Research

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**Table 37: 3y Fwd vol as % ATM**

94% of ATM for 3y fwd 1y10y

|     | 1y   | 2y   | 5y   | 10y | 30y |
|-----|------|------|------|-----|-----|
| 1m  | 277% | 185% | 106% | 90% | 80% |
| 3m  | 276% | 173% | 109% | 94% | 83% |
| 6m  | 207% | 146% | 107% | 95% | 84% |
| 1y  | 141% | 117% | 101% | 94% | 86% |
| 2y  | 103% | 101% | 98%  | 93% | 87% |
| 5y  | 93%  | 93%  | 92%  | 92% | 87% |
| 10y | 92%  | 92%  | 93%  | 92% | 89% |

Source: BofA Global Research

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**Table 38: 3m Z-Score of 3y Fwd vol % ATM**

1.4 Z-Score for 3y fwd 1y10y

|     | 1y   | 2y   | 5y   | 10y  | 30y  |
|-----|------|------|------|------|------|
| 1m  | -3.8 | -2.8 | -0.1 | 0.4  | 0.0  |
| 3m  | -3.7 | -3.5 | 0.1  | 1.0  | 0.4  |
| 6m  | -3.9 | -3.1 | 0.5  | 1.3  | 0.8  |
| 1y  | -3.4 | -2.1 | 0.6  | 1.4  | 1.2  |
| 2y  | -1.7 | 0.0  | 1.1  | 1.3  | 0.9  |
| 5y  | 0.0  | 0.0  | -0.2 | -0.8 | -0.5 |
| 10y | 0.0  | -0.1 | 0.1  | -0.4 | 0.1  |

Source: BofA Global Research

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## Ratios implied/delivered

**Table 39: Implied vs. Delivered (21 d) Ratio**

Ratios &gt; 100% virtually across the grid

|    | 1y   | 2y   | 3y   | 5y   | 7y   | 10y  | 30y  |
|----|------|------|------|------|------|------|------|
| 1m | 181% | 120% | 114% | 128% | 120% | 116% | 107% |
| 3m | 138% | 114% | 112% | 122% | 115% | 110% | 104% |
| 6m | 126% | 117% | 120% | 119% | 111% | 107% | 101% |
| 1y | 110% | 113% | 117% | 113% | 107% | 102% | 96%  |
| 2y | 109% | 108% | 104% | 100% | 96%  | 93%  | 89%  |

Source: BofA Global Research

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**Table 40: Implied vs. Delivered (63 d) Ratio**

Ratios &gt; 100% concentrated on left side

|    | 1y   | 2y   | 3y   | 5y   | 7y   | 10y  | 30y  |
|----|------|------|------|------|------|------|------|
| 1m | 245% | 163% | 143% | 144% | 133% | 129% | 129% |
| 3m | 195% | 154% | 138% | 136% | 127% | 123% | 125% |
| 6m | 177% | 152% | 142% | 131% | 122% | 120% | 122% |
| 1y | 150% | 141% | 134% | 125% | 118% | 115% | 116% |
| 2y | 127% | 119% | 114% | 110% | 107% | 106% | 108% |

Source: BofA Global Research

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**Table 41: 3m Z-Scores for Implied vs. Delivered (21 d) Ratio**

Broad fair/cheapness vs 1m history

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

Source: BofA Global Research

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**Table 42: 3m Z-Scores for Implied vs. Delivered (63 d) Ratio**

Broad richness vs 3m history

|    | 1y  | 2y  | 3y  | 5y  | 7y  | 10y | 30y |
|----|-----|-----|-----|-----|-----|-----|-----|
| 1m | 2.6 | 3.3 | 3.5 | 3.3 | 2.6 | 2.7 | 2.5 |
| 3m | 1.4 | 2.8 | 3.8 | 3.8 | 2.8 | 2.9 | 2.7 |
| 6m | 1.6 | 2.8 | 3.5 | 3.9 | 3.3 | 3.4 | 3.1 |
| 1y | 2.6 | 3.3 | 3.7 | 4.1 | 3.9 | 3.6 | 3.4 |
| 2y | 3.7 | 3.8 | 3.8 | 3.8 | 3.6 | 3.3 | 3.3 |

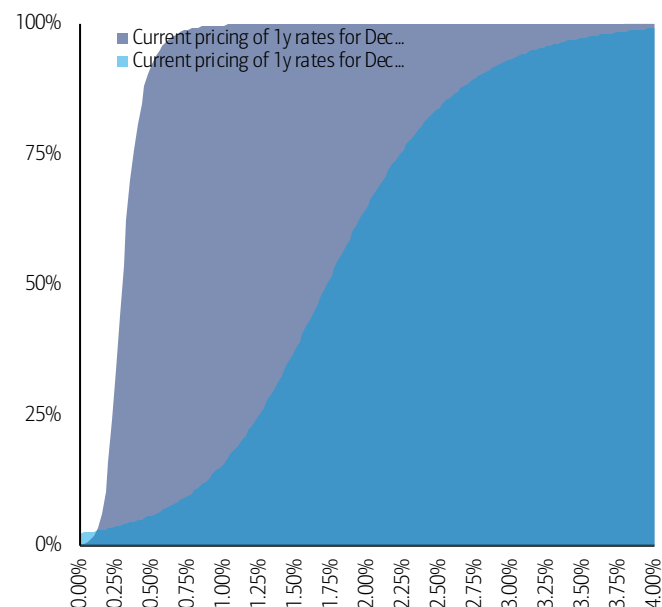
Source: BofA Global Research

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## Rates probability distributions

**Exhibit 11: CDF for 1y rates at end-2021 and end-2022**

1y rate cumulative distribution functions

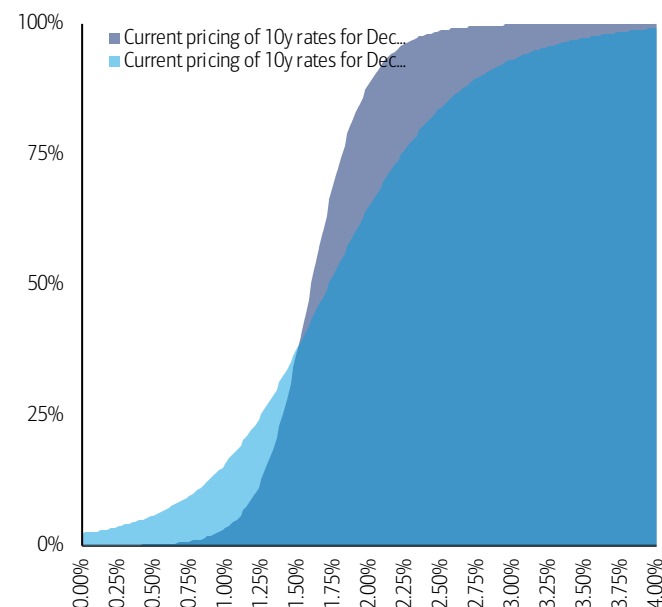


Source: BofA Global Research

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**Exhibit 12: CDF for 10y rates at end-2021 and end-2022**

10y rate cumulative distribution functions



Source: BofA Global Research

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# Trade activity

## Exhibit 13: 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    | -     | -   | -  | 25 | -     | -  | -     | -   | -   | 25    |
| 1m     | -     | -   | -  | -  | 960   | -  | 660   | -   | 240 | 1,860 |
| 3m     | -     | -   | -  | -  | 240   | -  | 720   | -   | 14  | 974   |
| 6m     | -     | 460 | -  | -  | -     | 25 | 220   | -   | -   | 705   |
| 1y     | 1,750 | 200 | -  | 25 | -     | -  | 20    | -   | -   | 1,995 |
| 2y     | -     | -   | -  | -  | -     | -  | -     | -   | -   | -     |
| 3Y     | -     | -   | -  | -  | -     | -  | -     | -   | -   | -     |
| 4Y     | -     | -   | -  | -  | -     | -  | -     | -   | -   | -     |
| 5Y     | -     | -   | -  | -  | -     | -  | -     | -   | 100 | 100   |
| 7Y     | -     | -   | -  | -  | -     | -  | -     | -   | -   | -     |
| 10Y    | -     | -   | -  | -  | -     | -  | 14    | 8   | 240 | 262   |
| 20Y    | -     | -   | -  | -  | -     | -  | -     | -   | -   | -     |
| 30Y    | -     | -   | -  | -  | -     | -  | -     | -   | -   | -     |
|        | 1,750 | 660 | -  | 50 | 1,200 | 25 | 1,634 | 8   | 594 | 5,921 |

Source: BofA Global Research

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## Exhibit 15: Receiver volumes over the last week (\$m notional)

Demand for receivers over the last week

| Receivers | 1y    | 2y  | 3Y | 4Y | 5Y  | 7Y | 10Y | 20Y | 30Y   |       |
|-----------|-------|-----|----|----|-----|----|-----|-----|-------|-------|
| <1m       | -     | -   | -  | -  | -   | -  | -   | -   | -     | -     |
| 1m        | -     | -   | -  | -  | 720 | -  | 270 | -   | 240   | 1,230 |
| 3m        | -     | -   | -  | -  | -   | -  | -   | -   | -     | -     |
| 6m        | -     | 460 | -  | -  | -   | -  | -   | -   | 360   | 820   |
| 1y        | 2,100 | 200 | -  | -  | -   | -  | -   | -   | -     | 2,300 |
| 2y        | -     | -   | -  | -  | -   | -  | -   | -   | -     | -     |
| 3Y        | -     | -   | -  | -  | -   | -  | -   | -   | -     | -     |
| 4Y        | -     | -   | -  | -  | -   | -  | -   | -   | -     | -     |
| 5Y        | -     | -   | -  | -  | -   | -  | -   | -   | 220   | 220   |
| 7Y        | -     | -   | -  | -  | -   | -  | -   | -   | -     | -     |
| 10Y       | -     | -   | -  | -  | -   | -  | 14  | 8   | 240   | 262   |
| 20Y       | -     | -   | -  | -  | -   | -  | -   | -   | -     | -     |
| 30Y       | -     | -   | -  | -  | -   | -  | -   | -   | -     | -     |
|           | 2,100 | 660 | -  | -  | 720 | -  | 284 | 8   | 1,060 | 4,832 |

Source: BofA Global Research

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## Exhibit 16: Straddle volumes over the last week (\$m notional)

Demand for straddles over the last week

| Straddles | 1y | 2y | 3Y | 4Y | 5Y | 7Y | 10Y | 20Y | 30Y |    |
|-----------|----|----|----|----|----|----|-----|-----|-----|----|
| <1m       | -  | -  | -  | -  | -  | -  | -   | -   | -   | -  |
| 1m        | -  | -  | -  | -  | -  | -  | 88  | -   | 10  | 98 |
| 3m        | -  | -  | -  | -  | -  | -  | -   | -   | -   | -  |
| 6m        | -  | -  | -  | -  | -  | -  | -   | -   | -   | -  |
| 1y        | -  | -  | -  | -  | -  | -  | -   | -   | -   | -  |
| 2y        | -  | -  | -  | -  | -  | -  | -   | -   | -   | -  |
| 3Y        | -  | -  | -  | -  | -  | -  | -   | -   | -   | -  |
| 4Y        | -  | -  | -  | -  | -  | -  | -   | -   | -   | -  |
| 5Y        | -  | -  | -  | -  | -  | -  | -   | -   | -   | -  |
| 7Y        | -  | -  | -  | -  | -  | -  | -   | -   | -   | -  |
| 10Y       | -  | -  | -  | -  | -  | -  | -   | -   | -   | -  |
| 20Y       | -  | -  | -  | -  | -  | -  | -   | -   | -   | -  |
| 30Y       | -  | -  | -  | -  | -  | -  | -   | -   | -   | -  |
|           | -  | -  | -  | -  | -  | -  | 88  | -   | 10  | 98 |

Source: BofA Global Research

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# Formosa issuance

## Exhibit 17: 2020 Formosa issuance (\$m)

Record issuance year in 2020: 37.5bn in 5y30y

|         |    | Underlying |   |   |   |   |   |     |    |    |    |        |
|---------|----|------------|---|---|---|---|---|-----|----|----|----|--------|
|         |    | 1          | 2 | 3 | 4 | 5 | 7 | 10  | 15 | 20 | 25 | 30     |
| Lockout | 1  | -          | - | - | - | - | - | 295 | -  | -  | -  | -      |
|         | 2  | -          | - | - | - | - | - | 50  | -  | -  | -  | 40     |
|         | 3  | -          | - | - | - | - | - | -   | -  | -  | -  | -      |
|         | 4  | -          | - | - | - | - | - | -   | -  | -  | -  | 20     |
|         | 5  | -          | - | - | - | - | - | -   | -  | -  | -  | 37,533 |
|         | 7  | -          | - | - | - | - | - | -   | -  | -  | -  | 945    |
|         | 10 | -          | - | - | - | - | - | -   | -  | -  | -  | 500    |
|         | 15 | -          | - | - | - | - | - | -   | -  | -  | -  | -      |
|         | 20 | -          | - | - | - | - | - | -   | -  | -  | -  | -      |
|         | 25 | -          | - | - | - | - | - | -   | -  | -  | -  | -      |
|         | 30 | -          | - | - | - | - | - | -   | -  | -  | -  | 2,500  |

Source: BofA Global Research

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## Exhibit 18: 2021 Formosa issuance YTD (\$m)

\$34bn issued in 2021 to date: \$23.3bn in 1H21 & \$12.6bn in 2H21

|         |    | Underlying |   |   |   |   |   |     |     |    |    |        |
|---------|----|------------|---|---|---|---|---|-----|-----|----|----|--------|
|         |    | 1          | 2 | 3 | 4 | 5 | 7 | 10  | 15  | 20 | 25 | 30     |
| Lockout | 1  | -          | - | - | - | - | - | 958 | 30  | -  | -  | 220    |
|         | 2  | -          | - | - | - | - | - | 284 | 45  | -  | -  | -      |
|         | 3  | -          | - | - | - | - | - | -   | 130 | -  | -  | 125    |
|         | 4  | -          | - | - | - | - | - | -   | 90  | -  | -  | -      |
|         | 5  | -          | - | - | - | - | - | -   | -   | -  | -  | 18,025 |
|         | 7  | -          | - | - | - | - | - | -   | -   | -  | -  | -      |
|         | 10 | -          | - | - | - | - | - | -   | -   | -  | -  | 920    |
|         | 15 | -          | - | - | - | - | - | -   | -   | -  | -  | -      |
|         | 20 | -          | - | - | - | - | - | -   | -   | -  | -  | -      |
|         | 25 | -          | - | - | - | - | - | -   | -   | -  | -  | -      |
|         | 30 | -          | - | - | - | - | - | -   | -   | -  | -  | 15,000 |

Source: BofA Global Research

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## Exhibit 19: Formosa issuance (\$m) since 2014

Peak issuance concentrated on the 5y30y tenor

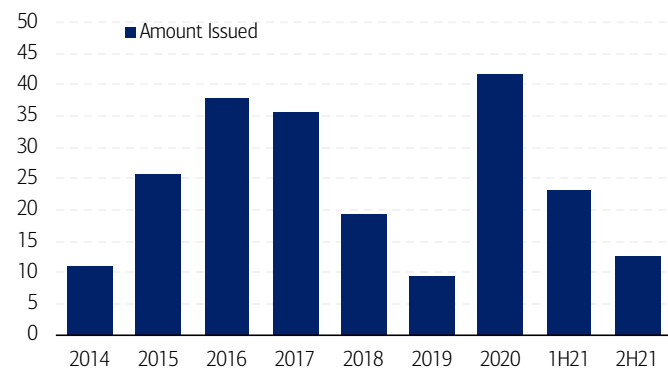
|         |    | Underlying |   |   |   |     |   |       |     |       |     |         |
|---------|----|------------|---|---|---|-----|---|-------|-----|-------|-----|---------|
|         |    | 1          | 2 | 3 | 4 | 5   | 7 | 10    | 15  | 20    | 25  | 30      |
| Lockout | 1  | -          | - | - | - | 205 | - | 1,478 | 472 | 840   | -   | 18,274  |
|         | 2  | -          | - | - | - | -   | - | 438   | 45  | 1,485 | -   | 22,177  |
|         | 3  | -          | - | - | - | -   | - | -     | 130 | 240   | 225 | 15,536  |
|         | 4  | -          | - | - | - | -   | - | -     | 90  | 25    | 275 | 2,441   |
|         | 5  | -          | - | - | - | -   | - | -     | 400 | 1,277 | 273 | 119,457 |
|         | 7  | -          | - | - | - | -   | - | -     | -   | -     | -   | 5,624   |
|         | 10 | -          | - | - | - | -   | - | -     | -   | -     | -   | 5,021   |
|         | 15 | -          | - | - | - | -   | - | -     | -   | -     | -   | -       |
|         | 20 | -          | - | - | - | -   | - | -     | -   | -     | -   | -       |
|         | 25 | -          | - | - | - | -   | - | -     | -   | -     | -   | -       |
|         | 30 | -          | - | - | - | -   | - | -     | -   | -     | -   | 20,500  |

Source: BofA Global Research

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## Exhibit 19: Total issuance per year since 2014 (\$bn)

2016/17 vintages vs 2020/21 vintages



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