Derivative Focus

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Turbo carry in USD and EUR forward vol

Searching 3000+ midcurve calendar spreads for maximum carry

Our goal is to look for effectively turbo-charged carry trades in midcurve calendar spreads (also known as flip-flops, a type of forward vol trade). These are trades which have meaningfully large pickups in carry vs more vanilla trades. Midcurve calendar spreads benefit not just from the rolldown of forwards on the curve, but also from being short gamma and long vega (with the roll up of forward vol to spot). Unlike pure forward vol trades (which are long vega but have no gamma exposure), these trades are short gamma in a concentrated region and this risk is compensated for by having a considerable carry. And unlike simple short gamma trades, they benefit from the long vega and the rollup of forward to spot vol (a phenomenon peculiar to rates which prices in mean-reversion). Using a set of criteria, we are able to identify USD 1m2y3y ATMF-10bp, 3m1y2y ATMF-20bp, and 1m3y1y ATMF-10bp together with EUR 3m1y2y ATMF-10bp midcurve-spot calendar spreads as being the "sweet spots" in the space of liquid calendar spreads.

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Research analysts

Quantitative Strategies

Nick Firoozye - NIplc
nick.firoozye@nomura.com
+44 20 7102 1660

Qilong Zhang - NIHK
qilong.zhang@nomura.com
+852 2252 6191

Introduction – where does the carry come from?

In this report, we scan the range of midcurve calendar spreads or midcurve/spot packages (also known as *flip-flops*, see for example, QE, Mean-Reversion and Cheap Forward Gamma), which are a means of going long forward vol while also receiving a relatively large positive carry. They are long vega, usually short gamma (i.e., not quite the same as a pure forward vol trade), but most importantly, can also be optimised for their carry and return profile. Using a set of criteria, we are able to identify USD 1m2y3y ATMF-10bp, 3m1y2y ATMF-20bp, and 1m3y1y ATMF-10bp together with EUR 3m1y2y ATMF-10bp midcurve-spot calendar spreads as being the "sweet spots" in the space of liquid calendar spreads.

Midcurve calendar spreads can result in what we think of as turbo-charged carry, primarily because of the risks that they have (which fortunately can be balanced with the returns in a way which results in relatively attractive trades). The results are in great contrast to more standard carry trades. For instance, cash or swaps typically have less risk and correspondingly less carry. Going long outright typically benefits from far less positive carry because although it performs poorly in a selloff, it also performs well in a rally.

Carry trades in midcurves on the other hand perform well only in a relatively narrow range of scenarios. Considerable rallies and considerable selloffs will both result in a possible loss of initial premium (i.e., the risk is effectively much greater than outright receiving positions in swaps). But if the past twelve months of market action is any guide, these turbo carry trades can still deliver good performance despite the extreme swings.

In many ways we can gain more insight by comparing midcurve calendar spreads to vanilla short gamma trades in swaptions rather than outright delta positions. Both the midcurve trade and the standard short gamma (i.e., selling ATMF straddles and delta-hedging) are effectively short the wings and get a good pickup in terms of risk premia due to this risk. But midcurve trades have the benefit of also being long vega. They are a

See Appendix A-1 for analyst certification, important disclosures and the status of non-US analysts.

form of forward vol (although not pure forward vol due to the short gamma position). This long vega position further enhances the carry due entirely to the roll-up of volatility from forward-vol to spot vol. In rates, oftentimes forward vol is below spot vol (although this depends on the underlying forward period and sector of the vol surface) due entirely to the fact that, effectively, the vol surface prices in mean-reversion (or long-term stationarity) of rates, something which can never be said of FX, commodities, or equities.

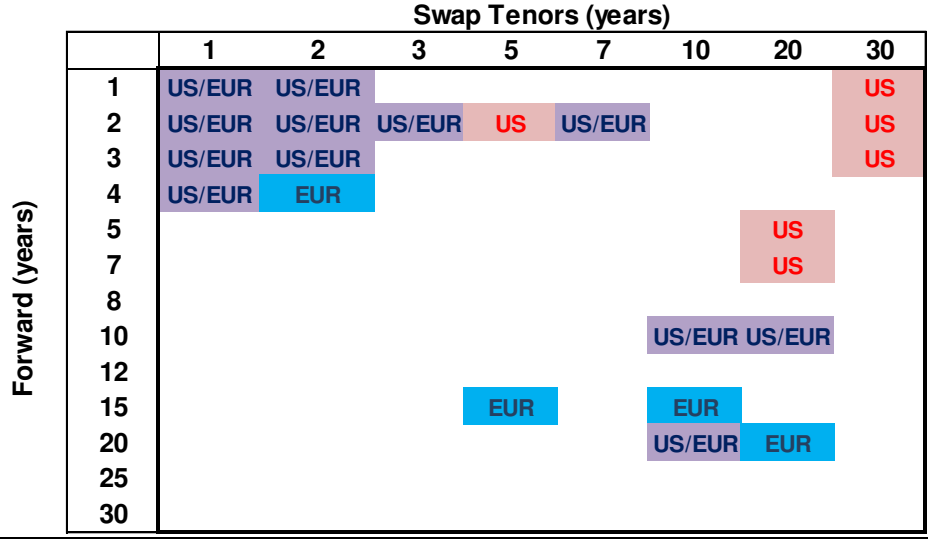
And, unlike pure forward vol trades (which also have relatively high carry due to the roll-up of forward vol to spot vol), midcurve calendar spreads also have a rates dependence which effectively increases the risk. The compensation for this risk is a much greater expected gain or carry.

Method and Nomenclature

Before discussing the results of our multi-dimensional search for optimal midcurve calendar spreads, we begin with some top-down nomenclature and methods.

Fig. 1: Liquid midcurves by currency

Upper left traded sector In both EUR/USD while *upper right* only US and *lower right* primarily EUR



Source: Nomura Research

A note on terminology: by *upper left*, *upper right*, *lower left* and *lower right*, we mean the various areas of Figure 1 (e.g., *upper left* is short forward short tenor). Also, unlike (spot) swaptions, midcurves have an added dimension which likewise adds to their complexity. So, for example, a (spot) 10y20y swaption would be a 10y expiry option on a 20y tenor swap, where the underlying is initially said to be the 10y forward 20y swap (which on expiry will become a 20y spot swap). In contrast, a 5y10y20y midcurve is a 5y expiry option on a 10y forward 20y swap. So for a (spot) swaption, for example the 10y20y, the forward and the expiry coincide. For a midcurve, they differ. We distinguish between *expiry*, *forward* and *swap tenor* in all of the ensuing analysis. We borrow the nomenclature of *upper right, upper left, lower right* and *lower left* from the (spot) volatility surface (which is a function of option expiry, which as we have mentioned is equal to forward period). Again, we will use expiry, forward and swap tenor throughout the rest of this paper.

We will also use swaption notation throughout, even when referring to forwards. So 10y20y forward is in fact the 10y forward of the 20y rate, the underlying for a 10y20y swaption, and we will make no effort to reconcile this with what we consider to be the outdated notation of the forward swap market, which reverses the order. Similarly we use ATMF to mean *at the money forward*, OTM to mean *out of the money*, and ITM to mean *in the money*.

In terms of method, first we look to optimize carry and other attributes of trades for both EUR and USD midcurve calendar spreads, where the investor is short a midcurve swaption and long a longer expiry spot swaption on the same underlying forward. An example would be going short a 6m receiver on a 1y1y rate (i.e., the mid-curve) and

going long an 18m receiver on a 1y rate (the spot swaption). This is effectively long forward starting volatility (long 6m forward 1y1y volatility). As we have noted in a previous publication (see QE, Mean-Reversion and Cheap Forward Gamma), it makes no difference whether we do this through receivers, through payers or through straddles due to put-call parity. This trade is also a means of taking views on autocorrelation.

Our search process consists of the following four dimensions:

- **Option expiry:** 1m,3m,6m,9m,1y,15m,18m,2y
- **Forward:** 1y,2y,3y,4y,5y,7y,8y,10y,12y,15y,20y,25y,30y
- **Swap Tenor:** 1y, 2y, 3y, 5y, 7y, 10y, 20y, 30y
- **Strike relative to ATMF:** -50bp,-40bp,-30bp,-20bp,-10bp,0bp, 10bp,20bp,30bp,40bp,50bp

Depending on whether the given midcurve is quoted (as shown in Figure 1) with some variation between USD and EUR, there are approximately 1500 possible trades in each currency. We calculate the premium or package price, carry, and the annualized carry as a percentage of the original premium. For now we only compute breakevens, vega, historic performance and risk measures on an ad hoc basis for those trades we consider attractive from the perspective of carry, given the computational burden of calculating these risk measures for all trades.

Ranking by annualized carry and then analyzing based on the payoff profile, we can identify a number of potentially attractive trades in both EUR and USD as we detail below.

We note that, given the complexity of the dataset, our initial approach is to look at ATMF midcurve calendar spreads by expiry for each all traded forward-tenor combinations in order to identify which may warrant further investigation. For those packages which have high annualized carry, we investigate skew, looking at whether a shift in strike may help or (more often) hurt the carry. Finally, we look at payoff profiles and breakevens, since high carry alone does not guarantee that a trade is actually worthwhile, given the negative convexity.

Our method for looking at performance is somewhat extreme and may be overly conservative. The payoff is a function of ATMF vol and underlying forwards. We compare payoffs to historical vols and forwards, looking at the past year of history. Given the relatively low level of overall volatilities, we plot one month or three month changes (depending on the horizon of the trade), and centre them at current ATMF and vol levels in order to look to more symmetric moves in the underlyings. This is, of course, punishing since many of the moves over the past year (in June with Bernanke's tapering speech in particular) will necessarily harm the best of carry trades. Surprisingly, some of our trades would have done very well in spite of these market moves, in great contrast to most normal carry trades which are often left under-water by any large moves.

Finally, we note that all carry calculations use mid pricing during the initial scanning phases, while the historical performance and the breakevens are calculated using package offer side, again just to be conservative. We report offer-side carry together with risk measures and breakevens only for the top trades.

USD midcurve calendar spreads, carry-optimized

In Figure 2, we look at annualized carry for USD trades focusing on those with higher carry. We can also see that longer expiry options in the upper left corner (i.e., 1y1y, 1y2y, 2y1y, 2y2y etc) are to be avoided entirely given their significantly negative carry. While carry appears to peak for short expiries, it is still relatively large for even longer expiries outside of this upper left sector. To avoid any confusion, these so-called *upper-left* trades are actually in the lower left of Figure 2.

Fig. 2: USD ATMF forward vol packages annualized carry for liquid midcurves.

1m1y30y stands out, and 1m2y30y is quite decent as well

		Underlying Forward																		
		1y1y	1y2y	1y30y	2y1y	2y2y	2y3y	2y5y	2y30y	3y1y	3y2y	3y5y	3y30y	4y1y	5y5y	5y20y	7y20y	10y10y	10y20y	20y10y
Expiry	1m	88%	197%	298%	149%	192%	217%	215%	222%	180%	197%	176%	189%	174%	148%	143%	131%	109%	126%	110%
	3m	-58%	30%	199%	58%	80%	108%	125%	154%	90%	113%	113%	135%	104%	104%	103%	96%	79%	92%	79%
	6m	-78%	-28%	150%	5%	31%	59%	78%	119%	53%	79%	79%	108%	80%	79%	83%	79%	64%	76%	64%
	9m	-74%	-46%	122%	-12%	10%	39%	58%	104%	38%	63%	66%	96%	62%	69%	73%	72%	57%	68%	58%
	1y	-67%	-47%	105%	-23%	-8%	25%	46%	94%	18%	53%	57%	88%	59%	64%	67%	68%	51%	64%	55%
	15m	-57%	-39%	91%	-23%	-9%	20%	36%	85%	15%	45%	48%	82%	50%	59%	63%	65%	48%	60%	49%
	18m	-51%	-25%	80%	-19%	-8%	16%	30%	80%	14%	41%	44%	78%	42%	55%	61%	63%	46%	59%	44%
	2y	-39%	-30%	70%	-15%	-5%	18%	26%	73%	13%	38%	37%	74%	34%	51%	58%	62%	44%	58%	36%

Source: Nomura Research

Carry is expressed as payoff if spot is realized as a percentage of the initial premium (i.e., 1m1y30y has a mid package price of 474c, and will roll to 593c if all is unchanged in only 1m time, a gain of 24.8% over the premium, or 298% annualized). We annualize the carry to compare evenly across expiries (since on an absolute basis the longer expiries have higher carry). We box the few trade ideas which we consider to be attractive above.

For those boxed trades (mostly upper right and upper left corners with respect to Figure 1 of 1m and 3m expiries) we see in Figure 3 that although shifting the strike may still result in quite high carry, typically only small moves of strike from ATMF will yield higher carry. We again box the most attractive trades, worthy of further consideration.

Fig. 3: Effects of skew on USD upper right and upper left forward vol packages

ATMF or ATMF-10bp in the 1M expiries stand out. 3m1y2y also looks attractive

		1m Expiries								3m Expiries							
		1y2y	1y30y	2y2y	2y30y	2y3y	2y5y	3y1y	3y2y	1y2y	1y30y	2y2y	2y30y	2y3y	2y5y	3y1y	3y2y
Relative Strike (bp)	-50	30%	-36%	86%	-5%	82%	55%	67%	69%	87%	10%	142%	28%	135%	104%	123%	116%
	-40	59%	-20%	96%	5%	95%	68%	85%	86%	123%	41%	167%	47%	161%	128%	145%	138%
	-30	78%	11%	123%	24%	126%	97%	117%	117%	178%	81%	202%	73%	197%	160%	172%	165%
	-20	124%	70%	179%	64%	183%	149%	170%	166%	261%	133%	181%	107%	210%	200%	161%	187%
	-10	265%	179%	273%	139%	275%	233%	245%	238%	126%	203%	124%	151%	153%	171%	121%	146%
	0	197%	298%	192%	222%	217%	215%	180%	197%	30%	199%	80%	154%	108%	125%	90%	113%
	10	-7%	118%	89%	100%	116%	117%	105%	121%	-31%	121%	46%	103%	73%	88%	64%	86%
	20	-111%	14%	21%	28%	46%	50%	50%	67%	-73%	62%	20%	63%	45%	59%	43%	64%
	30	-166%	-45%	-25%	-12%	-3%	4%	11%	27%	-102%	17%	-2%	33%	22%	36%	26%	45%
	40	-197%	-76%	-55%	-33%	-36%	-27%	-17%	-1%	-124%	-17%	-19%	10%	3%	16%	11%	30%
	50	-216%	-95%	-76%	-44%	-58%	-47%	-36%	-21%	-141%	-43%	-33%	-8%	-13%	0%	-1%	17%

Source: Nomura Research

Finally, we look at each in more detail, focusing on breakevens, this time including entirely on the top trades. In Figure 4 we use the offer side of the package to recalculate carry (with some modest changes since the carry is generally robust to transaction costs, and sometimes an improvement). We also calculate the lower and upper breakevens for the trades. (We shall see below that the payoffs are similar to being long butterflies for a fixed vol.) The breakevens are calculated by adjusting volatilities for the change in forwards, given the beta and rho and vol of vol for the specific aged swaptions.

Fig. 4: Risks and break-evens, and historic returns for top trades

1m2y3y and 3m1y2y and 1m3y1y stand out in terms of the backtests.

Mid-Curve Name	Relative Strike (bp)	Fwd (%)	Spot (%)	Offer Price (ct)	Aged-Package PV (ct)	Carry (%)	Ann Carry (%)	Lower B/E (%)	Upper B/E (%)	B/E Width (%)	Last 12m PnL (cts, diffs)	Last 12m PnL (cts, levels)	Last 12m Ret (diffs)	Last 12m Ret (levels)	Delta (ct/bp)	Gamma (ct/bp^2)	Vega (ct/bp)	Theta (ct/day)
1m1y30y	0	3.99	3.98	485	592.75	22.2%	266.4%	3.84	4.13	0.29	-28.7	35.00	-71%	87%	-0.82	-2.84	5.59	2.97
1m2y3y	-10	2.38	2.31	128	152.04	18.8%	225.6%	2.09	2.51	0.42	3.7	8.30	35%	78%	-0.47	-0.31	1.30	0.70
1m2y2y	-10	1.90	1.82	82.5	97.88	18.6%	223.2%	1.61	2.07	0.46	3.7	1.80	54%	26%	-0.34	-0.22	0.88	0.44
1m1y2y	-10	0.98	0.93	34	38.73	13.9%	166.8%	0.81	1.00	0.19	-0.1	-0.95	-4%	-11%	0.50	-0.33	0.56	0.18
3m1y2y	-20	1.12	0.93	29	43.44	49.8%	199.2%	0.79	1.17	0.38	4.7	7.00	65%	290%	-0.34	-0.14	0.41	0.07
1m3y1y	-10	2.45	2.36	58	67.37	16.2%	194.4%	2.15	2.63	0.48	2.1	4.70	43%	97%	-0.16	-0.09	-0.16	0.29

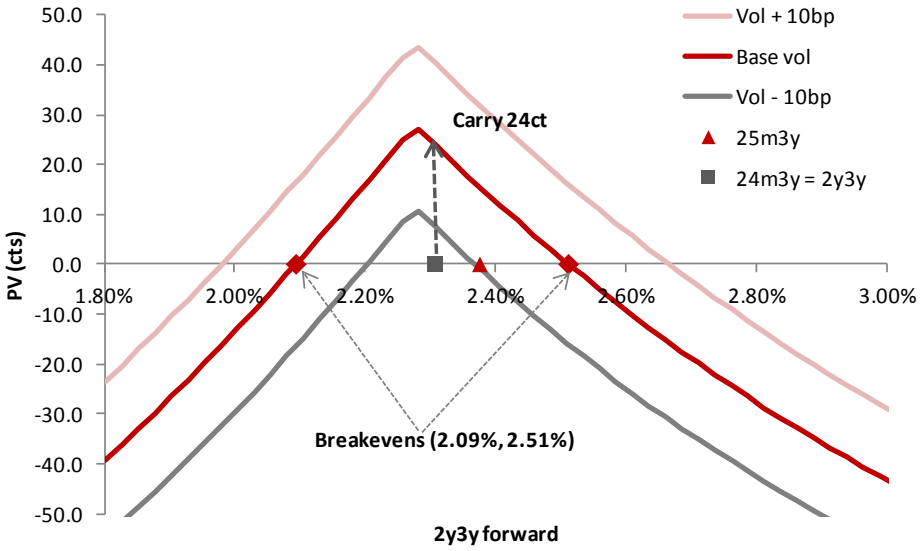
Source: Nomura Research

In Figure 4 we also calculate average PnL and annualized returns using differences in historical data (1M or 3M depending) and using unadjusted historical data (i.e., in levels), both over a 1Y history. We note that the 1m2y3y ATMF-10bp, the 3m1y2y ATMF-20bp,

and the 1m3y1y ATMF-10bp packages (the 2nd, 5th and 6th lines in Figure 4, which are boxed) all stand out in terms of historical performance. Meanwhile, (vol-adjusted) breakevens are also attractively wide at 42bp, 38bp and 48bp, respectively. In Figure 4 as well we quote the risks of the trade in terms of gamma, vega, etc.

Fig. 5: USD 1m2y3y ATMF-10 net payoff in 1M

With breakeven buffers at 22bp below spot and 20bp above spot mostly neutral to overall direction



Source: Nomura Research

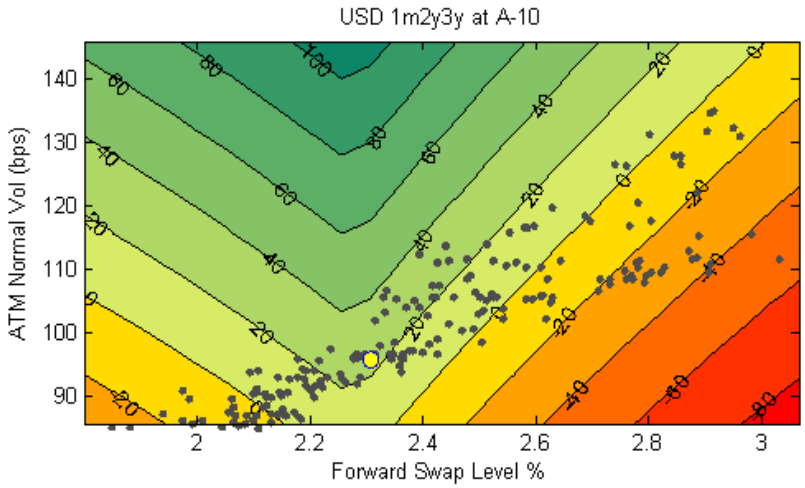
Focusing on the payoff net of premium in 1m time (just after the midcurve's expiry) for the 1m2y3y ATMF-10 trade in Figure 5, we see that it is similar to buying a butterfly (having limited downside, with max loss being the upfront premium), typically peaking close to the forward and tapering for larger moves. The carry (in cents) can be seen from difference of forwards (the grey box) and the base-vol curve directly above as noted in Figure 5. The, breakevens can be seen as the zero-crossings of the red base-vol line. In the table in Figure 4, we report (vol-adjusted) breakevens as being more realistic given this volatility dependence.

The sizeable volatility dependence of the payoff makes it challenging to look at historical returns specifically for a fixed vol, and instead we must look at 3D charts (or level lines as we do in Figure 6) in order to look more realistically at expected payoffs and breakevens. This is primarily because large moves in forwards have almost always come with large rises in volatility. This means that, effectively, the breakevens should be much wider than indicated by the (constant volatility) red line. This effect we pick up in our various backtests (as illustrated using level sets of the 3d payoffs below in Figures 6, 7, 8, and 12).

Before looking at the level sets, we should comment that the payoff profile is given immediately after the expiry of the midcurve. We note that the midcurve is swap settled. If we restrict ourselves to trading receivers, we are short a midcurve receiver and long a longer-expiry spot receiver. If the midcurve receiver expires OTM, i.e., worthless, we are effectively long a spot receiver. If on the other hand the midcurve receiver expires ITM, we are delivered a forward swap and, being short the midcurve receiver, we are paying fixed on this forward swap. The combination of the forward swap and the longer dated spot receiver is, given put-call parity, that we are long a longer dated payer swaption. This is what we describe as being a flip-flop (see QE, Mean-Reversion and Cheap Forward Gamma for further discussion). At the expiry of the midcurve, we are thus effectively long either an OTM receiver or an OTM payer. Consequently, we can easily see that the payoff profile should be peaked at the strike of the package, when the OTM receiver, or OTM payer is very close to being ATMF. Out of the moneyness will increase with any move, leading to the peaked payoff profile.

Fig. 6: USD 1m2y3y ATMF-10 net payoff in vol and forwards in 1m time (avg gain = 3.7ct using last 12m of data or 35% per annum)

Large selloffs have coincided with rising vols, widening the trade's breakevens, giving more downside protection



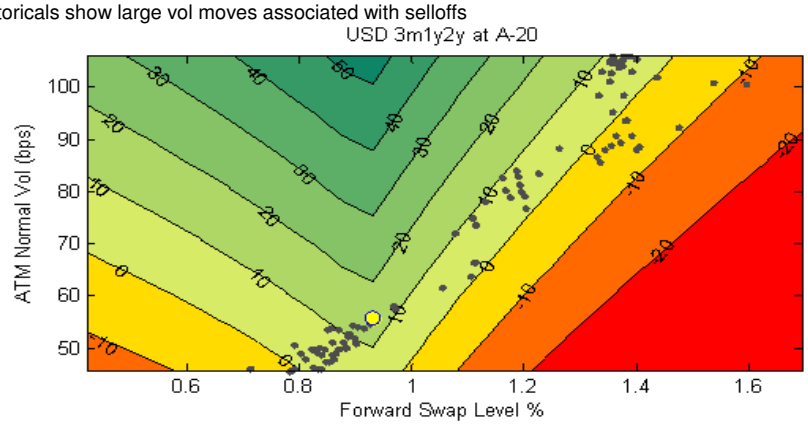
Source: Nomura Research

In Figure 6 we highlight the payoff now as a function of rates and volatility and superimpose changes in rates and volatility. We note that Figure 5 is merely the plot of this 3d level set from three separate horizontal slices (at the current vol which is shown as a yellow dot, and +10bp slices and -10bp slices).We have chosen to show historical changes in rates and log changes in vol rather than to show it in levels. In both cases the average performance would have been quite large. We note that the trade gains the most from rates staying on hold (as would be natural from a carry trade), but has been slightly more immune to large selloffs than large rallies, since historically, large selloffs coincided with large rallies in vol, effectively providing a buffer against losses.

In Figure 4, we report the previous year's performance of the trade using monthly differences (also illustrated in Figure 6) as a 35% annualized return. If we use the past year's data in levels, it results in an attractive 78% annualized return. Thus, in spite of this trade being effectively a carry trade and benefiting the most from modest moves in rates, it would have had attractive returns even in the relatively adverse market conditions experienced over the past twelve months.

Fig. 7: USD 3m1y2y ATMF-20 net payoff in 3m time (avg gain = 4.7ct or 65% per annum using the past twelve months)

Historicals show large vol moves associated with selloffs

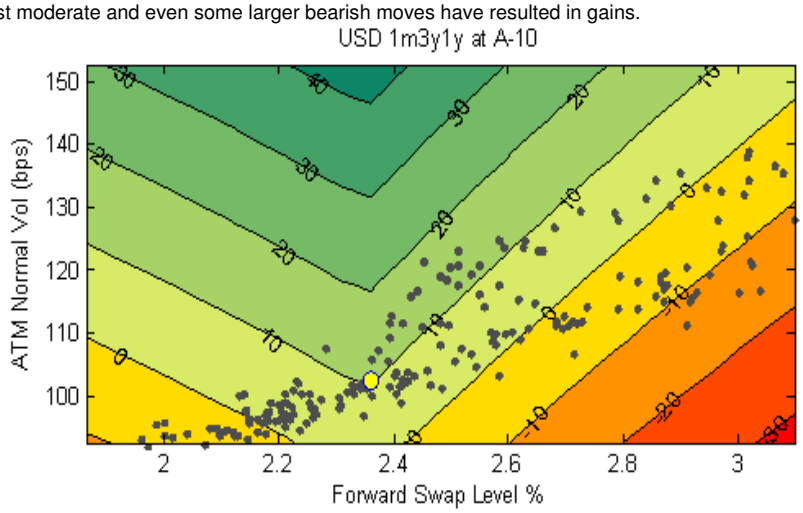


Source: Nomura Research

In Figure 7, we show the payoff of the USD 3m1y2y ATMF-20bp net of premium. Again the trade benefited from large selloffs with rising vols. The (vol-adjusted) breakevens are 14bp below spot and 24bp above spot, making this a relatively attractive modestly bearish trade for those with a slightly longer horizon.

Fig. 8: USD 1m3y1y ATMF-10 net payoff in 1m time (avg gain =2.1ct or 43% per annum using the past twelve months)

Most moderate and even some larger bearish moves have resulted in gains.



Source: Nomura Research

Finally, in Figure 8 we present the payoff of the final USD trade, the USD 1m3y1y ATMF-10 package, with an annualized carry of 194% and breakevens at 48bp wide over just 1M. This trade is also relatively centred with 27bp of buffer on the upside and 21bp on the downside from spot. Average returns in differences have been 43% and in levels 97% over the past year, making it a trade that historically has benefitted from large shifts in volatility to buffer most of the downside from selloffs in rates.

EUR midcurve calendar spreads, carry-optimized

We proceed with a similar analysis of EUR flip-flops, but note that there is no upper right sector for the actively traded midcurves and, instead, we find more attractive trades in the upper left sector.

Fig. 9: EUR ATMF forward vol packages annualized carry for liquid midcurves.

1m1y1y, 1m1y2y, 1m2y1y, 1m2y2y, and 1m2y3y (all upper left) stand out

		1y1y	1y2y	2y1y	2y2y	2y3y	3y1y	3y2y	4y1y	4y2y	5y5y	10y10y	10y20y	15y5y	15y10y	20y10y	20y20y
Expiry	1m	291%	353%	241%	233%	228%	187%	183%	172%	154%	136%	101%	109%	89%	84%	90%	122%
	3m	136%	180%	132%	117%	120%	100%	102%	104%	93%	84%	64%	70%	53%	51%	59%	82%
	6m	37%	71%	55%	53%	60%	57%	60%	74%	67%	70%	51%	56%	44%	41%	45%	66%
	9m	-23%	15%	28%	31%	41%	43%	44%	60%	60%	66%	47%	51%	41%	38%	41%	63%
	1y	-45%	-9%	13%	19%	32%	33%	37%	58%	55%	62%	44%	49%	38%	35%	39%	62%
	15m	-47%	-17%	1%	9%	22%	33%	32%	52%	49%	55%	42%	47%	36%	33%	37%	57%
	18m	-46%	-19%	-3%	2%	11%	33%	27%	45%	44%	51%	40%	46%	36%	32%	35%	56%
	2y	-41%	-17%	-10%	-6%	0%	34%	17%	34%	34%	46%	38%	46%	34%	30%	35%	59%

Source: Nomura Research

Focusing on short expiry options on 1y1y, 1y2y, 2y1y, 2y2y and 2y3y, we look at the effects of skew in Figure 10.

Fig. 10: Effects of skew on EUR upper left forward vol packages

1m1y2y ATMF,3m1y2y ATMF-10 stand out, and 1m1y2y ATMF-10, 3m1y1y ATMF-10 and 1m1y1y all have exceptional carry

		1m Expiries					3m Expiries				
		1y1y	1y2y	2y1y	2y2y	2y3y	1y1y	1y2y	2y1y	2y2y	2y3y
Relative Strike (bp)	-50	124%	-20%	-14%	54%	56%	-44%	66%	127%	105%	95%
	-40	-55%	12%	20%	61%	60%	-6%	118%	150%	126%	114%
	-30	-45%	47%	56%	80%	79%	62%	186%	184%	157%	144%
	-20	5%	123%	120%	130%	125%	158%	283%	234%	201%	185%
	-10	145%	297%	237%	230%	218%	298%	370%	224%	196%	194%
	0	291%	353%	241%	233%	228%	136%	180%	132%	117%	120%
	10	-33%	69%	81%	88%	91%	3%	65%	69%	62%	67%
	20	-153%	-73%	-10%	4%	11%	-72%	-9%	25%	22%	29%
	30	-204%	-147%	-62%	-44%	-36%	-118%	-60%	-8%	-7%	1%
	40	-230%	-188%	-92%	-72%	-62%	-148%	-96%	-31%	-29%	-21%
	50	-248%	-214%	-109%	-88%	-78%	-170%	-123%	-49%	-45%	-37%

Source: Nomura Research

We show the historical payoffs and returns and breakevens for the top few trades in Figure 11. Unfortunately, the historical returns on these highlighted EUR trades are not nearly as attractive as those in USD and using our very conservative criteria of considering only those trades with historically positive returns, we are left with 3m1y2y ATMF-10 (which we have boxed). We note that this trade has one of the widest breakevens at 50bp while some of those with high carry in EUR have very narrow B/E ranges.

Fig. 11: Risks and break-evens, and historic returns for EUR top trades

Only 3m1y2y stands out with positive historic gain, although others are attractive in more stable market conditions

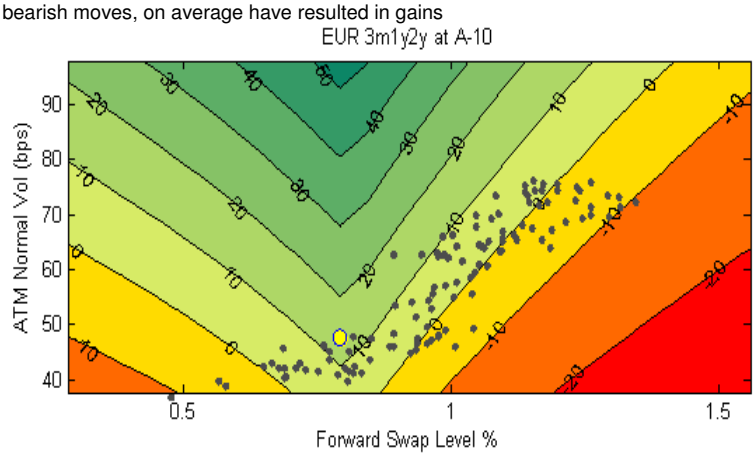
Mid-Curve Name	Relative Strike (bp)	Fwd (%)	Spot (%)	Offer Price (ct)	Aged-Package PV (ct)	Carry (%)	Ann Carry (%)	Lower B/E (%)	Upper B/E (%)	B/E width (%)	Last 12m PnL (cts,	Last 12m PnL (cts,	Last 12m Ret (diffs)	Last 12m Ret (levels)	Delta (ct/bp)	Gamma (ct/bp^2)	Vega (ct/bp)	Theta (ct/day)
3m1y2y	-10	0.90	0.79	23	37.1	61.3%	245.2%	0.61	1.11	0.50	2.2	7.31	38%	127%	-0.21	-0.12	0.42	0.12
1m1y2y	0	0.83	0.79	31	35.4	14.2%	170.3%	0.75	0.93	0.18	-5.55	-0.94	-215%	-36%	-0.94	-0.13	0.56	0.25
3m1y1y	-10	0.53	0.45	9.5	13.1	37.9%	151.6%	0.36	0.56	0.20	-1.53	-2.50	-64%	-105%	-0.15	-0.08	0.24	0.04
1m1y2y	-10	0.83	0.79	27.5	30.6	11.3%	135.3%	0.65	0.86	0.21	-3.09	-0.29	-135%	-13%	-0.45	-0.27	0.58	0.19
1m1y1y	0	0.47	0.45	13	13.5	3.8%	46.2%	0.44	0.51	0.07	-3.8	-4.55	-351%	-420%	-0.09	-0.25	0.3	0.09

Source: Nomura Research

Finally, as a means of gauging its performance, we plot the 3m1y2y ATMF-10 payoff in vol and forwards in 3m time, superimposing 3m changes of vols and forwards. As we can see the breakeven width of 50bp gives a relatively large buffer for the trade, and historical returns of 38% (in differences) or 127% (in levels), make this trade stand out as being particularly attractive. The downside buffer from spot of 18bp is considerably smaller than the upside buffer of 32bp from spot, giving this a decidedly bearish skew.

Fig. 12: EUR ATMF-10bp 3m1y2y net payoff in 3m time (avg gain = 2.2ct or 38% per annum using the past twelve months)

Most bearish moves, on average have resulted in gains



Source: Nomura Research

Our criteria for judging trades is very conservative, using historical performance over a rather tumultuous period. Most investors seeking carry will also look at trades with the view that there is stability ahead at least for the next month to three months, and consequently, the other trades that we did not display in as great detail, may offer generous upside as well for the risk. On the other hand, the trades we did highlight offer the best of both worlds, very high carry along with significant downside protection if the past twelve months are any guide. They are also largely bearish in outlook, benefiting more from rising rates than falling rates. To recap the risk of midcurve calendar spreads, these trades will tend to lose money if

- Forwards move outside the range (specified in terms of breakevens in the previous discussion)
- Volatilities decrease significantly.

These risks are not completely independent. Typically large bearish moves have been associated with rising volatility (providing a further buffer against losses when rates rise). On the other hand, large bullish moves have oftentimes coincided with falling volatility (decreasing the buffer against losses). This consequently has given the trades a more bearish bias. Nonetheless, we believe that the highlighted trades more than adequately compensate for these risks where we believe the breakevens are relatively wide and the vega is high enough to help balance risk and return, especially in light of the market action in the past twelve months. In any event, the maximum downside is to lose the initial premium.

While selling convexity does generally enhance returns, it is rare that this can be as extreme as in the case of midcurve calendar spreads or flip-flop trades. With carry (in percentage of initial premium) in annualized terms in the range of around 200%-300%, these trades have particularly large gains from no change in market circumstances. Meanwhile, in the case of large moves, the long vega position (long forward vol) is likely to provide a buffer against losses, and perhaps even outright gains.

Trade Ideas:

- Sell $100m 1m1y30y ATMF receivers and buy $100m 13m1y30y ATMF receivers
- Sell $100m 3m1y2y ATMF-20bp receivers and buy $100m 15m2y ATMF-20bp receivers
- Sell $100m 1m3y1y ATMF-10bp receivers and buy $100m 37m1y ATMF-10bp receivers (37m as in 3y1m expiry).
- Sell €100m 3m1y2y ATMF-10bp receivers and buy €100m 15m2y ATMF-10bp receivers.

Appendix A-1

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