

Flow Exotics RV

Higher returns through EUR and USD through vanilla and mild exotics

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Where are we?

Will carry be a thing of the past?

USD Forwards and Vols – the context

**USD ATM Forward Swap (with 3m z-score Heatmap:
Blue z<0, rich, Red, z>0, cheap)**

| Underlying | | | | | | | | | | | |
|------------|------|------|------|------|------|------|------|------|------|------|------|
| Fwd | 3M | 6M | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y |
| 1M | 0.24 | 0.25 | 0.3 | 0.59 | 1.03 | 1.85 | 2.41 | 2.92 | 3.37 | 3.55 | 3.67 |
| 3M | 0.26 | 0.27 | 0.34 | 0.7 | 1.16 | 1.97 | 2.51 | 3 | 3.42 | 3.59 | 3.7 |
| 6M | 0.28 | 0.31 | 0.44 | 0.88 | 1.36 | 2.14 | 2.65 | 3.11 | 3.5 | 3.65 | 3.75 |
| 1Y | 0.48 | 0.57 | 0.81 | 1.33 | 1.8 | 2.5 | 2.93 | 3.33 | 3.66 | 3.78 | 3.84 |
| 2Y | 1.45 | 1.58 | 1.86 | 2.3 | 2.67 | 3.16 | 3.45 | 3.73 | 3.94 | 4.01 | 4.02 |
| 3Y | 2.41 | 2.54 | 2.79 | 3.09 | 3.34 | 3.64 | 3.84 | 4.03 | 4.15 | 4.17 | 4.14 |
| 5Y | 3.63 | 3.7 | 3.88 | 3.96 | 4.05 | 4.18 | 4.28 | 4.36 | 4.37 | 4.33 | 4.26 |
| 7Y | 4.1 | 4.13 | 4.27 | 4.28 | 4.34 | 4.43 | 4.47 | 4.47 | 4.43 | 4.38 | 4.28 |
| 10Y | 4.44 | 4.48 | 4.61 | 4.58 | 4.58 | 4.58 | 4.55 | 4.49 | 4.41 | 4.35 | 4.24 |
| 15Y | 4.42 | 4.44 | 4.53 | 4.46 | 4.44 | 4.39 | 4.35 | 4.3 | 4.23 | 4.17 | 4.06 |
| 20Y | 4.19 | 4.21 | 4.3 | 4.24 | 4.22 | 4.18 | 4.16 | 4.12 | 4.06 | 4 | 3.88 |
| 30Y | 3.89 | 3.9 | 3.99 | 3.93 | 3.92 | 3.89 | 3.86 | 3.81 | 3.74 | 3.66 | 3.53 |

**USD ATM Implied Vol (bp) (with 3m z-score Heatmap:
Blue z<0, i.e., Cheap, Red, z>0, rich)**

| Underlying | | | | | | | | | | | |
|------------|-------|-------|-------|-------|-------|------|------|------|------|------|------|
| Fwd | 3M | 6M | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y |
| 1M | 10.5 | 10.5 | 17.9 | 33.4 | 50.5 | 67.0 | 68.7 | 66.5 | 63.1 | 62.7 | 61.0 |
| 3M | 14.5 | 14.5 | 20.7 | 38.8 | 55.6 | 70.1 | 72.0 | 70.1 | 65.9 | 64.8 | 62.6 |
| 6M | 14.2 | 14.2 | 29.7 | 49.8 | 64.8 | 75.2 | 75.6 | 74.6 | 70.2 | 68.9 | 66.2 |
| 1Y | 32.5 | 32.5 | 50.8 | 70.8 | 81.7 | 84.9 | 84.0 | 81.6 | 76.0 | 73.6 | 70.7 |
| 2Y | 75.5 | 75.5 | 89.4 | 96.2 | 96.5 | 93.8 | 90.7 | 86.2 | 79.2 | 76.5 | 73.0 |
| 3Y | 106.2 | 106.2 | 104.5 | 104.0 | 101.6 | 96.4 | 93.0 | 88.2 | 80.8 | 77.4 | 73.6 |
| 5Y | 106.0 | 106.0 | 105.9 | 103.3 | 100.6 | 95.4 | 92.6 | 88.7 | 80.7 | 76.8 | 73.4 |
| 7Y | 100.7 | 100.7 | 99.6 | 97.5 | 95.1 | 90.4 | 88.1 | 84.8 | 77.0 | 73.3 | 70.1 |
| 10Y | 87.7 | 87.7 | 89.5 | 87.8 | 86.4 | 84.0 | 81.7 | 78.4 | 70.8 | 67.4 | 64.7 |
| 15Y | 74.4 | 74.4 | 74.4 | 71.9 | 70.9 | 69.4 | 68.4 | 66.9 | 60.4 | 58.0 | 55.4 |
| 20Y | 65.3 | 65.3 | 64.9 | 62.3 | 61.3 | 59.9 | 59.5 | 58.8 | 53.3 | 51.8 | 48.6 |
| 30Y | 56.0 | 56.0 | 55.8 | 55.4 | 55.6 | 55.9 | 55.6 | 55.0 | 51.0 | 51.0 | 48.2 |

- Forwards rallied, except shorter tenors and expiries (upper right). Fed Chair Janet Yellen changed some of that.
- Vols mostly fell except the lower left (15y1y and 20y1y in particular), which fell due to volta hedging of Berm books in a selloff. Berm books so far ITM so no further rehedging needed in a selloff.
- Some fast money buying of 30y20y, 30y30y, but otherwise no flow there.
- Rising correlations means caplet vols fall relative to swaption vol.
- Short gamma performs but the margin is thin. Resume short gamma?

USD Imp/3M Realized Vol Ratio

| Underlying | | | | | | | | | | | |
|------------|------|------|------|------|------|------|------|------|------|------|------|
| Fwd | 3M | 6M | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y |
| 1M | 4.73 | 2.58 | 1.57 | 1.23 | 1.01 | 1.04 | 1.04 | 1.07 | 1.06 | 1.07 | 1.06 |
| 3M | 1.92 | 1.88 | 1.43 | 1.12 | 0.98 | 1.02 | 1.04 | 1.08 | 1.08 | 1.08 | 1.07 |
| 6M | 1.52 | 1.69 | 1.39 | 1.12 | 1.02 | 1.05 | 1.08 | 1.12 | 1.12 | 1.12 | 1.11 |
| 1Y | 1.08 | 1.08 | 1.1 | 1.04 | 0.98 | 1.02 | 1.08 | 1.13 | 1.12 | 1.12 | 1.11 |
| 2Y | 1.04 | 1 | 0.97 | 1 | 0.97 | 1.04 | 1.11 | 1.14 | 1.12 | 1.11 | 1.09 |
| 3Y | 1.09 | 1.05 | 0.97 | 1.01 | 1.06 | 1.14 | 1.19 | 1.18 | 1.13 | 1.11 | 1.08 |
| 5Y | 1.29 | 1.29 | 1.22 | 1.27 | 1.26 | 1.26 | 1.26 | 1.22 | 1.15 | 1.11 | 1.07 |
| 7Y | 1.35 | 1.33 | 1.24 | 1.27 | 1.25 | 1.26 | 1.23 | 1.2 | 1.12 | 1.06 | 1.03 |
| 10Y | 1.34 | 1.32 | 1.23 | 1.24 | 1.21 | 1.18 | 1.16 | 1.13 | 1.04 | 0.98 | 0.96 |
| 15Y | 1.11 | 1.1 | 1.03 | 1.07 | 1.06 | 1.05 | 1.03 | 1 | 0.9 | 0.88 | 0.85 |
| 20Y | 0.99 | 0.97 | 0.89 | 0.91 | 0.91 | 0.9 | 0.88 | 0.86 | 0.82 | 0.8 | 0.76 |
| 30Y | 0.94 | 0.92 | 0.86 | 0.87 | 0.85 | 0.83 | 0.83 | 0.86 | 0.85 | 0.81 | 0.62 |

EUR Forwards and Vols – the context

EUR ATM Forward Swap (with 3m z-score Heatmap:
Blue z<0, rich, Red, z>0, cheap)

| Underlying | | | | | | | | | | | | |
|------------|------|------|------|------|------|------|------|------|------|------|------|--|
| Fwd | 3M | 6M | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y | |
| 1M | 0.41 | 0.41 | 0.43 | 0.5 | 0.64 | 1.03 | 1.4 | 1.86 | 2.31 | 2.47 | 2.53 | |
| 3M | 0.41 | 0.42 | 0.44 | 0.53 | 0.69 | 1.08 | 1.46 | 1.91 | 2.34 | 2.5 | 2.55 | |
| 6M | 0.42 | 0.42 | 0.46 | 0.58 | 0.76 | 1.17 | 1.54 | 1.98 | 2.39 | 2.53 | 2.57 | |
| 1Y | 0.46 | 0.48 | 0.56 | 0.72 | 0.93 | 1.35 | 1.72 | 2.13 | 2.49 | 2.61 | 2.62 | |
| 2Y | 0.74 | 0.77 | 0.89 | 1.12 | 1.35 | 1.75 | 2.07 | 2.42 | 2.68 | 2.75 | 2.73 | |
| 3Y | 1.16 | 1.22 | 1.36 | 1.58 | 1.79 | 2.14 | 2.41 | 2.68 | 2.85 | 2.87 | 2.82 | |
| 5Y | 2.01 | 2.07 | 2.21 | 2.38 | 2.53 | 2.77 | 2.93 | 3.07 | 3.09 | 3.04 | 2.94 | |
| 7Y | 2.68 | 2.72 | 2.85 | 2.95 | 3.05 | 3.18 | 3.26 | 3.27 | 3.19 | 3.1 | 2.99 | |
| 10Y | 3.23 | 3.26 | 3.36 | 3.39 | 3.41 | 3.42 | 3.37 | 3.29 | 3.16 | 3.04 | 2.96 | |
| 15Y | 3.23 | 3.23 | 3.28 | 3.24 | 3.21 | 3.14 | 3.08 | 2.99 | 2.88 | 2.84 | 2.82 | |
| 20Y | 2.89 | 2.89 | 2.93 | 2.9 | 2.87 | 2.82 | 2.77 | 2.71 | 2.71 | 2.71 | 2.72 | |
| 30Y | 2.57 | 2.59 | 2.65 | 2.66 | 2.67 | 2.69 | 2.71 | 2.72 | 2.73 | 2.73 | 2.74 | |

EUR ATM Implied Vol (bp) (with 3m z-score Heatmap:
Blue z<0, cheap, Red z>0, Rich)

| Underlying | | | | | | | | | | | | |
|------------|------|------|------|------|------|------|------|------|------|------|------|--|
| Fwd | 3M | 6M | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y | |
| 1M | 22.6 | 22.5 | 24.2 | 30.5 | 39.6 | 51.3 | 52.4 | 52.8 | 51 | 49.6 | 48.3 | |
| 3M | 22.6 | 23.2 | 24.6 | 32.9 | 42.2 | 53.6 | 55.4 | 56.7 | 54.2 | 51.6 | 49.9 | |
| 6M | 23.1 | 23.6 | 26.6 | 36.2 | 45.5 | 56.6 | 58.3 | 59.6 | 56.4 | 54.6 | 52.4 | |
| 1Y | 27.4 | 29.5 | 33 | 45.8 | 54.5 | 63.5 | 65 | 66.1 | 62.5 | 59.6 | 57.1 | |
| 2Y | 47.3 | 50.1 | 55.2 | 62 | 66.8 | 71.9 | 72.2 | 71.9 | 67.8 | 65.4 | 63.1 | |
| 3Y | 69 | 68.7 | 69.6 | 72.2 | 73.7 | 76.2 | 75.7 | 74.5 | 70.3 | 68 | 65.5 | |
| 5Y | 88.1 | 85.1 | 80.3 | 79.7 | 79.6 | 79.5 | 78.8 | 77.7 | 72.7 | 69.7 | 66.9 | |
| 7Y | 88.4 | 84.3 | 78.7 | 77.8 | 77.4 | 76.7 | 76.4 | 75.9 | 70.3 | 66.9 | 62.8 | |
| 10Y | 82.4 | 79.5 | 74.8 | 73.5 | 73.3 | 73.2 | 72.9 | 72.4 | 66.5 | 62.5 | 57.7 | |
| 15Y | 75.4 | 73.1 | 67.8 | 66.6 | 66.4 | 66.3 | 65.9 | 65.1 | 58.4 | 54.2 | 49.4 | |
| 20Y | 64.5 | 64 | 60.6 | 59.8 | 59.7 | 59.5 | 58.9 | 57.8 | 51.5 | 47.6 | 43.5 | |
| 30Y | 52 | 52.3 | 50.8 | 50.2 | 50 | 49.6 | 48.9 | 47.7 | 42.4 | 38.8 | 35.7 | |

- Mostly bull-flattening pressure. Some pivoting with front ends in bearish mode.
- Vols have fallen across the board with lower right hit hardest in Q3 2013 (now making it back from outright buying or vs 5y5y/5y10y).
- Recent Berm flow could put LR under more pressure.
- Short gamma trades continue to perform comfortably, although Imp/Real is under a little pressure in short dates (i.e., trending down a bit).

EUR Imp/3M Realized Vol Ratio

| Underlying | | | | | | | | | | | | |
|------------|------|------|------|------|------|------|------|------|------|------|------|--|
| Fwd | 3M | 6M | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y | |
| 1M | 2.91 | 2.36 | 1.41 | 1.1 | 1.1 | 1.07 | 1.07 | 1.09 | 1.11 | 1.12 | 1.11 | |
| 3M | 1.97 | 1.07 | 1.17 | 1.12 | 1.16 | 1.15 | 1.18 | 1.24 | 1.25 | 1.24 | 1.23 | |
| 6M | 0.73 | 0.97 | 1 | 1.06 | 1.13 | 1.18 | 1.22 | 1.3 | 1.3 | 1.32 | 1.3 | |
| 1Y | 1.08 | 1.01 | 0.96 | 1.09 | 1.15 | 1.23 | 1.31 | 1.4 | 1.42 | 1.42 | 1.42 | |
| 2Y | 1.1 | 1.07 | 1.1 | 1.12 | 1.14 | 1.3 | 1.39 | 1.47 | 1.49 | 1.5 | 1.51 | |
| 3Y | 1.21 | 1.13 | 1.06 | 1.09 | 1.2 | 1.36 | 1.43 | 1.52 | 1.54 | 1.55 | 1.55 | |
| 5Y | 1.57 | 1.56 | 1.49 | 1.52 | 1.56 | 1.63 | 1.68 | 1.71 | 1.69 | 1.66 | 1.63 | |
| 7Y | 1.83 | 1.72 | 1.58 | 1.64 | 1.64 | 1.7 | 1.72 | 1.77 | 1.7 | 1.64 | 1.55 | |
| 10Y | 1.91 | 1.85 | 1.7 | 1.69 | 1.69 | 1.7 | 1.74 | 1.77 | 1.65 | 1.58 | 1.44 | |
| 15Y | 1.94 | 1.87 | 1.7 | 1.7 | 1.7 | 1.7 | 1.69 | 1.67 | 1.53 | 1.41 | 1.25 | |
| 20Y | 1.74 | 1.7 | 1.56 | 1.53 | 1.52 | 1.52 | 1.54 | 1.54 | 1.35 | 1.23 | 1.09 | |
| 30Y | 1.43 | 1.42 | 1.34 | 1.3 | 1.28 | 1.22 | 1.19 | 1.14 | 0.99 | 0.9 | 0.86 | |

Curve Trades

Conditional, Conditional Midcurve and CMS Trades

USD Vanilla Conditional Steepeners

Eyeballing value-

PV01 wtd, with 10y tails ATMF, all others with strikes adjusted to equalize premium

USD Yield Curve Carry (Spot - Fwd) (bp) (for Payers)

| Option Expiry | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y |
|---------------|------|------|------|------|------|------|------|-----|-----|
| 1m | -2 | -5 | -6 | -6 | -5 | -4 | -3 | -2 | -2 |
| 3m | -6 | -16 | -19 | -17 | -14 | -11 | -9 | -6 | -5 |
| 6m | -17 | -35 | -40 | -34 | -28 | -22 | -19 | -12 | -9 |
| 1y | -53 | -81 | -83 | -70 | -56 | -43 | -37 | -24 | -18 |
| 2y | -163 | -179 | -168 | -135 | -107 | -82 | -71 | -46 | -35 |
| 3y | -249 | -253 | -232 | -181 | -143 | -110 | -95 | -61 | -46 |
| 5y | -353 | -338 | -302 | -233 | -186 | -141 | -120 | -76 | -57 |
| 7y | -390 | -369 | -329 | -256 | -203 | -152 | -128 | -79 | -59 |
| 10y | -420 | -396 | -351 | -269 | -209 | -153 | -127 | -76 | -54 |
| 12y | -422 | -396 | -349 | -264 | -203 | -146 | -120 | -70 | -47 |
| 15y | -411 | -382 | -335 | -250 | -190 | -133 | -108 | -59 | -36 |
| 20y | -389 | -361 | -314 | -229 | -170 | -115 | -92 | -43 | -20 |
| 30y | -364 | -338 | -292 | -208 | -146 | -89 | -63 | -13 | 6 |

USD Yield Curve Carry (Fwd - Spot) (bp) (for Receivers)

| Option Expiry | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y |
|---------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 1m | 2 | 5 | 6 | 6 | 5 | 4 | 3 | 2 | 2 |
| 3m | 6 | 16 | 19 | 17 | 14 | 11 | 9 | 6 | 5 |
| 6m | 17 | 35 | 40 | 34 | 28 | 22 | 19 | 12 | 9 |
| 1y | 53 | 81 | 83 | 70 | 56 | 43 | 37 | 24 | 18 |
| 2y | 163 | 179 | 168 | 135 | 107 | 82 | 71 | 46 | 35 |
| 3y | 249 | 253 | 232 | 181 | 143 | 110 | 95 | 61 | 46 |
| 5y | 353 | 338 | 302 | 233 | 186 | 141 | 120 | 76 | 57 |
| 7y | 390 | 369 | 329 | 256 | 203 | 152 | 128 | 79 | 59 |
| 10y | 420 | 396 | 351 | 269 | 209 | 153 | 127 | 76 | 54 |
| 12y | 422 | 396 | 349 | 264 | 203 | 146 | 120 | 70 | 47 |
| 15y | 411 | 382 | 335 | 250 | 190 | 133 | 108 | 59 | 36 |
| 20y | 389 | 361 | 314 | 229 | 170 | 115 | 92 | 43 | 20 |
| 30y | 364 | 338 | 292 | 208 | 146 | 89 | 63 | 13 | -6 |

Payers Moneyness (Fwd - Strike) (bp)

| Option Expiry | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y |
|---------------|-------|-------|-------|-------|------|-----|-----|------|------|
| 1m | 7.7 | 6.1 | 2.8 | -1.3 | -1.3 | - | 0.4 | 1.4 | 2.0 |
| 3m | 13.6 | 9.4 | 3.1 | -2.9 | -2.5 | - | 0.9 | 2.8 | 3.6 |
| 6m | 19.3 | 10.8 | 2.4 | -2.9 | -2.1 | - | 1.2 | 4.1 | 5.6 |
| 1y | 19.2 | 1.7 | -7.2 | -6.2 | -3.8 | - | 2.0 | 6.8 | 8.9 |
| 2y | -15.4 | -22.6 | -20.1 | -11.8 | -6.7 | - | 3.5 | 11.8 | 15.4 |
| 3y | -35.9 | -30.2 | -24.1 | -15.9 | -8.9 | - | 4.4 | 15.1 | 19.6 |
| 5y | -37.7 | -30.6 | -24.7 | -14.3 | -8.1 | - | 5.9 | 20.6 | 26.5 |
| 7y | -37.8 | -31.7 | -25.4 | -14.0 | -6.9 | - | 6.9 | 23.9 | 29.7 |
| 10y | -33.4 | -27.7 | -23.2 | -15.6 | -9.1 | - | 7.7 | 26.2 | 32.0 |
| 12y | -31.7 | -24.8 | -20.5 | -13.8 | -8.1 | - | 7.9 | 25.5 | 32.6 |
| 15y | -28.0 | -19.0 | -15.1 | -9.8 | -5.9 | - | 8.0 | 25.8 | 32.4 |
| 20y | -24.4 | -14.0 | -10.2 | -5.6 | -3.4 | - | 8.0 | 24.3 | 33.8 |
| 30y | -3.5 | -0.8 | -1.6 | -3.9 | -2.6 | - | 7.6 | 18.9 | 30.2 |

Receivers Moneyness (Strike - Fwd) (bp)

| Option Expiry | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y |
|---------------|-------|-------|-------|-------|------|-----|-----|------|------|
| 1m | 7.2 | 5.3 | 2.4 | -1.1 | -1.1 | - | 0.4 | 1.4 | 2.0 |
| 3m | 12.0 | 7.3 | 2.4 | -2.3 | -2.1 | - | 0.8 | 2.6 | 3.5 |
| 6m | 15.2 | 8.0 | 1.8 | -2.4 | -1.8 | - | 1.1 | 3.6 | 5.4 |
| 1y | 12.6 | 1.1 | -5.0 | -4.9 | -3.2 | - | 1.7 | 6.3 | 8.6 |
| 2y | -10.2 | -15.7 | -14.7 | -9.2 | -5.5 | - | 3.1 | 11.0 | 14.8 |
| 3y | -24.7 | -24.4 | -20.9 | -12.5 | -7.9 | - | 3.9 | 14.0 | 18.9 |
| 5y | -28.0 | -23.5 | -19.3 | -11.6 | -6.8 | - | 5.3 | 19.5 | 25.9 |
| 7y | -28.8 | -24.7 | -20.3 | -14.6 | -6.9 | - | 6.3 | 22.9 | 29.2 |
| 10y | -26.6 | -22.6 | -19.4 | -13.6 | -9.2 | - | 7.2 | 25.7 | 31.8 |
| 12y | -26.0 | -20.7 | -17.6 | -12.3 | -7.4 | - | 7.5 | 26.3 | 32.8 |
| 15y | -24.1 | -16.6 | -13.5 | -9.2 | -5.5 | - | 7.8 | 26.2 | 33.4 |
| 20y | -22.5 | -13.0 | -9.8 | -5.6 | -3.3 | - | 7.8 | 24.9 | 35.6 |
| 30y | -3.3 | -0.8 | -1.4 | -3.6 | -2.3 | - | 6.8 | 17.4 | 28.8 |

Payers Total Pickup (Spot - Strike) (bp)

| Option Expiry | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y |
|---------------|--------|--------|--------|--------|--------|--------|--------|-------|-------|
| 1m | 5.6 | 0.7 | -3.7 | -6.9 | -6.1 | -3.6 | -2.7 | -0.6 | 0.5 |
| 3m | 7.2 | -6.5 | -16.4 | -16.4 | -10.7 | -8.4 | -3.2 | -1.0 | - |
| 6m | 2.4 | -24.8 | -37.2 | -37.4 | -30.0 | -24.5 | -17.4 | -8.0 | -3.6 |
| 1y | -34.3 | -79.9 | -80.0 | -76.0 | -59.5 | -43.0 | -35.2 | -17.4 | -9.5 |
| 2y | -178.1 | -288.9 | -288.3 | -146.7 | -113.2 | -82.4 | -67.9 | -44.4 | -26.9 |
| 3y | -285.4 | -286.9 | -259.7 | -197.0 | -152.3 | -110.4 | -90.3 | -45.9 | -26.9 |
| 5y | -390.9 | -368.9 | -326.2 | -247.2 | -194.0 | -141.4 | -114.1 | -55.5 | -30.9 |
| 7y | -428.3 | -400.6 | -354.5 | -270.3 | -211.2 | -151.9 | -121.1 | -55.4 | -28.9 |
| 10y | -453.8 | -423.4 | -373.9 | -284.4 | -218.1 | -152.9 | -119.3 | -49.5 | -21.5 |
| 12y | -454.0 | -420.6 | -369.5 | -277.5 | -211.2 | -146.2 | -112.2 | -43.2 | -14.4 |
| 15y | -439.1 | -401.1 | -350.5 | -260.1 | -195.6 | -133.3 | -99.9 | -33.6 | -3.7 |
| 20y | -413.8 | -374.9 | -324.0 | -235.1 | -173.5 | -115.4 | -83.5 | -18.2 | 14.0 |
| 30y | -367.8 | -338.4 | -293.4 | -211.7 | -148.9 | -88.9 | -55.6 | 6.2 | 36.1 |

Receivers Total Pickup (Strike - Spot) (bp)

| Option Expiry | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| 1m | 9.3 | 10.7 | 8.9 | 4.5 | 3.7 | 3.6 | 3.6 | 3.4 | 3.5 |
| 3m | 18.3 | 23.2 | 21.8 | 14.6 | 11.8 | 10.7 | 10.0 | 8.7 | 8.1 |
| 6m | 32.1 | 43.3 | 41.5 | 32.0 | 26.1 | 21.5 | 19.7 | 15.9 | 14.6 |
| 1y | 66.1 | 82.3 | 77.8 | 64.0 | 52.0 | 43.1 | 38.0 | 30.5 | 26.9 |
| 2y | 152.6 | 163.4 | 153.5 | 128.7 | 101.0 | 82.4 | 73.9 | 57.0 | 49.7 |
| 3y | 224.8 | 228.4 | 210.7 | 168.7 | 136.0 | 110.4 | 98.6 | 75.1 | 65.4 |
| 5y | 325.2 | 314.9 | 282.2 | 221.4 | 179.0 | 141.4 | 125.4 | 95.6 | 83.2 |
| 7y | 361.7 | 344.3 | 308.7 | 244.5 | 196.3 | 151.9 | 134.3 | 102.2 | 87.7 |
| 10y | 393.9 | 373.0 | 331.3 | 255.2 | 200.8 | 152.9 | 134.3 | 101.4 | 85.3 |
| 12y | 396.3 | 375.0 | 331.5 | 251.3 | 195.7 | 146.2 | 127.7 | 95.9 | 79.8 |
| 15y | 386.9 | 365.5 | 321.8 | 241.1 | 184.3 | 133.8 | 115.7 | 85.6 | 69.4 |
| 20y | 366.9 | 347.8 | 304.0 | 223.9 | 166.8 | 115.4 | 99.3 | 67.4 | 55.4 |
| 30y | 361.0 | 336.8 | 290.4 | 204.2 | 143.9 | 88.9 | 69.9 | 30.1 | 22.9 |

Price given 10K notional at 10y tail

| Option Expiry | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1m | 71.3 | 70.6 | 68.9 | 68.3 | 68.8 | 69.6 | 69.8 | 70.3 | 70.3 |
| 3m | 127.3 | 120.2 | 114.4 | 115.8 | 118.8 | 122.7 | 124.3 | 124.7 | 124.7 |
| 6m | 192.6 | 171.9 | 167.2 | 175.6 | 184.1 | 185.3 | 187.0 | 189.9 | 190.7 |
| 1y | 247.6 | 213.2 | 222.6 | 252.9 | 267.4 | 277.5 | 280.5 | 285.3 | 286.8 |
| 2y | 250.1 | 268.7 | 311.8 | 360.6 | 383.1 | 400.0 | 405.8 | 415.1 | 417.8 |
| 3y | 279.0 | 327.2 | 377.9 | 431.8 | 456.7 | 476.5 | 484.7 | 498.4 | 502.6 |
| 5y | 388.9 | 447.2 | 497.3 | 547.6 | 569.1 | 585.8 | 592.4 | 602.6 | 604.8 |
| 7y | 429.8 | 485.2 | 536.2 | 587.1 | 605.4 | 618.2 | 623.1 | 629.5 | 629.8 |
| 10y | 448.2 | 501.3 | 545.3 | 584.9 | 600.2 | 610.1 | 612.5 | 613.3 | 611.4 |
| 12y | 441.2 | 493.4 | 533.3 | 565.8 | 575.7 | 580.8 | 582.5 | 582.0 | 579.6 |
| 15y | 415.2 | 464.9 | 499.5 | 523.4 | 525.3 | 523.5 | 524.5 | 522.6 | 519.8 |
| 20y | 361.8 | 407.0 | 435.8 | 452.5 | 446.8 | 439.5 | 440.4 | 438.3 | 435.7 |
| 30y | 278.2 | 306.2 | 327.3 | 341.8 | 342.7 | 342.9 | 345.7 | 349.2 | 349.8 |

Price given 10K notional at 10y tail

| Option Expiry | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y |
|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1m | 2.3 | 18.9 | 43.5 | 79.9 | 80.1 | 69.6 | 65.8 | 57.4 | 52.2 |
| 3m | 5.2 | 36.0 | 86.4 | 141.6 | 141.2 | 121.8 | 115.1 | 99.2 | 92.3 |
| 6m | 20.4 | 75.4 | 145.7 | 201.8 | 199.8 | 185.3 | 176.0 | 153.2 | 141.0 |
| 1y | 79.5 | 198.1 | 285.8 | 307.9 | 300.7 | 277.5 | 263.3 | 225.8 | 209.0 |
| 2y | 380.5 | 460.9 | 482.2 | 460.7 | 439.7 | 400.0 | 376.2 | 314.8 | 288.0 |
| 3y | 573.4 | 607.0 | 607.9 | 561.9 | 529.9 | 476.5 | 448.2 | 374.5 | 342.2 |
| 5y | 674.9 | 679.3 | 684.3 | 655.6 | 630.8 | 585.8 | 547.3 | 446.2 | 404.0 |
| 7y | 694.2 | 706.5 | 713.7 | 685.2 | 661.5 | 618.2 | 574.8 | 462.2 | 422.3 |
| 10y | 654.5 | 672.8 | 688.7 | 681.5 | 656.6 | 610.1 | 564.9 | 451.3 | 413.6 |
| 12y | 621.8 | 634.5 | 650.1 | 644.5 | 622.0 | 580.8 | 537.3 | 431.3 | 394.2 |
| 15y | 557.0 | 560.7 | 575.9 | 573.2 | 554.9 | 523.5 | 483.9 | 391.9 | 356.1 |
| 20y | 463.6 | 465.4 | 478.5 | 476.0 | 460.9 | 439.5 | 407.1 | 337.1 | 294.8 |
| 30y | 288.5 | 308.6 | 331.9 | 353.2 | 350.2 | 342.9 | 323.7 | 294.3 | 262.3 |

As an alternative to a bear flattener, 1y 2y-10y-30y bear tightener – buy 1y2y payers + 1y30y payers, sell 1y10y payers has pickup of 10.6bp to forwards and -2.8bp wider than spot.

- 3y 2s30s bear steepeners at 34.2+19.6=53.7bp better than forwards and 286-26=+260bp total pickup, and 502-327=175ct expected upside.
- Compares favourably with 3y 2s10s with 34.2bp better than forwards, and 286-110=176bp total pickup and 476-327=149ct expected upside.
- 2s30s Spot at 303bp, entry at 43bp slope, not seen since June 2007.

| | Bear Steepener 3y2s30s | 3y 2s10s |
|---------------------|------------------------|----------|
| Carry (bp) | 206.30 | 142.32 |
| Vol Pickup (bp) | 53.73 | 34.15 |
| Total Pickup (bp) | 260.03 | 176.48 |
| Expected Value (ct) | 175.37 | 149.22 |

EUR Vanilla Conditional Steepeners

Eyeballing value -

PV01 wtd, with 10y tails ATMF, all others with strikes adjusted to equalize premium

Market pays better for short expiry bear flatteners

and long expiry bear steepeners

EUR Yield Curve Carry (Spot - Fwd) (bp) (for Payers)

| Option Expiry | Swap Tenor | | | | | | | | | |
|---------------|------------|------|------|------|------|------|------|-----|-----|--|
| | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y | |
| 1m | -1 | -2 | -2 | -3 | -3 | -2 | -2 | -1 | -1 | |
| 3m | -3 | -5 | -7 | -8 | -8 | -7 | -6 | -4 | -3 | |
| 6m | -6 | -11 | -15 | -17 | -17 | -14 | -12 | -7 | -5 | |
| 1y | -16 | -26 | -33 | -36 | -34 | -29 | -25 | -14 | -10 | |
| 2y | -52 | -68 | -76 | -75 | -69 | -57 | -49 | -28 | -20 | |
| 3y | -100 | -113 | -118 | -113 | -101 | -82 | -70 | -40 | -28 | |
| 5y | -182 | -190 | -189 | -173 | -152 | -120 | -100 | -55 | -40 | |
| 7y | -242 | -244 | -239 | -213 | -183 | -138 | -114 | -60 | -45 | |
| 10y | -293 | -288 | -275 | -236 | -194 | -141 | -113 | -55 | -42 | |
| 12y | -301 | -294 | -277 | -231 | -186 | -132 | -103 | -47 | -37 | |
| 15y | -284 | -273 | -255 | -209 | -165 | -111 | -83 | -35 | -28 | |
| 20y | -250 | -239 | -221 | -176 | -133 | -83 | -60 | -23 | -19 | |
| 30y | -221 | -215 | -202 | -165 | -129 | -85 | -63 | -26 | -21 | |

EUR Yield Curve Carry (Fwd - Spot) (bp) (for Receivers)

| Option Expiry | Swap Tenor | | | | | | | | | |
|---------------|------------|-----|-----|-----|-----|-----|-----|-----|-----|--|
| | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y | |
| 1m | 1 | 2 | 2 | 3 | 3 | 2 | 2 | 1 | 1 | |
| 3m | 3 | 5 | 7 | 8 | 8 | 7 | 6 | 4 | 3 | |
| 6m | 6 | 11 | 15 | 17 | 17 | 14 | 12 | 7 | 5 | |
| 1y | 16 | 26 | 33 | 36 | 34 | 29 | 25 | 14 | 10 | |
| 2y | 52 | 68 | 76 | 75 | 69 | 57 | 49 | 28 | 20 | |
| 3y | 100 | 113 | 118 | 113 | 101 | 82 | 70 | 40 | 28 | |
| 5y | 182 | 190 | 189 | 173 | 152 | 120 | 100 | 55 | 40 | |
| 7y | 242 | 244 | 239 | 213 | 183 | 138 | 114 | 60 | 45 | |
| 10y | 293 | 288 | 275 | 236 | 194 | 141 | 113 | 55 | 42 | |
| 12y | 301 | 294 | 277 | 231 | 186 | 132 | 103 | 47 | 37 | |
| 15y | 284 | 273 | 255 | 209 | 165 | 111 | 83 | 35 | 28 | |
| 20y | 250 | 239 | 221 | 176 | 133 | 83 | 60 | 23 | 19 | |
| 30y | 221 | 215 | 202 | 165 | 129 | 85 | 63 | 26 | 21 | |

Payers Moneyess (Fwd - Strike) (bp)

| Option Expiry | Swap Tenor | | | | | | | | | |
|---------------|------------|-------|-------|-------|------|-----|-----|------|------|--|
| | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y | |
| 1m | 3.0 | 4.3 | 2.7 | 0.1 | -0.1 | - | 0.2 | 0.9 | 1.4 | |
| 3m | 10.0 | 8.3 | 5.4 | 1.1 | 0.4 | - | 0.5 | 2.3 | 3.2 | |
| 6m | 15.3 | 12.4 | 8.2 | 1.8 | 0.7 | - | 0.9 | 3.3 | 4.7 | |
| 1y | 22.9 | 16.5 | 10.2 | 2.7 | 1.2 | - | 1.3 | 5.4 | 7.4 | |
| 2y | 20.6 | 12.0 | 5.9 | -0.3 | -0.6 | - | 2.0 | 7.7 | 10.2 | |
| 3y | 7.4 | 2.7 | 0.4 | -2.8 | -1.9 | - | 2.4 | 9.3 | 12.8 | |
| 5y | -8.0 | -6.1 | -5.5 | -4.7 | -3.0 | - | 3.4 | 14.2 | 18.7 | |
| 7y | -8.9 | -6.1 | -4.8 | -2.7 | -1.9 | - | 4.5 | 19.2 | 26.8 | |
| 10y | -9.8 | -5.0 | -4.0 | -3.1 | -2.3 | - | 5.4 | 24.3 | 35.1 | |
| 12y | -10.8 | -5.8 | -4.7 | -3.8 | -2.8 | - | 6.4 | 28.0 | 39.4 | |
| 15y | -12.4 | -7.4 | -6.2 | -5.1 | -3.7 | - | 8.0 | 33.4 | 45.4 | |
| 20y | -15.3 | -11.3 | -9.9 | -8.2 | -5.6 | - | 8.7 | 35.8 | 47.3 | |
| 30y | -21.6 | -17.4 | -15.2 | -11.5 | -7.5 | - | 9.0 | 37.7 | 47.7 | |

Receivers Moneyess (Strike - Fwd) (bp)

| Option Expiry | Swap Tenor | | | | | | | | | |
|---------------|------------|-------|------|------|------|-----|-----|------|------|--|
| | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y | |
| 1m | 4.6 | 3.9 | 2.4 | 0.1 | -0.1 | - | 0.5 | 0.9 | 1.4 | |
| 3m | 8.7 | 6.9 | 4.4 | 0.9 | 0.4 | - | 0.4 | 2.2 | 3.2 | |
| 6m | 12.9 | 9.9 | 6.3 | 1.4 | 0.6 | - | 0.8 | 3.1 | 4.7 | |
| 1y | 18.4 | 12.4 | 7.5 | 2.4 | 0.9 | - | 1.1 | 5.0 | 7.4 | |
| 2y | 13.9 | 8.1 | 4.1 | -0.2 | -0.4 | - | 1.7 | 7.0 | 9.9 | |
| 3y | 4.8 | 1.8 | 0.3 | -2.1 | -1.5 | - | 2.0 | 8.2 | 11.7 | |
| 5y | -5.1 | -4.1 | -3.8 | -3.5 | -2.3 | - | 2.8 | 12.0 | 16.8 | |
| 7y | -6.0 | -4.3 | -3.4 | -2.0 | -1.4 | - | 3.0 | 15.8 | 22.3 | |
| 10y | -7.1 | -3.7 | -3.0 | -2.3 | -1.6 | - | 4.3 | 19.5 | 28.4 | |
| 12y | -7.8 | -4.4 | -3.5 | -2.8 | -2.1 | - | 4.9 | 22.4 | 32.3 | |
| 15y | -8.8 | -5.4 | -4.6 | -3.7 | -2.7 | - | 6.0 | 26.9 | 38.0 | |
| 20y | -10.3 | -7.6 | -6.8 | -5.7 | -4.0 | - | 6.6 | 29.6 | 40.3 | |
| 30y | -13.5 | -11.1 | -9.8 | -7.8 | -5.2 | - | 6.9 | 31.5 | 41.1 | |

Payers Total Pickup (Spot - Strike) (bp)

| Option Expiry | Swap Tenor | | | | | | | | | |
|---------------|------------|--------|--------|--------|--------|--------|--------|-------|-------|--|
| | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y | |
| 1m | 3.8 | 2.6 | 0.3 | -2.7 | -3.0 | -2.4 | -1.9 | -0.3 | 0.6 | |
| 3m | 7.4 | 3.4 | -1.8 | -7.4 | -7.9 | -7.1 | -5.8 | -1.4 | 0.7 | |
| 6m | 9.8 | 1.9 | -6.9 | -15.4 | -16.0 | -14.3 | -11.6 | -3.9 | 0.3 | |
| 1y | 6.9 | -9.6 | -23.1 | -33.2 | -32.8 | -28.7 | -23.6 | -8.9 | -2.7 | |
| 2y | -31.7 | -55.9 | -69.6 | -75.4 | -69.5 | -57.0 | -43.0 | -20.3 | -9.6 | |
| 3y | -92.3 | -110.7 | -118.0 | -115.6 | -103.3 | -82.3 | -68.1 | -30.4 | -15.5 | |
| 5y | -189.6 | -195.6 | -194.6 | -177.7 | -154.7 | -119.5 | -96.3 | -40.8 | -21.2 | |
| 7y | -250.6 | -250.6 | -243.5 | -215.4 | -184.4 | -138.2 | -109.3 | -41.2 | -17.7 | |
| 10y | -302.3 | -292.7 | -278.6 | -239.3 | -196.5 | -141.0 | -107.8 | -30.7 | -7.0 | |
| 12y | -311.7 | -299.8 | -281.7 | -234.4 | -189.3 | -131.6 | -97.0 | -19.3 | 2.6 | |
| 15y | -296.8 | -280.0 | -260.9 | -214.0 | -168.9 | -111.0 | -75.3 | -1.4 | 17.8 | |
| 20y | -265.4 | -249.9 | -230.5 | -184.4 | -139.0 | -82.6 | -51.0 | 13.0 | 28.8 | |
| 30y | -242.9 | -232.3 | -216.7 | -176.4 | -136.6 | -85.1 | -54.3 | 12.0 | 26.6 | |

Receivers Total Pickup (Strike - Spot) (bp)

| Option Expiry | Swap Tenor | | | | | | | | | |
|---------------|------------|-------|-------|-------|-------|-------|-------|------|------|--|
| | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y | |
| 1m | 5.8 | 5.6 | 4.9 | 2.9 | 2.8 | 2.4 | 2.3 | 2.1 | 2.3 | |
| 3m | 11.3 | 11.8 | 11.7 | 9.3 | 8.6 | 7.1 | 6.7 | 5.8 | 5.7 | |
| 6m | 18.4 | 20.5 | 21.4 | 18.7 | 17.3 | 14.3 | 13.3 | 10.3 | 9.7 | |
| 1y | 34.4 | 38.6 | 40.8 | 37.9 | 34.9 | 28.7 | 26.1 | 19.3 | 17.2 | |
| 2y | 66.1 | 76.0 | 79.6 | 74.9 | 68.5 | 57.0 | 51.0 | 34.9 | 25.3 | |
| 3y | 104.4 | 115.2 | 118.7 | 110.7 | 99.9 | 82.3 | 72.5 | 47.9 | 40.0 | |
| 5y | 176.5 | 185.5 | 185.4 | 169.5 | 149.4 | 119.5 | 102.5 | 67.0 | 55.6 | |
| 7y | 235.8 | 240.2 | 235.3 | 210.7 | 181.1 | 138.2 | 117.4 | 75.1 | 66.8 | |
| 10y | 285.5 | 283.9 | 271.7 | 233.9 | 192.5 | 141.0 | 117.5 | 74.5 | 70.5 | |
| 12y | 293.1 | 289.6 | 273.5 | 227.8 | 184.3 | 131.6 | 108.3 | 69.6 | 69.0 | |
| 15y | 275.5 | 267.2 | 250.1 | 205.2 | 162.4 | 111.0 | 88.4 | 61.8 | 65.7 | |
| 20y | 239.7 | 231.0 | 213.8 | 170.6 | 129.4 | 82.6 | 56.4 | 52.3 | 59.0 | |
| 30y | 207.8 | 203.8 | 191.7 | 157.3 | 123.9 | 85.7 | 70.1 | 57.2 | 62.0 | |

Price given 10K notional at 10y tail

| Option Expiry | Swap Tenor | | | | | | | | | |
|---------------|------------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y | |
| 1m | 53.5 | 53.3 | 52.6 | 51.7 | 51.8 | 52.0 | 52.2 | 52.5 | 52.5 | |
| 3m | 103.5 | 102.3 | 99.8 | 97.6 | 97.9 | 98.7 | 99.4 | 100.6 | 100.7 | |
| 6m | 156.0 | 153.0 | 147.8 | 144.0 | 145.3 | 147.5 | 148.9 | 151.5 | 151.9 | |
| 1y | 239.4 | 228.9 | 219.5 | 216.5 | 221.1 | 227.2 | 229.7 | 234.6 | 235.7 | |
| 2y | 322.9 | 302.9 | 298.2 | 309.6 | 322.9 | 337.6 | 341.9 | 350.8 | 353.4 | |
| 3y | 349.5 | 346.5 | 353.7 | 377.5 | 397.7 | 419.0 | 424.6 | 436.6 | 440.6 | |
| 5y | 397.7 | 413.4 | 434.7 | 479.3 | 504.0 | 530.2 | 537.4 | 555.9 | 562.0 | |
| 7y | 447.8 | 471.2 | 494.2 | 537.0 | 558.6 | 590.7 | 613.2 | 621.0 | | |
| 10y | 507.5 | 535.9 | 551.5 | 575.7 | 590.5 | 611.0 | 619.2 | 645.9 | 654.4 | |
| 12y | 507.2 | 531.7 | 545.7 | 568.1 | 606.6 | 616.0 | 644.1 | 651.5 | | |
| 15y | 485.2 | 502.2 | 515.2 | 538.9 | 557.9 | 584.0 | 595.1 | 622.9 | 628.1 | |
| 20y | 417.2 | 431.7 | 446.2 | 475.6 | 501.1 | 531.7 | 541.0 | 560.9 | 563.6 | |
| 30y | 325.1 | 336.0 | 347.7 | 370.6 | 389.8 | 412.7 | 419.8 | 434.9 | 436.5 | |

Price given 10K notional at 10y tail

| Option Expiry | Swap Tenor | | | | | | | | | |
|---------------|------------|-------|-------|-------|-------|-------|-------|-------|-------|--|
| | 1y | 2y | 3y | 5y | 7y | 10y | 12y | 20Y | 30Y | |
| 1m | 8.1 | 14.3 | 27.9 | 50.8 | 52.5 | 52.0 | 50.4 | 44.1 | 55.6 | |
| 3m | 13.6 | 28.0 | 50.9 | 87.8 | 94.2 | 94.2 | 95.1 | 80.2 | 72.1 | |
| 6m | 18.8 | 41.5 | 74.2 | 127.6 | 138.7 | 147.5 | 141.0 | 122.0 | 110.2 | |
| 1y | 35.7 | 82.0 | 128.8 | 192.8 | 210.8 | 227.2 | 218.1 | 186.9 | 170.3 | |
| 2y | 143.3 | 198.2 | 246.4 | 312.3 | 327.8 | 337.6 | 324.4 | 283.4 | 264.0 | |
| 3y | 286.1 | 323.7 | 350.0 | 401.7 | 414.0 | 419.0 | 404.0 | 356.7 | 330.5 | |
| 5y | 463.1 | 463.2 | 479.6 | 517.7 | 528.4 | 530.2 | 509.6 | 439.1 | 408.6 | |
| 7y | 516.8 | 519.0 | 531.5 | 558.0 | 573.1 | 582.8 | 555.4 | 463.6 | 411.7 | |
| 10y | 577.6 | 571.7 | 579.9 | 597.7 | 607.0 | 611.0 | 580.2 | 471.5 | 403.2 | |
| 12y | 580.3 | 571.1 | 577.7 | 593.9 | 603.2 | 606.6 | 572.7 | 455.2 | 385.6 | |
| 15y | 562.1 | 548.2 | 553.8 | 570.3 | 580.9 | 584.0 | 545.6 | 416.2 | 347.0 | |
| 20y | 499.9 | 492.5 | 499.8 | 519.7 | 531.3 | 531.7 | 493.9 | 367.8 | 308.3 | |
| 30y | 414.9 | 408.4 | 410.7 | 418.1 | 420.7 | 412.7 | 382.4 | 278.7 | 238.7 | |

Benchmark 6m 2s10s
bull steepener at
9.9bp pickup to
forwards, 20.5-
14.3=6.2bp flatter than
spot, with 41.5-
147.6=-106ct
expected payoff.

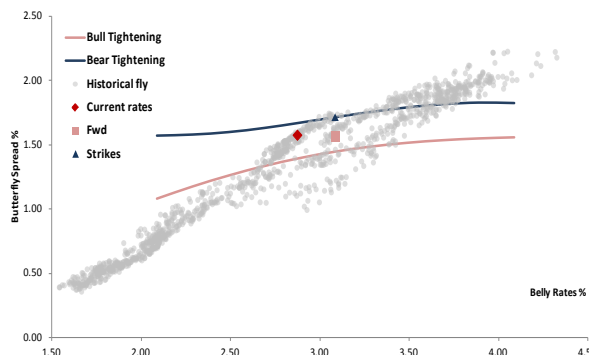
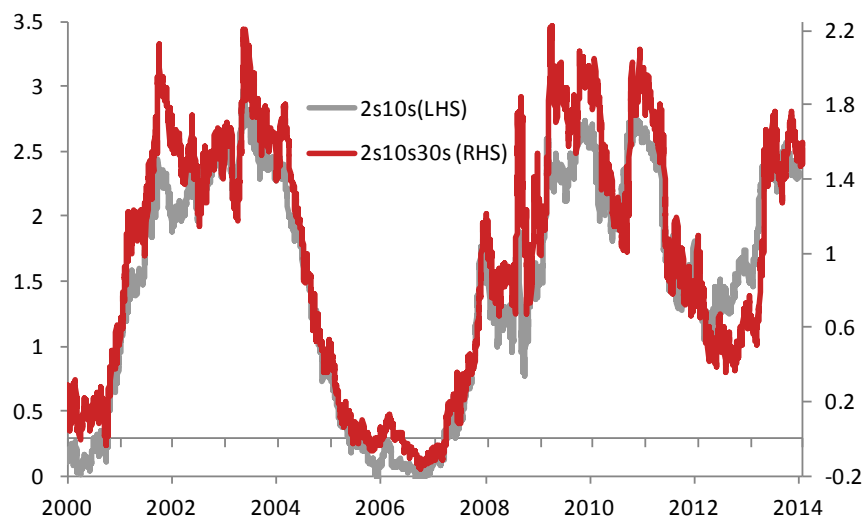
USD Conditional Bear flies (Bear tighteners)

Short-dated bear flies (tighteners) offer upside to conventional flatteners.

| | 2s10s30s | 3s10s30s | 2s10s | 2s10s30s | 3s10s30s | 2s10s | 2s10s30s | 3s10s30s | 2s10s |
|----|------------|------------|------------|--------------|--------------|--------------|------------|------------|------------|
| | Vol Pickup | Vol Pickup | Vol Pickup | Total Pickup | Total Pickup | Total Pickup | Value (ct) | Value (ct) | Value (ct) |
| 1m | 8.1 | 4.8 | 6.1 | 8.4 | 4.0 | 4.3 | 1.7 | 0.0 | 1.0 |
| 3m | 13.0 | 6.7 | 9.4 | 14.0 | 4.1 | 4.2 | 1.2 | -4.7 | -1.6 |
| 6m | 16.4 | 8.0 | 10.8 | 14.9 | 2.2 | -3.0 | -7.9 | -12.6 | -13.4 |
| 1y | 10.6 | 1.7 | 1.7 | -2.8 | -13.4 | -36.4 | -55.0 | -45.7 | -64.3 |
| 2y | -7.3 | -4.8 | -22.6 | -56.7 | -43.3 | -119.4 | -113.6 | -70.9 | -131.3 |
| 3y | -14.6 | -8.5 | -34.2 | -92.9 | -65.7 | -176.5 | -123.1 | -72.4 | -149.2 |

As an alternative to a **bear flattener**, 6m 2y-10y-30y **bear tightener** – buy 6m2y payers + 6m30y payers, sell 6m10y payers has pickup of 16.4bp to forwards and is 14.9bp wider than spot.

Vol-adjusted value compares favourably with that of 6m 2s10s



USD Midcurve Conditional Steepeners (6M expiries)

6m10y struck ATMF, find bp pickup of all other legs. Searching for better curve trades.

| Currency: USD Expiry: 6m | | | | | | | | | | | | | | | | | |
|--------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|--------------------------------|-----|-----|-----|----|----|-----|-----|-----|
| Payers | | | | | | | | | Receivers | | | | | | | | |
| Fwd Pickup (Spot-Fwd, bp) | | | | | | | | | Fwd Pickup (Fwd-Spot, bp) | | | | | | | | |
| Fwd/Tenor | 1y | 2y | 3y | 5y | 7y | 10y | 20y | 30y | Fwd/Tenor | 1y | 2y | 3y | 5y | 7y | 10y | 20y | 30y |
| Spot | -13 | -29 | -35 | -34 | -28 | -22 | -12 | -9 | Spot | 13 | 29 | 35 | 34 | 28 | 22 | 12 | 9 |
| 1y | -44 | -47 | | -35 | | | | -9 | 1y | 44 | 47 | | 35 | | | | 9 |
| 18m | -48 | -46 | -41 | -32 | | | | -8 | 18m | 48 | 46 | 41 | 32 | | | | 8 |
| 2y | -49 | -43 | -38 | -28 | | | | -7 | 2y | 49 | 43 | 38 | 28 | | | | 7 |
| 30m | -44 | | | | | | | | 30m | 44 | | | | | | | |
| 3y | -38 | -33 | | -20 | | | | -5 | 3y | 38 | 33 | | 20 | | | | 5 |
| 4y | -27 | | | | | | | | 4y | 27 | | | | | | | |
| 5y | | | | -9 | | | -2 | -1 | 5y | | | | 9 | | | 2 | 1 |
| 7y | | | | | | | 0 | | 7y | | | | | | | 0 | |
| 10y | | | | 1 | | 1 | 1 | | 10y | | | | -1 | | -1 | -1 | |
| Vol Pickup (Fwd-Strike, bp) | | | | | | | | | Vol Pickup (Strike-Fwd, bp) | | | | | | | | |
| Fwd/Tenor | 1y | 2y | 3y | 5y | 7y | 10y | 20y | 30y | Fwd/Tenor | 1y | 2y | 3y | 5y | 7y | 10y | 20y | 30y |
| Spot | 21 | 17 | 7 | 0 | 0 | 0 | 4 | 5 | Spot | 18 | 12 | 5 | 0 | 0 | 0 | 4 | 5 |
| 1y | 0 | -8 | | -7 | | | | 4 | 1y | 0 | -8 | | -7 | | | | 4 |
| 18m | -16 | | | | | | | | 18m | -12 | | | | | | | |
| 2y | -18 | -21 | -12 | -9 | | | | 3 | 2y | -14 | -17 | -12 | -9 | | | | 3 |
| 30m | -27 | | | | | | | | 30m | -21 | | | | | | | |
| 3y | -23 | -20 | | -8 | | | | 3 | 3y | -19 | -17 | | -8 | | | | 3 |
| 4y | -11 | | | | | | | | 4y | -11 | | | | | | | |
| 5y | | | | -5 | | | 4 | 4 | 5y | | | | -5 | | | 4 | 4 |
| 7y | | | | | | | 3 | | 7y | | | | | | | 3 | |
| 10y | | | | 3 | | 0 | 2 | | 10y | | | | 3 | | 0 | 2 | |
| Total Pickup (Spot-Strike, bp) | | | | | | | | | Total Pickup (Strike-Spot, bp) | | | | | | | | |
| Fwd/Tenor | 1y | 2y | 3y | 5y | 7y | 10y | 20y | 30y | Fwd/Tenor | 1y | 2y | 3y | 5y | 7y | 10y | 20y | 30y |
| Spot | 8 | -11 | -29 | -34 | -28 | -22 | -8 | -4 | Spot | 31 | 40 | 40 | 34 | 28 | 22 | 16 | 14 |
| 1y | -44 | -54 | | -42 | | | | -5 | 1y | 44 | 39 | | 28 | | | | 13 |
| 18m | -64 | | | | | | | | 18m | 36 | | | | | | | |
| 2y | -66 | -64 | -50 | -38 | | | | -4 | 2y | 35 | 27 | 25 | 19 | | | | 10 |
| 30m | -71 | | | | | | | | 30m | 22 | | | | | | | |
| 3y | -61 | -53 | | -28 | | | | -2 | 3y | 19 | 16 | | 12 | | | | 7 |
| 4y | -38 | | | | | | | | 4y | 17 | | | | | | | |
| 5y | | | | -15 | | | 1 | 3 | 5y | | | | 4 | | | 6 | 5 |
| 7y | | | | | | | 3 | | 7y | | | | | | | 3 | |
| 10y | | | | 3 | | 1 | 4 | | 10y | | | | 2 | | -1 | 1 | |

6m2y-6m3y2y looks attractive relative to the standard 6m 2s10s bear flattener.










6m2y1y-6m5y5y has lower negative carry than standard 6m 2s10s bear steepener.

Trade Idea: USD 6m2y-6m3y2y Bear Flatteners

Of bear flatteners, this has a higher pickup than many at 36bp compared with 2s10s, which has only 10bp to forwards. Spread is highly correlated with 2s10s at 99%.

| USD Bear Flatteners 6m2y vs 6m3y2y, \$10k/bp | | | |
|---|--------------------|--------------------|-------------|
| | Long Payer 6m2y | Midcurve 6m3y2y | Spread (bp) |
| Spot | 0.57% | 3.08% | 251.4 |
| Forward | 0.92% | 3.35% | 243.7 |
| Strike | 0.92% | 3.71% | 279.8 |
| | ATMF | ATMF+36 | ATMF+36 |
| Pickup (bp) | | | |
| Fwd-Spot | -35 | -27 | -8 |
| Vol | 0 | -36 | 36 |
| Total | -35 | -63 | 28 |
| Z-Scores: Spot Vol-Normalized Pickup (no units) | | | |
| Fwd-Spot | -1.04 | -0.37 | |
| Vol | 0.00 | -0.50 | |
| Total | -1.04 | -0.87 | |
| Prob(Fwd(T)>Strike) | 15.0% | 19.1% | |
| Conditional Valuation and Premia (USD) | | | |
| PV | 165,706 | 165,706 | 0 |
| Expected Value | 133,588 | 143,400 | -9,813 |
| Premium | -19.4% | -13.5% | |

| USD Bear Flatteners 6m2y vs 6m10y, \$10k/bp | | | |
|---|--------------------|----------------------|-------------|
| | Long Payer 6m2y | Short Payer 6m10y | Spread (bp) |
| Spot | 0.57% | 2.87% | 230.6 |
| Forward | 0.92% | 3.09% | 217.1 |
| Strike | 0.92% | 3.19% | 227.5 |
| | ATMF | ATMF+10 | ATMF+10 |
| Pickup (bp) | | | |
| Fwd-Spot | -35 | -21 | -13 |
| Vol | 0 | -10 | 10 |
| Total | -35 | -32 | -3 |
| Z-Scores: Spot Vol-Normalized Pickup (no units) | | | |
| Fwd-Spot | -1.04 | -0.42 | |
| Vol | 0.00 | -0.20 | |
| Total | -1.04 | -0.62 | |
| Prob(Fwd(T)>Strike) | 15.0% | 26.7% | |
| Conditional Valuation and Premia (USD) | | | |
| PV | 165,706 | 165,706 | 0 |
| Expected Value | 133,588 | 155,645 | -22,058 |
| Premium | -19.4% | -6.1% | |

| 1y History | Spread | Current | High | Low | Mean | Volatility | Z-Score | Correlation to Spread |
|---|-----------|---------|-------|-------|-------|------------|---------|-----------------------|
|  | 0y2y | 0.48 | 0.66 | 0.34 | 0.46 | 6.3 | 0.39 | |
|  | 3y2y | 2.89 | 3.37 | 1.40 | 2.59 | 55.3 | 0.53 | |
|  | 3y2y-0y2y | 240.3 | 273.7 | 105.6 | 213.5 | 51.1 | 0.52 | 1.00 |
|  | 2s10s | 231.0 | 258.0 | 147.3 | 219.0 | 33.1 | 0.36 | 0.99 |
|  | 5s10s | 114.8 | 138.5 | 98.8 | 118.6 | 9.4 | -0.40 | 0.81 |
|  | 2s5s | 116.2 | 132.2 | 47.5 | 100.4 | 25.2 | 0.63 | 1.00 |
|  | 10s30s | 80.6 | 100.5 | 70.2 | 87.0 | 6.9 | -0.92 | -0.73 |
|  | 2s30s | 311.7 | 344.3 | 240.3 | 306.0 | 29.1 | 0.19 | 0.95 |
|  | 2s5s10s | 1.3 | 14.7 | -53.4 | -18.2 | 18.8 | 1.04 | 0.93 |

Trade Idea: USD 6m2y1y-6m5y5y Bear Steepeners

Amongst bear steepeners, this has one of the strongest likelihoods of ending ITM. Spread is highly correlated with 5s10s in particular.

| USD Bear Steepener 6m2y1y vs 6m5y5y, \$10k/bp | | | |
|---|--------------------|--------------------|-------------|
| | Midcurve 6m2y1y | Midcurve 6m5y5y | Spread (bp) |
| Spot | 1.93% | 4.11% | 218.3 |
| Forward | 2.41% | 4.18% | 177.4 |
| Strike | 2.41% | 4.05% | 164.6 |
| | ATMF | ATMF-13 | ATMF-13 |
| Pickup (bp) | | | |
| Fwd-Spot | -48 | -7 | 41 |
| Vol | 0 | 13 | 13 |
| Total | -48 | 5 | 54 |
| Z-Scores: Spot Vol-Normalized Pickup (no units) | | | |
| Fwd-Spot | -0.72 | -0.13 | |
| Vol | 0.00 | 0.22 | |
| Total | -0.72 | 0.10 | |
| Prob(Fwd(T)>Strike) | 23.6% | 53.8% | |
| Conditional Valuation and Premia (USD) | | | |
| PV | 296,853 | 296,853 | 0 |
| Expected Value | 267,735 | 298,107 | 30,372 |
| Premium | -9.8% | 0.4% | |

| USD Bear Steepener 6m5y vs 6m10y, \$10k/bp | | | |
|---|---------------------|---------------------|-------------|
| | Short Payer 6m5y | Long Payer 6m10y | Spread (bp) |
| Spot | 1.81% | 2.87% | 106.0 |
| Forward | 2.16% | 3.09% | 93.2 |
| Strike | 2.16% | 3.06% | 90.7 |
| | ATMF | ATMF-2 | ATMF-2 |
| Pickup (bp) | | | |
| Fwd-Spot | -34 | -21 | 13 |
| Vol | 0 | 2 | 2 |
| Total | -34 | -19 | 15 |
| Z-Scores: Spot Vol-Normalized Pickup (no units) | | | |
| Fwd-Spot | -0.66 | -0.42 | |
| Vol | 0.00 | 0.05 | |
| Total | -0.66 | -0.37 | |
| Prob(Fwd(T)>Strike) | 25.4% | 35.6% | |
| Conditional Valuation and Premia (USD) | | | |
| PV | 221,917 | 221,917 | 0 |
| Expected Value | 206,133 | 216,069 | 9,936 |
| Premium | -7.1% | -2.6% | |

| 1y History | Spread | Current | High | Low | Mean | Volatility | Z-Score | Correlation to Spread |
|------------|-----------|---------|-------|-------|-------|------------|---------|-----------------------|
| | 2y1y | 1.63 | 2.04 | 0.64 | 1.33 | 34.0 | 0.89 | |
| | 5y5y | 4.14 | 4.61 | 2.91 | 4.03 | 49.4 | 0.23 | |
| | 5y5y-2y1y | 251.2 | 330.4 | 224.8 | 270.3 | 24.6 | -0.78 | 1.00 |
| | 2s10s | 231.0 | 258.0 | 147.3 | 219.0 | 33.1 | 0.36 | 0.77 |
| | 5s10s | 114.8 | 138.5 | 98.8 | 118.6 | 9.4 | -0.40 | 0.98 |
| | 2s5s | 116.2 | 132.2 | 47.5 | 100.4 | 25.2 | 0.63 | 0.64 |
| | 10s30s | 80.6 | 100.5 | 70.2 | 87.0 | 6.9 | -0.92 | -0.08 |
| | 2s30s | 311.7 | 344.3 | 240.3 | 306.0 | 29.1 | 0.19 | 0.85 |
| | 2s5s10s | 1.3 | 14.7 | -53.4 | -18.2 | 18.8 | 1.04 | 0.37 |

Trade Idea: Reds-Blues Bear Flattener

Front-end bear flatteners. Picking the right contracts. Sep Reds-Blues bear flatteners are the only expiry with positive carry.

| Expiry Month | Type | Contract Name | BBG Code (Call) | Expiry | Futures | Future Price | 3m Libor | ATM Strike | Option P/x | | Carry till expiry | | 3m carry (i.e. Jun rolls down to Mar) | | | | | | |
|--------------|------|--------------------|-----------------|-------------|----------|--------------|----------|------------|------------|------|-------------------|-------|---------------------------------------|-------------|----------|-------------|------------|-----|------|
| | | | | | | | | | Call | Put | Call | Put | Contract | Expiry | Futures | Call (Bull) | Put (Bear) | | |
| Jun | Reg | Jun 2014 | EDM4C 99.75 | Mon, 16-Jun | Jun 2014 | 99.743 | 0.26 | 99.750 | 0.7 | 0.9 | -0.7 | -0.9 | | | | | | | |
| | 1y | Jun 2014 x Jun 201 | 0EM4C 99.25 | Fri, 13-Jun | Jun 2015 | 99.293 | 0.71 | 99.250 | 3.1 | 2.0 | -3.0 | -2.2 | | | | | | | |
| | 2y | Jun 2014 x Jun 201 | 2EM4C 98.125 | Fri, 13-Jun | Jun 2016 | 98.168 | 1.83 | 98.125 | 5.1 | 4.1 | -4.7 | -4.5 | | | | | | | |
| | 3y | Jun 2014 x Jun 201 | 3EM4C 97.125 | Fri, 13-Jun | Jun 2017 | 97.173 | 2.83 | 97.125 | 5.5 | 4.3 | -4.8 | -5.0 | | | | | | | |
| | 4y | Jun 2014 x Jun 201 | 4EM4C 96.5 | Fri, 13-Jun | Jun 2018 | 96.518 | 3.48 | 96.500 | 4.7 | 4.2 | -3.8 | -5.0 | | | | | | | |
| Sep | Reg | Sep 2014 | EDU4C 99.75 | Mon, 15-Sep | Sep 2014 | 99.713 | 0.29 | 99.750 | 0.8 | 1.7 | -0.8 | -1.7 | Jun 2014 | Mon, 16-Jun | Jun 2014 | 0.7 | -0.1 | 0.9 | -0.8 |
| | 1y | Sep 2014 x Sep 201 | 0EU4C 99 | Fri, 12-Sep | Sep 2015 | 99.053 | 0.95 | 99.000 | 5.7 | 4.4 | -5.5 | -4.6 | Jun 2014 x Jun 2015 | Fri, 13-Jun | Jun 2015 | 8.0 | 2.3 | 0.7 | -3.7 |
| | 2y | Sep 2014 x Sep 201 | 2EU4C 97.875 | Fri, 12-Sep | Sep 2016 | 97.883 | 2.12 | 97.875 | 7.2 | 7.0 | -6.7 | -7.5 | Jun 2014 x Jun 2016 | Fri, 13-Jun | Jun 2016 | 9.5 | 2.3 | 2.2 | -4.8 |
| | 3y | Sep 2014 x Sep 201 | 3EU4C 97 | Fri, 12-Sep | Sep 2017 | 96.990 | 3.01 | 97.000 | 7.1 | 7.4 | -6.4 | -8.1 | Jun 2014 x Jun 2017 | Fri, 13-Jun | Jun 2017 | 7.5 | 0.4 | 3.2 | -4.2 |
| | 4y | Sep 2014 x Sep 201 | 4EU4C 96.375 | Fri, 12-Sep | Sep 2018 | 96.388 | 3.61 | 96.375 | 7.0 | 6.7 | -6.1 | -7.5 | Jun 2014 x Jun 2018 | Fri, 13-Jun | Jun 2018 | 6.6 | -0.4 | 3.1 | -4.6 |
| Dec | Reg | Dec 2014 | EDZ4C 99.625 | Mon, 15-Dec | Dec 2014 | 99.638 | 0.36 | 99.625 | 2.6 | 2.3 | -2.5 | -2.3 | Sep 2014 | Mon, 15-Sep | Sep 2014 | 2.9 | 0.3 | 0.7 | -1.6 |
| | 1y | Dec 2014 x Dec 201 | 0EZ4C 98.75 | Fri, 12-Dec | Dec 2015 | 98.773 | 1.23 | 98.750 | 7.5 | 7.0 | -7.3 | -7.2 | Sep 2014 x Sep 2015 | Fri, 12-Sep | Sep 2015 | 10.3 | 2.8 | 2.7 | -4.2 |
| | 2y | Dec 2014 x Dec 201 | 2EZ4C 97.625 | Fri, 12-Dec | Dec 2016 | 97.613 | 2.39 | 97.625 | 9.1 | 9.4 | -8.6 | -9.9 | Sep 2014 x Sep 2016 | Fri, 12-Sep | Sep 2016 | 11.4 | 2.3 | 4.9 | -4.5 |
| | 3y | Dec 2014 x Dec 201 | 3EZ4C 96.875 | Fri, 12-Dec | Dec 2017 | 96.813 | 3.19 | 96.875 | 8.2 | 9.8 | -7.5 | -10.5 | Sep 2014 x Sep 2017 | Fri, 12-Sep | Sep 2017 | 9.1 | 0.8 | 6.2 | -3.6 |
| | 4y | Dec 2014 x Dec 201 | 4EZ4C 96.25 | Fri, 12-Dec | Dec 2018 | 96.263 | 3.74 | 96.250 | 8.7 | 8.4 | -7.8 | -9.2 | Sep 2014 x Sep 2018 | Fri, 12-Sep | Sep 2018 | 8.9 | 0.3 | 5.5 | -2.9 |
| Mar | Reg | Mar 2015 | EDH5C 99.5 | Mon, 16-Mar | Mar 2015 | 99.498 | 0.50 | 99.500 | 4.0 | 4.1 | -4.0 | -4.2 | Dec 2014 | Mon, 15-Dec | Dec 2014 | 4.8 | 0.6 | 1.4 | -2.7 |
| | 1y | Mar 2015 x Mar 201 | 0EH5C 98.5 | Fri, 13-Mar | Mar 2016 | 98.473 | 1.53 | 98.500 | 9.2 | 9.9 | -8.9 | -10.2 | Dec 2014 x Dec 2015 | Fri, 12-Dec | Dec 2015 | 12.0 | 2.7 | 5.1 | -4.8 |
| | 2y | Mar 2015 x Mar 201 | 2EH5C 97.375 | Fri, 13-Mar | Mar 2017 | 97.388 | 2.61 | 97.375 | 11.4 | 11.1 | -10.8 | -11.7 | Dec 2014 x Dec 2016 | Fri, 12-Dec | Dec 2016 | 13.3 | 1.9 | 7.3 | -3.8 |
| | 3y | Mar 2015 x Mar 201 | 3EH5C 96.625 | Fri, 13-Mar | Mar 2018 | 96.660 | 3.34 | 96.625 | 11.3 | 10.4 | -10.5 | -11.2 | Dec 2014 x Dec 2017 | Fri, 12-Dec | Dec 2017 | 12.2 | 0.9 | 7.5 | -2.9 |
| | 4y | Mar 2015 x Mar 201 | 4EH5C 96.125 | Fri, 13-Mar | Mar 2019 | 96.153 | 3.85 | 96.125 | 10.2 | 9.5 | -9.3 | -10.4 | Dec 2014 x Dec 2018 | Fri, 12-Dec | Dec 2018 | 10.7 | 0.4 | 7.2 | -2.3 |

•Carry (in cts) for buying Sep (close to ATM) red put and selling blue put is $-3.7+4.2=0.5$

Trade Idea: CMS Spread options and cap spreads

Better carry through cap spreads of spread caps (call spread on slope)

Maximizing carry via cap spreads

Looking for highest carry on SL trades by expiry. Cap Spreads (of spread caps) mostly do better.

Maximum 1y carry achievable for SL CMS spread cap by index

| Expiry | 1y | 2y | 3y | 4y | 5y | 6y | 7y | 8y | 9y | 10y |
|------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| USD 5s30s | 111% | 95% | 72% | 28% | 12% | 11% | 7% | 4% | 2% | 0% |
| USD 2s30s | 54% | 87% | 80% | 55% | 26% | 20% | 14% | 13% | 11% | 7% |
| USD 10s30s | 73% | 53% | 28% | 17% | 9% | 6% | 5% | 12% | 13% | 13% |
| USD 2s10s | 18% | 53% | 57% | 43% | 23% | 10% | 7% | 11% | 11% | 10% |
| USD 5s10s | 138% | 68% | 22% | 12% | 4% | 6% | 5% | 3% | 3% | 2% |
| EUR 5s30s | 37% | 34% | 37% | 30% | 33% | 19% | 26% | 15% | 14% | 13% |
| EUR 2s30s | 11% | 28% | 33% | 35% | 49% | 32% | 31% | 18% | 13% | 6% |
| EUR 10s30s | 42% | 23% | 19% | 18% | 28% | 24% | 35% | 3% | 8% | 23% |
| EUR 2s10s | -4% | 10% | 17% | 18% | 23% | 12% | 9% | 9% | 7% | 3% |
| EUR 5s10s | 11% | 14% | 14% | 12% | 14% | 19% | 24% | 13% | 12% | 7% |

- USD 5s10s and 5s30s have the most attractive carry over 1y horizons.
- Longer-dated SL 5s30s and 10s30s in EUR continue to have carry over 1y horizons.

Maximum 1y carry achievable for a spread of SL CMS spread caps

| Expiry | 1y | 2y | 3y | 4y | 5y |
|------------|------|------|-----|-----|-----|
| USD 5s30s | 210% | 109% | 75% | 33% | 15% |
| USD 2s30s | 65% | 95% | 85% | 61% | 30% |
| USD 10s30s | 142% | 65% | 34% | 20% | 12% |
| USD 2s10s | 54% | 68% | 74% | 52% | 28% |
| USD 5s10s | 254% | 89% | 32% | 17% | 12% |
| EUR 5s30s | 90% | 44% | 43% | 35% | 37% |
| EUR 2s30s | 47% | 37% | 41% | 41% | 53% |
| EUR 10s30s | 96% | 35% | 25% | 20% | 30% |
| EUR 2s10s | 10% | 16% | 23% | 21% | 26% |
| EUR 5s10s | 54% | 23% | 18% | 15% | 16% |

- Doing call spreads on USD 5s30s and 5s10s and 10s30s can significantly improve carry.
- Doing cap spreads on EUR 5s10s and 10s30s leads to noticeable gains.

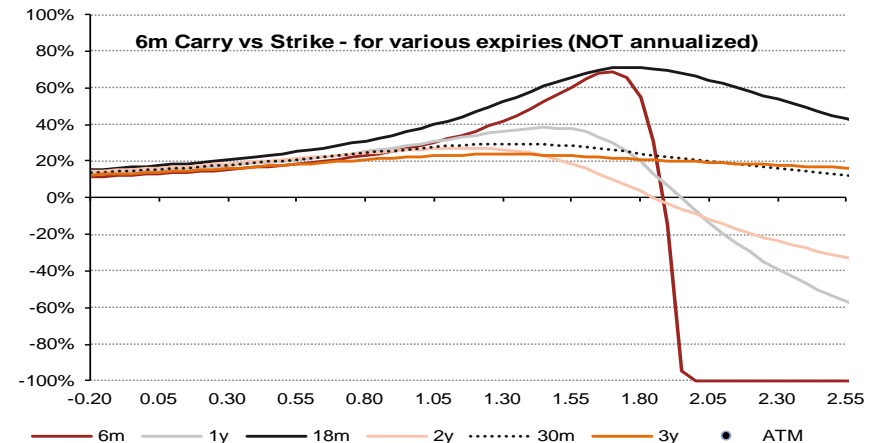
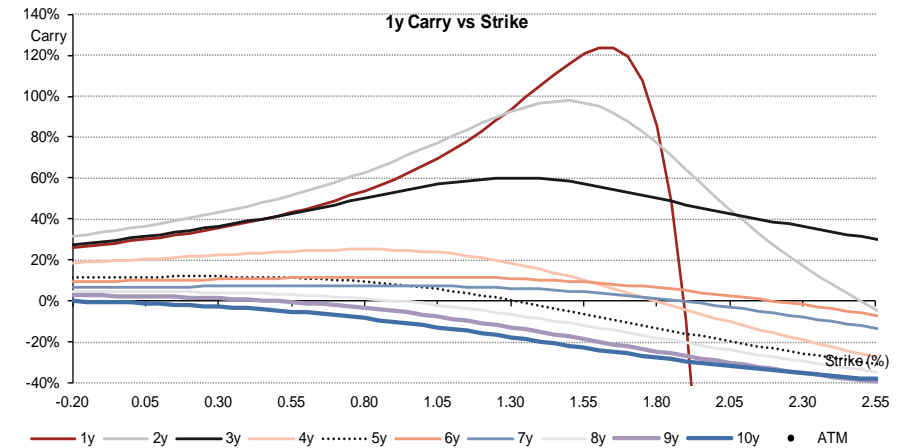
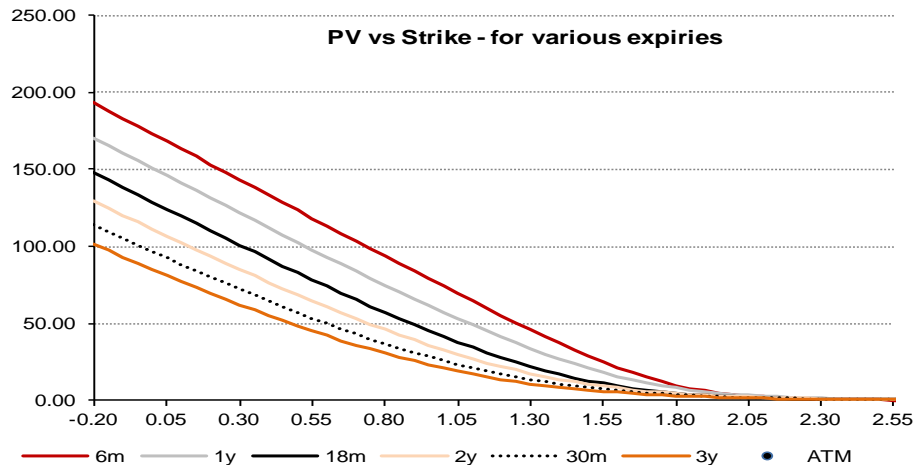
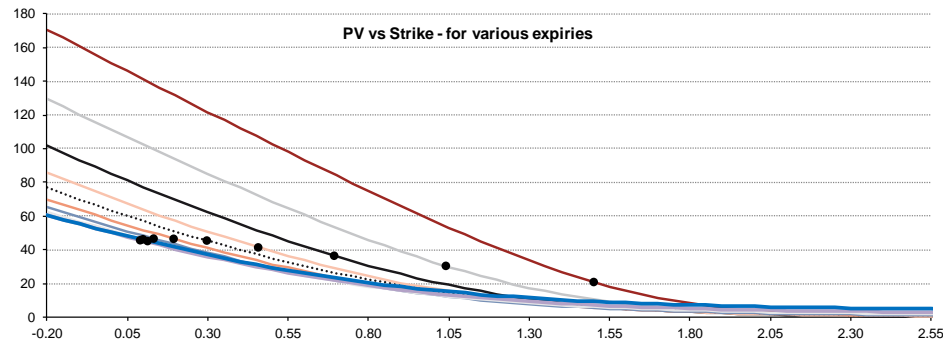
Trade Idea: USD 5s30s CMS Spread options

Maximizing Carry vs Strike

Annual expiries out to 10y (and 1y carry) and shorter expiries (with 6m carry)

Higher strikes than ATMF (pictured by dots) tend to have higher carry. Of the short dates, 18m expiries stand out.

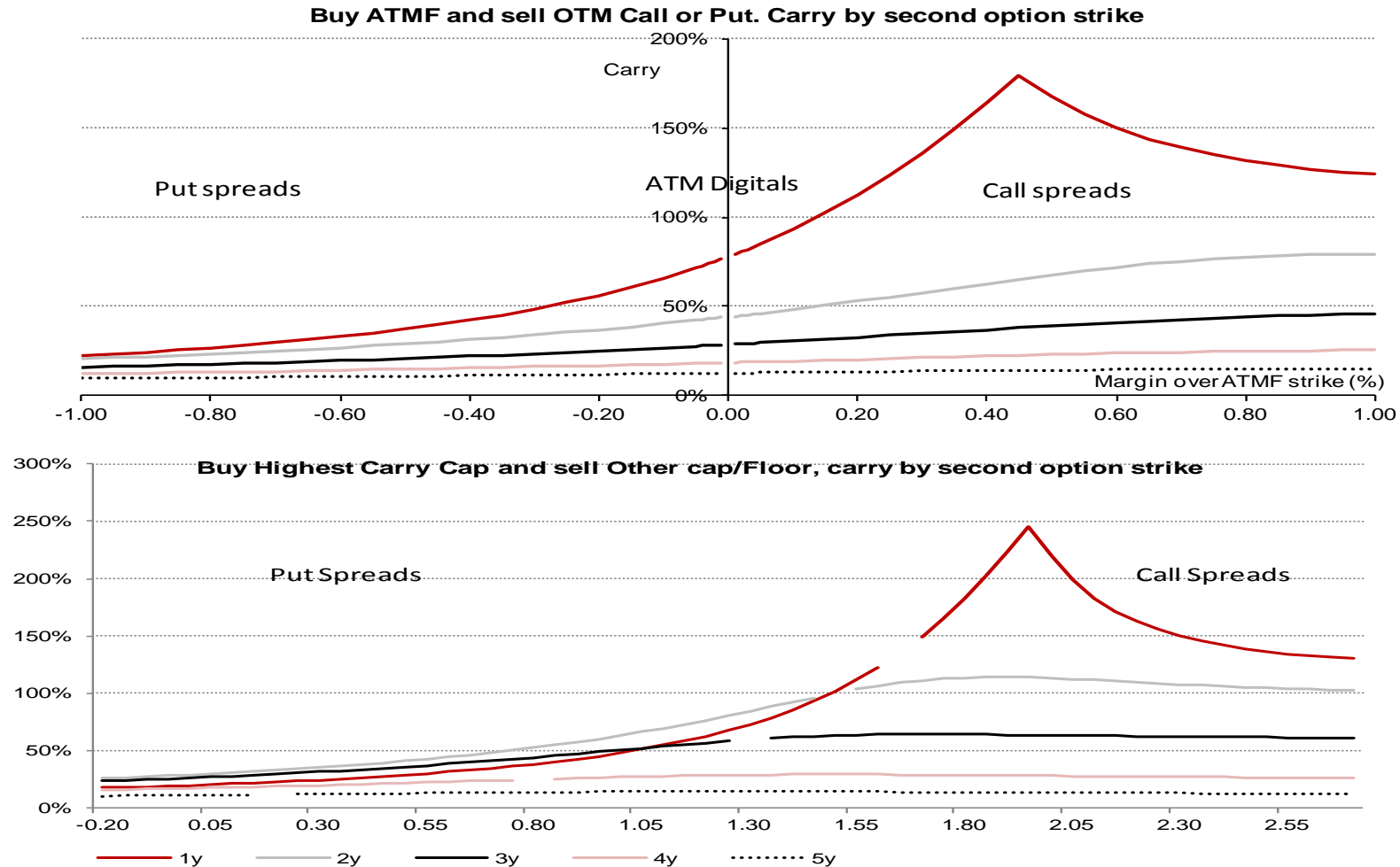
USD 5s30s caps, pricing by strike



Trade Idea: USD 5s30s CMS Spread options

Enhancing carry with spreads of cap spreads (i.e., call spreads on the slope)

ATMF vs ATMF+Xbp trades enhance carry. Highest Strike vs Higher strike cap spread do even better.

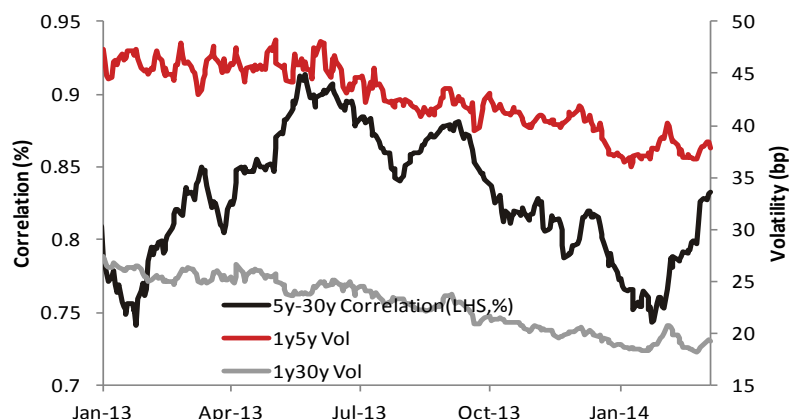


Trade Idea: USD 5s30s CMS Spread options

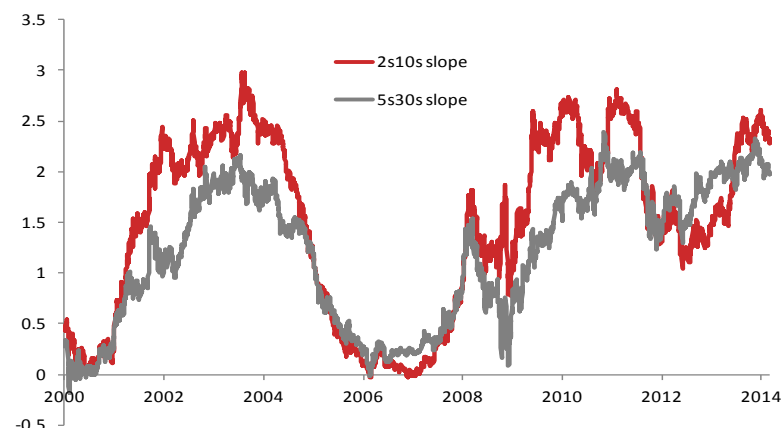
Entry levels and outlook

Entry levels are decent. Spread caps have lower risk than outright spread trades. And flattening pressure unlikely to be as severe on 5s30s as on 2s10s

Drivers of the cheapening: Correlation has risen while vols have fallen, leading to cheaper 5s30s options



Slope without 5s30s is not as overpriced as 2s10s, modestly less volatile



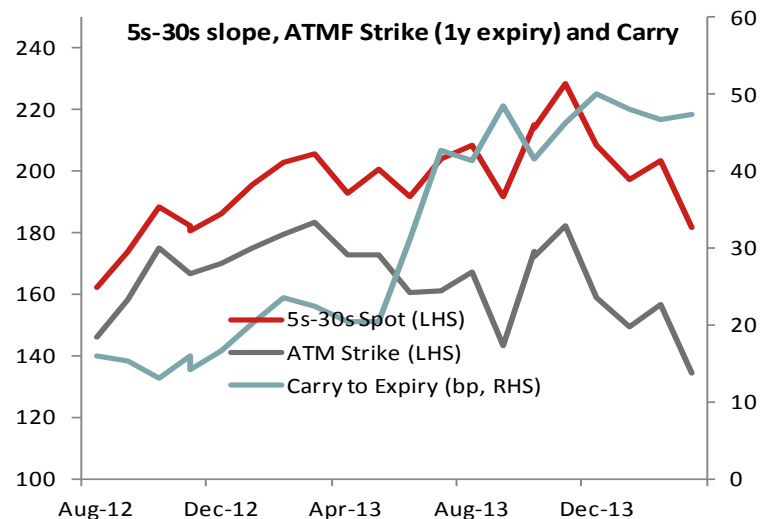
Cap spreads have considerably lower risk than outright caps (Risks as of 7 March)

| USD CMS 5s30s SL Caps \$100mn/leg | Strike | ATMF (%) | Premium (\$) | Theta (\$/day) | Delta (\$/bp) | Vega (\$/bp) | Correl Risk (\$/%) |
|--------------------------------------|-----------|-------------|--------------|-------------------|------------------|-----------------|-----------------------|
| 1y Cap | 1.7 | 1.470 | 13,250 | -286 | -497 | 3000 | -4813 |
| 1y Cap Spread | 1.70-1.95 | 1.470 | 18,000 | -92 | -268 | 998 | -1360 |
| 6m Cap | 1.65 | 1.724 | 6,750 | -396 | -276 | 2292 | -3218 |
| 6m Cap Spread | 1.70-2.00 | 1.724 | 17,000 | -124 | -184 | 763 | -220 |
| 18m Cap | 1.8 | 1.208 | 7,250 | -137 | -370 | 2109 | -4704 |

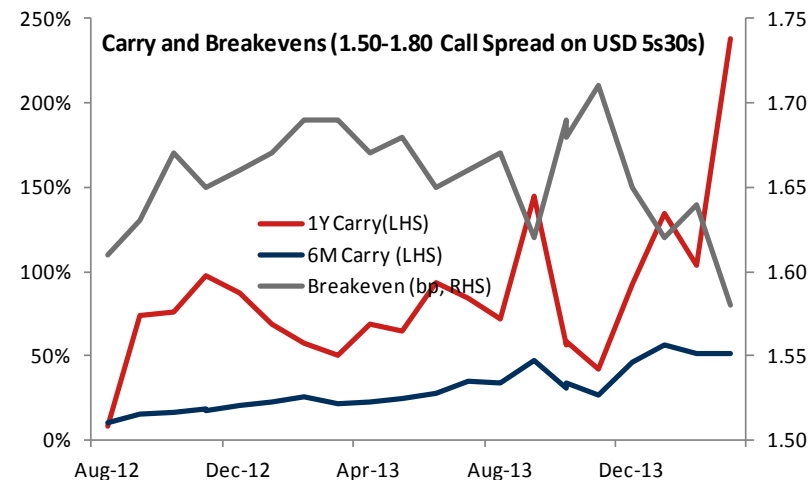
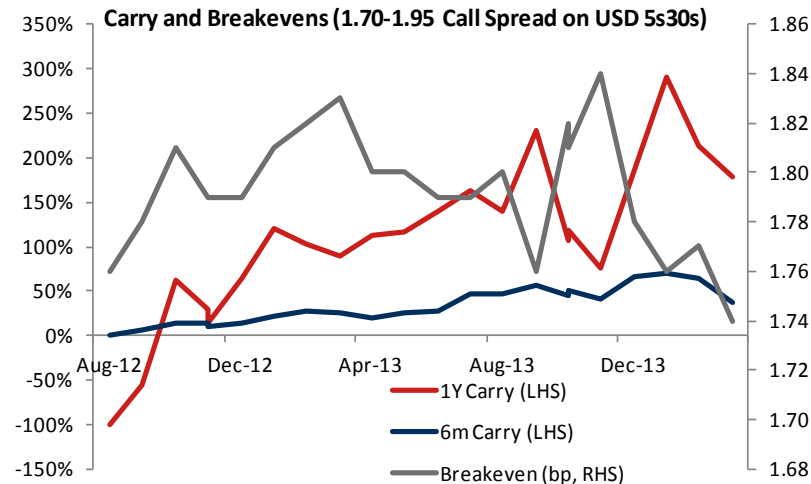
Trade Idea: USD 5s30s CMS Spread options

Maximizing carry alone is worthless - Historical entry levels, carry, and breakevens

Carry is not only very high, but the trades are less risky (breakevens are lower)



- Call Spread 1.70-1.95 was recommended on 7 March.
- We adjust the strikes to 1.50-1.80 for better performance given the current conditions.
- With current breakevens of 1.58% and 1y carry of 238% (6M: 51%, 3m: 19%).



Flow Exotics RV Trade Ideas

Short gamma, Long vega (and forward vol) and often long curve carry

USD Vol Surface - Forward

| USD Spot | | | | | | | | | |
|----------|-----|-----|-----|----|----|-----|-----|-----|-----|
| Fwd | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y |
| 3M | 21 | 39 | 56 | 70 | 72 | 70 | 66 | 65 | 63 |
| 6M | 30 | 50 | 65 | 75 | 76 | 75 | 70 | 69 | 66 |
| 1Y | 51 | 71 | 82 | 85 | 84 | 82 | 76 | 74 | 71 |
| 2Y | 89 | 96 | 96 | 94 | 91 | 86 | 79 | 76 | 73 |
| 3Y | 104 | 104 | 102 | 96 | 93 | 88 | 81 | 77 | 74 |
| 5Y | 106 | 103 | 101 | 95 | 93 | 89 | 81 | 77 | 73 |
| 7Y | 100 | 97 | 95 | 90 | 88 | 85 | 77 | 73 | 70 |
| 10Y | 89 | 88 | 86 | 84 | 82 | 78 | 71 | 67 | 65 |
| 20Y | 65 | 62 | 61 | 60 | 59 | 59 | 53 | 52 | 49 |
| 30Y | 56 | 55 | 56 | 56 | 56 | 55 | 51 | 51 | 48 |

The context: forward vol largely below spot in longer expiries across all tenors. The vol roll is only one component of forward vol type strategies.

| 1y Forward | | | | | | | | | |
|------------|-----|-----|-----|----|----|-----|-----|-----|-----|
| Fwd | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 25Y | 30Y |
| 3M | 56 | 72 | 72 | 84 | 85 | 83 | 75 | 73 | 71 |
| 6M | 61 | 75 | 78 | 85 | 85 | 83 | 76 | 73 | 71 |
| 1Y | 87 | 92 | 93 | 93 | 91 | 87 | 80 | 75 | 73 |
| 2Y | 103 | 105 | 104 | 99 | 95 | 90 | 82 | 76 | 74 |
| 3Y | 108 | 107 | 105 | 99 | 96 | 91 | 83 | 76 | 75 |
| 5Y | 105 | 103 | 100 | 96 | 93 | 89 | 80 | 74 | 72 |
| 7Y | 98 | 96 | 94 | 90 | 87 | 84 | 75 | 70 | 68 |
| 10Y | 86 | 85 | 83 | 81 | 79 | 76 | 68 | 64 | 62 |
| 20Y | 64 | 62 | 61 | 60 | 59 | 58 | 52 | 49 | 47 |
| 30Y | 55 | 55 | 55 | 55 | 55 | 54 | 50 | | |

| Differences: 1y Forward | | | | | | | | | |
|-------------------------|----|----|----|----|----|-----|-----|-----|-----|
| | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y |
| 3M | 35 | 33 | 16 | 14 | 13 | 13 | 9 | 8 | 8 |
| 6M | 31 | 25 | 13 | 10 | 9 | 8 | 6 | 4 | 5 |
| 1Y | 36 | 21 | 11 | 8 | 7 | 5 | 4 | 1 | 2 |
| 2Y | 14 | 9 | 8 | 5 | 4 | 4 | 3 | 0 | 1 |
| 3Y | 4 | 3 | 3 | 3 | 3 | 3 | 2 | -1 | 1 |
| 5Y | -1 | 0 | -1 | 1 | 0 | 0 | -1 | -3 | -1 |
| 7Y | -2 | -1 | -1 | 0 | -1 | -1 | -2 | -3 | -2 |
| 10Y | -3 | -3 | -3 | -3 | -3 | -2 | -3 | -3 | -3 |
| 20Y | -1 | 0 | 0 | 0 | 0 | -1 | -1 | -3 | -2 |
| 30Y | -1 | 0 | -1 | -1 | -1 | -1 | -1 | | |

UL has most negative carry, LR has best vol roll.

| 2y Forward | | | | | | | | | |
|------------|-----|-----|-----|-----|----|-----|-----|-----|-----|
| Fwd | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 25Y | 30Y |
| 3M | 79 | 93 | 97 | 94 | 92 | 88 | 80 | 75 | 73 |
| 6M | 78 | 95 | 99 | 95 | 93 | 89 | 81 | 75 | 73 |
| 1Y | 107 | 111 | 110 | 102 | 99 | 93 | 84 | 77 | 75 |
| 2Y | 111 | 111 | 108 | 101 | 98 | 93 | 84 | 76 | 75 |
| 3Y | 112 | 109 | 106 | 101 | 97 | 93 | 84 | 77 | 75 |
| 5Y | 103 | 101 | 99 | 93 | 91 | 88 | 78 | 72 | 70 |
| 7Y | 95 | 92 | 90 | 87 | 85 | 82 | 73 | 67 | 66 |
| 10Y | 84 | 82 | 81 | 80 | 78 | 75 | 67 | 61 | 60 |
| 20Y | 63 | 61 | 60 | 59 | 58 | 58 | 52 | 48 | 46 |
| 30Y | 54 | 54 | 54 | 55 | 54 | 54 | 49 | | |

| Differences: 2y Forward | | | | | | | | | |
|-------------------------|----|----|----|----|----|-----|-----|-----|-----|
| | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y |
| 3M | 58 | 54 | 41 | 24 | 20 | 18 | 14 | 10 | 10 |
| 6M | 48 | 45 | 34 | 20 | 17 | 14 | 11 | 6 | 7 |
| 1Y | 56 | 40 | 28 | 17 | 15 | 11 | 8 | 3 | 4 |
| 2Y | 22 | 15 | 12 | 7 | 7 | 7 | 5 | 0 | 2 |
| 3Y | 8 | 5 | 4 | 5 | 4 | 5 | 3 | 0 | 1 |
| 5Y | -3 | -2 | -2 | -2 | -2 | -1 | -3 | -5 | -3 |
| 7Y | -5 | -5 | -5 | -3 | -3 | -3 | -4 | -6 | -4 |
| 10Y | -5 | -6 | -5 | -4 | -4 | -3 | -4 | -6 | -5 |
| 20Y | -2 | -1 | -1 | -1 | -1 | -1 | -1 | -4 | -3 |
| 30Y | -2 | -1 | -2 | -1 | -2 | -1 | -2 | | |

| 5y Forward | | | | | | | | | |
|------------|-----|-----|-----|----|----|-----|-----|-----|-----|
| Fwd | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 25Y | 30Y |
| 3M | 110 | 106 | 104 | 97 | 94 | 92 | 81 | 73 | 70 |
| 6M | 115 | 109 | 106 | 98 | 94 | 93 | 81 | 73 | 70 |
| 1Y | 109 | 107 | 105 | 97 | 94 | 92 | 81 | 72 | 69 |
| 2Y | 105 | 105 | 103 | 93 | 91 | 90 | 78 | 70 | 67 |
| 3Y | 104 | 102 | 98 | 92 | 89 | 88 | 76 | 69 | 66 |
| 5Y | 90 | 89 | 87 | 85 | 85 | 83 | 71 | 64 | 61 |
| 7Y | 84 | 82 | 81 | 80 | 80 | 77 | 66 | 60 | 57 |
| 10Y | 76 | 74 | 73 | 73 | 71 | 69 | 59 | 53 | 50 |
| 20Y | 59 | 57 | 57 | 56 | 56 | 56 | 49 | 44 | 42 |
| 30Y | 52 | 51 | 52 | 52 | 52 | 51 | 46 | | |

| Differences: 5y Forward | | | | | | | | | |
|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y |
| 3M | 89 | 67 | 48 | 27 | 22 | 22 | 15 | 8 | 7 |
| 6M | 85 | 59 | 41 | 23 | 18 | 18 | 11 | 4 | 4 |
| 1Y | 58 | 36 | 23 | 12 | 10 | 10 | 5 | -2 | -2 |
| 2Y | 16 | 9 | 7 | -1 | 0 | 4 | -1 | -6 | -6 |
| 3Y | 0 | -2 | -4 | -4 | -4 | 0 | -5 | -8 | -8 |
| 5Y | -16 | -14 | -14 | -10 | -8 | -6 | -10 | -13 | -12 |
| 7Y | -16 | -15 | -14 | -10 | -8 | -8 | -11 | -13 | -13 |
| 10Y | -13 | -14 | -13 | -11 | -11 | -9 | -12 | -14 | -15 |
| 20Y | -6 | -5 | -4 | -4 | -3 | -3 | -4 | -8 | -7 |
| 30Y | -4 | -4 | -4 | -4 | -4 | -4 | -5 | | |

Highest Carry 5y triangles.

EUR Vol Surface - Forward

| EUR Spot | | | | | | | | | | |
|----------|----|----|----|----|----|-----|-----|-----|-----|--|
| Fwd | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y | |
| 3M | 25 | 33 | 42 | 54 | 55 | 57 | 54 | 52 | 50 | |
| 6M | 27 | 36 | 46 | 57 | 58 | 60 | 56 | 55 | 52 | |
| 1Y | 33 | 46 | 55 | 63 | 65 | 66 | 62 | 60 | 57 | |
| 2Y | 55 | 62 | 67 | 72 | 72 | 72 | 68 | 65 | 63 | |
| 3Y | 70 | 72 | 74 | 76 | 76 | 75 | 70 | 68 | 65 | |
| 5Y | 80 | 80 | 80 | 80 | 79 | 78 | 73 | 70 | 67 | |
| 7Y | 79 | 78 | 77 | 77 | 76 | 76 | 70 | 67 | 63 | |
| 10Y | 75 | 74 | 73 | 73 | 73 | 72 | 67 | 62 | 58 | |
| 20Y | 61 | 60 | 60 | 59 | 59 | 58 | 52 | 48 | 44 | |
| 30Y | 51 | 50 | 50 | 50 | 49 | 48 | 42 | 39 | 36 | |

The context: forward vol largely below spot in longer expiries across all tenors. The vol roll is only one component of forward vol type strategies.

| 1y Forward | | | | | | | | | | |
|------------|----|----|----|----|----|-----|-----|-----|-----|--|
| Fwd | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y | |
| 3M | 36 | 45 | 54 | 63 | 67 | 70 | 66 | 64 | 62 | |
| 6M | 43 | 49 | 56 | 65 | 68 | 70 | 65 | 64 | 63 | |
| 1Y | 50 | 58 | 64 | 71 | 72 | 73 | 70 | 68 | 66 | |
| 2Y | 67 | 71 | 71 | 76 | 76 | 76 | 72 | 70 | 68 | |
| 3Y | 78 | 76 | 78 | 79 | 78 | 78 | 74 | 71 | 69 | |
| 5Y | 80 | 80 | 79 | 79 | 79 | 79 | 73 | 70 | 67 | |
| 7Y | 78 | 77 | 76 | 76 | 77 | 76 | 71 | 67 | 62 | |
| 10Y | 75 | 73 | 73 | 73 | 73 | 72 | 66 | 62 | 57 | |
| 20Y | 60 | 59 | 59 | 59 | 58 | 57 | 51 | 46 | 42 | |
| 30Y | 51 | 50 | 50 | 49 | 48 | 47 | 41 | 38 | 35 | |

| Differences: 1y Forward | | | | | | | | | | |
|-------------------------|----|----|----|----|----|-----|-----|-----|-----|--|
| | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y | |
| 3M | 11 | 12 | 12 | 9 | 12 | 13 | 12 | 12 | 12 | |
| 6M | 16 | 13 | 10 | 8 | 10 | 10 | 9 | 9 | 11 | |
| 1Y | 17 | 12 | 9 | 8 | 7 | 7 | 8 | 8 | 9 | |
| 2Y | 12 | 9 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | |
| 3Y | 8 | 4 | 4 | 3 | 2 | 3 | 4 | 3 | 4 | |
| 5Y | 0 | 0 | -1 | -1 | 0 | 1 | 0 | 0 | 0 | |
| 7Y | -1 | -1 | -1 | -1 | 1 | 0 | 1 | 0 | -1 | |
| 10Y | 0 | -1 | 0 | 0 | 0 | 0 | -1 | 0 | -1 | |
| 20Y | -1 | -1 | -1 | 0 | -1 | -1 | -1 | -2 | -2 | |
| 30Y | 0 | 0 | 0 | -1 | -1 | -1 | -1 | -1 | -1 | |

| 2y Forward | | | | | | | | | | |
|------------|----|----|----|----|----|-----|-----|-----|-----|--|
| Fwd | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y | |
| 3M | 56 | 57 | 60 | 67 | 69 | 71 | 69 | 67 | 65 | |
| 6M | 60 | 61 | 64 | 70 | 71 | 72 | 70 | 68 | 66 | |
| 1Y | 66 | 67 | 69 | 73 | 74 | 75 | 72 | 70 | 68 | |
| 2Y | 76 | 76 | 75 | 78 | 78 | 78 | 74 | 71 | 69 | |
| 3Y | 80 | 77 | 78 | 79 | 79 | 80 | 75 | 72 | 69 | |
| 5Y | 79 | 77 | 77 | 77 | 78 | 79 | 72 | 68 | 64 | |
| 7Y | 77 | 75 | 75 | 75 | 76 | 76 | 69 | 65 | 60 | |
| 10Y | 72 | 72 | 71 | 72 | 72 | 71 | 64 | 60 | 54 | |
| 20Y | 59 | 58 | 58 | 57 | 56 | 55 | 49 | 44 | 40 | |
| 30Y | 49 | 49 | 48 | 47 | 47 | 46 | 40 | 36 | 33 | |

| Differences: 2y Forward | | | | | | | | | | |
|-------------------------|----|----|----|----|----|-----|-----|-----|-----|--|
| | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y | |
| 3M | 31 | 24 | 18 | 13 | 14 | 14 | 15 | 15 | 15 | |
| 6M | 33 | 25 | 18 | 13 | 13 | 12 | 14 | 13 | 14 | |
| 1Y | 33 | 21 | 14 | 10 | 9 | 9 | 10 | 10 | 11 | |
| 2Y | 21 | 14 | 8 | 6 | 6 | 6 | 6 | 6 | 6 | |
| 3Y | 10 | 5 | 4 | 3 | 3 | 5 | 5 | 4 | 4 | |
| 5Y | -1 | -3 | -3 | -3 | -1 | 1 | -1 | -2 | -3 | |
| 7Y | -2 | -3 | -2 | -2 | 0 | 0 | -1 | -2 | -3 | |
| 10Y | -3 | -2 | -2 | -1 | -1 | -1 | -3 | -2 | -4 | |
| 20Y | -2 | -2 | -2 | -2 | -3 | -3 | -3 | -4 | -4 | |
| 30Y | -2 | -1 | -2 | -3 | -2 | -2 | -2 | -3 | -3 | |

LR has best vol roll, although 5y and 7y expiries on short tails are decent.

| 5y Forward | | | | | | | | | | |
|------------|-----|----|----|----|----|-----|-----|-----|-----|--|
| Fwd | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y | |
| 3M | 116 | 95 | 86 | 79 | 78 | 81 | 72 | 66 | 59 | |
| 6M | 106 | 89 | 82 | 78 | 77 | 80 | 71 | 65 | 58 | |
| 1Y | 80 | 74 | 71 | 71 | 72 | 77 | 70 | 64 | 55 | |
| 2Y | 76 | 71 | 69 | 70 | 71 | 77 | 69 | 62 | 54 | |
| 3Y | 72 | 68 | 69 | 69 | 71 | 76 | 68 | 61 | 53 | |
| 5Y | 72 | 69 | 69 | 69 | 72 | 74 | 66 | 59 | 50 | |
| 7Y | 68 | 66 | 66 | 69 | 70 | 71 | 61 | 55 | 49 | |
| 10Y | 67 | 66 | 66 | 67 | 67 | 66 | 55 | 49 | 42 | |
| 20Y | 53 | 51 | 50 | 50 | 49 | 49 | 42 | 35 | 30 | |
| 30Y | 48 | 49 | 48 | 47 | 46 | 43 | 35 | 31 | 25 | |

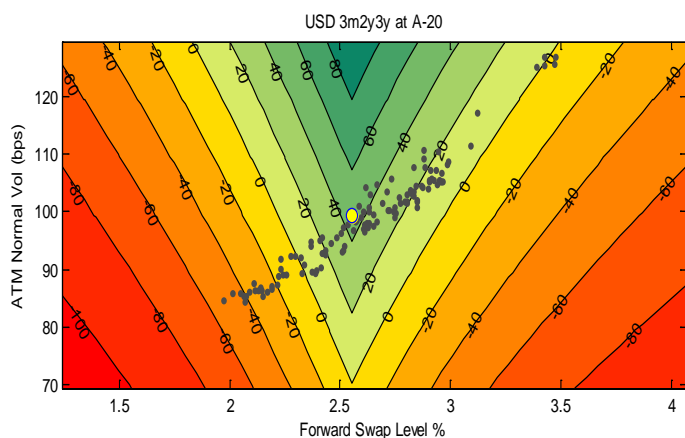
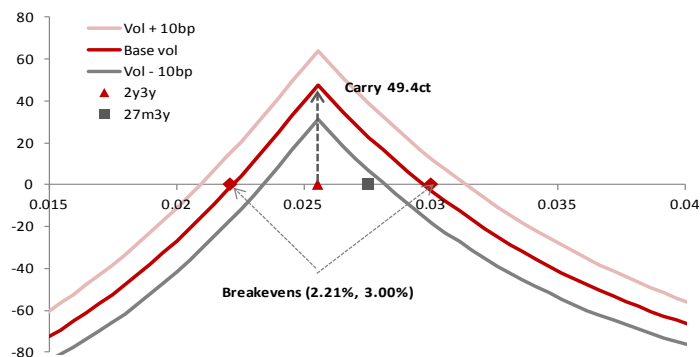
| Differences: 5y Forward | | | | | | | | | | |
|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| | 1Y | 2Y | 3Y | 5Y | 7Y | 10Y | 15Y | 20Y | 30Y | |
| 3M | 91 | 62 | 44 | 25 | 23 | 24 | 18 | 14 | 9 | |
| 6M | 79 | 53 | 36 | 21 | 19 | 20 | 15 | 10 | 6 | |
| 1Y | 47 | 28 | 16 | 8 | 7 | 11 | 8 | 4 | -2 | |
| 2Y | 21 | 9 | 2 | -2 | -1 | 5 | 1 | -3 | -9 | |
| 3Y | 2 | -4 | -5 | -7 | -5 | 1 | -2 | -7 | -12 | |
| 5Y | -8 | -11 | -11 | -11 | -7 | -4 | -7 | -11 | -17 | |
| 7Y | -11 | -12 | -11 | -8 | -6 | -5 | -9 | -12 | -14 | |
| 10Y | -8 | -8 | -7 | -6 | -6 | -6 | -12 | -13 | -16 | |
| 20Y | -8 | -9 | -10 | -9 | -10 | -9 | -10 | -13 | -14 | |
| 30Y | -3 | -1 | -2 | -3 | -3 | -5 | -7 | -8 | -11 | |

Highest Carry 5y triangles.

Short Gamma Trade Idea: USD 3m2y3y A-20bp Turbo Carry

Sell 3m2y3y ATMF-20bp Midcurve Payers, Buy 27m3y ATMF-20bp Payers for a premium of 114ct (39.6bp) and roll of 49.4ct (17.1bp) or 173% annualised carry

Spot at 2.56% (ATMF-20bp), fwds at 2.75%. B/E range is 2.21%-3.00% or 79bp wide. Trade has bearish skew owing to highly positive realised volta.



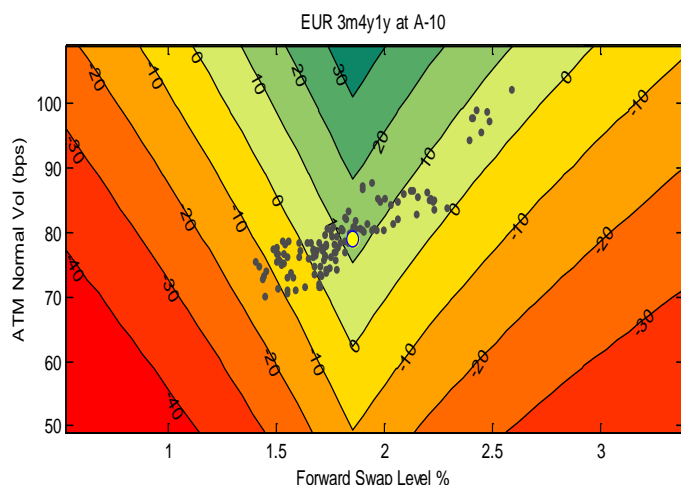
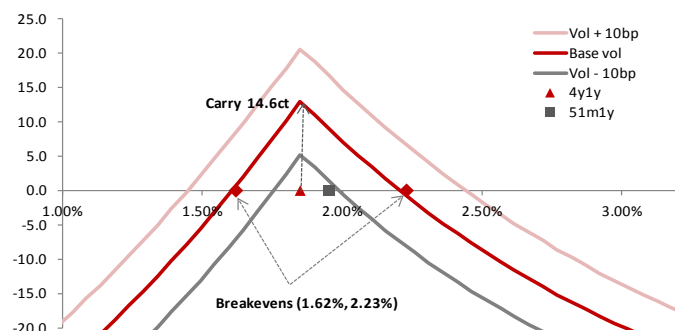
| Strike (bp) | Premium (ct) | Rolldown (ct) | Premium (bp) | Rolldown (bp) | Carry (%) | Implied Vol (bp) | Forward % | Forward % | B/E Width (bp) | Adj Ann Carry |
|-------------|--------------|---------------|--------------|---------------|-----------|------------------|-----------|-----------|----------------|---------------|
| -20 | 114.0 | 49.4 | 39.6 | 17.1 | 173% | 92.6 | 2.21 | 3.00 | 79.17 | 296% |
| -10 | 117.0 | 35.1 | 40.6 | 12.2 | 120% | 95.0 | 2.31 | 3.11 | 80.06 | 202% |
| 0 | 118.3 | 22.7 | 41.1 | 7.9 | 77% | 97.6 | 2.39 | 3.23 | 84.09 | 132% |
| 10 | 118.0 | 12.6 | 41.0 | 4.4 | 43% | 100.2 | 2.46 | 3.37 | 91.16 | 78% |
| 20 | 116.4 | 4.6 | 40.4 | 1.6 | 16% | 103.0 | 2.52 | 3.53 | 100.79 | 31% |

| Package Name | Fwd (%) | Spot (%) | Relative Strike (bp) | Delta (ct/bp) | Gamma (ct/bp2) | Vega (ct/bp) | Theta (ct/day) |
|--------------------|---------|----------|----------------------|---------------|----------------|--------------|----------------|
| USD 3m2y3y AMTF-20 | 2.75 | 2.56 | -20 | -0.43 | -0.16 | 1.04 | 0.23 |

Short Gamma Trade Idea: EUR 3m4y1y A-10bp Turbo Carry

Sell 3m4y1y ATMF-10bp Midcurve Payers, Buy 51m1y ATMF-10bp Payers for a premium of 48ct (49.6bp) and roll of 14.6ct (15.1bp). With an annualised carry of 121%.

Spot at 1.85% (ATMF-10bp), Fwds at 1.95%. B/E range is 1.62%-2.23% or 62bp wide. Trade has bearish skew owing to highly positive realised vol



| Relative Strike (bp) | Upfront Premium (ct) | Rolldown (ct) | Premium (bp) | Rolldown (bp) | Ann Carry (%) | ImpliedVo l (bp) | Low B/E Forward % | High B/E Forward % | B/E Width (bp) | Adj Ann Carry |
|----------------------|----------------------|---------------|--------------|---------------|---------------|------------------|-------------------|--------------------|----------------|---------------|
| -20 | 46.2 | 10.8 | 47.8 | 11.2 | 94% | 78.4 | 1.52 | 2.12 | 60.4 | 145% |
| -10 | 48.0 | 14.6 | 49.6 | 15.1 | 121% | 80.2 | 1.62 | 2.23 | 61.7 | 187% |
| 0 | 49.0 | 9.9 | 50.7 | 10.3 | 81% | 82.3 | 1.70 | 2.37 | 67.3 | 132% |
| 10 | 49.3 | 6.3 | 50.9 | 6.5 | 51% | 84.8 | 1.76 | 2.53 | 76.8 | 92% |
| 20 | 48.8 | 3.5 | 50.5 | 3.6 | 29% | 87.5 | 1.81 | 2.71 | 89.6 | 58% |

| Package Name | Fwd (%) | Spot (%) | Relative Strike (bp) | Delta (ct/bp) | Gamma (ct/bp ²) | Vega (ct/bp) | Theta (ct/day) |
|--------------------|---------|----------|----------------------|---------------|-----------------------------|--------------|----------------|
| EUR 3m4y1y ATMF-10 | 1.95 | 1.85 | -10 | -0.17 | -0.08 | 0.55 | 0.09 |

Top Long-dated Midcurve Calendar Spread (“turbo-carry”)

Sorted on (vol) Adjusted Annualised Carry over 1y horizon. Only for 5y expiries.

USD Trades

| Expiry | Forward Tenor | Swap Tenor | Sector | Mid-curve Name | Fwd-Swap Name | Strike | Forward% | Spot% | RateRateCorr | Upfront Premium (ct) | Rolldown (ct) | Premium (bp) | Rolldown (bp) | Ann Carry % | ImpliedVol (bp) | Low B/E Forward | High B/E Forward | Adjusted Ann Carry |
|--------|---------------|------------|--------|----------------|---------------|--------|----------|-------|--------------|----------------------|---------------|--------------|---------------|-------------|-----------------|-----------------|------------------|--------------------|
| 5y | 6y | 1y | LL | 5y6y1y | 6y1y | -50 | 4.50 | 4.03 | 1.00 | 22.8 | 62.5 | 26.3 | 72.1 | 55% | 88.5 | 2.12 | 7.58 | 151% |
| 5y | 5y | 1y | LL | 5y5y1y | 5y1y | -50 | 4.46 | 3.80 | 1.00 | 21.0 | 57.4 | 23.3 | 63.9 | 55% | 90.9 | 2.07 | 7.51 | 147% |
| 5y | 6y | 1y | LL | 5y6y1y | 6y1y | -40 | 4.50 | 4.03 | 1.00 | 23.2 | 60.9 | 26.7 | 70.2 | 53% | 88.7 | 2.19 | 7.71 | 146% |
| 5y | 5y | 2y | LL | 5y5y2y | 5y2y | -50 | 4.48 | 3.91 | 0.99 | 40.5 | 116.6 | 22.9 | 66.0 | 58% | 89.5 | 2.13 | 7.17 | 145% |
| 5y | 6y | 2y | LL | 5y6y2y | 6y2y | -40 | 4.49 | 4.09 | 1.00 | 45.2 | 121.3 | 26.6 | 71.3 | 54% | 86.6 | 2.23 | 7.33 | 141% |
| 5y | 5y | 3y | LL | 5y5y3y | 5y3y | -50 | 4.48 | 3.99 | 0.99 | 59.7 | 171.8 | 22.9 | 66.0 | 58% | 87.8 | 2.20 | 6.87 | 137% |
| 5y | 6y | 1y | LL | 5y6y1y | 6y1y | -30 | 4.50 | 4.03 | 1.00 | 23.5 | 57.0 | 27.1 | 65.7 | 49% | 88.9 | 2.26 | 7.87 | 137% |
| 5y | 5y | 1y | LL | 5y5y1y | 5y1y | -40 | 4.46 | 3.80 | 1.00 | 21.3 | 53.6 | 23.7 | 59.6 | 50% | 91.2 | 2.14 | 7.60 | 135% |
| 5y | 5y | 2y | LL | 5y5y2y | 5y2y | -40 | 4.48 | 3.91 | 0.99 | 41.1 | 108.6 | 23.3 | 61.5 | 53% | 89.7 | 2.21 | 7.31 | 134% |
| 5y | 7y | 1y | LL | 5y7y1y | 7y1y | -30 | 4.48 | 4.15 | 1.00 | 25.8 | 60.9 | 30.9 | 72.9 | 47% | 84.7 | 2.32 | 7.69 | 134% |
| 5y | 6y | 2y | LL | 5y6y2y | 6y2y | -50 | 4.49 | 4.09 | 1.00 | 44.5 | 112.7 | 26.2 | 66.2 | 51% | 86.5 | 2.15 | 7.20 | 132% |
| 5y | 6y | 2y | LL | 5y6y2y | 6y2y | -30 | 4.49 | 4.09 | 1.00 | 45.8 | 113.6 | 26.9 | 66.7 | 50% | 86.7 | 2.30 | 7.46 | 132% |
| 5y | 7y | 1y | LL | 5y7y1y | 7y1y | -40 | 4.48 | 4.15 | 1.00 | 25.5 | 58.6 | 30.5 | 70.1 | 46% | 84.6 | 2.24 | 7.56 | 129% |
| 5y | 5y | 3y | LL | 5y5y3y | 5y3y | -40 | 4.48 | 3.99 | 0.99 | 60.6 | 162.4 | 23.3 | 62.4 | 54% | 87.9 | 2.28 | 7.00 | 129% |
| 5y | 6y | 1y | LL | 5y6y1y | 6y1y | -20 | 4.50 | 4.03 | 1.00 | 23.8 | 53.3 | 27.4 | 61.4 | 45% | 89.1 | 2.34 | 8.02 | 128% |
| 5y | 7y | 2y | LL | 5y7y2y | 7y2y | -30 | 4.48 | 4.20 | 1.00 | 49.7 | 116.1 | 30.3 | 70.9 | 47% | 82.8 | 2.34 | 7.40 | 128% |
| 5y | 7y | 1y | LL | 5y7y1y | 7y1y | -20 | 4.48 | 4.15 | 1.00 | 26.1 | 57.1 | 31.2 | 68.3 | 44% | 84.8 | 2.39 | 7.86 | 126% |
| 5y | 5y | 2y | LL | 5y5y2y | 5y2y | -30 | 4.48 | 3.91 | 0.99 | 41.7 | 101.0 | 23.6 | 57.2 | 48% | 89.9 | 2.28 | 7.45 | 125% |
| 5y | 6y | 3y | LL | 5y6y3y | 6y3y | -30 | 4.48 | 4.14 | 0.99 | 67.7 | 167.4 | 27.0 | 66.7 | 49% | 84.8 | 2.36 | 7.14 | 124% |
| 5y | 7y | 2y | LL | 5y7y2y | 7y2y | -20 | 4.48 | 4.20 | 1.00 | 50.2 | 112.6 | 30.7 | 68.7 | 45% | 82.9 | 2.41 | 7.54 | 124% |

Highlighting two highest carry, highest expected return midcurve calendar spreads with 5y.

EUR Trades

| Expiry | Forward Tenor | Swap Tenor | Sector | Mid-curve Name | Fwd-Swap Name | Strike | Forward% | Spot% | RateRateCorr | Upfront Premium (ct) | Rolldown (ct) | Premium (bp) | Rolldown (bp) | Ann Carry % | ImpliedVol (bp) | Low B/E Forward | High B/E Forward | Adjusted Ann Carry |
|--------|---------------|------------|--------|----------------|---------------|--------|----------|-------|--------------|----------------------|---------------|--------------|---------------|-------------|-----------------|-----------------|------------------|--------------------|
| 5y | 6y | 4y | LL | 5y6y4y | 6y4y | -50 | 3.41 | 2.91 | 0.98 | 60.9 | 213.6 | 17.1 | 60.0 | 70% | 80.7 | 1.37 | 5.68 | 168% |
| 5y | 7y | 2y | LL | 5y7y2y | 7y2y | -50 | 3.43 | 2.93 | 1.00 | 34.3 | 113.3 | 19.3 | 63.5 | 66% | 81.1 | 1.38 | 5.87 | 163% |
| 5y | 5y | 5y | Mid | 5y5y5y | 5y5y | -50 | 3.39 | 2.77 | 0.97 | 66.5 | 230.4 | 14.8 | 51.1 | 69% | 80.8 | 1.34 | 5.53 | 161% |
| 5y | 6y | 3y | LL | 5y6y3y | 6y3y | -50 | 3.42 | 2.81 | 0.99 | 45.6 | 152.1 | 16.8 | 56.0 | 67% | 81.4 | 1.35 | 5.61 | 156% |
| 5y | 6y | 4y | LL | 5y6y4y | 6y4y | -40 | 3.41 | 2.91 | 0.98 | 62.6 | 197.5 | 17.6 | 55.4 | 63% | 81.0 | 1.45 | 5.81 | 152% |
| 5y | 7y | 3y | LL | 5y7y3y | 7y3y | -40 | 3.41 | 3.03 | 0.99 | 52.5 | 161.3 | 19.9 | 61.1 | 62% | 80.6 | 1.47 | 5.84 | 149% |
| 5y | 7y | 2y | LL | 5y7y2y | 7y2y | -40 | 3.43 | 2.93 | 1.00 | 35.3 | 105.4 | 19.8 | 59.1 | 60% | 81.4 | 1.45 | 5.87 | 145% |
| 5y | 4y | 6y | Mid | 5y4y6y | 4y6y | -50 | 3.37 | 2.61 | 0.94 | 65.8 | 221.8 | 12.0 | 40.5 | 67% | 80.6 | 1.37 | 5.21 | 144% |
| 5y | 5y | 4y | LL | 5y5y4y | 5y4y | -50 | 3.40 | 2.66 | 0.97 | 53.0 | 173.4 | 14.5 | 47.4 | 65% | 81.4 | 1.32 | 5.32 | 144% |
| 5y | 8y | 1y | LL | 5y8y1y | 8y1y | -40 | 3.44 | 3.04 | 1.00 | 20.1 | 57.5 | 22.9 | 65.4 | 57% | 81.2 | 1.49 | 6.04 | 143% |
| 5y | 7y | 3y | LL | 5y7y3y | 7y3y | -30 | 3.41 | 3.03 | 0.99 | 53.8 | 154.9 | 20.4 | 58.7 | 58% | 80.9 | 1.54 | 5.97 | 141% |
| 5y | 5y | 5y | Mid | 5y5y5y | 5y5y | -40 | 3.39 | 2.77 | 0.97 | 68.4 | 211.1 | 15.2 | 46.8 | 62% | 81.1 | 1.42 | 5.53 | 140% |
| 5y | 6y | 2y | LL | 5y6y2y | 6y2y | -50 | 3.41 | 2.69 | 0.99 | 30.6 | 96.5 | 16.7 | 52.7 | 63% | 82.0 | 1.31 | 5.38 | 140% |
| 5y | 7y | 3y | LL | 5y7y3y | 7y3y | -50 | 3.41 | 3.03 | 0.99 | 51.0 | 147.8 | 19.3 | 56.0 | 58% | 80.4 | 1.39 | 5.71 | 139% |
| 5y | 7y | 1y | LL | 5y7y1y | 7y1y | -50 | 3.42 | 2.83 | 1.00 | 18.3 | 54.1 | 20.2 | 59.9 | 59% | 81.6 | 1.38 | 5.65 | 139% |
| 5y | 6y | 3y | LL | 5y6y3y | 6y3y | -40 | 3.42 | 2.81 | 0.99 | 46.8 | 140.5 | 17.2 | 51.8 | 60% | 81.7 | 1.42 | 5.61 | 138% |
| 5y | 8y | 1y | LL | 5y8y1y | 8y1y | -50 | 3.44 | 3.04 | 1.00 | 19.6 | 53.0 | 22.3 | 60.3 | 54% | 81.0 | 1.42 | 5.92 | 135% |
| 5y | 6y | 4y | LL | 5y6y4y | 6y4y | -30 | 3.41 | 2.91 | 0.98 | 64.2 | 182.0 | 18.0 | 51.1 | 57% | 81.3 | 1.52 | 5.82 | 134% |
| 5y | 8y | 2y | LL | 5y8y2y | 8y2y | -30 | 3.40 | 3.14 | 1.00 | 39.4 | 106.4 | 22.7 | 62.4 | 55% | 80.5 | 1.55 | 5.93 | 134% |
| 5y | 8y | 2y | LL | 5y8y2y | 8y2y | -20 | 3.40 | 3.14 | 1.00 | 40.3 | 106.3 | 23.2 | 61.2 | 53% | 80.7 | 1.62 | 6.07 | 130% |

Long Vega Trade Idea: Midcurve Calendar Spread – EUR 5y6y4y A-50

NOMURA

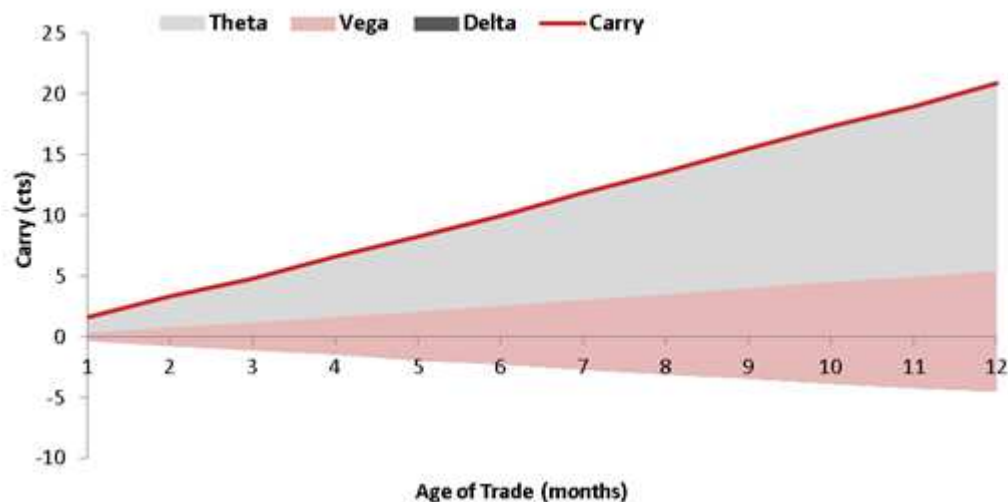
EUR Midcurve 5y6y4y A-50 for 60.9cts premium 70% total carry.

Trade Idea: *long* 11y4y A-50 payer and short 5y6y4y A-50bp payers. The package costs 60.9cts.

70% annualized carry (20.9 ct) for 1y, approx ½ is vega, 2/3rds is time decay, and it trades a little short.

Carry breakdown in the first year

| | Carry | Delta | Vega | Theta | Unexp |
|-------|-------|-------|------|-------|-------|
| Total | 20.9 | -4.5 | 10.1 | 15.4 | 0.0 |



Long Vega Trade Idea: Midcurve Calendar Spread– USD 5y6y1y A-50

NOMURA

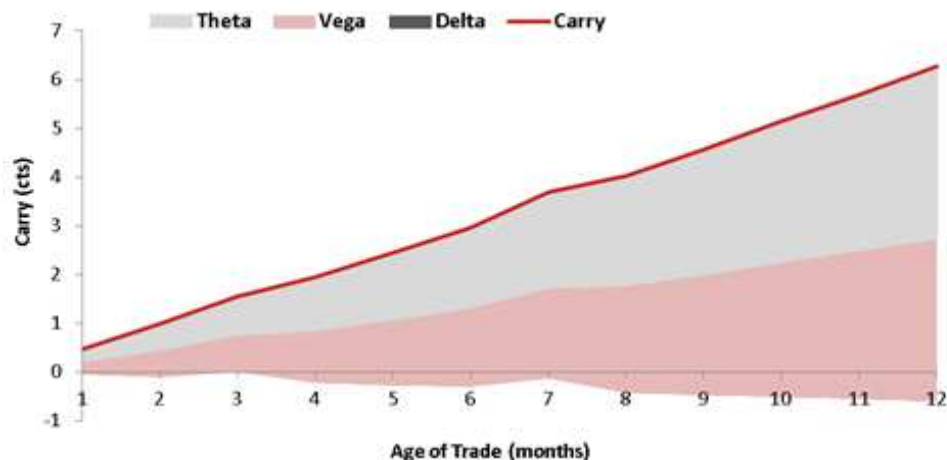
USD Midcurve 5y6y1y A-50 for 60.9cts premium 70% total carry.

Trade Idea: *long* 11y4y A-50 payer and short 5y6y4y A-50bp payers. The package costs 22cts.

55% annualized carry (6.3 ct) for 1y, approx ½ is vega, and ½ is time decay. Small negative curve contribution.

Carry breakdown in the first year

| | Carry | Delta | Vega | Theta | Unexp |
|-------|-------|-------|------|-------|-------|
| Total | 6.3 | -0.6 | 3.3 | 3.5 | 0.0 |



USD Top Triangles (6m horizon)

Sorted on Vega Roll ("Quality" carry)

| Forward Vol | Triangle | 6m Carry/Premium | | | |
|-------------|-----------------------|------------------|-------------|------------|-------|
| | | Total Carry | Delta Carry | Vega Carry | Theta |
| 10y1y4y | 10y1y + 11y4y - 10y5y | 18.8% | -0.3% | 13.0% | 6.1% |
| 5y1y20y | 5y1y + 6y20y - 5y21y | 18.2% | -1.2% | 12.6% | 7.1% |
| 5y1y21y | 5y1y + 6y21y - 5y22y | 18.2% | -1.2% | 12.5% | 7.1% |
| 5y1y22y | 5y1y + 6y22y - 5y23y | 18.1% | -1.2% | 12.5% | 7.0% |
| 5y1y23y | 5y1y + 6y23y - 5y24y | 18.0% | -1.2% | 12.4% | 7.0% |
| 5y1y24y | 5y1y + 6y24y - 5y25y | 17.9% | -1.2% | 12.3% | 7.0% |
| 10y1y5y | 10y1y + 11y5y - 10y6y | 18.1% | -0.3% | 12.2% | 6.2% |
| 5y1y25y | 5y1y + 6y25y - 5y26y | 17.6% | -1.3% | 12.0% | 7.1% |
| 5y1y26y | 5y1y + 6y26y - 5y27y | 17.4% | -1.3% | 11.7% | 7.2% |
| 10y2y3y | 10y2y + 12y3y - 10y5y | 18.2% | 0.5% | 11.7% | 5.8% |
| 5y1y19y | 5y1y + 6y19y - 5y20y | 17.0% | -1.2% | 11.7% | 6.7% |
| 5y1y18y | 5y1y + 6y18y - 5y19y | 16.9% | -1.2% | 11.5% | 6.7% |
| 5y1y17y | 5y1y + 6y17y - 5y18y | 16.7% | -1.2% | 11.4% | 6.6% |
| 5y1y27y | 5y1y + 6y27y - 5y28y | 17.1% | -1.3% | 11.4% | 7.2% |
| 5y1y16y | 5y1y + 6y16y - 5y17y | 16.6% | -1.1% | 11.3% | 6.6% |
| 5y1y30y | 5y1y + 6y30y - 5y31y | 17.4% | -1.4% | 11.3% | 7.7% |
| 5y1y15y | 5y1y + 6y15y - 5y16y | 16.4% | -1.1% | 11.2% | 6.5% |
| 5y1y28y | 5y1y + 6y28y - 5y29y | 16.8% | -1.3% | 11.1% | 7.2% |
| 5y1y29y | 5y1y + 6y29y - 5y30y | 16.6% | -1.3% | 10.8% | 7.2% |
| 10y1y6y | 10y1y + 11y6y - 10y7y | 16.6% | -0.3% | 10.8% | 6.1% |

Sorted on Total Carry

| Forward Vol | Triangle | 6m Carry/Premium | | | |
|-------------|----------------------|------------------|-------------|------------|-------|
| | | Total Carry | Delta Carry | Vega Carry | Theta |
| 1y1y30y | 1y1y + 2y30y - 1y31y | 31.0% | 1.8% | 8.7% | 20.7% |
| 1y1y29y | 1y1y + 2y29y - 1y30y | 30.4% | 1.8% | 8.6% | 20.2% |
| 1y1y28y | 1y1y + 2y28y - 1y29y | 30.3% | 1.8% | 8.6% | 20.2% |
| 1y1y27y | 1y1y + 2y27y - 1y28y | 30.3% | 1.8% | 8.6% | 20.2% |
| 1y1y26y | 1y1y + 2y26y - 1y27y | 30.2% | 1.8% | 8.5% | 20.1% |
| 1y1y25y | 1y1y + 2y25y - 1y26y | 30.1% | 1.7% | 8.5% | 20.1% |
| 1y1y24y | 1y1y + 2y24y - 1y25y | 30.1% | 1.7% | 8.5% | 20.1% |
| 1y1y23y | 1y1y + 2y23y - 1y24y | 30.0% | 1.7% | 8.4% | 20.1% |
| 1y1y22y | 1y1y + 2y22y - 1y23y | 29.9% | 1.7% | 8.4% | 20.1% |
| 1y1y21y | 1y1y + 2y21y - 1y22y | 29.9% | 1.6% | 8.4% | 20.1% |
| 1y1y20y | 1y1y + 2y20y - 1y21y | 29.7% | 1.6% | 8.3% | 20.1% |
| 1y1y19y | 1y1y + 2y19y - 1y20y | 28.9% | 1.5% | 7.9% | 19.8% |
| 1y1y18y | 1y1y + 2y18y - 1y19y | 28.7% | 1.4% | 7.7% | 19.8% |
| 1y1y17y | 1y1y + 2y17y - 1y18y | 28.5% | 1.3% | 7.6% | 19.8% |
| 1y1y16y | 1y1y + 2y16y - 1y17y | 28.2% | 1.2% | 7.5% | 19.8% |
| 1y1y15y | 1y1y + 2y15y - 1y16y | 28.0% | 1.1% | 7.3% | 19.8% |
| 1y1y14y | 1y1y + 2y14y - 1y15y | 26.4% | 0.9% | 6.9% | 18.8% |
| 1y1y13y | 1y1y + 2y13y - 1y14y | 26.1% | 0.8% | 6.7% | 18.8% |
| 1y1y12y | 1y1y + 2y12y - 1y13y | 25.6% | 0.5% | 6.5% | 18.8% |
| 1y2y30y | 1y2y + 3y30y - 1y32y | 25.2% | 2.0% | 6.7% | 16.6% |

EUR Top Triangles (6m horizon)

Sorted on Vega Roll ("Quality" carry)

| Forward Vol | Triangle | 6m Carry/Premium | | | |
|-------------|----------------------|------------------|-------------|------------|-------|
| | | Total Carry | Delta Carry | Vega Carry | Theta |
| 5y1y29y | 5y1y + 6y29y - 5y30y | 26.6% | -0.8% | 19.5% | 8.1% |
| 5y1y30y | 5y1y + 6y30y - 5y31y | 26.0% | -0.8% | 19.0% | 8.0% |
| 5y1y28y | 5y1y + 6y28y - 5y29y | 25.7% | -0.8% | 18.7% | 8.0% |
| 5y1y27y | 5y1y + 6y27y - 5y28y | 24.8% | -0.8% | 17.9% | 7.9% |
| 5y1y8y | 5y1y + 6y8y - 5y9y | 19.6% | -0.7% | 13.8% | 6.6% |
| 5y1y26y | 5y1y + 6y26y - 5y27y | 23.9% | -0.8% | 17.1% | 7.7% |
| 5y1y7y | 5y1y + 6y7y - 5y8y | 19.6% | -0.8% | 13.7% | 6.9% |
| 5y1y9y | 5y1y + 6y9y - 5y10y | 19.0% | -0.6% | 13.4% | 6.3% |
| 5y1y6y | 5y1y + 6y6y - 5y7y | 19.6% | -0.9% | 13.6% | 7.1% |
| 5y1y25y | 5y1y + 6y25y - 5y26y | 23.1% | -0.7% | 16.4% | 7.6% |
| 5y1y24y | 5y1y + 6y24y - 5y25y | 22.2% | -0.7% | 15.6% | 7.5% |
| 5y1y5y | 5y1y + 6y5y - 5y6y | 19.1% | -1.1% | 13.1% | 7.3% |
| 5y1y23y | 5y1y + 6y23y - 5y24y | 21.4% | -0.7% | 15.0% | 7.3% |
| 5y1y22y | 5y1y + 6y22y - 5y23y | 20.7% | -0.7% | 14.3% | 7.2% |
| 5y1y21y | 5y1y + 6y21y - 5y22y | 19.9% | -0.7% | 13.7% | 7.1% |
| 5y1y2y | 5y1y + 6y2y - 5y3y | 17.5% | -1.5% | 12.2% | 7.0% |
| 5y1y1y | 5y1y + 6y1y - 5y2y | 15.6% | -1.6% | 11.0% | 6.3% |
| 5y1y20y | 5y1y + 6y20y - 5y21y | 19.2% | -0.6% | 13.1% | 7.0% |
| 5y1y3y | 5y1y + 6y3y - 5y4y | 17.5% | -1.4% | 11.8% | 7.2% |
| 5y1y15y | 5y1y + 6y15y - 5y16y | 17.7% | -0.5% | 12.2% | 6.1% |

Sorted on Total Carry

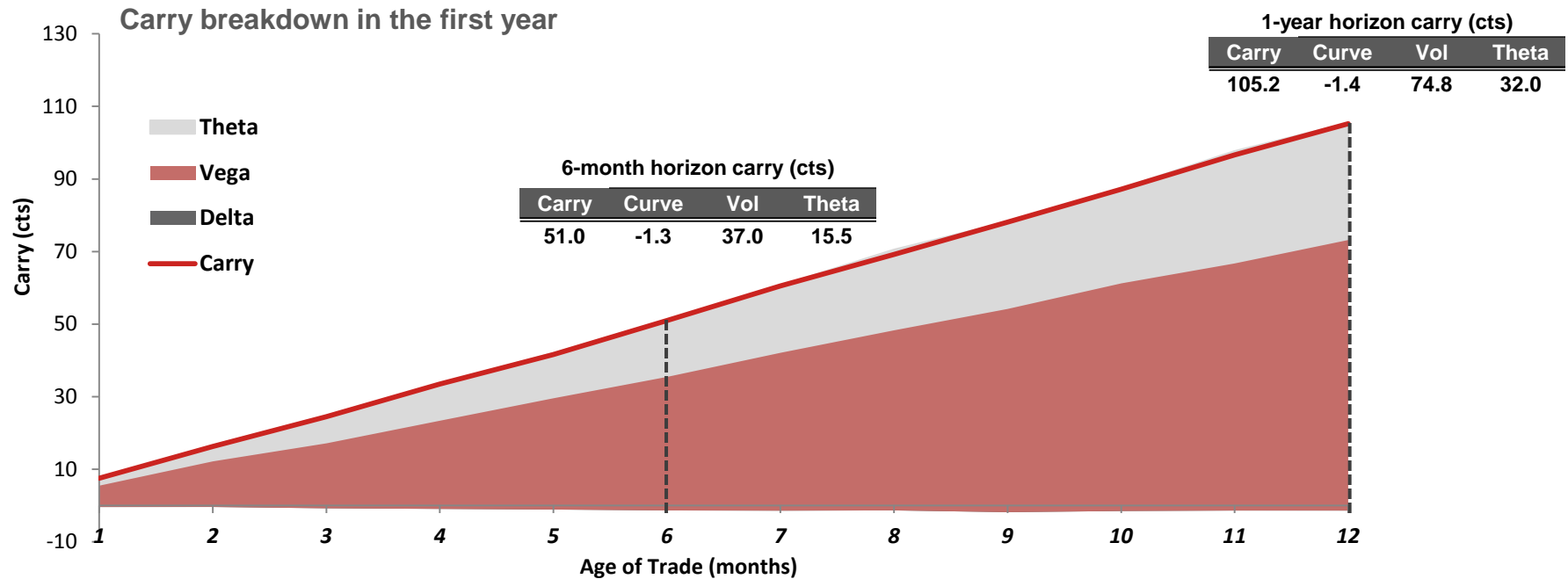
| Forward Vol | Triangle | 6m Carry/Premium | | | |
|-------------|----------------------|------------------|-------------|------------|-------|
| | | Total Carry | Delta Carry | Vega Carry | Theta |
| 5y1y29y | 5y1y + 6y29y - 5y30y | 26.6% | -0.8% | 19.5% | 8.1% |
| 5y1y30y | 5y1y + 6y30y - 5y31y | 26.0% | -0.8% | 19.0% | 8.0% |
| 5y1y28y | 5y1y + 6y28y - 5y29y | 25.7% | -0.8% | 18.7% | 8.0% |
| 5y1y27y | 5y1y + 6y27y - 5y28y | 24.8% | -0.8% | 17.9% | 7.9% |
| 5y1y26y | 5y1y + 6y26y - 5y27y | 23.9% | -0.8% | 17.1% | 7.7% |
| 5y1y25y | 5y1y + 6y25y - 5y26y | 23.1% | -0.7% | 16.4% | 7.6% |
| 1y1y9y | 1y1y + 2y9y - 1y10y | 22.5% | -1.8% | 6.4% | 18.1% |
| 5y1y24y | 5y1y + 6y24y - 5y25y | 22.2% | -0.7% | 15.6% | 7.5% |
| 1y1y10y | 1y1y + 2y10y - 1y11y | 22.2% | -1.4% | 7.2% | 16.6% |
| 1y1y11y | 1y1y + 2y11y - 1y12y | 21.6% | -1.1% | 6.7% | 16.2% |
| 5y1y23y | 5y1y + 6y23y - 5y24y | 21.4% | -0.7% | 15.0% | 7.3% |
| 1y1y12y | 1y1y + 2y12y - 1y13y | 21.1% | -0.9% | 6.3% | 15.9% |
| 1y1y13y | 1y1y + 2y13y - 1y14y | 20.7% | -0.6% | 6.0% | 15.6% |
| 5y1y22y | 5y1y + 6y22y - 5y23y | 20.7% | -0.7% | 14.3% | 7.2% |
| 1y1y8y | 1y1y + 2y8y - 1y9y | 20.6% | -2.2% | 4.9% | 18.2% |
| 1y1y14y | 1y1y + 2y14y - 1y15y | 20.3% | -0.4% | 5.6% | 15.4% |
| 5y2y28y | 5y2y + 7y28y - 5y30y | 20.1% | -0.9% | 12.9% | 8.4% |
| 1y1y15y | 1y1y + 2y15y - 1y16y | 20.1% | -0.3% | 5.0% | 15.6% |
| 5y2y29y | 5y2y + 7y29y - 5y31y | 20.0% | -0.9% | 12.8% | 8.4% |
| 5y1y21y | 5y1y + 6y21y - 5y22y | 19.9% | -0.7% | 13.7% | 7.1% |
| 5y2y30y | 5y2y + 7y30y - 5y32y | 19.9% | -0.9% | 12.7% | 8.4% |

Long Vega Trade Idea: Swaption Triangle – EUR 5y1y29y

EUR Swaption Triangle 5y1y29y – 105cts (55%) “quality” carry in one-year’s time.

Trade Idea: *long* 5y1y AMTF straddle and 6y29y ATMF straddle vs *short* 5y30y ATMF straddle. The package costs 191.2cts.

5y1y29y offers 105cts carry (with 75cts from vol) in a 1-year horizon, the highest among 4000+ EUR swaption triangle packages, with very little curve dependence on the expected return (i.e., primarily vega slide).



Forward rate reference: 5y1y=2.25%, 6y29y=2.98% and 5y30y=2.94%

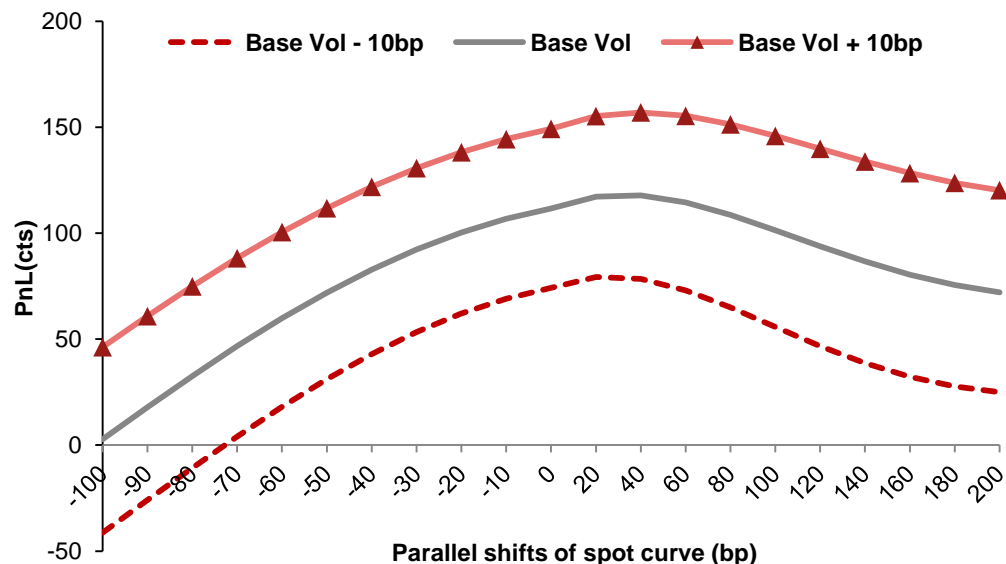
Long Vega Trade Idea: Swaption Triangle – EUR 5y1y29y

EUR Swaption Triangle 5y1y29y – risks and scenarios.

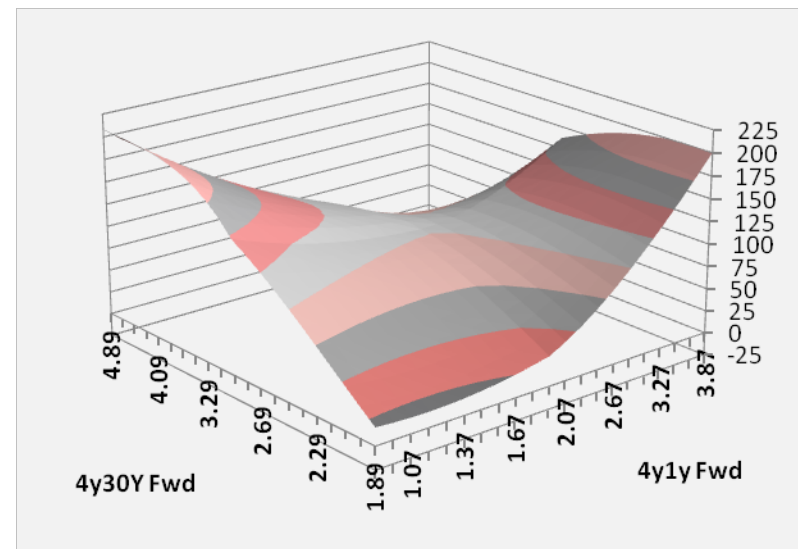
Synthetic forward vol exposure and a wide range of breakevens. Mostly vega risk with far lower breakevens.

| | Name | Forward (%) | Strike (%) | Vol (bps) | Premium (cts) | Delta (/1bp) | Gamma (/1bp2) | Vega (/1bp) | Theta (/1day) |
|------|---------------------|-------------|------------|-----------|---------------|--------------|---------------|-------------|---------------|
| Buy | 5y1y ATMF Straddle | 2.25 | 2.25 | 81.2 | 137 | 0 | 0 | 2 | 0 |
| Buy | 6y29y ATMF Straddle | 2.98 | 2.98 | 66.2 | 2,332 | -6 | 0 | 36 | -1 |
| Sell | 5y30y ATMF Straddle | 2.94 | 2.94 | 67.7 | -2,278 | 6 | 0 | -34 | 1 |
| | | | | | 191.2 | -0.6 | 0.0 | 3.3 | 0.1 |

Package P&L at the 1-year horizon vs curve parallel shift



Package P&L at the 1-year horizon vs curve shape



Esoteric Vanilla trades

Being aware of Vol Roll

USD Vol Surface Carry / Vega Slide and Time Decay

Total carry by risk, curve carry, vega slide, and time decay.

What to expect from holding straddles. Looking for sweet spots when curves might not perform.

Carry in cts / Initial Premium

| USD (Straddle) Total Carry (1y horizon) as % of Premium | | | | | | | |
|---|--------|--------|--------|--------|--------|--------|--------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -57.8% | -41.9% | -66.9% | -77.4% | -82.7% | -85.8% | -88.8% |
| 3m | -38.9% | -15.2% | -44.6% | -62.7% | -71.2% | -76.5% | -81.5% |
| 6m | -22.6% | 4.3% | -24.8% | -50.1% | -62.0% | -69.1% | -75.5% |
| 9m | -8.5% | 14.1% | -11.2% | -41.0% | -55.0% | -63.3% | -70.8% |
| 1y | 8.2% | 23.2% | 0.2% | -33.1% | -48.8% | -57.9% | -66.6% |
| 18m | 16.3% | 11.0% | -9.5% | -27.5% | -34.0% | -37.2% | -40.1% |
| 2y | 9.2% | 3.5% | -9.5% | -20.0% | -23.3% | -25.0% | -26.2% |
| 3y | -1.0% | -2.0% | -8.8% | -13.3% | -14.6% | -14.9% | -15.3% |
| 5y | -0.7% | -1.4% | -3.9% | -5.9% | -6.1% | -6.1% | -6.6% |
| 7y | 0.1% | 0.3% | -0.2% | -0.9% | -0.9% | -1.0% | -1.1% |
| 10y | 2.6% | 3.1% | 1.9% | 1.7% | 1.7% | 1.6% | 1.4% |
| 15y | 4.3% | 4.3% | 4.4% | 3.8% | 3.8% | 3.6% | 3.3% |
| 20y | 4.2% | 4.6% | 4.4% | 3.9% | 3.8% | 3.5% | 3.8% |
| 30y | 3.7% | 2.8% | 2.7% | 2.4% | 2.1% | 1.8% | 1.6% |

| Vega (Vol) Carry % | | | | | | | |
|--------------------|--------|--------|-------|-------|-------|--------|--------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -0.5% | 0.4% | -1.7% | -2.4% | -2.7% | -2.8% | -3.0% |
| 3m | -9.9% | -5.5% | -2.4% | -5.1% | -5.8% | -5.9% | -7.1% |
| 6m | -19.6% | -8.9% | -1.7% | -6.6% | -8.7% | -9.7% | -10.6% |
| 9m | -19.4% | -10.4% | -1.4% | -6.9% | -9.4% | -10.6% | -11.8% |
| 1y | -14.7% | -9.7% | -0.7% | -6.2% | -8.8% | -9.8% | -11.7% |
| 18m | -5.4% | -1.0% | 1.5% | -2.2% | -3.4% | -4.1% | -5.2% |
| 2y | -4.7% | 1.4% | 2.4% | -0.5% | -1.1% | -1.4% | -1.6% |
| 3y | 1.8% | 4.5% | 2.3% | -0.3% | -0.8% | -0.7% | -0.8% |
| 5y | 5.5% | 4.9% | 2.9% | 0.9% | 0.7% | 0.8% | 0.4% |
| 7y | 3.9% | 4.1% | 3.4% | 2.7% | 2.7% | 2.7% | 2.7% |
| 10y | 4.3% | 4.1% | 3.0% | 2.9% | 3.0% | 3.0% | 2.8% |
| 15y | 3.6% | 3.9% | 3.8% | 3.3% | 3.4% | 3.2% | 3.3% |
| 20y | 2.8% | 3.0% | 3.1% | 2.7% | 2.6% | 2.4% | 2.8% |
| 30y | 1.7% | 1.3% | 0.7% | 0.6% | 0.4% | 0.1% | 0.0% |

Best Vega Roll, doesn't always have good carry

| Delta (Curve) Carry % | | | | | | | |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | 7.1% | 12.8% | 5.3% | 2.6% | 1.6% | 1.1% | 0.8% |
| 3m | 19.2% | 32.2% | 16.4% | 8.6% | 5.5% | 3.9% | 2.8% |
| 6m | 31.8% | 48.6% | 28.7% | 15.5% | 10.2% | 7.4% | 5.3% |
| 9m | 41.2% | 57.0% | 38.4% | 21.1% | 14.2% | 10.4% | 7.6% |
| 1y | 51.6% | 64.7% | 46.8% | 26.3% | 17.9% | 13.4% | 9.8% |
| 18m | 49.8% | 44.0% | 26.2% | 13.8% | 9.5% | 7.3% | 5.7% |
| 2y | 36.7% | 27.7% | 15.8% | 8.8% | 6.4% | 5.3% | 4.3% |
| 3y | 13.3% | 10.2% | 5.8% | 3.9% | 3.1% | 2.8% | 2.5% |
| 5y | 1.7% | 1.6% | 1.1% | 1.0% | 0.9% | 0.9% | 0.8% |
| 7y | 0.2% | 0.3% | 0.4% | 0.4% | 0.4% | 0.3% | 0.2% |
| 10y | -0.4% | 0.3% | 0.1% | 0.0% | 0.0% | -0.1% | -0.2% |
| 15y | 0.0% | -0.3% | -0.1% | -0.2% | -0.3% | -0.3% | -0.5% |
| 20y | 0.0% | 0.2% | -0.1% | -0.1% | -0.2% | -0.3% | -0.4% |
| 30y | 0.0% | -0.6% | -0.1% | -0.2% | -0.3% | -0.3% | -0.4% |

| Theta % | | | | | | | |
|---------|--------|--------|--------|--------|--------|--------|--------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -66.7% | -53.0% | -74.0% | -83.4% | -88.2% | -91.2% | -94.0% |
| 3m | -42.8% | -37.1% | -53.3% | -63.6% | -70.4% | -75.2% | -78.8% |
| 6m | -34.1% | -34.9% | -50.6% | -56.4% | -60.9% | -64.7% | -69.1% |
| 9m | -30.1% | -32.5% | -48.2% | -54.7% | -58.4% | -61.3% | -64.8% |
| 1y | -28.7% | -31.9% | -46.0% | -53.3% | -57.5% | -60.7% | -63.5% |
| 18m | -27.9% | -31.9% | -37.0% | -39.0% | -40.0% | -40.3% | -40.5% |
| 2y | -22.9% | -25.6% | -27.7% | -28.3% | -28.6% | -28.8% | -28.9% |
| 3y | -16.1% | -16.7% | -16.9% | -16.9% | -16.9% | -17.0% | -17.0% |
| 5y | -7.9% | -7.9% | -7.8% | -7.8% | -7.8% | -7.8% | -7.8% |
| 7y | -4.0% | -4.0% | -4.0% | -4.0% | -4.0% | -4.0% | -4.0% |
| 10y | -1.2% | -1.2% | -1.2% | -1.2% | -1.2% | -1.2% | -1.2% |
| 15y | 0.7% | 0.7% | 0.7% | 0.7% | 0.7% | 0.7% | 0.7% |
| 20y | 1.4% | 1.4% | 1.4% | 1.4% | 1.4% | 1.4% | 1.4% |
| 30y | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% | 2.0% |

USD Vol Surface Carry

Carry attributed for pv01 neutral payer trades.

Carry in cts / Initial pv01 (i.e., carry per cts/bp spread exposure).

To construct carry/risk, numbers can be subtracted (to form a pv01 neutral trade).

| USD (Payer) Total Carry (1y horizon) as % of PV01 | | | | | | | |
|---|--------|--------|--------|--------|--------|--------|--------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -2.18 | -3.92 | -7.97 | -7.88 | -7.47 | -7.42 | -7.27 |
| 3m | -4.21 | -7.60 | -13.93 | -13.83 | -12.94 | -12.66 | -12.21 |
| 6m | -8.65 | -14.33 | -21.53 | -21.13 | -19.87 | -19.48 | -18.67 |
| 9m | -14.43 | -21.61 | -28.20 | -27.25 | -25.57 | -24.96 | -23.95 |
| 1y | -20.73 | -28.54 | -33.97 | -32.40 | -30.23 | -29.29 | -28.13 |
| 18m | -34.65 | -39.95 | -39.28 | -33.35 | -28.56 | -26.13 | -23.63 |
| 2y | -46.40 | -46.14 | -38.80 | -30.68 | -25.32 | -22.67 | -19.92 |
| 3y | -47.03 | -42.49 | -32.05 | -24.06 | -19.36 | -16.76 | -14.47 |
| 5y | -25.77 | -21.25 | -15.86 | -11.87 | -9.12 | -7.71 | -6.70 |
| 7y | -8.24 | -7.37 | -5.70 | -3.09 | -1.75 | -1.25 | -0.87 |
| 10y | -0.90 | 0.02 | 1.19 | 2.20 | 2.48 | 2.40 | 2.41 |
| 15y | 7.63 | 7.66 | 7.14 | 6.19 | 5.55 | 5.17 | 5.10 |
| 20y | 7.69 | 7.51 | 6.83 | 5.83 | 5.37 | 5.11 | 5.05 |
| 30y | 5.47 | 4.16 | 5.01 | 5.02 | 4.37 | 3.62 | 3.19 |

| Vega (Vol) Carry % | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | 0.25 | 0.48 | 0.84 | 0.77 | 0.71 | 0.70 | 0.68 |
| 3m | -0.11 | -0.05 | 0.44 | 0.18 | 0.23 | 0.36 | 0.46 |
| 6m | -1.60 | -1.65 | -0.39 | -0.95 | -1.06 | -1.01 | -0.83 |
| 9m | -3.17 | -2.91 | -0.97 | -1.79 | -2.08 | -2.05 | -1.96 |
| 1y | -3.94 | -3.28 | -1.05 | -2.17 | -2.57 | -2.49 | -2.57 |
| 18m | -4.19 | -1.58 | 0.11 | -1.19 | -1.50 | -1.66 | -1.92 |
| 2y | -4.92 | -0.97 | 0.82 | -0.53 | -0.77 | -0.90 | -0.93 |
| 3y | 0.87 | 2.40 | 1.33 | -0.12 | -0.42 | -0.35 | -0.39 |
| 5y | 4.51 | 4.00 | 2.20 | 0.59 | 0.42 | 0.46 | 0.25 |
| 7y | 4.07 | 3.90 | 3.35 | 2.46 | 2.30 | 2.23 | 2.00 |
| 10y | 5.05 | 4.49 | 2.99 | 2.66 | 2.53 | 2.41 | 2.21 |
| 15y | 4.09 | 4.45 | 4.15 | 3.44 | 3.17 | 2.88 | 2.86 |
| 20y | 3.45 | 3.32 | 3.35 | 2.82 | 2.51 | 2.19 | 2.46 |
| 30y | 1.93 | 1.53 | 0.89 | 0.69 | 0.41 | 0.09 | 0.02 |

Bear Steepener: Long 15y30y, Short 3y10y

Bear Flattener: Long 10y2y, Short 5y30y

| Delta (Curve) Carry % | | | | | | | |
|-----------------------|--------|--------|--------|--------|--------|-------|-------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -0.54 | -1.38 | -1.98 | -1.37 | -1.00 | -0.80 | -0.62 |
| 3m | -1.54 | -3.57 | -5.36 | -3.87 | -2.91 | -2.36 | -1.84 |
| 6m | -3.70 | -7.18 | -9.74 | -7.14 | -5.43 | -4.47 | -3.51 |
| 9m | -6.77 | -11.29 | -13.77 | -10.12 | -7.73 | -6.41 | -5.06 |
| 1y | -10.95 | -15.88 | -17.62 | -12.93 | -9.90 | -8.23 | -6.52 |
| 18m | -21.14 | -25.48 | -23.33 | -16.11 | -11.85 | -9.55 | -7.35 |
| 2y | -29.98 | -31.48 | -25.01 | -16.30 | -11.69 | -9.28 | -7.03 |
| 3y | -35.91 | -32.58 | -21.79 | -13.37 | -9.25 | -7.11 | -5.24 |
| 5y | -22.48 | -17.62 | -11.06 | -6.07 | -3.74 | -2.65 | -1.71 |
| 7y | -7.91 | -6.98 | -5.08 | -1.91 | -0.76 | -0.36 | 0.11 |
| 10y | -4.52 | -3.11 | -0.54 | 0.68 | 0.98 | 0.98 | 1.13 |
| 15y | 2.60 | 2.30 | 2.12 | 1.91 | 1.63 | 1.56 | 1.55 |
| 20y | 2.49 | 2.51 | 1.86 | 1.44 | 1.44 | 1.54 | 1.29 |
| 30y | 1.01 | 0.14 | 1.60 | 1.84 | 1.66 | 1.24 | 1.01 |

| Theta % | | | | | | | |
|---------|--------|--------|--------|--------|--------|--------|--------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -2.01 | -3.08 | -7.31 | -7.95 | -7.88 | -8.05 | -8.06 |
| 3m | -2.37 | -3.50 | -8.36 | -10.02 | -10.46 | -11.05 | -11.36 |
| 6m | -3.19 | -5.28 | -10.80 | -12.28 | -12.83 | -13.70 | -14.34 |
| 9m | -4.39 | -7.28 | -13.20 | -14.83 | -15.13 | -15.91 | -16.54 |
| 1y | -5.83 | -9.38 | -15.23 | -17.13 | -17.43 | -18.11 | -18.58 |
| 18m | -9.21 | -12.81 | -15.99 | -16.02 | -15.20 | -14.92 | -14.37 |
| 2y | -11.45 | -13.64 | -14.54 | -13.78 | -12.79 | -12.43 | -11.90 |
| 3y | -11.92 | -12.24 | -11.53 | -10.52 | -9.64 | -9.26 | -8.81 |
| 5y | -7.74 | -7.56 | -6.95 | -6.35 | -5.77 | -5.49 | -5.21 |
| 7y | -4.34 | -4.23 | -3.91 | -3.60 | -3.25 | -3.09 | -2.94 |
| 10y | -1.39 | -1.33 | -1.23 | -1.13 | -1.01 | -0.96 | -0.92 |
| 15y | 0.94 | 0.91 | 0.87 | 0.83 | 0.75 | 0.72 | 0.69 |
| 20y | 1.73 | 1.66 | 1.60 | 1.55 | 1.41 | 1.37 | 1.29 |
| 30y | 2.52 | 2.48 | 2.52 | 2.48 | 2.30 | 2.29 | 2.16 |

USD Vol Surface Carry

Carry attributed for vega neutral straddle trades.

Carry in cts / Initial Vega (i.e., carry per cts/bp-vol exposure)

To construct carry/risk, numbers can be subtracted (to form a vega neutral trade).

| USD (Straddle) Total Carry (1y horizon) as % of Vega | | | | | | | |
|--|--------|--------|--------|--------|--------|--------|--------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -10.75 | -12.57 | -40.17 | -48.21 | -49.57 | -51.72 | -52.73 |
| 3m | -8.69 | -4.90 | -26.59 | -40.87 | -44.36 | -47.18 | -48.71 |
| 6m | -7.50 | 0.89 | -15.24 | -35.24 | -42.02 | -46.46 | -48.94 |
| 9m | -5.17 | 6.41 | -6.18 | -30.36 | -39.45 | -44.86 | -48.48 |
| 1y | 1.29 | 14.53 | 2.90 | -25.15 | -35.99 | -41.97 | -46.63 |
| 18m | 5.52 | 7.10 | -7.31 | -22.73 | -26.26 | -27.95 | -28.85 |
| 2y | 2.21 | 2.31 | -7.97 | -17.09 | -18.57 | -19.34 | -19.42 |
| 3y | 0.38 | -1.05 | -7.71 | -11.31 | -11.55 | -11.39 | -11.19 |
| 5y | -1.15 | -1.56 | -3.77 | -5.28 | -5.03 | -4.79 | -4.83 |
| 7y | 0.14 | 0.12 | -0.01 | -0.68 | -0.58 | -0.59 | -0.74 |
| 10y | 3.05 | 2.64 | 1.47 | 1.22 | 1.15 | 1.06 | 0.86 |
| 15y | 3.19 | 3.40 | 3.15 | 2.60 | 2.36 | 2.12 | 2.02 |
| 20y | 2.87 | 2.93 | 2.70 | 2.35 | 2.07 | 1.83 | 1.88 |
| 30y | 2.00 | 1.51 | 1.49 | 1.33 | 1.07 | 0.88 | 0.77 |

| Vega (Vol) Carry % | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | 2.03 | 3.95 | 6.87 | 6.34 | 5.86 | 5.75 | 5.55 |
| 3m | -0.55 | -0.26 | 2.18 | 0.89 | 1.14 | 1.76 | 2.26 |
| 6m | -5.61 | -5.76 | -1.35 | -3.31 | -3.72 | -3.53 | -2.89 |
| 9m | -9.12 | -8.35 | -2.79 | -5.15 | -5.98 | -5.88 | -5.64 |
| 1y | -9.89 | -8.22 | -2.63 | -5.43 | -6.43 | -6.24 | -6.44 |
| 18m | -8.54 | -3.21 | 0.22 | -2.43 | -3.06 | -3.38 | -3.91 |
| 2y | -8.70 | -1.71 | 1.46 | -0.94 | -1.36 | -1.59 | -1.65 |
| 3y | 1.26 | 3.47 | 1.93 | -0.17 | -0.61 | -0.51 | -0.57 |
| 5y | 5.05 | 4.48 | 2.47 | 0.66 | 0.47 | 0.51 | 0.28 |
| 7y | 3.86 | 3.70 | 3.17 | 2.33 | 2.18 | 2.11 | 1.89 |
| 10y | 4.00 | 3.56 | 2.37 | 2.11 | 2.00 | 1.91 | 1.75 |
| 15y | 2.64 | 2.88 | 2.68 | 2.22 | 2.05 | 1.87 | 1.85 |
| 20y | 1.93 | 1.86 | 1.88 | 1.58 | 1.41 | 1.23 | 1.38 |
| 30y | 0.88 | 0.70 | 0.41 | 0.32 | 0.19 | 0.04 | 0.01 |

Vega Neutral Trade: Long 10y1y, Short 5y10y (a momentum trade)

| Delta (Curve) Carry % | | | | | | | |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | 1.11 | 4.04 | 3.69 | 1.72 | 0.99 | 0.68 | 0.46 |
| 3m | 3.57 | 12.36 | 12.47 | 6.11 | 3.58 | 2.43 | 1.61 |
| 6m | 9.15 | 24.09 | 23.61 | 12.13 | 7.37 | 5.12 | 3.44 |
| 9m | 16.28 | 34.59 | 33.27 | 17.48 | 10.84 | 7.67 | 5.26 |
| 1y | 25.30 | 44.97 | 42.07 | 22.42 | 14.08 | 10.11 | 7.04 |
| 18m | 32.88 | 36.42 | 24.98 | 12.22 | 7.65 | 5.69 | 4.21 |
| 2y | 31.04 | 28.01 | 16.23 | 8.21 | 5.43 | 4.27 | 3.32 |
| 3y | 15.99 | 12.86 | 6.85 | 3.98 | 2.95 | 2.47 | 2.10 |
| 5y | 2.14 | 2.18 | 1.40 | 1.11 | 0.93 | 0.84 | 0.72 |
| 7y | 0.31 | 0.35 | 0.47 | 0.40 | 0.34 | 0.24 | 0.18 |
| 10y | 0.11 | 0.11 | 0.09 | 0.04 | -0.02 | -0.05 | -0.13 |
| 15y | -0.02 | -0.04 | -0.07 | -0.13 | -0.15 | -0.19 | -0.25 |
| 20y | -0.01 | 0.15 | -0.06 | -0.09 | -0.12 | -0.15 | -0.21 |
| 30y | -0.02 | -0.32 | -0.05 | -0.10 | -0.15 | -0.19 | -0.21 |

| Theta % | | | | | | | |
|---------|--------|--------|--------|--------|--------|--------|--------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -14.98 | -20.96 | -54.73 | -61.77 | -62.17 | -64.12 | -64.76 |
| 3m | -10.76 | -14.69 | -38.06 | -47.34 | -50.11 | -53.33 | -55.19 |
| 6m | -10.50 | -16.69 | -35.47 | -41.45 | -43.78 | -47.07 | -49.53 |
| 9m | -12.07 | -19.47 | -36.02 | -41.35 | -42.58 | -45.01 | -47.04 |
| 1y | -14.12 | -22.26 | -36.50 | -41.82 | -42.89 | -44.76 | -46.13 |
| 18m | -18.68 | -26.00 | -32.51 | -32.58 | -30.92 | -30.35 | -29.24 |
| 2y | -20.12 | -24.00 | -25.65 | -24.33 | -22.60 | -21.97 | -21.04 |
| 3y | -16.89 | -17.40 | -16.49 | -15.11 | -13.86 | -13.34 | -12.69 |
| 5y | -8.34 | -8.22 | -7.62 | -7.02 | -6.40 | -6.11 | -5.82 |
| 7y | -3.99 | -3.89 | -3.62 | -3.37 | -3.06 | -2.92 | -2.78 |
| 10y | -1.04 | -1.02 | -0.97 | -0.90 | -0.82 | -0.78 | -0.75 |
| 15y | 0.58 | 0.56 | 0.54 | 0.51 | 0.46 | 0.44 | 0.42 |
| 20y | 0.94 | 0.91 | 0.88 | 0.85 | 0.77 | 0.75 | 0.70 |
| 30y | 1.14 | 1.13 | 1.14 | 1.12 | 1.04 | 1.03 | 0.98 |

EUR Vol Surface Carry / Vega Slide and Time Decay

Total carry by risk, curve carry, vega slide, and time decay.

What to expect from holding straddles. Looking for sweet spots when curves might not perform.

Carry in cts / Initial Premium

| EUR (Straddle) Total Carry (1y horizon) as % of Premium | | | | | | | |
|---|--------|--------|--------|--------|--------|--------|--------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -89.5% | -78.0% | -73.1% | -77.0% | -83.4% | -87.6% | -91.0% |
| 3m | -84.8% | -69.5% | -59.7% | -66.8% | -75.8% | -81.6% | -86.6% |
| 6m | -73.6% | -55.1% | -46.5% | -56.6% | -68.2% | -76.1% | -82.4% |
| 9m | -60.7% | -44.2% | -37.1% | -49.8% | -63.4% | -72.3% | -79.7% |
| 1y | -48.8% | -35.1% | -29.0% | -44.3% | -59.7% | -69.3% | -77.4% |
| 18m | -35.2% | -26.4% | -24.3% | -34.4% | -41.0% | -44.5% | -47.7% |
| 2y | -30.6% | -21.2% | -18.6% | -24.6% | -29.1% | -31.7% | -33.8% |
| 3y | -13.6% | -10.8% | -10.7% | -15.2% | -17.9% | -19.1% | -19.5% |
| 5y | -3.3% | -3.3% | -4.5% | -8.1% | -8.8% | -8.7% | -8.6% |
| 7y | 0.7% | 0.1% | -1.1% | -3.3% | -3.2% | -3.1% | -2.0% |
| 10y | 0.5% | 0.4% | -0.3% | -0.8% | -0.8% | -0.5% | 0.1% |
| 15y | 1.1% | 1.1% | 1.2% | 1.2% | 1.8% | 2.3% | 2.6% |
| 20y | 2.1% | 2.0% | 2.0% | 2.4% | 2.7% | 2.8% | 2.8% |
| 30y | 3.2% | 3.1% | 3.1% | 3.1% | 3.2% | 3.2% | 3.1% |

| Vega (Vol) Carry % | | | | | | | |
|--------------------|--------|--------|-------|--------|--------|--------|--------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -8.0% | -7.4% | -7.4% | -7.8% | -8.2% | -8.4% | -8.6% |
| 3m | -9.1% | -12.3% | -7.9% | -11.4% | -11.8% | -11.2% | -11.1% |
| 6m | -7.1% | -9.1% | -5.5% | -9.3% | -10.1% | -11.6% | -12.2% |
| 9m | -7.4% | -10.3% | -4.8% | -9.0% | -10.9% | -12.7% | -14.1% |
| 1y | -9.6% | -12.0% | -4.3% | -9.3% | -12.0% | -13.6% | -15.7% |
| 18m | -18.6% | -10.8% | -1.2% | -5.0% | -7.0% | -8.7% | -11.0% |
| 2y | -20.2% | -9.7% | -1.3% | -2.7% | -4.6% | -6.2% | -7.7% |
| 3y | -6.2% | -1.8% | 1.2% | -0.9% | -2.3% | -3.0% | -3.1% |
| 5y | 3.2% | 3.3% | 2.6% | -0.2% | -0.4% | -0.1% | 0.0% |
| 7y | 4.9% | 4.4% | 3.5% | 1.7% | 2.0% | 2.2% | 3.3% |
| 10y | 2.5% | 2.5% | 1.8% | 1.6% | 1.7% | 2.0% | 2.6% |
| 15y | 1.3% | 1.4% | 1.6% | 1.7% | 2.4% | 2.8% | 3.1% |
| 20y | 1.8% | 1.7% | 1.8% | 2.2% | 2.5% | 2.7% | 2.6% |
| 30y | 2.3% | 2.2% | 2.2% | 2.2% | 2.2% | 2.3% | 2.2% |

| Delta (Curve) Carry % | | | | | | | |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | 0.5% | 2.2% | 3.4% | 2.5% | 1.4% | 0.8% | 0.5% |
| 3m | 1.5% | 5.8% | 9.3% | 7.0% | 4.0% | 2.4% | 1.4% |
| 6m | 4.2% | 11.7% | 16.1% | 11.9% | 7.2% | 4.5% | 2.7% |
| 9m | 8.4% | 17.4% | 21.8% | 15.8% | 9.6% | 6.1% | 3.8% |
| 1y | 13.6% | 22.8% | 26.9% | 19.2% | 11.7% | 7.6% | 4.8% |
| 18m | 14.5% | 18.2% | 15.2% | 9.6% | 5.6% | 3.7% | 2.5% |
| 2y | 12.9% | 13.9% | 10.4% | 6.3% | 3.7% | 2.6% | 1.9% |
| 3y | 9.2% | 8.2% | 5.9% | 3.6% | 2.2% | 1.6% | 1.4% |
| 5y | 2.9% | 2.8% | 2.2% | 1.3% | 0.9% | 0.7% | 0.7% |
| 7y | 1.3% | 1.2% | 0.9% | 0.5% | 0.3% | 0.2% | 0.2% |
| 10y | 0.2% | 0.2% | 0.1% | -0.1% | -0.2% | -0.3% | -0.2% |
| 15y | 0.0% | -0.1% | -0.2% | -0.3% | -0.4% | -0.3% | -0.4% |
| 20y | 0.0% | -0.1% | -0.1% | -0.2% | -0.2% | -0.2% | -0.2% |
| 30y | 0.0% | 0.0% | 0.1% | 0.1% | 0.1% | 0.1% | 0.1% |

| Theta % | | | | | | | |
|---------|--------|--------|--------|--------|--------|--------|--------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -93.5% | -82.6% | -77.8% | -81.2% | -87.1% | -91.0% | -94.3% |
| 3m | -81.6% | -63.2% | -59.5% | -61.8% | -69.8% | -76.2% | -81.3% |
| 6m | -69.6% | -55.7% | -55.3% | -56.9% | -63.0% | -67.7% | -73.1% |
| 9m | -60.1% | -51.0% | -53.8% | -55.8% | -60.2% | -63.6% | -67.8% |
| 1y | -53.1% | -46.2% | -52.1% | -54.6% | -59.0% | -62.2% | -65.2% |
| 18m | -31.3% | -34.0% | -38.5% | -39.1% | -39.8% | -39.7% | -39.4% |
| 2y | -23.3% | -25.4% | -27.7% | -28.3% | -28.2% | -28.1% | -28.0% |
| 3y | -16.5% | -17.0% | -17.6% | -17.7% | -17.6% | -17.6% | -17.6% |
| 5y | -9.3% | -9.4% | -9.4% | -9.3% | -9.3% | -9.3% | -9.3% |
| 7y | -5.5% | -5.5% | -5.5% | -5.4% | -5.4% | -5.4% | -5.5% |
| 10y | -2.3% | -2.3% | -2.3% | -2.3% | -2.3% | -2.3% | -2.3% |
| 15y | -0.2% | -0.2% | -0.2% | -0.2% | -0.2% | -0.2% | -0.2% |
| 20y | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% | 0.3% |
| 30y | 0.8% | 0.8% | 0.8% | 0.8% | 0.8% | 0.8% | 0.8% |

Best Vega Roll generally has decent total carry.

EUR Vol Surface Carry

Carry attributed for pv01 neutral payer trades.

Carry in cts / Initial pv01 (i.e., carry per cts/bp spread exposure)

| EUR (Payer) Total Carry (1y horizon) as % of PV01 | | | | | | | |
|---|--------|--------|--------|--------|--------|--------|--------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -2.66 | -3.26 | -5.59 | -5.72 | -5.52 | -5.34 | -5.12 |
| 3m | -4.88 | -6.42 | -10.40 | -10.98 | -10.47 | -9.95 | -9.44 |
| 6m | -7.41 | -10.01 | -15.87 | -16.74 | -15.77 | -15.19 | -14.37 |
| 9m | -9.96 | -13.87 | -20.72 | -21.77 | -20.50 | -19.71 | -18.70 |
| 1y | -12.88 | -17.95 | -25.06 | -26.31 | -24.79 | -23.65 | -22.51 |
| 18m | -19.18 | -23.44 | -27.11 | -26.28 | -22.72 | -20.65 | -18.95 |
| 2y | -26.17 | -27.55 | -27.44 | -24.39 | -20.61 | -18.58 | -16.89 |
| 3y | -30.10 | -28.48 | -25.21 | -20.94 | -17.12 | -15.06 | -13.19 |
| 5y | -22.32 | -21.02 | -17.90 | -14.14 | -10.66 | -8.79 | -7.67 |
| 7y | -14.25 | -13.03 | -9.86 | -6.50 | -4.21 | -3.04 | -2.14 |
| 10y | -4.99 | -3.80 | -1.88 | 0.23 | 0.87 | 1.05 | 0.98 |
| 15y | 6.73 | 5.94 | 5.15 | 4.71 | 4.44 | 3.88 | 3.42 |
| 20y | 5.68 | 5.50 | 5.06 | 4.52 | 3.59 | 3.28 | 2.80 |
| 30y | 1.55 | 1.70 | 2.12 | 2.57 | 2.38 | 2.31 | 2.11 |

| Vega (Vol) Carry % | | | | | | | |
|--------------------|-------|-------|-------|-------|-------|-------|-------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -0.21 | -0.24 | -0.41 | -0.45 | -0.45 | -0.45 | -0.44 |
| 3m | -0.44 | -0.79 | -0.82 | -1.25 | -1.23 | -1.11 | -1.05 |
| 6m | -0.52 | -0.91 | -0.87 | -1.56 | -1.59 | -1.76 | -1.75 |
| 9m | -0.74 | -1.43 | -0.99 | -1.97 | -2.24 | -2.51 | -2.64 |
| 1y | -1.24 | -2.15 | -1.06 | -2.44 | -2.98 | -3.22 | -3.54 |
| 18m | -3.99 | -2.81 | -0.38 | -1.69 | -2.20 | -2.62 | -3.20 |
| 2y | -6.30 | -3.41 | -0.53 | -1.07 | -1.75 | -2.24 | -2.70 |
| 3y | -3.00 | -0.92 | 0.63 | -0.45 | -1.11 | -1.41 | -1.39 |
| 5y | 2.27 | 2.35 | 1.88 | -0.12 | -0.23 | -0.04 | 0.02 |
| 7y | 4.12 | 3.63 | 2.83 | 1.37 | 1.46 | 1.56 | 2.20 |
| 10y | 2.42 | 2.36 | 1.70 | 1.41 | 1.41 | 1.57 | 1.87 |
| 15y | 1.35 | 1.44 | 1.59 | 1.74 | 2.14 | 2.34 | 2.38 |
| 20y | 1.97 | 1.84 | 1.95 | 2.29 | 2.32 | 2.25 | 2.03 |
| 30y | 2.58 | 2.46 | 2.41 | 2.32 | 2.07 | 1.97 | 1.73 |

To construct carry/risk, numbers can be subtracted (to form a pv01 neutral trade).

| Delta (Curve) Carry % | | | | | | | |
|-----------------------|--------|--------|--------|--------|-------|-------|-------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -0.20 | -0.49 | -1.00 | -0.89 | -0.65 | -0.48 | -0.34 |
| 3m | -0.61 | -1.43 | -2.90 | -2.60 | -1.92 | -1.44 | -1.04 |
| 6m | -1.58 | -3.16 | -5.60 | -4.97 | -3.68 | -2.81 | -2.04 |
| 9m | -3.00 | -5.16 | -8.18 | -7.18 | -5.33 | -4.09 | -2.99 |
| 1y | -4.77 | -7.38 | -10.70 | -9.27 | -6.88 | -5.31 | -3.90 |
| 18m | -8.51 | -11.78 | -14.15 | -11.45 | -8.07 | -6.06 | -4.36 |
| 2y | -12.61 | -15.21 | -15.69 | -11.87 | -8.13 | -6.04 | -4.33 |
| 3y | -19.02 | -18.89 | -16.42 | -11.28 | -7.36 | -5.33 | -3.82 |
| 5y | -17.75 | -16.59 | -13.02 | -7.55 | -4.39 | -2.97 | -2.14 |
| 7y | -13.63 | -12.00 | -8.15 | -3.48 | -1.61 | -0.75 | -0.70 |
| 10y | -5.17 | -3.99 | -1.46 | 0.87 | 1.35 | 1.26 | 0.77 |
| 15y | 5.48 | 4.61 | 3.69 | 3.11 | 2.44 | 1.67 | 1.17 |
| 20y | 3.30 | 3.26 | 2.73 | 1.86 | 0.95 | 0.73 | 0.50 |
| 30y | -1.97 | -1.69 | -1.21 | -0.64 | -0.47 | -0.38 | -0.29 |

| Theta % | | | | | | | |
|---------|-------|-------|--------|--------|--------|--------|--------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -2.55 | -2.85 | -4.67 | -4.92 | -5.01 | -5.01 | -4.92 |
| 3m | -4.05 | -4.22 | -6.50 | -7.07 | -7.50 | -7.72 | -7.76 |
| 6m | -5.22 | -5.73 | -9.09 | -9.80 | -10.14 | -10.43 | -10.60 |
| 9m | -6.05 | -7.23 | -11.48 | -12.43 | -12.55 | -12.69 | -12.78 |
| 1y | -6.90 | -8.46 | -13.38 | -14.66 | -14.84 | -14.87 | -14.78 |
| 18m | -6.71 | -8.89 | -12.62 | -13.20 | -12.50 | -12.02 | -11.44 |
| 2y | -7.26 | -8.92 | -11.21 | -11.43 | -10.72 | -10.29 | -9.86 |
| 3y | -7.98 | -8.57 | -9.30 | -9.10 | -8.55 | -8.23 | -7.90 |
| 5y | -6.83 | -6.77 | -6.73 | -6.46 | -6.03 | -5.78 | -5.54 |
| 7y | -4.69 | -4.61 | -4.50 | -4.37 | -4.03 | -3.83 | -3.62 |
| 10y | -2.25 | -2.18 | -2.13 | -2.07 | -1.90 | -1.79 | -1.66 |
| 15y | -0.14 | -0.14 | -0.15 | -0.16 | -0.15 | -0.15 | -0.14 |
| 20y | 0.42 | 0.41 | 0.40 | 0.38 | 0.33 | 0.30 | 0.28 |
| 30y | 0.93 | 0.92 | 0.91 | 0.88 | 0.78 | 0.71 | 0.66 |

EUR Vol Surface Carry

Carry attributed to vega neutral straddle trades

Carry in cts / Initial Vega (i.e., carry per cts/bp-vol exposure)

To construct carry/risk, numbers can be subtracted (to form a vega neutral trade).

| EUR (Straddle) Total Carry (1y horizon) as % of Vega | | | | | | | |
|--|--------|--------|--------|--------|--------|--------|--------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -20.54 | -21.90 | -35.21 | -37.93 | -39.66 | -40.28 | -40.11 |
| 3m | -20.85 | -22.46 | -31.24 | -36.92 | -39.97 | -40.88 | -41.15 |
| 6m | -19.26 | -19.48 | -26.03 | -33.45 | -37.96 | -40.77 | -41.78 |
| 9m | -17.41 | -17.65 | -22.11 | -31.19 | -37.41 | -41.03 | -42.85 |
| 1y | -15.77 | -15.83 | -18.21 | -29.27 | -37.14 | -41.11 | -43.73 |
| 18m | -15.42 | -14.09 | -16.24 | -23.68 | -26.33 | -27.54 | -28.31 |
| 2y | -16.84 | -13.15 | -13.31 | -17.62 | -19.56 | -20.52 | -21.03 |
| 3y | -9.47 | -7.80 | -8.12 | -11.27 | -12.53 | -12.94 | -12.63 |
| 5y | -2.62 | -2.61 | -3.59 | -6.30 | -6.37 | -6.03 | -5.74 |
| 7y | 0.58 | 0.08 | -0.85 | -2.49 | -2.25 | -2.05 | -1.23 |
| 10y | 0.35 | 0.32 | -0.25 | -0.59 | -0.52 | -0.33 | 0.04 |
| 15y | 0.73 | 0.76 | 0.79 | 0.81 | 1.07 | 1.24 | 1.28 |
| 20y | 1.28 | 1.19 | 1.20 | 1.36 | 1.39 | 1.35 | 1.22 |
| 30y | 1.64 | 1.58 | 1.56 | 1.50 | 1.33 | 1.26 | 1.12 |

| Vega (Vol) Carry % | | | | | | | |
|--------------------|--------|-------|-------|-------|-------|-------|-------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -1.84 | -2.08 | -3.56 | -3.85 | -3.90 | -3.86 | -3.78 |
| 3m | -2.23 | -3.96 | -4.12 | -6.31 | -6.21 | -5.60 | -5.29 |
| 6m | -1.85 | -3.21 | -3.06 | -5.49 | -5.61 | -6.22 | -6.17 |
| 9m | -2.12 | -4.12 | -2.85 | -5.66 | -6.43 | -7.22 | -7.59 |
| 1y | -3.11 | -5.39 | -2.68 | -6.12 | -7.49 | -8.08 | -8.88 |
| 18m | -8.15 | -5.74 | -0.78 | -3.46 | -4.51 | -5.37 | -6.55 |
| 2y | -11.15 | -6.04 | -0.94 | -1.91 | -3.11 | -3.99 | -4.80 |
| 3y | -4.34 | -1.32 | 0.90 | -0.67 | -1.62 | -2.06 | -2.03 |
| 5y | 2.55 | 2.64 | 2.09 | -0.16 | -0.28 | -0.07 | -0.01 |
| 7y | 3.90 | 3.44 | 2.68 | 1.29 | 1.38 | 1.47 | 2.07 |
| 10y | 1.92 | 1.87 | 1.34 | 1.12 | 1.12 | 1.25 | 1.49 |
| 15y | 0.88 | 0.93 | 1.03 | 1.14 | 1.40 | 1.53 | 1.55 |
| 20y | 1.10 | 1.03 | 1.09 | 1.29 | 1.30 | 1.27 | 1.15 |
| 30y | 1.18 | 1.13 | 1.10 | 1.06 | 0.94 | 0.90 | 0.79 |

| Delta (Curve) Carry % | | | | | | | |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | 0.12 | 0.62 | 1.62 | 1.26 | 0.66 | 0.38 | 0.22 |
| 3m | 0.36 | 1.88 | 4.88 | 3.85 | 2.10 | 1.21 | 0.69 |
| 6m | 1.10 | 4.15 | 9.03 | 7.04 | 3.99 | 2.41 | 1.39 |
| 9m | 2.42 | 6.93 | 12.99 | 9.92 | 5.65 | 3.48 | 2.06 |
| 1y | 4.41 | 10.25 | 16.95 | 12.70 | 7.26 | 4.52 | 2.72 |
| 18m | 6.36 | 9.72 | 10.18 | 6.60 | 3.59 | 2.27 | 1.49 |
| 2y | 7.12 | 8.64 | 7.42 | 4.50 | 2.51 | 1.68 | 1.21 |
| 3y | 6.44 | 5.96 | 4.49 | 2.65 | 1.55 | 1.11 | 0.91 |
| 5y | 2.34 | 2.21 | 1.76 | 1.03 | 0.64 | 0.49 | 0.46 |
| 7y | 1.01 | 0.91 | 0.68 | 0.35 | 0.20 | 0.11 | 0.14 |
| 10y | 0.15 | 0.13 | 0.07 | -0.07 | -0.14 | -0.16 | -0.14 |
| 15y | -0.01 | -0.05 | -0.11 | -0.20 | -0.22 | -0.19 | -0.18 |
| 20y | -0.02 | -0.04 | -0.08 | -0.12 | -0.08 | -0.08 | -0.07 |
| 30y | 0.02 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.03 |

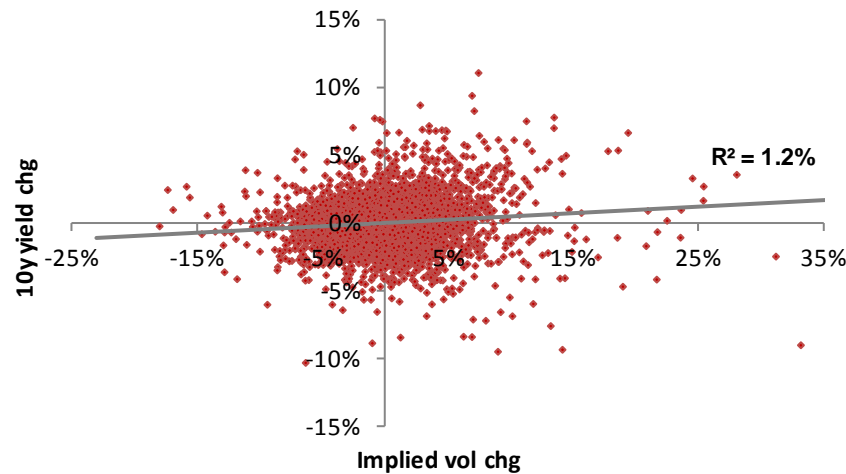
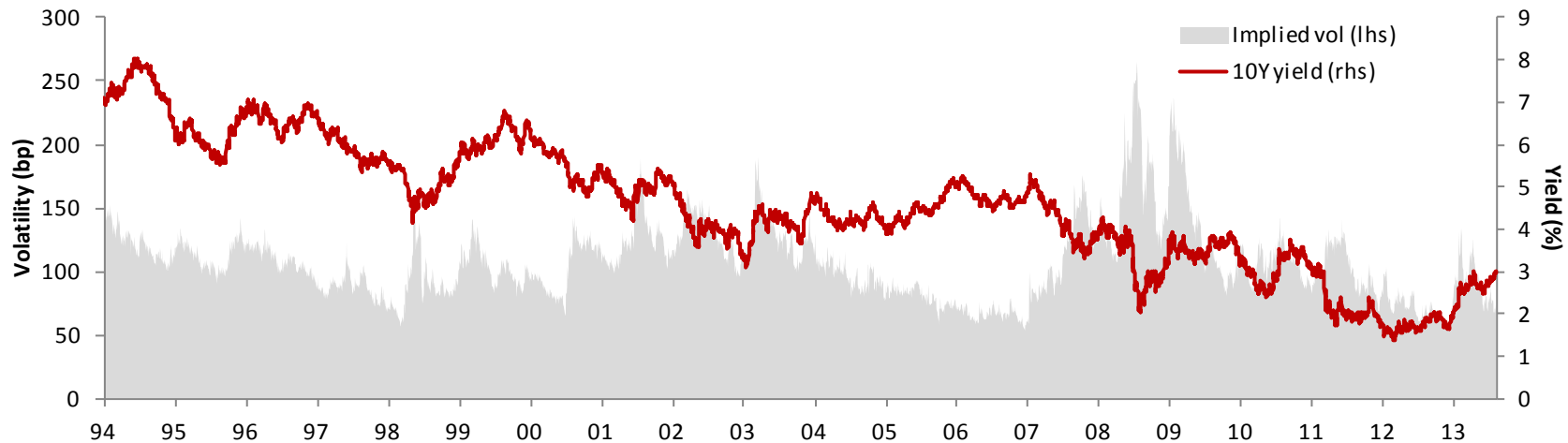
| Theta % | | | | | | | |
|---------|--------|--------|--------|--------|--------|--------|--------|
| | 1y | 2y | 5y | 10y | 15y | 20y | 30y |
| 1m | -21.44 | -23.20 | -37.48 | -39.99 | -41.43 | -41.89 | -41.55 |
| 3m | -20.05 | -20.44 | -31.15 | -34.17 | -36.78 | -38.14 | -38.62 |
| 6m | -18.19 | -19.67 | -30.95 | -33.59 | -35.07 | -36.29 | -37.08 |
| 9m | -17.23 | -20.33 | -32.08 | -34.94 | -35.53 | -36.09 | -36.49 |
| 1y | -17.15 | -20.82 | -32.74 | -36.05 | -36.72 | -36.94 | -36.85 |
| 18m | -13.71 | -18.16 | -25.78 | -26.96 | -25.54 | -24.57 | -23.38 |
| 2y | -12.83 | -15.77 | -19.81 | -20.22 | -18.97 | -18.22 | -17.44 |
| 3y | -11.46 | -12.32 | -13.38 | -13.11 | -12.33 | -11.87 | -11.40 |
| 5y | -7.52 | -7.47 | -7.45 | -7.18 | -6.73 | -6.45 | -6.20 |
| 7y | -4.31 | -4.26 | -4.19 | -4.10 | -3.81 | -3.62 | -3.42 |
| 10y | -1.73 | -1.70 | -1.68 | -1.65 | -1.52 | -1.43 | -1.33 |
| 15y | -0.14 | -0.14 | -0.14 | -0.13 | -0.12 | -0.11 | -0.10 |
| 20y | 0.21 | 0.21 | 0.20 | 0.20 | 0.18 | 0.16 | 0.15 |
| 30y | 0.43 | 0.43 | 0.42 | 0.40 | 0.36 | 0.33 | 0.30 |

Appendix: Does Short Gamma make sense now?

Is a hiking environment a good one to short gamma?

What is the impact of rising yield on Short Gamma

No strong evidence shows that a rising 10y yield will imply a significant volatility increase.

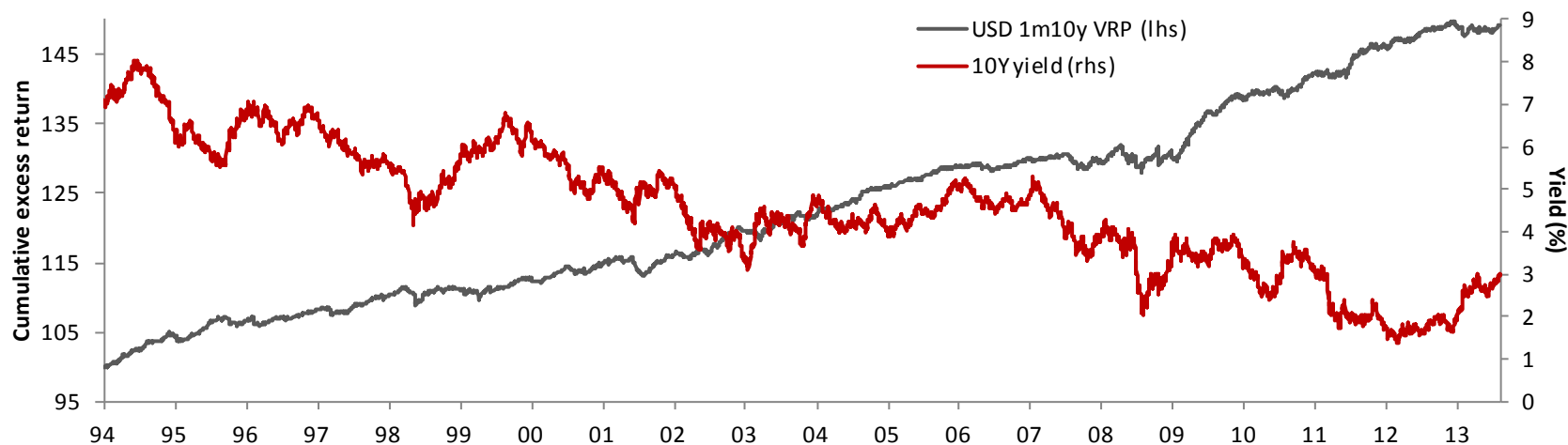


The correlation between the change in the 10y yield and the change in implied volatility is only 10.8%. The linear relationship is even weaker ($R\text{-squared} = 1.2\%$).

What is the impact of rising yield on Short Gamma

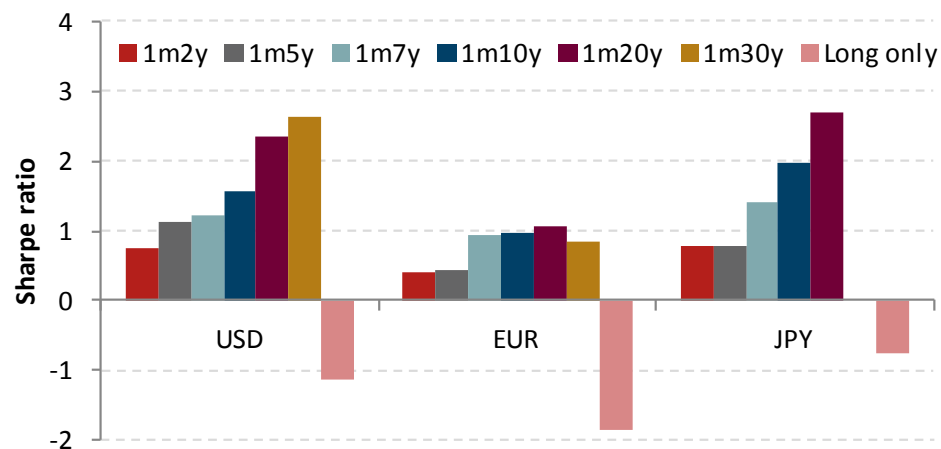
iVRP performs well even when the Fed hikes rates

iVRP = Short 1m10y ATMF straddles (same notional) daily, delta hedged daily.



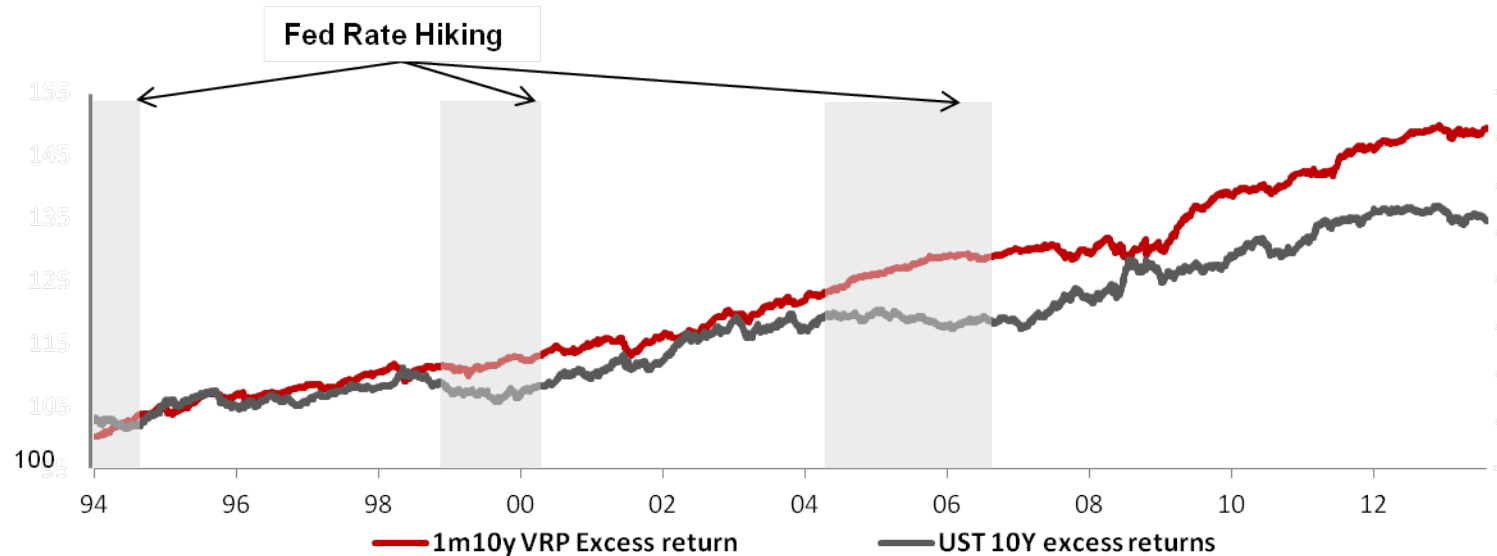
iVRP (USD 1m10y) even outperforms when yields rise. For EUR and JPY, iVRP also performs well during yield hiking periods.

| USD 1m10y VRP | Yield rises | Yield falls |
|---------------|-------------|-------------|
| Ret (ann.) | 2.56% | 1.57% |
| Std (ann.) | 1.62% | 1.42% |
| Sharpe ratio | 1.58 | 1.11 |



iVRP outperforms in hiking rate environments

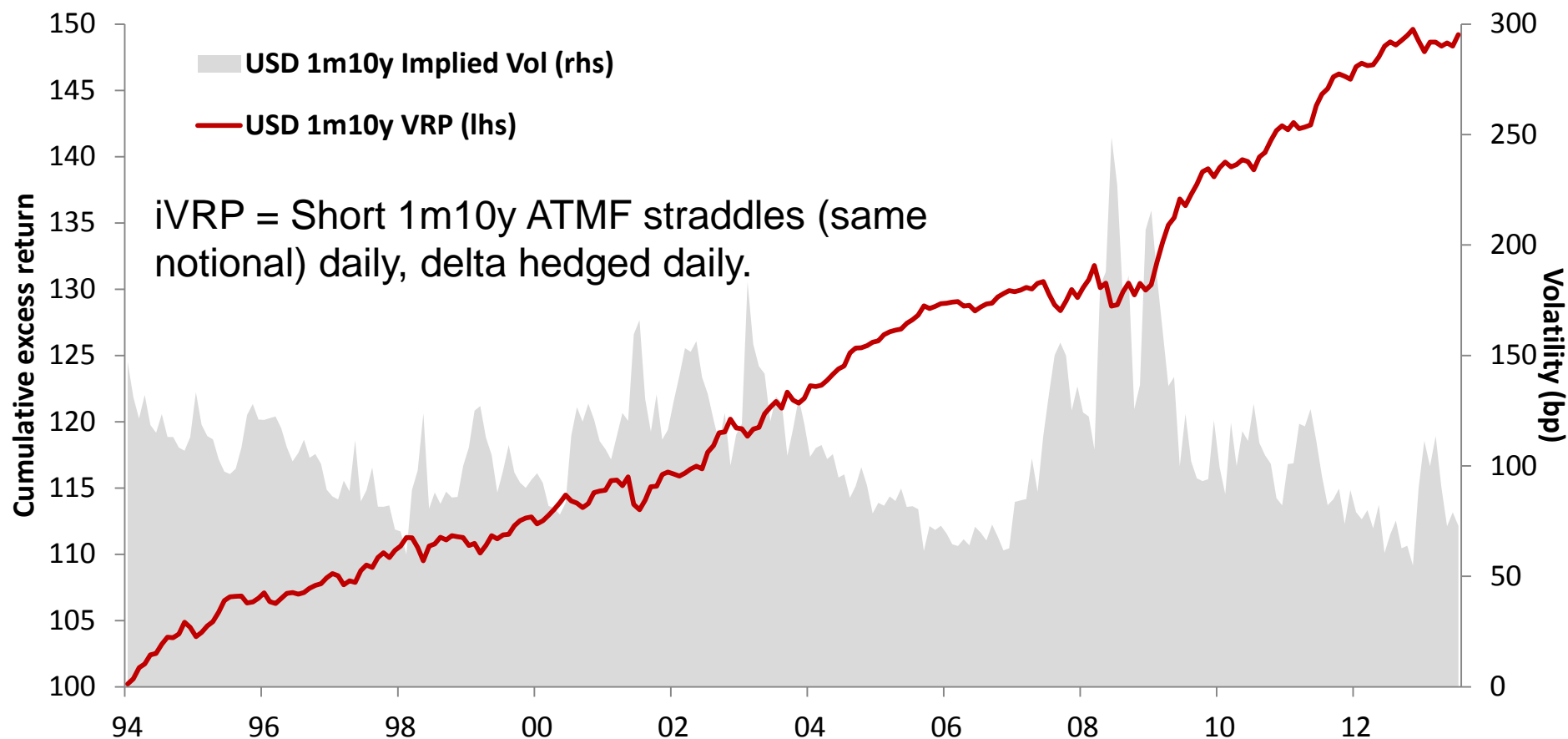
During the Fed rate hiking periods of 1994, 1999 and 2004, interest rate VRP outperformed long-only bond positions



| Period | Description | Sharpe ratio |
|----------------------|----------------------|--------------|
| Jun 1994 – Mar 1995 | Hiking from low rate | 4.91 |
| Dec 2001 – Mar 2004 | Low rate | 1.69 |
| Mar 2004 – June 2006 | Hiking from low rate | 2.49 |
| Dec 2008 - present | Low rate | 1.89 |

Short Gamma (Nomura iVRP) v.s. 1-month implied volatility

NOMURA



VRP underperforms in a rising vol environment

- The average annual return is generally lower when volatility is rising. This is particularly true when the absolute level of volatility is relatively high. We are currently in the 1st bucket according to the volatility level (less than 85.58bp).

| | | | | | |
|-------------------------|------------|-------------|------------|------------|------------|
| | | falling vol | | rising vol | |
| | | 1st bucket | 2nd bucket | 3rd bucket | 4th bucket |
| low vol ↑ high vol ↓ | 1st bucket | 4.48% | 2.91% | 1.87% | -1.61% |
| | 2nd bucket | 4.57% | 3.92% | 0.40% | -2.32% |
| | 3rd bucket | 5.06% | 4.01% | 0.83% | -4.49% |
| | 4th bucket | 7.58% | 5.17% | 0.61% | -3.56% |

Note: The level and the change of implied vol are divided into four buckets respectively. The average return of VRP is then calculated for each conditional bucket. The quartiles of the vol level are 85.58bp, 104.32bp and 121.55bp, and the quartiles of the change of vol are -8.67%, -1.31% and 8.55%. All the data are calculated on a monthly basis.

- Given the current level of volatility (1st bucket), there is roughly a 73% chance that VRP will end up in positive returns (if the change in volatility falls into the first three buckets, less than 8.55%).

| | | | | | |
|-------------------------|------------|-------------|------------|------------|------------|
| | | falling vol | | rising vol | |
| | | 1st bucket | 2nd bucket | 3rd bucket | 4th bucket |
| low vol ↑ high vol ↓ | 1st bucket | 3.42% | 5.56% | 9.40% | 6.84% |
| | 2nd bucket | 5.56% | 5.56% | 5.56% | 8.12% |
| | 3rd bucket | 4.70% | 7.69% | 5.13% | 7.26% |
| | 4th bucket | 11.54% | 5.98% | 4.70% | 2.99% |

... but the recovery is generally fast

- Since 1994, there have been several major drawdowns for USD 1m10y VRP index (summarized as follows). The average time of recovery to previous B/E level is 4.7 months.

| Trough date | Recovery to B/E date | Drawdown | Event | Recovery time (months) |
|-------------|----------------------|----------|--------------------------------------|------------------------|
| Oct 1998 | Jan 1999 | -1.58% | Russian default | 3 |
| Dec 2001 | Apr 2002 | -2.21% | Enron scandal | 4 |
| Jul 2003 | Oct 2003 | -1.08% | Fed's unconventional monetary policy | 3 |
| Feb 2008 | Jul 2008 | -1.71% | Subprime crisis | 5 |
| Nov 2008 | Jul 2009 | -2.38% | Lehman collapse | 7 |
| Jun 2013 | Dec 2013 | -1.14% | Tapering concern | 6 |

- For the same period, it takes S&P 500 (excess returns) roughly 10 years to recover from its trough in Mar 2003



Appendix: Technical details

Details of calculations and tables

Expected Value – How should we construct it?

We don't want to maximize carry without being aware of break-evens.

How do we construct a single (optimizable) value?

1. Construct candidate Physical measures:

1. Historical performance in changes: Calculate physical measure using change data, centre at spot.
2. Historical performance in levels: Calculate physical measure using level data.
3. Centre at spot. Assume carry is realised in an expected sense.
For ease assume $\text{Spot}(T) \sim N(\text{Spot}(0), \text{Spot-Vol}(0,T)*T^{1/2})$ (We call this the **Expected payoff**.)

2. Calculate expectation under these, i.e., backtested performance for Historical P-measure, or Expected payoff for the Spot-vol case.

3. Effectively, we have adjusted breakevens by spot-vol.

We can optimize over each of these. We have chosen Expected Payoff. This penalizes narrow break-evens even when carry is high.

To do:

- **Compare Expiries:** vol-adjusted breakevens do help to make comparisons across strikes and tenors, but we do not compare across expiries well.
- **Calculate ex-ante Sharpe Ratios.** Maximize Sharpe Ratio rather than expectation.
- **Directional:** Consider conditioning on views other than carry (i.e., more than 'spot is realised').
- **Historical:** Construct historical (kernel) densities. Calculate entry points, historic returns, etc.

Conditional Curve Trades Pickup Reports

Example: 6m10y and other 6m expiry vanilla swaptions

Fix 10y notional, Calculate 6m10y ATMF premium.

Scale all others by Notionals by Pv01 ratio. Shift Strikes to have same premium as 6m10y ATMF.

Total Pickup = Vol Pickup + Yield Curve Carry

Can subtract various pickup numbers to get (approx) vol pickup or total pickup for alternative curve trades.

| 6m Expiry | | 1y | 2y | 3y | 5y | 7y | 10y | 20Y | 30Y |
|------------------|--------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Spot | | 0.27 | 0.38 | 0.64 | 1.45 | 2.15 | 2.80 | 3.57 | 3.74 |
| Fwd | | 0.34 | 0.56 | 0.93 | 1.79 | 2.44 | 3.03 | 3.69 | 3.84 |
| Swap PV01 | | 1.0 | 2.0 | 3.0 | 4.9 | 6.6 | 9.0 | 15.0 | 19.0 |
| Notional traded | | 90,414,841 | 45,234,884 | 30,305,079 | 18,529,281 | 13,604,458 | 10,000,000 | 6,000,245 | 4,753,810 |
| Payers | Strike | 0.10 | 0.32 | 0.74 | 1.74 | 2.43 | ATMF | 3.65 | 3.78 |
| | PV | 219,394 | 219,394 | 219,394 | 219,394 | 219,394 | 219,394 | 219,394 | 219,394 |
| | Moneyiness | 24.3 | 23.6 | 18.9 | 5.2 | 1.1 | 0.0 | 4.1 | 5.7 |
| | Yield Curve Carry (Fwd - Spot) | 7.2 | 18.0 | 28.4 | 34.2 | 29.1 | 22.6 | 12.6 | 9.6 |
| | Total pickup | 17.1 | 5.6 | -9.4 | -29.0 | -28.0 | -22.6 | -8.5 | -3.9 |
| Receivers | Strike | 0.56 | 0.76 | 1.07 | 1.83 | 2.45 | ATMF | 3.73 | 3.89 |
| | PV | 219,394 | 219,394 | 219,394 | 219,394 | 219,394 | 219,394 | 219,394 | 219,394 |
| | Moneyiness | 22.2 | 20.0 | 14.5 | 3.8 | 0.8 | 0.0 | 3.6 | 5.4 |
| | Yield Curve Carry (Fwd - Spot) | 7.2 | 18.0 | 28.4 | 34.2 | 29.1 | 22.6 | 12.6 | 9.6 |
| | Total pickup | 29.4 | 38.0 | 42.9 | 38.1 | 29.9 | 22.6 | 16.2 | 15.0 |

Decomposing Total Carry

Swaption = Annuity x Option Premium = A * C

$$C = \text{BlackScholes}(F, K, \sigma, t)$$

$$dC \simeq \Delta dF + \nu d\sigma + \Theta dt + \frac{1}{2} \gamma d^2 F + \dots$$

$$A \simeq \text{DiscFactor}(r, t) \times \text{CashPV01}(F)$$

$$\begin{aligned} dA &\approx \text{CashPV01} \times d\text{DiscFactor} + \text{DiscFactor} \times d\text{CashPV01} \\ &\approx \text{CashPV01} \times \frac{\partial \text{DiscFactor}(r, t)}{\partial t} dt + \text{DiscFactor} \times \frac{\partial \text{CashPV01}}{\partial F} dF \end{aligned}$$

First term is a sort of theta term, and second term is a sort of delta term.

$$\begin{aligned} d\text{SwaptionPV} &= C dA + A dC + dA dC \\ &\approx C dA + A dC \\ &\approx C \times (\text{CashPV01} \times d\text{DiscFactor} + \text{DiscFactor} \times d\text{CashPV01}) + A \times (\Delta dF + \nu d\sigma + \Theta dt + \frac{1}{2} \gamma d^2 F) \\ &= \underbrace{(C \times \text{DiscFactor} \times d\text{CashPV01} + A \times \Delta dF + \frac{1}{2} \gamma d^2 F)}_{\text{1st term}} + \underbrace{A \times \nu d\sigma + (C \times \text{CashPV01} \times d\text{DiscFactor} + A \times \Theta dt)}_{\text{2nd term}} \end{aligned}$$

1st term is a curve carry (delta + gamma etc), 2nd term is vol carry, 3rd term is theta carry.

Appendix A1 - I

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- Quantitative analysis of price variations.
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Appendix A1 - II

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