Global Rates Viewpoint

Rates vol: changes in supply and demand

Bank of America Merrill Lynch

07 December 2017

Rates Research
Global

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The rates vol market from a supply & demand perspective

While the macro drivers of low volatility are well understood, the supply and demand picture, and the flow from market participants have undergone seismic shifts in the last few years. In this publication, we highlight key supply/demand drivers across the volatility surface, explore how some have changed, and provide our outlook for 2018.

Gamma: sizing up the systematic sellers

In short dated volatility, we use SDR data to analyse the magnitude of the systematic short US rates vol strategies. Our analysis suggests that systematic sellers account for at least $6bn in 1m10y straddle sales on a monthly basis, on average. This is unlikely to be offset even accounting for the pick-up in vol demand from MBS hedges next year. In EUR, we find that the rise in long-dated conventional govt bond supply could have been partly responsible for the large decline in gamma on long tails. Investors in search for yield may have been selling some of the convexity embedded in these long bonds.

While the flow picture does not support owning volatility, at least there is a fundamental offset – 2017 marked the first year where realized moves in 5y US rates were greater on inflation event days (CPI, PCE) than growth days. We are modestly long gamma, seeing a recovery of delivered moves driven by higher inflation, central bank communication changes and increased data dependency across markets.

Vega: taking issue with issuance consensus

In the US, the consensus around Vega remains that a decrease in supply will support longer dated vol in 2018. We disagree. We see both regulation and Taiwanese insurance positioning supportive of further Formosa supply. This could weigh in on already low levels of Vega in the upcoming year.

Table 1: Map of the key volatility buyers and sellers

	Sub 4y tails		5-9y tails		10y+ tails	
	Demand	Supply	Demand	Supply	Demand	Supply
gamma (1m-1y expiries)	Fast money: CB related trades	Fast money: CB related trades	Fast money, esp. curve trades	Fast money, esp. curve trades	Fast money: curve trades	Fast money: eg Curve, calendar trades
	MBS hedging	Callable issuance (esp GSEs)	MBS hedging	Systematic short vol	MBS hedging	Systematic short vol
	Corporates: to cap funding costs		Corporates: rate lock pre issuance	Callable issuance	Corporates: rate lock pre issuance	Convexity selling on purchase of long-dated bonds
vega (2y+ expiries)	Corporates: to cap or reduce funding costs	Callable issuance	LDI hedging	Callable issuance	LDI hedging	Callable issuance
			Systematic long vol		Systematic long vol	

Source: BofA Merrill Lynch Global Research. Note: the table shows a summary of key supply and demand drivers impacting the US and EU rates vol market. The red shades represent buy flow and the green shades represent sell flow, with darker color indicating heavier impact. The players' impact are based on our qualitative assessment of their importance based on indicators such as fixed income issuance across markets and trading activities based on SDR data.

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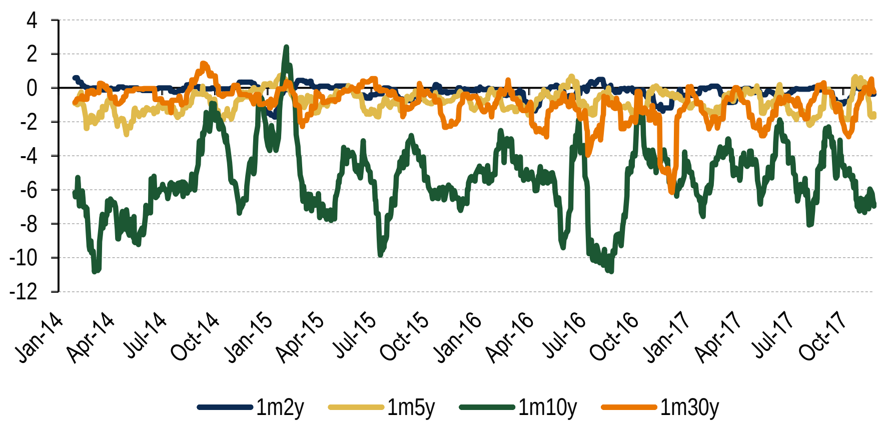
Gamma: systematic sellers hold the key

Systematic vol sellers: the sellers are gonna sell

Across asset classes, the systematic gamma selling strategies have been among the best performers in 2017, and their popularity has resulted in huge supply of volatility in gamma space. Investors typically sell shorted-dated (1M - 3M) structures such as straddles or strangles on a regular basis with certain delta hedging threshold.

In our recent studies, we have conducted theoretical simulations of these strategies in USD and EUR space and concluded that: 1) selling vol in a low vol regime still works – which suggests that volatility is low but not necessarily cheap; 2) selling vol would have worked better in monetary policy implementation phases vs. policy communication transitions, and the 5y point appeared especially sensitive to communication changes; and 3) contrary to consensus, selling vol in the front end of the curve, on a delta hedged basis, would have outperformed other tails in the Fed's hiking cycle as the CB became more predictable.

Chart 1: 4-week rolling flow of 1m straddles expressed in 1m10y straddle notional equivalents (bn).



Source: BofA Merrill Lynch Global Research, DTCC

While a difficult task, we make an attempt to quantify these flows in USD using DTCC SDR data. In Chart 1, we show a 4-week rolling sum of 1m straddle flows across key tenors since 2014, expressed in 1m10y straddle notional equivalents. While subject to its flaws, we make a few observations:

- The rolling 4-week net flow in Chart 1 is subject to some event shocks from time to time, but the series has been generally mean-reverting in recent years. This is somewhat a surprise to us – given the focus in short gamma strategies this .year, flows did not see meaningful pick-up.

  We see two possible implications. If our analysis indeed captures the trend of the general market flow, it indicates that systematic vol sellers are not the ones that drove the collapse of vol this year. On the other hand, if the vol selling flow was indeed exacerbated in 2017, our analysis would show that the selling flow has ventured out to other structures (e.g. strangles, longer expiries, or trades over the exchanges), instead of sticking to conventional methods.

- The monthly net flows across 1m straddles on different tails have ranged from -$4bn to -$12bn in recent years, with the notional typically stabilizing around -$8bn level. We are currently just below the long run average. This may suggest that while the selling could certainly continue to build, it is more likely to slow given the somewhat stretched positions and upcoming even risks around Dec FOMC meeting and the debt limit / tax reform deadlines.

- In the 1m10y specifically, when looking at the periods where the rolling sum was stable (such as July 2014 or November 2015), we find it was consistently around the - $5-6bn range. This could be an indication of the size of systematic selling in straddle format in the favourite 1m10y point.

This analysis is based on transaction level data from DTCC SDR. While it includes trade details such as the structure, expiry, maturity, and strikes, it does not give us the direction of the trade. To tackle this problem, we consider straddle trades only and compute a theoretical price based on (1) the trade details disclosed from SDR and (2) a linear interpolation of pricing levels inferred from yield curves and vol cubes at the close on day T-1 and day T. If the actual execution price is higher than this theoretical price, we classify it as a buy flow, and vice versa.

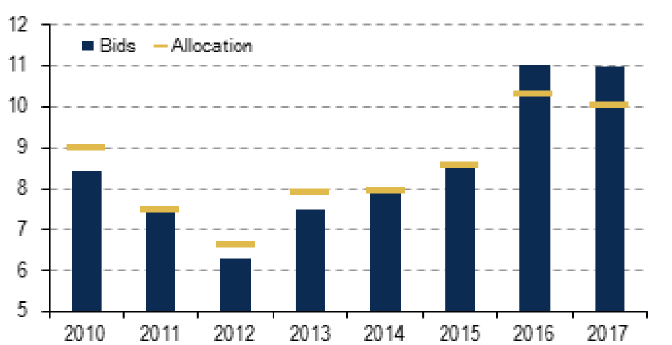
Admittedly, this is a very coarse estimation and it is subject to limitations. First, it only looks at straddles for the purpose of gathering cleaner data, so it ignored other types of structures that are short volatility. Second, this analysis only looks at trades that are captured by SDR. Trades that are executed amongst non-US institutions or over the exchange are not included in this data. Additionally, the direction of the trade is based on a linearly interpolated price on the day, which could deviate from the actual quotes on days that saw big intraday swings, thus misclassifying the buy or sell flow.

Selling the convexity of long-dated EUR bond issuance

We believe that part of the decline in EUR rates vol in the top right could be related to the selling of convexity by EUR government bond investors.

Indeed, the past two years have seen a surge in the weighted average maturity (WAM) of EUR bond issuance and, importantly this appears to have been driven by demand shifting further out the curve as rates declined. This can be clearly seen in Chart 2, where the rise in the WAM of demand surpasses that of actual bond issuance.

Chart 2: Long-dated EUR govt bond supply has been demand driven



Source: BofA Merrill Lynch Global Research.

Table 2: Regression of 3m30y vol vs delivered and long-dated (25y+) conventional govt bond supply

	3m30y 1m delivered	Supply since 2010	Supply, from negative rates	Intercept
coefficients	0.70	0.30	-0.49	30.5
standard errors	0.02	0.08	0.06	2.07
Rsquare	0.72			

Source: BofA Merrill Lynch Global Research

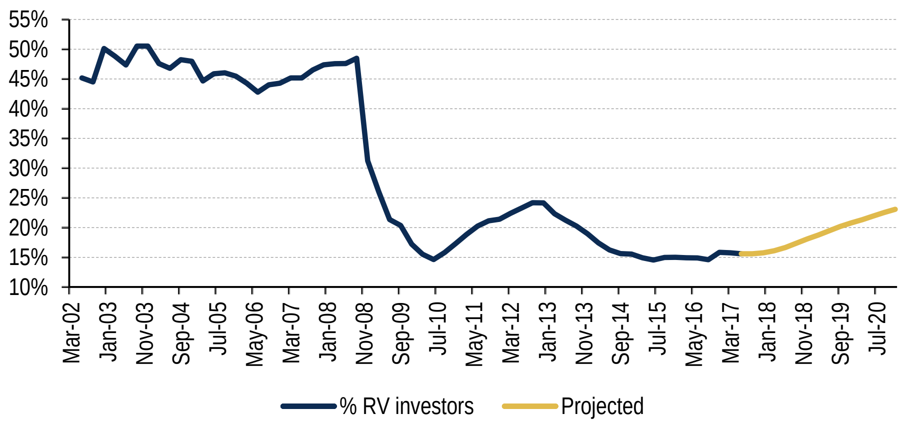
Because this growing demand for longer-dated bonds has been the result of a search for yield, rather than a search for convexity, we believe that a rising number of bond investors may have been selling some of the convexity as they purchased new long-end bonds supplied to the market. Their behaviour could be akin to that of systematic sellers of vol in long tails.

To confirm this, we regressed weekly 3m30y implied vol against three variables using data since 2010 (one vol related variable and two supply related variables, Table 2): the 1M delivered vol of 3m30y rate, the 3M rolling amount of 25y+ EUR government bond supply, expressed in 30y equivalent terms, and that rolling amount times a dummy equal to 1 only from Jun-14 (when the ECB cut the Deposit rate to negative, marking the start of investors extending out the curve). We find that all three are significant, and more importantly, the sign on the first supply variable is positive while it is negative on the dummy controlled variable. This appears to confirm that long-dated govt bond supply now has a different, dampening impact on 3m30y implied vol (overall, each 10bn 30y equivalent increase in the rolling 25y+ issuance lowers 3m30y by c.2bp/annum).

MBS hedging: unlikely to see demand

In short-dated volatility, mortgage portfolio managers, primarily GSEs, have been the biggest buyers of vol historically, due to their need to hedge negative convexity. These investors mattered a lot more in the past due to the size of their portfolio and the consistency of hedging, which created a feedback loop in periods of rate/vol shocks such as 2003. Over the last few years however, both the size and the hedging behavior have changed significantly, resulting in much smaller convexity driven flows. Chart 3 shows that the size of the portfolio that are likely to be hedged have become much smaller compared to pre-crisis years.

Chart 3: % Percentage of the MBS market in RV investor hands has dropped significantly post crisis



Source: BofA Merrill Lynch Global Research

In 2018 and beyond, the Fed's balance sheet normalization will be the biggest change from previous years, as demand transitions from price insensitive investors to primarily price sensitive investors. Our MBS strategists estimate that money managers and mortgage REITs, who are most likely to convexity hedge their portfolios, are likely to absorb about $95bn of the incremental supply in 2018 (split into $70bn and $25bn between money managers and REITs). If all of this is hedged in swaptions, it would translate into roughly $15bn of new 3m10y swaption straddle demand.

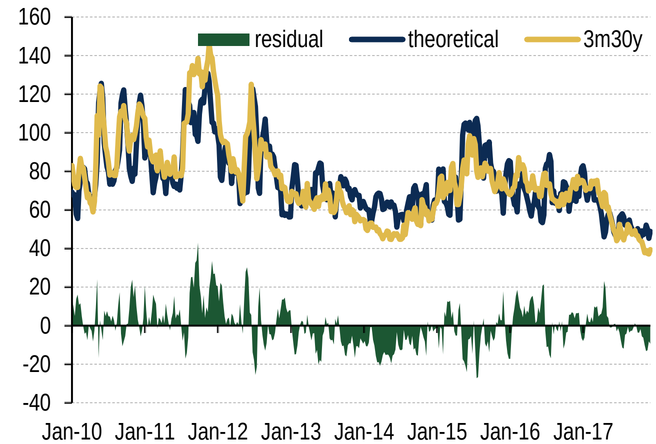
However, actual hedging demand may be much smaller. Conservatively speaking, assuming the longer-term average 20% of the money managers hedge (20% of the $70bn), the incremental hedging demand for gamma would be in the neighbourhood of $6bn over the course of 2018 (This compares to an monthly rolling sum of -$5bn notional on average this year in 3m10y straddles, based on our methodology above). While this should be modestly bullish for gamma in 2018, we expect the additional flow would pick up only towards the second half of 2018 when the Fed's portfolio rundown steps up (see Chart 11 in 2018 Agency MBS Outlook).

Till data turns, flows dominate

The above analysis shows a clear abundance of vol sellers that is not going to balance itself. Ultimately, the rates market has to deliver so that option prices can move and the supply/demand landscape can shift.

We continue to believe that, from a macro perspective, the increase in market sensitivity to economic data and a potentially changing central bank communication strategy are bullish for gamma in the medium term. This has the potential to significantly lower returns of systematic short strategies thus reducing the notional allocated to them over the course of the year. We reiterate our view that higher vol comes with higher rates, and continue to like USD payers in 5y tail with changing Fed reaction function and tax reform implementation being key triggers.

Chart 4: 3m30y EUR implied vol vs theoretical, from regression Table 2



Source: BofA Merrill Lynch Global Research

Table 3: 1y z-score of payer skew richness/cheapness

skew measure as: zero cost payer ladder breakeven/implied vol

expiry\tail	1y	2y	5y	7y	10y	30y
3M	-0.6	-0.4	-0.8	-0.9	-1.0	-1.3
6M	-0.4	-0.3	-0.8	-0.9	-1.0	-1.2
1Y	0.1	0.5	0.0	-0.3	-0.6	-0.9
2Y	-0.5	-0.2	0.9	0.6	-0.4	-1.1

Source: BofA Merrill Lynch Global Research

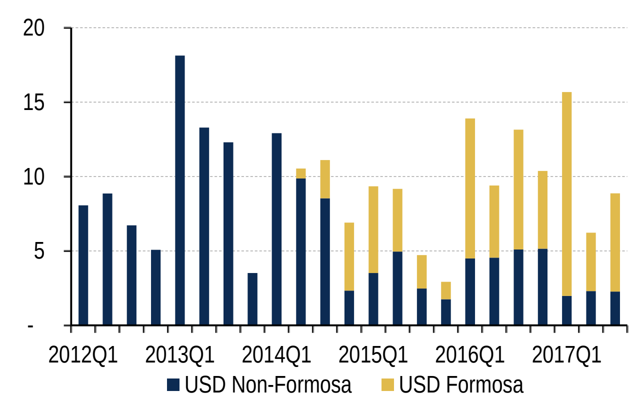
In EUR, the analysis on potential convexity selling suggests that implied vol on 30y tail is cheap (Chart 4), and that any re-pricing higher, as delivered vol rises with rates, can be significantly exacerbated by reduced long-end bond issuance. We would indeed expect debt agencies to respond dynamically to changes in investor demand when yields rise. Yet, the payer skew in 30y tails does not currently reflect this risk, in our view. In fact, we find that it is in 30y tails that the skew is cheapest on a 1y basis (Table 3).

Vega: take issue with issuance

We think the consensus is overly bearish on USD callable supply in the coming year. We take the opposite side and see more pressure for vega to move lower.

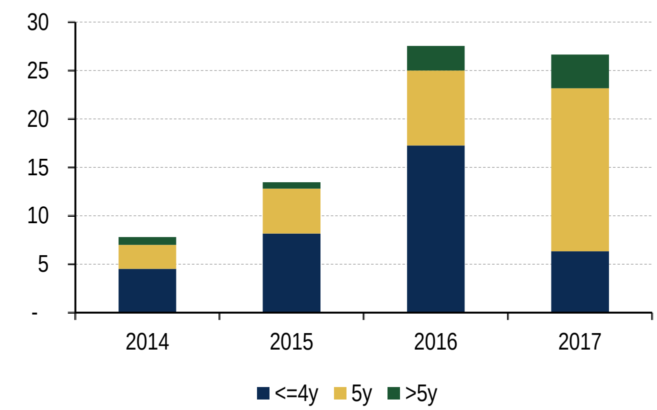
On long-dated volatility, supply has been mainly driven by fixed coupon callable bond issuance, as issuers typically sell the optionality to the option desk to lower funding cost. These deals then put dealers into long Bermudan swaption positions which they typically hedge by selling long-dated European swaptions in the market. In recent years, Formosa callable bond issuance has been the talk in town as they have been contributing to more than half of the total callable zero supply (Chart 5). Therefore, our view on US long-dated volatility hinges on our understanding of Formosa bond supply.

Chart 5: Callable zero issuance in the US has been dominated by Formosa bonds in recent years ($bn)



Source: BofA Merrill Lynch Global Research, Bloomberg

Chart 6: Zero-coupon Formosa callable issuance by NC periods ($bn)



Source: BofA Merrill Lynch Global Research, Bloomberg

Year to date, we have seen a total of $26bn issuance in Formosa zero coupon callable bonds, modestly lower than last year (Chart 6), largely in-line with our expectation on weaker investment demand as the unexpected size of FX losses hit insurers' reserve level, yield levels compressed somewhat in the second half of 2017, and regulation changes created incentive to front load issuance to Q1. More recently, market consensus seems to center around much less Formosa issuance in 2018 due to FX losses and a potential overhaul of the regulations on Taiwan life insurance companies' ability to buy international bonds listed on Taiwan Exchange.

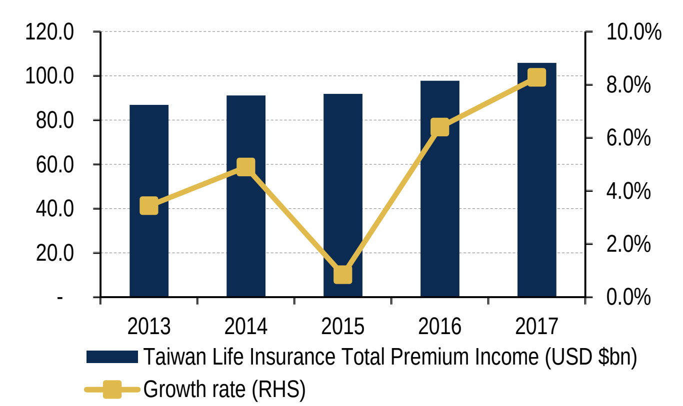
We take the opposite side of consensus on this issue, and look at it from three angles.

1. The FX loss argument was an H1 2017 story. The 7% appreciation of TWD against USD in Q1 was unexpected, resulting in large losses in Taiwanese lifers' USD-denominated investment assets. However, the FX exposure is not new news (TWD also experienced similar appreciation episode in early 2016 and 2015); it was the surprise that resulted in more significant losses. Now, lifers are much better positioned in their foreign-denominated holdings, and FX moves have even resulted in portfolio gains recently, according to their Q3 earnings. So currency exposure is no longer a reason to be bearish on demand.

2. We believe regulation is a tailwind for issuance, contrary to consensus belief. Taiwan financial regulators did raise concerns over the heavy insurance company concentration in this market and the potential of rising systemic risks a few months ago. Since then, there has been a shift in tone. A mid-November press report from China Times has indicated that FSC acknowledges these concerns, so they may look for ways to diversify the issuer and investor pool in the Formosa bond market, instead of stifling a slowly maturing international bond market.

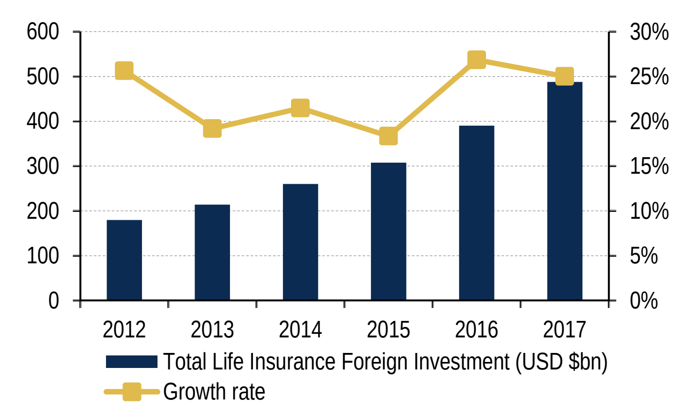
   More recently, according to United Daily News, FSC regulators see more activity ahead in Taiwan international bond market in the coming year and may potentially lower the hurdles for foreign banks to issue bonds that are listed on Taipei Exchange. And they have already started dialogues with new issuers to tap this market.

Chart 7: Life insurance companies saw the highest premium income growth in the last five years



Note: 2017 data is the sum of Q1-Q3 reported premium income ($83bn) and an estimated Q4 premium assuming Q4 premium grows at the slower monthly pace seen in 2017($22bn)
Source: BofA Merrill Lynch Global Research, Bloomberg

Chart 8: Size of Taiwan life insurance portfolio in foreign investment have been growing at double digit rate in recent years



Note: 2017 data is updated to Q3 and we assume Q4 investments grow at average rate seen in the first three quarters. Source: BofA Merrill Lynch Global Research, Bloomberg

3. In terms of potential new demand from life insurance companies alone, we look at two figures: life insurance premium income and investment portfolio assets invested in foreign-denominated assets – both have been on the rise. Chart 7 shows the total premium income in the past five years – year to date, they have been tracking the highest annual amounts in history, which implies new investment

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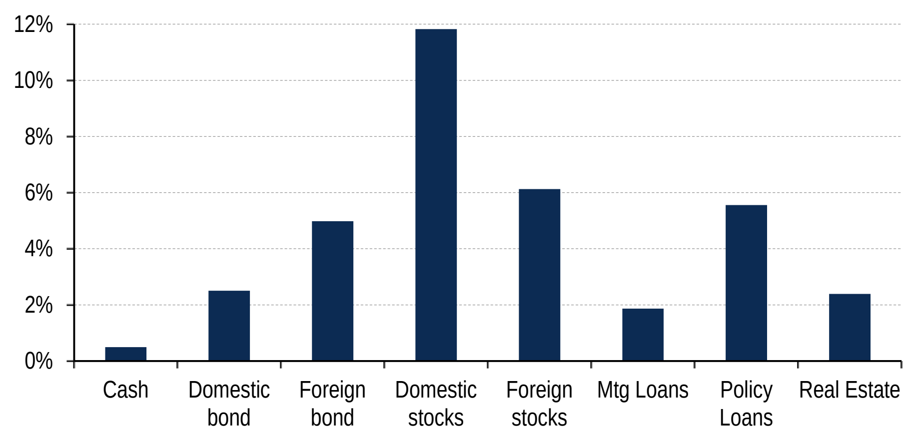
needs in the near future. And Chart 8 shows the total portfolio allocation in overseas investments (which includes Formosa bonds).

We estimate 2018 demand for Formosa issuance could be north of $30bn. To arrive at this number, we use the following simplistic assumptions: given the continued growth in premium income, we assume lifers' foreign investments (currently close to $500bn in size) will keep growing; and we use 18% growth rate which has been the lower bound in the last five years (Chart 8). We also assume a 30% allocation to Formosa bonds (e.g. China Life and Shin Kong Life Q3 disclosure suggest their Formosa bond holdings are around 40%, courtesy of our equity research colleagues in Asia). A piece of supporting evidence to our estimates is that Cathay Life, one of the top five investors, recently announced that they were looking to invest about $8bn in Formosa bond in 2018 in their investors briefing in November.

From a yield pick-up perspective, according to Q3 reports from top life insurance companies' investment portfolio (Chart 9), Formosa issuance, which have yielded about 4.5% on average recently, are still one of the most attractive asset classes among fixed income assets.

In addition, Taiwan Insurance Institute's recent report on the industry's outlook for H2 2017 and the coming year was also upbeat in growth of insurance premiums and investment returns, quoting better positioned FX hedges and synchronized global growth.

Chart 9: Investment portfolio returns by asset class, according to company filings

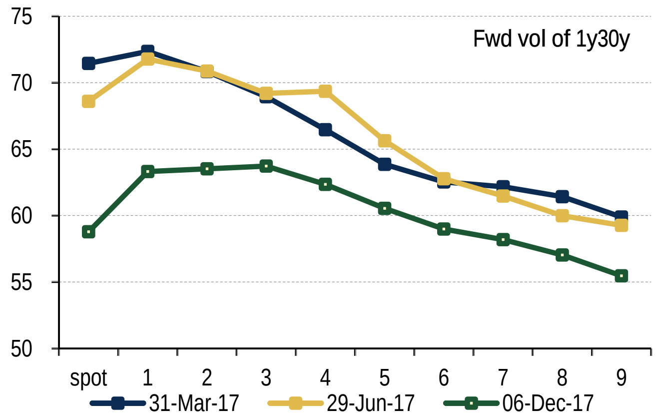


Source: BofA Merrill Lynch Global Research, Company filings

Granted, activities have been slow in recent months compared to the first half of the year as issuance was more front loaded due to the uncertainties with rule changes. Given our argument above and that consensus for this diminished issuance has already been strong, any upside surprises in Formosa issuance should be a negative for Vega.

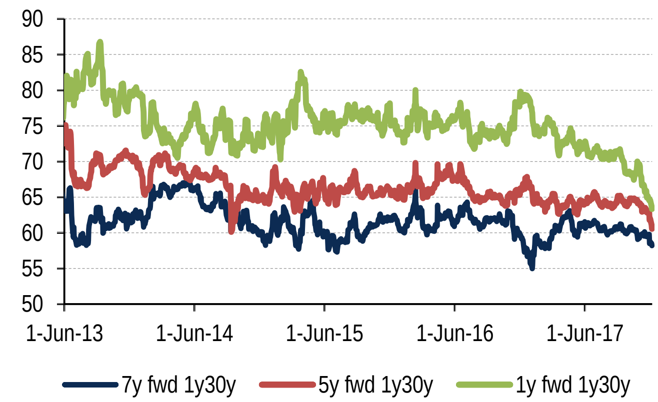
In this context, we like to look at the implied term structure of 1y30y vol (Chart 10). Increased Formosa issuance (with minimum required NC5) should pressure all 4y+ forward points. While selling any 4y+ forward 1y30y vol is negative carry, we find that the 7y fwd is not only the one offering the least negative carry, it is also the one to have cheapened the least in the last 6 months (Chart 11).

Chart 10: Term structure of 1y30y vol: selling 7y fwd 1y30y vol has the least negative carry, out of all 4y+ forwards



Source: BofA Merrill Lynch Global Research

Chart 11: 7y fwd 1y30y vol is still high historically compared to others



Source: BofA Merrill Lynch Global Research

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