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Derivative Focus

CROSS-ASSET

EUR liquid vol triangles

One year carry of 36% in liquid vanilla vols

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Quantitative Strategies

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We recommend the simple EUR 1y10y20y receiver triangle (long 1y10y, long 11y20y, short 1y30y) for its 36% carry over one year. The carry itself is balanced between approximately 22% vega carry, 12% curve roll-down and 64% theta. This trade was selected from a scan of some 2000+ triangles (see EUR—Looking for the perfect triangle), and of those with relatively liquid legs, had the largest carry.

Forward vol at cheap levels

We recommend the following swaption triangle trade:

Long €100mn 1y10y ATMF receiver

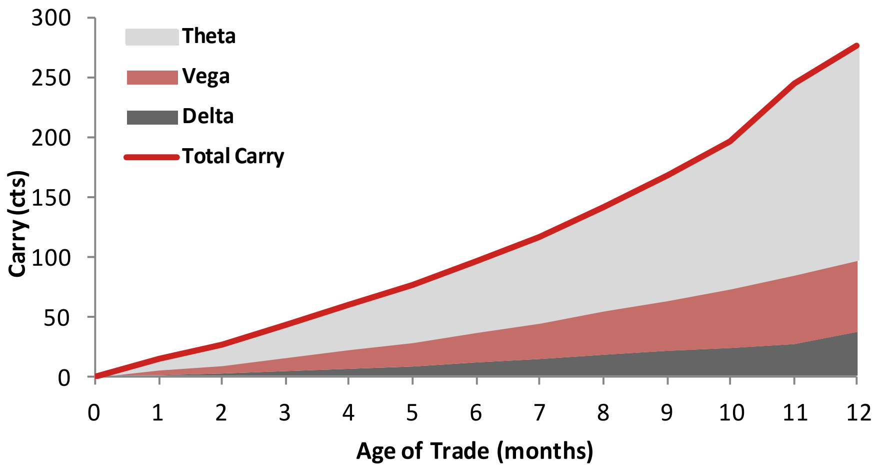
Short €100mn 1y30y ATMF receiver

Long €100mn 11y20y ATMF receiver

for a package price of €7,526,500[1]. The triangle has good carry, 36% over a one-year horizon (the holding horizon, in fact the expiry of the two short options). This carry can be broken down and is quite balanced between delta, vega and theta, with theta accounting for between 58-65% and vega making up some 22-39% of it, depending on the horizon, as we can see in Figure 1.

Fig. 1: Cumulative carry attribution by month

Vega slide explains 20-40% of entire carry, with theta providing the bulk of It



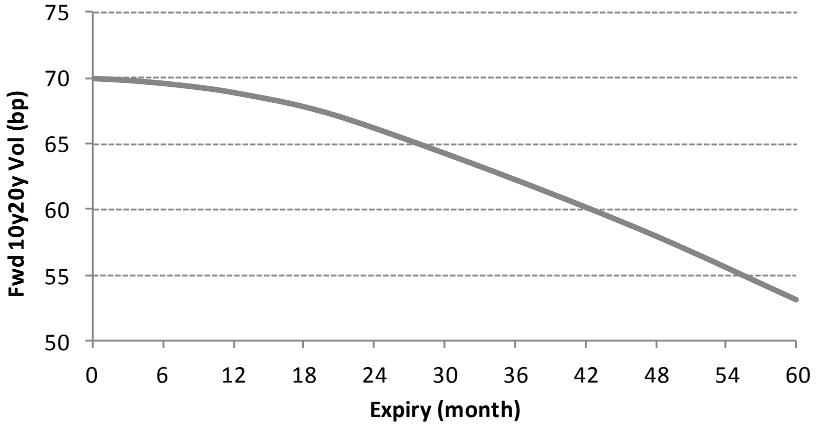
Source: Nomura Research

This trade carries positively mainly because of 1) positive net time decay (i.e. theta), 2) roll-up along the forward vol curve (see Figure 2), and 3) rolldown along the rate curve. While Figure 3 suggests longer-dated triangles (e.g. 5y10y20y) would have better vol roll, the combined effects mentioned above lead to a far higher carry for the 1y10y20y.

[1] The triangle is a vanilla version of the 1y10y20y turbo carry trade (see *Turbo carry in USD and EUR forward vol* and *Turbo carry zooms ahead* for a description).

Fig. 2: Downward term structure of forward 10y20y volatility

Long fwd vol exposure benefits from the positive roll-up on the 10y20y fwd vol curve

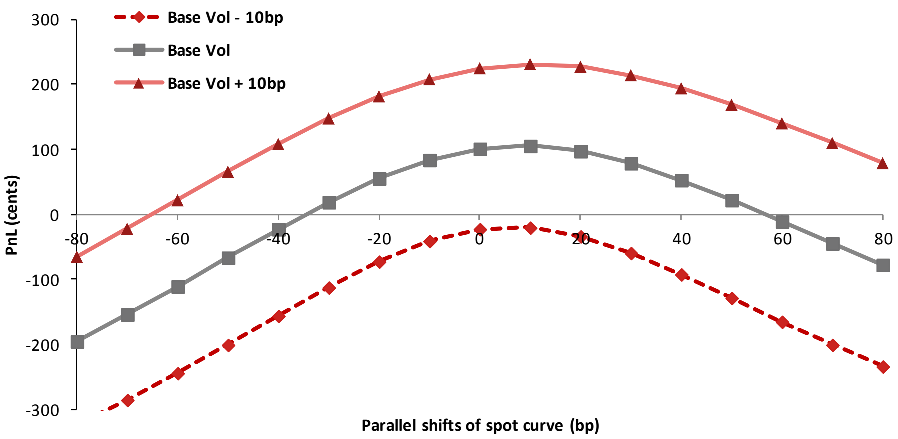


Source: Nomura Research

Over a six-month horizon, the trade carries 13.6% and the payoff profile for a parallel shift of the spot curve exhibits quite high breakevens (of spot-35bp and spot+54bp, or 89bp wide), much like the payoff profile of a short straddle (see Figure 3), although with lower negative gamma.

Fig. 3: Payoff profile in six months' time

Parallel shifts of spot curve (B/E of (-35bp,+54bp) gives good leeway

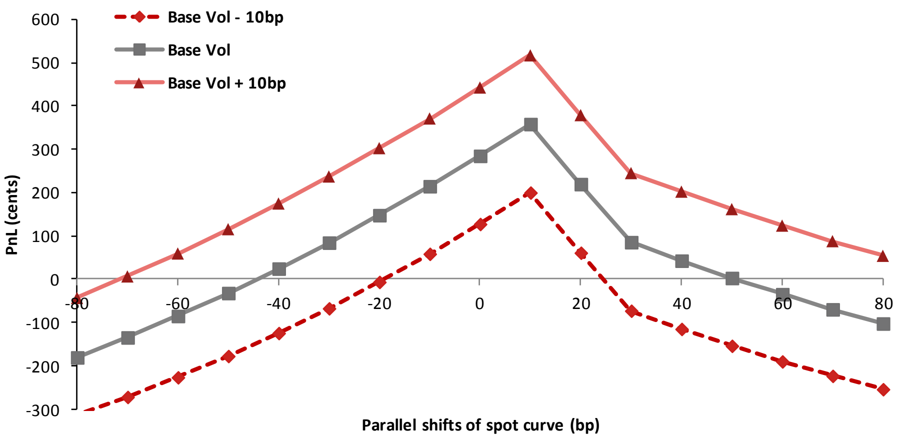


Source: Nomura Research

And, like turbo carry, the trade is long vega. Given any rising rates environment, it is also likely that vols should rise, making the breakevens widen considerably.

Fig. 4: Payoff profile in one year's time

Vol dependence on remaining 10y20y, with breakevens of (-44bp,+50bp)



Source: Nomura Research

We see in Figure 4 that the payoff profile (again still vol dependent) in one year's time, has wider breakevens (of spot-44bp,spot+50bp), and the volatility dependence of the underlying 10y20y remaining receiver means it should have a significant amount of remaining vega. Note that the y-axis is on a different scale from Figure 4, given the significantly higher carry over a one-year horizon.

Fig. 5: Risk profile: slightly short gamma but long vega and theta

Attractive risk profile with efficient vega exposure

		Notional (EUR)	ATMF (%)	Premium	Delta (/1bp)	Gamma (/1bp2)	Vega (/1bp)	Theta (/1day)
Buy	**1y10y ATMF Receiver**	100mn	2.19	2,363,696	-50,021	658	35,391	-4,576
Buy	**11y20y ATMF Receiver**	100mn	3.04	9,911,094	-93,415	714	161,944	-1,561
Sell	**1y30y ATMF Receiver**	100mn	2.67	-4,696,790	112,060	-1,876	-81,428	9,212
				7,578,000	**-31,377**	**-504**	**115,908**	**3,075**

Source: Nomura Research

This trade also effectively puts the investor into a 10y20y receiver position in one year's time, at the lower price of 757.8cts, compared with the current 991cts. Figure 5 shows that the trade has a large long vega position, comparable to that of the 11y20y ATMF receiver, while its theta, the primary source of expected returns, is comparable to that of a short 1y10y receiver (as is its gamma).

Irrespective of one's views on the economy, carry trades have been successful recently. And, if Europe is set to repeat the path set by the Japanese, carry trades should to perform well for some time. The triangle benefits from high carry under relatively modest moves in rates, while rising volatility can make it outperform.

Among the triangles we scanned several had higher carry (e.g. 1y1y30y, 1y1y29y, 5y1y29y, and 1y2y30y with carry as high as 49.9%, but which used far less liquid tails, e.g. 1y31y or 2y29y). We opted for a triangle that has two highly liquid underlyings 1y10y and 1y30y, while the 11y20y is not illiquid, and in one year's time will age into the relatively standard 10y20y.

Why receivers and not straddles?

While some would do vol triangles in straddles, it turns out that, for triangles where all legs are struck ATMF, it matters little whether it is done through payers only, receivers only or through straddles. In general terms

Payer Triangle ≈ Receiver Triangle ≈ 0.5 * Straddle Triangle

We say they are approximately equal because dv01s can drift if rates move far from ATM (we note this is also true of virtually all our dv01 neutral trades, e.g. steepeners and flatteners, which can turn into something entirely different with a net dv01 in more extreme curve scenarios) and there are modest differences in the case of cash-settled triangles.

In particular, if we take a physical or swap-settled 1y10y20y triangle, for example, say the three strikes are k_{1y10y}, k_{11y20y}, and k_{1y30y}; and their forwards are s_{1y10y}, s_{11y20y}, and s_{1y30y}.

Payer triangle = 1y10y Payer @k_{1y10y} + 11y20y Payer @k_{11y20y} – 1y30y Payer @k_{1y30y}

Receiver triangle = 1y10y Receiver @k_{1y10y} + 11y20y Receiver @k_{11y20y} – 1y30y Receiver @k_{1y30y}

And consequently, we have from put-call parity:

Payer triangle – Receiver triangle

= (1y10y Payer – 1y10y Receiver) + (11y20y Payer – 11y20y Receiver) – (1y30y Payer – 1y30y Receiver)

= PV01_1y10y ($s_{1y10y} - k_{1y10y}$) + PV01_11y20y($s_{11y20y} - k_{11y20y}$) – PV01_1y30y($s_{1y30y} - k_{1y30y}$)

= [PV01_1y10y *s_{1y10y} + PV01_11y20y*s_{11y20y} – PV01_1y30y*s_{1y30y}] – [PV01_1y10y *k_{1y10y} + PV01_11y20y* k_{11y20y} – PV01_1y30y* k_{1y30y}]

$$= \; -\;[\;PV01\_1y10y * k_{1y10y} \;+\; PV01\_11y20y * k_{11y20y} \;-\; PV01\_1y30y * k_{1y30y}\;]$$

$$\approx \mathbf{0}$$

For a physical-settled swaption the first set of grouped terms cancels out because $PV01\_1y30y * s_{1y30y} = PV01\_11y20y * s_{1y20y} + PV01\_1y10y * s_{1y10y}$ (i.e. just by the common definition of forwards, where usually this identity is stated for constructing forwards out of spot swaps rather than using forwards to construct yet more forwards).

The second set of grouped terms will only cancel out for a few relevant choices of strikes. For instance, if we set k_{1y10y}, k_{11y20y}, and k_{1y30y} to their respective ATMFs, the second set of grouped terms will also cancel out, when rates are at the forwards. Of course there will be variation if, during the course of the trade, rates move and the strikes are no longer very close to their respective forwards. But PV01 drift is a relatively common occurrence in rates trades so this should not be much of an issue. Setting the strikes to the respective ATMFs would be a vanilla approximation of the turbo-carry 1y10y20y ATMF package.

An alternative is to set all three strikes to be the same (i.e., $k_{1y10y} = k_{11y20y} = k_{1y30y} = k$), in which case the identity holds for all rate scenarios and is a vanilla approximation of the turbo-carry 1y10y20y k% package.

The above formula will no longer be identically zero in the case of cash-settled swaptions (i.e. the standard in Europe), since the payoffs involve the computation of a CashPV01 (based on a flat yield curve) rather than the actual PV01 as used above. In the case of cash-settled swaptions, the difference between payer triangles and receiver triangle payoffs will be very small. The size of the difference will depend on the differences between cash PV01 and regular PV01 (i.e. depending on the slope of the yield curve), and, depending on the strikes on any possible PV01 drift.

We choose to structure our trade idea using ATMF cash-settled receivers, given that they are the more commonly traded and liquid form of swaptions in EUR. From the point of view of carry and risk (see Figure 6), the receivers and payers alternatives have identical theta, vega and very nearly identical gamma, while the receiver has a higher delta than the payer, partly the source of its modestly higher carry (see the delta component from Figure 1). Meanwhile, the receivers trade has modestly better carry than the straddle-based alternative, and three fewer legs.

Fig. 6: Variations on the triangle theme

Cash settled ATMF 1y10y20y triangles vary only modestly.

1y10y20y ATMF Triangle	Delta (/1bp)	Gamma (/1bp2)	Vega (/1bp)	Theta (/1day)	Carry (1y)
Straddle	-50,365	-1,058	231,816	6,150	33.8%
Receiver	-31,377	-504	115,908	3,075	35.6%
Payer	-18,988	-555	115,908	3,075	34.2%

Source: Nomura Research

Given the large breakeven width (94bp) and the relatively large carry over a one-year horizon, we believe the 1y10y20y ATMF receiver triangle is likely to perform well over the coming year.

Trade Idea: Buy EUR 100mn 1y10y ATMF receiver, S**ell EUR 100mn 1y30y ATMF receiver, Buy EUR 100mn 11y20y ATMF receiver**, **for a package price of EUR 7,578,000.**

Appendix A-1

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