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# Trading EUR front end de-correlation

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## Cheap option on Japan-style curve slopes

Global Markets Research
Fixed Income Strategist
Nick Firoozye
+44 20 7102 1660
nick.firoozye@nomura.com

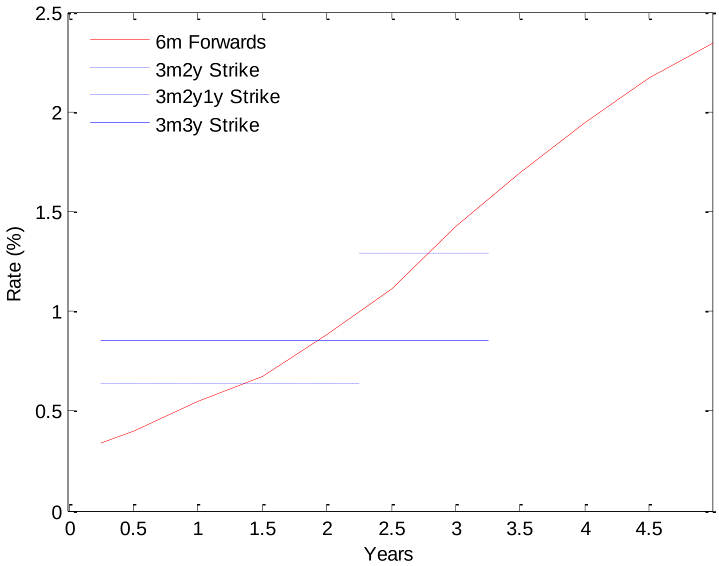


**Go long €100mm 3m2y ATMF swaptions and €100m 3m2y1y ATMF mid-curve swaptions, go short €100mm 3m3y ATMF swaptions at a package price of 1.5 cents. The trade benefits from both steepening and flattening of front ends with asymmetric upside.**

De-correlation in rates is essentially the view that the yield curve will not continue to move according to the previously standard parallel shifts. In the recent past, parallel shifts are no longer the norm. Especially with front ends pegged close to their lows, slope shifts have become far more common. This trade idea benefits most from a yield curve which remains anchored at the front end, at least for a 3m horizon.

Correlation is priced into a variety of instruments which are commonly traded in rates derivatives. In particular, caps and floors have elements of correlation priced into them but in addition they have elements of forward vol, muddying any specific correlation view. Mid-curve swaptions have correlation priced into them but, unlike caps and floors, they can be traded relative to spot swaptions without the need to mix in elements of forward volatility.

**Fig. 1: The three strikes and the forward curve**




Source: Nomura Research

We recommend going long €100mm 3m2y 65bp strike payers, long €100mm 3m2y1y ATMF (@ 133bp) mid-curve payers, and going short €100mm 3m3y 89bp strike payers. The package premium is approximately 1.5cents. We note that the ATMF for the 3m2y1y is merely the DV01 weighted average of the strikes of the 3m2y and 3m3y, i.e.,

$$\text{Strike}_{3m2y1y} = (\text{DV01}_{3m3y}\,\text{Strike}_{3m3y} - \text{DV01}_{3m2y}\,\text{Strike}_{3m2y})/(\text{DV01}_{3m3y} - \text{DV01}_{3m2y}).$$

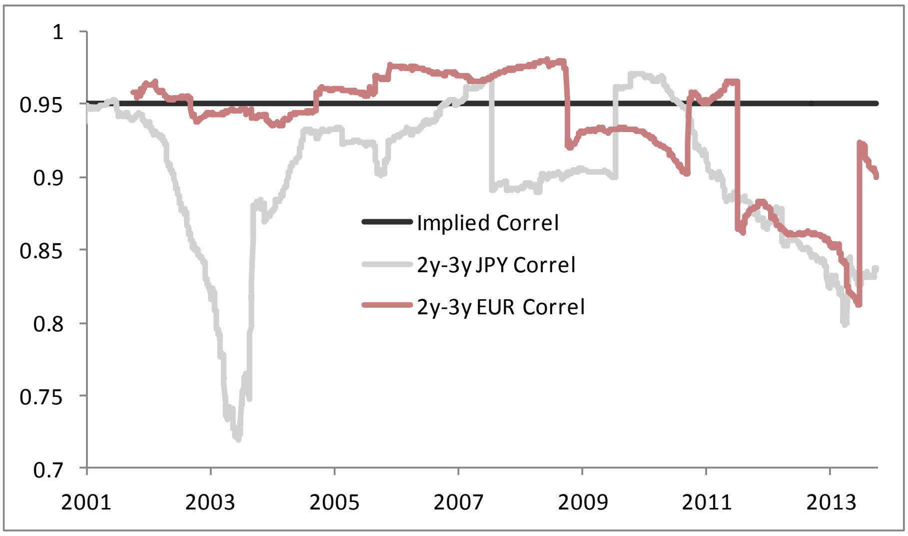
In particular, in Figure 1 we show the 3m forward 2y rate (the underlying for the 3m2y swaption) and the 2.25y forward 1y rate (the underlying for the 3m2y1y forward mid-curve swaptions) and their relation to the 3m forward 3y rate (the underlying for the 3m3y swaption). We note that the 3m2y strike (the lower dotted blue line) is the (discount-function-weighted) average of the corresponding 6m forward rates (denoted by the solid red line), and the 3m2y1y strike (the higher dotted blue line) is a similar average of the corresponding 6m forward rates, as is the (solid blue line) the 3m3y strike.

In a world where parallel yield curve shifts dominate (i.e., where correlation between points on the curve is high), the package of the 3m2y swaptions + 3m2y1y mid-curve would move in or out of the money exactly the same amount as would the 3m3y swaptions and, effectively, the package premium would be lost as it expires worthless.

It is only in a world of de-correlated rates that we can see value in the package, where the 3m forward 2y and the 2.25y forward 1y rates move through their respective strikes (i.e., through the 3m2y strike and the 3m2y1y strike, respectively) while the 3m forward 3y can possibly stay at the money the entire time. In other words, the trade can make money in a steepening or flattening of the yield curve, (especially those which pivot on the 3m3y, leaving it unchanged).

There are relatively few packages that can take advantage of front end steepening with such limited downside. Spread options are far more common in much longer dates (say 2s-10s). Conditional curve trades are feasible but exhibit far greater downside potential in certain flattening environments. The de-correlation package is one of the only liquid packages with effectively floored downside.

**Fig. 2: Implied and 2y Rolling Correlations**




Source: Nomura Research, Bloomberg

The trade itself is particularly attractive given the pricing of correlation implied in the package. While the implied correlation is close to 95%, correlation post-crisis has been mostly far off the pre-crisis highs. In figure 2 we plot running 2y correlations of daily changes in 2y and 3y spot swap rates. We note, as well, that JPY correlations have historically been far lower given the QE-related pegging of the front end, where most motion of the yield curve has been through steepening and flattening.

The post crisis decline in correlations in Europe has only recently been reversed due, in part, to the talk of tapering coming out of the Fed. Implicitly the trade should benefit from realized correlations being below 95%.

We note that although the 2y realized correlations exhibit a significant trend, the implied correlation is usually related to short-term realized correlations which were also trending down but recently rose given the concerns over Fed tapering. Some dealer selling of mid-curve calendar spreads has also put a modest amount of downward pressure on mid-curve vols (thus putting upward pressure on implied correlation). Given the fact that Europe very much has its own dynamic, similar in many ways to Japan rather than to the US, it is all the more likely that slope will reassert itself as a dominant factor. In other words, it is likely that realized correlation will once again head lower.

We note, however, that we do not propose trading the correlation directly, although this is feasible. It is not possible to disentangle correlation and gamma positions of course,, It is possible to be short gamma in both underlyings (the 2y swap and 3y spot swaps, with the 2y1y forward a function of these two spot rates) and hedge with the implied correlation by hedging the entire structure with just one of the underlyings. We however

**Fig. 3: Initial profile of trade**

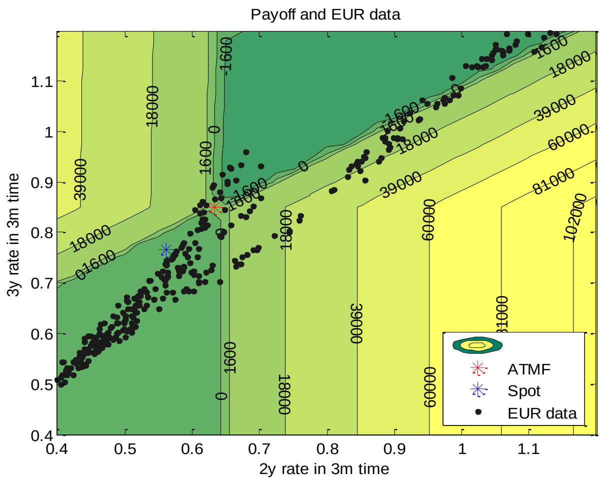
| | PV (cents) | Delta | Gamma | Vega | PV01 Underlying |
|---|---|---|---|---|---|
| **Package** | 1.5 | -7 | 52 | 45 | 0 |
| **3m2y** | 15.8 | 864 | 436 | 388 | 1,991 |
| **3m2y1y** | 17.7 | 429 | 97 | 237 | 984 |
| **3m3y** | -32.0 | -1767 | -481 | -580 | -2975 |

Source: Nomura Research

And while the trade may appear bearish since it uses only payers, we should mention that due to put-call parity and the identity linking spot and forward rates, it makes no difference if we change it to use only receivers. Similarly, the package with straddles has twice the original cost and has twice the original payoff.

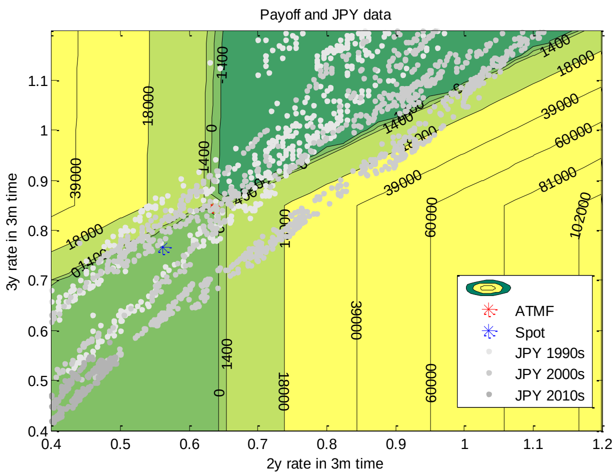
In Figure 4 below, we plot the payoff profile for the package relative to 2y rates and 3y rates (in 3m time). The strikes (of the 2y and 3y spot starting swaptions) are given by the red star and spot 2y and 3y swap rates are given by the blue star. The 0 line represents the break-even, and the darker green patch is where the premium of 1.5 cents is lost, with the darkest green area representing a modest downside (by our calculations the *net loss including premium* was not more than 2.5 cents).

**Fig. 4: Payoff and recent EUR data**




Source: Nomura Research

**Fig. 5: Payoff and historic JPY data**




Source: Nomura Research

A flat yield curve is represented by points on the 45°-diagonal of each of Figures 4 and 5. Steepening moves are indicated by a movement towards the upper left corner (i.e., orthogonal to the diagonal) while parallel shifts are in the direction of the 45°-diagonal.

We note that for an initial premium of €1,500 (i.e., 1.5 cents on a EUR 10mm notional), trade payoffs of over €18,000 (i.e., 18 cents, or 12 to 1, or the line starting at 2y rates between 0.7 and 0.8) were common enough in EUR data.

We see that the JPY data is even more compelling (see Figure 5.). We plot in darker grey JPY history since 2010, with lighter grey indicating JPY rates in the 2000s and earlier. And, given the significant de-correlation of rates in JPY in the 2000s and 1990s, (and the fact that levels in the 2000s in JPY were more comparable with those of EUR today), the upside in a Japan-style scenario is far greater, where front ends could be considerably steeper than they have been in EUR.

While the yield curve historically has moved in a more parallel fashion, recent responses to a pegged front end made steepening and flattening much more common. In Japan this was most apparent, given the fact that front ends have been pegged for so long. Given the fact that rates continue to be on hold and nervous markets are likely to price in a premium, a steepening of front ends is relatively likely. This de-correlation package is a particularly cheap way of putting on front end steepeners (and flatteners) with a very limited downside.

**Go long €100m 3m2y 65bp strike payers and €100m 3m2y1y 133bp strike mid-curve payers, go short €100mm 3m3y 89bp payers at a package price of 1.5 cents.**

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