The quest for carry

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Rates and Currencies Research
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Key takeaways

- Changes in market dynamics YTD have put carry trades to the test.
- Looking across G10 rates markets, US investors can still find more attractive bonds than Treasuries on an FX hedged basis.
- Given the potential risks ahead, we recommend ways for carry seeking investors to minimize exposure to market moves.

By Carol Zhang

Chart of the day: The most attractive carry trade at the beginning of the year fared the worst

	US	Germany	France	Italy	Spain	UK	Canada	Japan	Australia
FX hedged yield as of 7/11 (%)									
2y	2.58	2.51	2.68	3.93	2.88	2.52	2.54	2.99	2.44
5y	2.75	2.56	2.86	4.66	3.20	2.59	2.53	3.15	2.47
10y	2.85	2.65	2.93	4.97	3.58	2.59	2.47	3.22	2.47
30y	2.95	2.49	3.00	4.95	3.94	2.94	2.51	3.35	2.82
Vol adj net yield									
2y	83.7	52.1	64.7	11.7	80.0	68.8	69.5	103.7	74.5
5y	71.5	50.5	60.9	18.2	64.6	65.9	67.7	89.5	76.8
10y	76.3	53.4	70.3	41.4	74.8	60.2	64.8	91.1	67.9
30y	87.1	50.4	74.1	72.1	76.3	81.8	68.1	97.6	78.2
	US	**Germany**	**France**	**Italy**	**Spain**	**UK**	**Canada**	**Japan**	**Australia**
FX hedged yield as of 1/4 (%)									
2y	1.95	2.05	2.20	2.32	2.25	1.99	2.01	2.46	2.04
5y	2.27	2.23	2.44	3.11	2.78	2.16	2.06	2.70	2.12
10y	2.45	2.44	2.80	4.02	3.54	2.49	2.13	2.86	2.17
30y	2.79	2.61	3.10	4.59	4.18	3.02	2.48	3.15	2.61
Vol adj net yield									
2y	90.09	78.67	88.22	101.10	98.98	66.11	84.79	104.04	70.20
5y	74.68	67.92	73.29	87.20	69.80	64.17	66.92	86.15	65.54
10y	73.19	64.54	67.20	94.33	85.32	63.48	58.39	88.03	63.62
30y	74.15	63.00	75.52	104.60	98.75	81.29	60.28	91.08	60.67

Note: We calculate synthetic yields in USD terms via asset swap across key G10 markets and tenors, to highlight the relative attractiveness across G10 rates. Vol adjusted yields are calculated as the fraction of the FX hedged yields divided by the 3m rolling standard deviation of daily changes. Green cells represent top three attractive assets, and yellow cells represent the least attractive three. For more details of the calculation please contact the author. Source: BofA Merrill Lynch Global Research, Bloomberg

Going up the stairs and avoid the elevator down

Carry trades work the best in a low vol environment. As volatility hit record lows in 2017, carry trades became the go-to positions at the beginning of the year. However, after a few equity market corrections, a European peripheral scare, and a looming trade war, even bonds with the best risk-adjusted yields in January did not fare well.

Stellar economic data combined with heightened risks in the second half of the year left the market with little outright conviction. In our view, in the current environment, it is possible to still capture carry while limiting market exposure. In our view, buying a high-yielding bond, and dynamically hedging with a low yielding bond can help offset market-to-market moves. We illustrate the idea with an example where we apply the Kalman filter to dynamically estimate hedge ratios.

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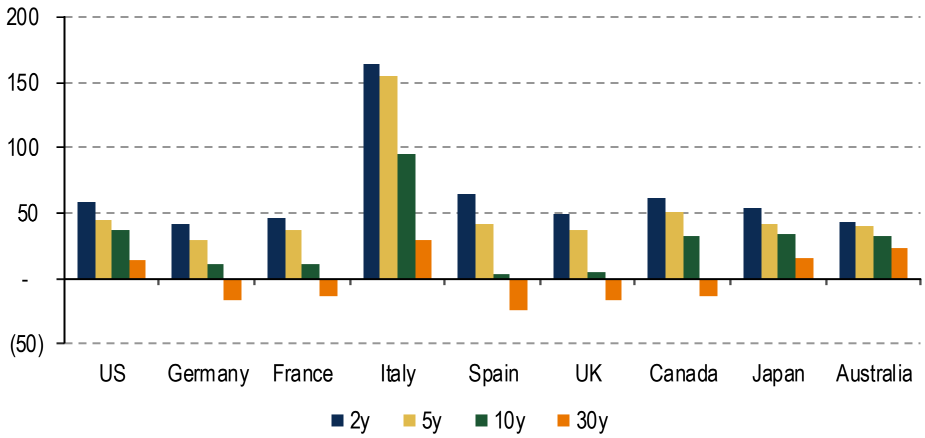
Keep calm and carry on

Carry trades falling out of favor is one symptom that 2018 is different to 2017. With the G10 duration sell-off in 1Q and the European peripheral spreads blowout in 2Q, most carry positions were in limbo as yields moved markedly higher YTD (Chart 1). Both from an absolute yield term or risk adjusted perspective, Italian government bonds were the go-to carry trades at the beginning of the year, but now rank the lowest in vol adjusted terms given the sharp move in peripheral spreads (Chart of the day: The most attractive carry trade at the beginning of the year fared the worst)

Chart 1: YTD, FX hedged yields in key G10 markets moved up markedly, putting carry trades at risk



Source: BofA Merrill Lynch Global Research, Bloomberg

The key risks with fixed income carry trades are directionality and volatility. In a rising rate environment, the income accumulated from being long bonds can be cannibalized quickly by a sell-off in rates or a move in FX if currency risk is unhedged. Market events this year suggest that even after taking into account realized volatility in the calculation, market dynamics can quickly shift.

Market neutral carry trades

Given the low level of conviction in duration and potential risks ahead, we recommend ways for carry-seeking investors to hedge their positions to limit market exposure. Common practices of such trades tend to involve having diversified or long/short positions such that market fluctuations can be canceled out. In rates, one way to do this is to go long high-yielding bonds, and hedge with matched maturity low yielding bonds cross markets in a FX hedged way.

The key issue is the choice of hedge ratio. As two bonds do not always move in the same direction and the magnitude of the moves change over time in both legs, we like hedging the long position with dynamic hedge ratios that evolve with market conditions. In this case, we apply the Kalman filter algorithm to hedge ratios, which functions similarly to a linear regression, but responds to new data more quickly. Simplistically speaking, the Kalman filter recursively estimates and updates the variable (in this case, the hedge ratio) every time new information comes in. Much like a regression, the Kalman filter is applied here to find the beta between two assets so that the cumulative yield moves on both sides of the trades can be largely offset. For more details on the algorithm, please see the appendix.

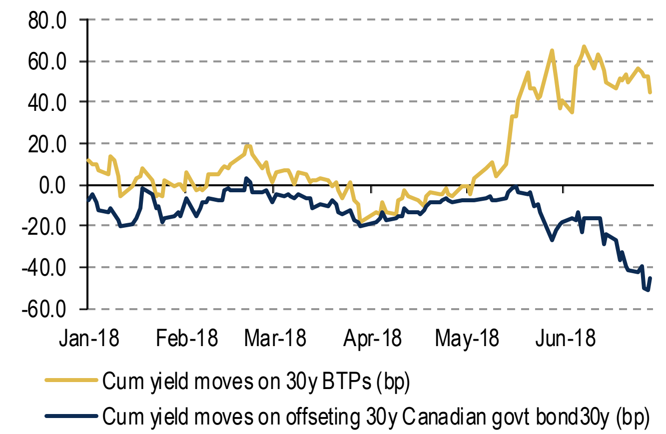
To illustrate the idea, we pick two bonds from the perspective of USD-based investors. We go long the bond that has been consistently more attractive in yield, and hedge with a matched duration bond that has been consistently the least attractive in yield terms. We note that, as shown in the example below, not all hedging positions are to short the bond, but we pick the lowest yielding position so that the negative carry would be the lowest when we do go short. From the Chart of the day, after adjusting for FX hedge, 30y BTPs have consistently been the most attractive bond in terms of yield pickup, and in the same maturity bucket, 30y Canadian bonds have been consistently the least attractive.

Assuming we go long 30y BTP at the beginning of this year, and hedge using 30y Canadian bonds, applying the Kalman filter gives us a time series of what would have been the hedge ratio on the 30y Canadian bond as shown in Chart 2. A positive number indicates buying more CAD bonds. As the peripheral risks started to escalate in late May, the amount of the 30y Canadian bond quickly increases from below 50% to almost three times the notional of 30y BTPs.

Chart 2: Hedge ratio on 30y Canada government bond over time

Source: BofA Merrill Lynch Global Research

Chart 3: By dynamically adjusting hedge ratio, the hedge to a long 30y BTP position mitigates exposure to market direction.



Source: BofA Merrill Lynch Global Research

From a capital gain/loss perspective, while not a perfect match, dynamically changing the size of the hedging leg more or less removes exposure to the market environment, as illustrated in Chart 3. From a carry perspective, this trade makes over 3% in two quarters, over 2% from the long position in 30y BTPs, and about another 1% in the 30y Canada government bond, since the hedge was in long positions most of the time. In comparison, an outright long position in 30y BTPs would suffer a loss given the almost 9% price correction.

Interestingly, our example shows that the hedge to a long position in a bond even within G10 markets is not always to short another bond. Intuitively, bonds with higher yields could have an inherent risk premium built in, and vice versa for a low yielding bond. When market dynamics change and volatility picks up, the two positions are likely to act like a risk asset vs a haven asset.

Appendix: a simple description of how the Kalman filter works

The Kalman filter was introduced by and named after R.E. Kalman in the 1960s for signal processing problems. It has since been heavily researched and its applications range from trajectory tracking for the Apollo mission to dealing with noisy data in econometrics. It operates recursively on streams of noisy input data to produce estimates of the underlying system state. The benefits of the algorithm are that it does not require a long history of observation, and reacts to new data faster than a traditional rolling regression.

The Kalman filter involves two stages, an estimation stage (first equation below) and an update stage (second equation below). The estimation stage describes how a set of variables evolve from one period to the next, and the update stage receives new information and refresh the estimation.

$$x_{t+1} = \beta_t x_t + w_t$$

$$z_t = H_t x_t + e_t$$

Where:

- x_t is the current hidden state (in our case, the hedge ratio),
- β_t is the transition matrix (in our case, this is the identity matrix assuming the hedge ratio follows a random walk)
- z_t is the latest observation (eg, yield moves of bond 1)
- H_t is the latest observation (eg, yield moves of bond 2)
- w_t and e_t are normally distributed white noise

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