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Derivative Focus

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Turbo carry zooms ahead

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A performance update of the turbo-carry trades

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Quantitative Strategies

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The performance of the four mid-curve calendar spread trades (USD 1m2y3m ATMF-10bp, USD 1m3y1y ATMF-10bp, USD 3m1y2y ATMF-20bp, EUR 3m1y2y ATMF-10bp) recommended on 8 November (Turbo carry in USD and EUR forward vol) has been impressive, with annualised returns of the expired USD 1m2y3y at 471% and USD 1m3y1y at 599% of the initial premiums, while the outstanding three-month trades' performances have been more mixed, with the EUR 3m1y2y trade up 118% and the USD 3m1y2y trade down 58%. We show that carry was the largest contributor to P&Ls, but volatility also helped. For the ongoing trades, we show that the EUR trade is very likely to make a healthy profit, while the USD trade will probably result in a loss and we recommended taking it off.

In our previous report Turbo carry in USD and EUR forward vol, we recommended four mid-curve calendar spread trades on 8 November 2013. They are as follows:

- **USD 1m2y3y AMTF-10**: sell \$100mn 1m2y3y AMTF-10bp receiver and buy \$100mn 25m3y ATMF-10bp receiver.
- **USD 1m3y1y AMTF-10**: sell \$100mn 1m3y1y AMTF-10bp receiver and buy \$100mn 37m1y ATMF-10bp receiver.
- **USD 3m1y2y AMTF-20**: sell \$100mn 3m1y2y AMTF-20bp receiver and buy \$100mn 15m2y ATMF-20bp receiver.
- **EUR 3m1y2y AMTF-10**: sell €100mn 3m1y2y AMTF-10bp receiver and buy €100mn 15m2y ATMF-10bp receiver.

Since we initiated the trades, volatility had been steadily nudging upwards, while forward rates have been largely range-bound. As Figure 1 shows the two one-month-expiry trades have both expired, realising relatively high profits (one gaining 20ct on 128ct entry price, or 471% annualised return, and the second gaining 10.2ct on 58ct entry price, or 599% annualised return), and the remaining two are still active, one with positive P&L (with a MTM of 2.8ct on 23ct entry price, or 118% annualized return as of 31-Dec-13) and one with negative P&L (-3.4ct on 29ct entry price or -58% annualised return as of 31-Dec-13). Note, we reported offer-side entry prices to make our P&L estimates more conservative.

Fig. 1: Trade P&Ls snapshot as of 31 December 2013

Trade P&Ls from trades entry at offer price on November 8th, together with delta and vega exposures

Trade	Status	Delta (ct/bp)	Vega (ct/bp)	Price (ct) Entry	Exit	Current	P&L (ct)	Ann. Return
USD 1m2y3y AMTF-10	Expired on Dec 9th	-0.47	1.30	128	148.0	-	20.0	471%
USD 1m3y1y AMTF-10	Expired on Dec 9th	-0.16	0.55	58	68.2	-	10.2	599%
USD 3m1y2y AMTF-20	Active	-0.34	0.41	29	-	25.6	-3.4	-58%
EUR 3m1y3y ATMF-10	Active	-0.21	0.42	23	-	25.8	2.8	118%

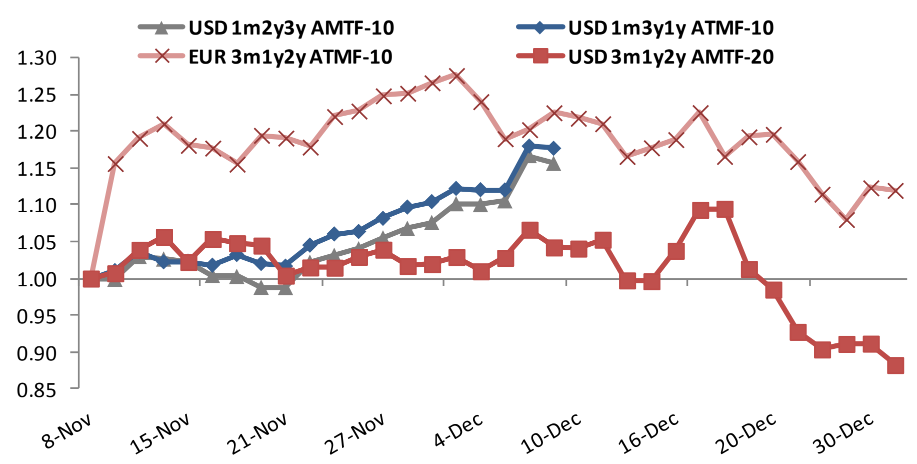
Source: Nomura Research

For a review of mid-curve calendar spread trades (also known as flip-flops), we provide a brief description in the grey box in Figure 3.

Mid-curve calendar spreads are long vega, usually short gamma, but more importantly, may also be optimised for their carry and return profile. By scanning 3000+ mid-curve calendar spreads in our previous report, we identified the four “sweet spots” that had meaningfully large carry pickups, but also had relatively wide buffers before they lose money (i.e., the break-evens are quite wide as the trade payoff is basically the shape of a swaption butterfly).

To show how likely these trades will end in-the-money, we analyse the evolution of the P&Ls, together with changes in the underlying rates and the breakevens. In Figure 2, we present the normalised (mark-to-market) P&Ls from their inception until 31 December 2013. Then, in Figure 4 we show the history of their underlying forward rates together with the trade breakevens. The breakeven rate is defined as the rate at which the mid-curve calendar spread starts to lose money at the end of the trade horizon.

Fig. 2: Cumulative P&Ls (normalised) since 8 November 2013



Source: Nomura Research

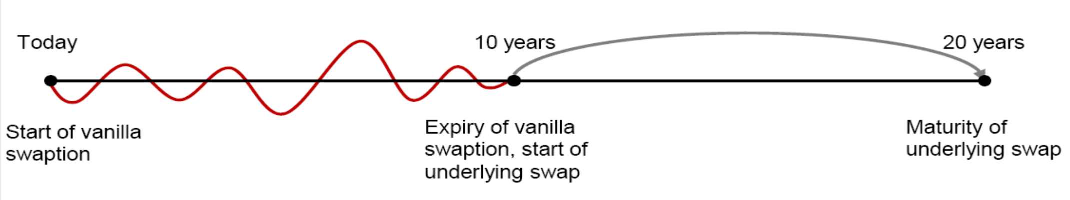
Generally speaking, the wider the B/E band, the more likely a mid-curve calendar spread will expire at a profit. At trade inception, the width of the B/E band is largely determined by the expected carry. A high expected carry leads to a large P&L buffer, and this then translates into a wide B/E band. As time passes, the B/E band is then affected by unrealised P&L and the underlying forward rate/vol. Both positive unrealised P&L and higher vol will widen the band, and vice versa. Figure 4 shows that to generally be the case with rising vols corresponding to modestly wider B/E bands.

By monitoring the B/E bands and underlying forward rates in Figure 4, we are able to assess how likely the trade will end up making money. While there may seem to be some disparity between Figures 2 and 4, we note that Figure 2 is the full mark-to-market (MTM) of each trade. The MTM depends on a variety of factors, including the relationship between spot vol and mid-curve vol, as well as the underlying forwards for each. But payoff at expiry of the first mid-curve will only depend on the vol and forward of the underlying.

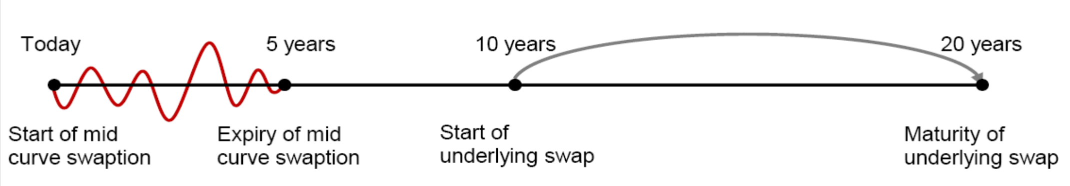
Fig. 3: A brief review of mid-curve calendar spreads

Mid-curve calendar spread trades (also known as flip-flops, see for example, QE, Mean-reversion and Cheap Forward Gamma) is a package involving short selling a mid-curve swaption and going long a longer-expiry swaption on the same underlying swap. Investors typically use mid-curve calendar spreads to take a view on forward volatility. This comes from the fact that, conceptually, spot volatility can be decomposed into forward volatility and mid-curve volatility. Taking 10y10y for example, Figure 2 below illustrates examples of the reference time periods covered by different interest rate volatilities and their instruments. The red lines indicate the time over which interest rate volatility exposure is taken, and the grey line indicates the underlying forward swap rate.

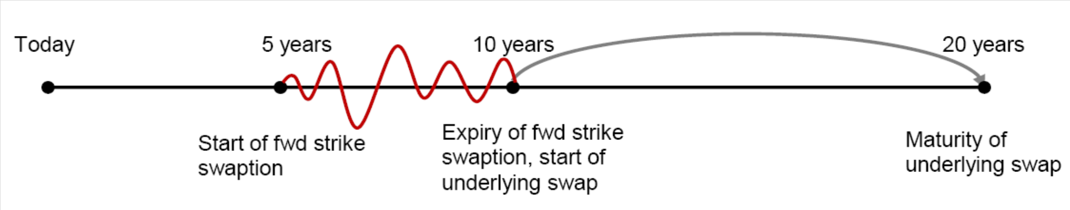
- **(Spot) Swaption: 10y10y Swaption**– a plain vanilla swaption has its strike set at inception and the underlying swap starts on a sport basis from the option expiry date.



- **Midcurve Swaption: 5y mid-curve on 5y10y swap rate** – the volatility of a forward-starting swaption, called mid-curve, whose strike is set at inception and but the underlying swap starts several years following the option expiry date.



- **Forward-starting Swaption: 5y forward 5y10y option** – 5y forward 5y10y volatility is the implied volatility of a forward strike swaption whose strike is only set after several years at the then ATMF level, and the underlying swap starts on a spot basis from the option expiry date.



In mathematical terms, the below relation holds for those volatility exposures of different time periods for the underlying 10y10y rate:

$$10\text{y} \times \sigma^2_{10\text{y}10\text{y}} = 5\text{y} \times \sigma^2_{5\text{y}5\text{y}10\text{y}\,\text{mid-curve}} + 5\text{y} \times \sigma^2_{5\text{y}\,\text{fwd}\,5\text{y}10\text{y}}$$

With the above (assuming flat skews where volatility is the standard deviation), 5y fwd 5y10y volatility can be backed out if we know 10y10y swaption volatility and 5y5y10y mid-curve volatility.

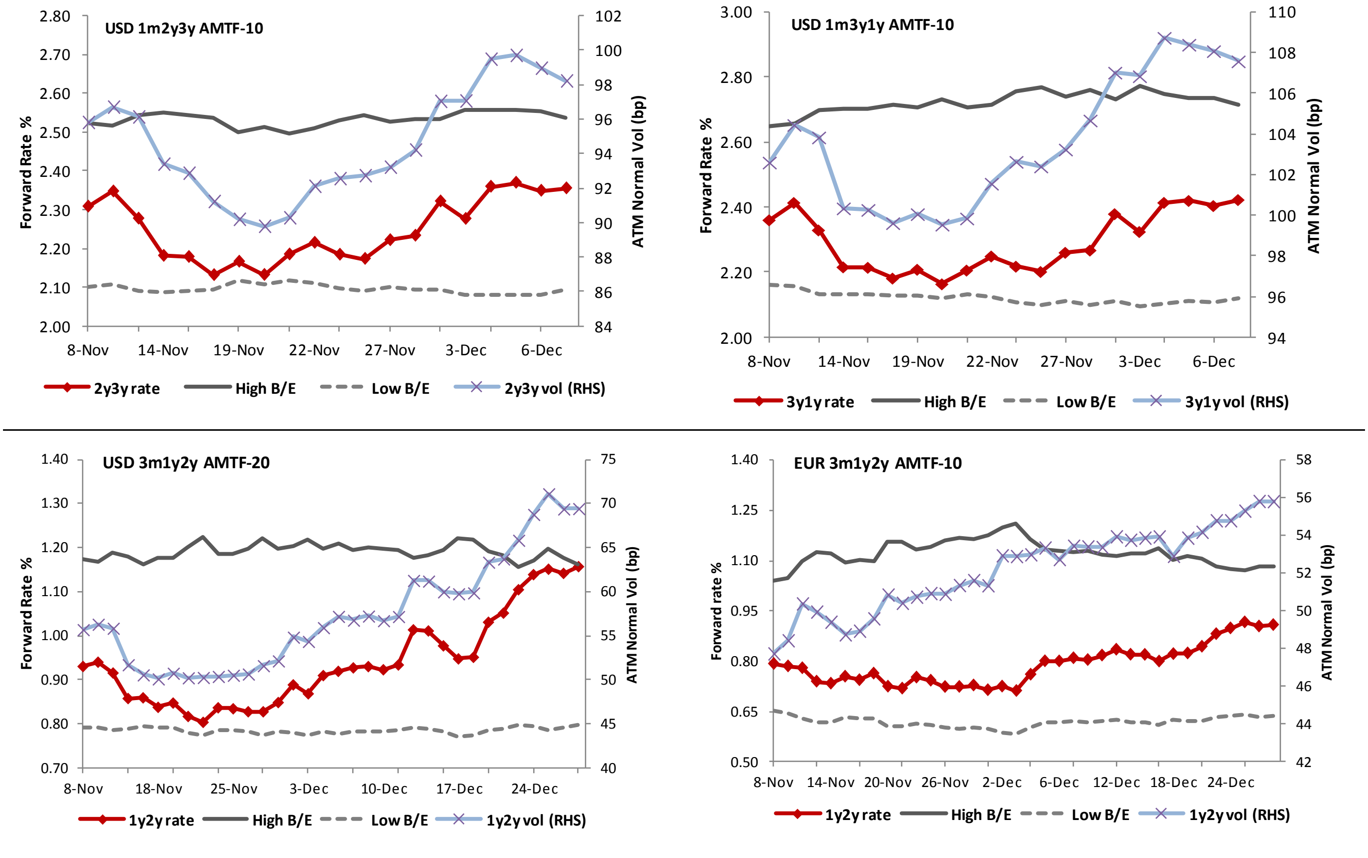
Therefore, a forward strike swaption, in nature a pure exposure to forward volatility, can be approximated by short selling a mid-curve and buying a plain vanilla swaption, which is a mid-curve calendar spread. Due to put-call parity, at the expiry date, a mid-curve calendar spread becomes either an OTM payer or an OTM receiver no matter it is payer or receiver at the inception, hence the name flip-flop.

We consider a simple example from QE, mean-reversion, and cheap forward gamma, of shorting a 6m1y1y 60.5bp payer and going long an 18m1y 60.5bp payer. If the first payer expires OTM in 6m time, we are still long a (then) 1y1y 60.5bp payer, with its vol and rates exposures. If on the other hand, the 6m1y1y expires ITM, we are short a forward 1y1y payer swap (i.e., we are receiving) with coupon of 60.5bp. Combining this 1y1y forward receiver swap with the 1y1y payer swaption position, through put-call parity, we are thus long a 1y1y 60.5bp receiver swaption, with its vol and rates exposures. We thus can see intuitively that the trade should be long 1y1y vol in 6m time. And, its payoff should peak near when 1y1y rate is at the (current) 18m1y rate in 6m time, since we are always long an effectively OTM option struck at 60.5bp, either a receiver or a payer, and consequently, valuations should be at their highest when forwards are close to the OTM option's strike.

Source: Nomura Research, Global Markets, , QE, Mean-reversion and Cheap Forward Gamma

Fig. 4: History snapshot of underlying forward rates/vols and the breakevens (B/E)

If the forward rate, indicated by red line, stays within the range of low/high breakevens (B/E) at expiry, the package should make money.



Source: Nomura Research

So, for instance, 1m2y3y MTM close to the start of the trade will depend on 25m3y forwards (25m forwards of 3y rates), 25m3y vols, and on 1m2y3y mid-curve vols. And as Figure 2 shows on 20-21 November, they all conspired to make the MTM P&Ls negative. Nonetheless, the payoff at expiry on 9 December, depended only on the then 2y3y forwards and 2y3y spot volatility, and as Figure 4 shows the forwards were entirely within the B/E bands for the duration of the trade, making it all the more likely that the trade should expire in-the-money, as was true.

For those two trades still active, the MTM gains of the EUR 3m1y2y make it seem relatively safe, as does the fact that the forward EUR 1y2y rate is comfortably within the upper and lower breakevens (in the lower right plot in Figure 4). By contrast, the USD 3m1y2y has been flirting with negative P&L for some time (Figure 2), which should not necessarily be a concern in and of itself, were it not for the fact that the forward USD 1y2y rate is now slightly above the upper B/E. It appears unlikely the trade will expire in-the-money if forwards continue on the current path and consequently, we would advise clients that have put on the 3m1y2y trade to exit at a small loss.

Finally, we look at the P&L breakdown in Figure 5. As expected, the majority of the P&L comes from carry, especially for those expired trades. This would be largely explained by their long forward volatility positions, which further enhanced carry pickups due entirely to the roll-up of volatility from forward to spot volatility.

Fig. 5: Breakdown of P&L (ct) until 31 December 2013

Trade	Delta	Gamma	Vega	Carry	Total P&L
USD 1m2y3y AMTF-10	-7.1	-0.3	1.0	26.4	**20.0**
USD 1m3y1y AMTF-10	-6.3	3.9	2.2	10.3	**10.2**
USD 3m1y2y AMTF-20	-8.2	-7.3	6.7	5.5	**-3.4**
EUR 3m1y3y ATMF-10	-3.2	-0.2	3.6	2.5	**2.8**

Source: Nomura Research

Moreover, the long vega exposures have also helped to offset the loss due to bearish rate moves. This is primarily because large upward moves in forwards have almost always come with large rises in volatility. The positive rate-vol correlation makes for an extra cushion for adverse market moves, such as the recent rates sell-off due to QE tapering.

We note that our two one-month trades expired with large gains, primarily driven by carry, but with contributions from rising volatility. The two three-month trades' performances are more mixed – we would continue to hold the EUR trade, as moves in forwards have been relatively mild, and would recommend exiting the USD trade at a loss.

The short horizon trades have been a success as moves in forwards were largely contained before Federal Reserve Chairman Ben Bernanke's pre-Christmas announcement of the planned tapering. While the longer horizon trades have proven trickier, we believe that this announcement has resolved a great deal of the policy-related uncertainty, and carry trades will likely now resume their decent performance.

Appendix A-1

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