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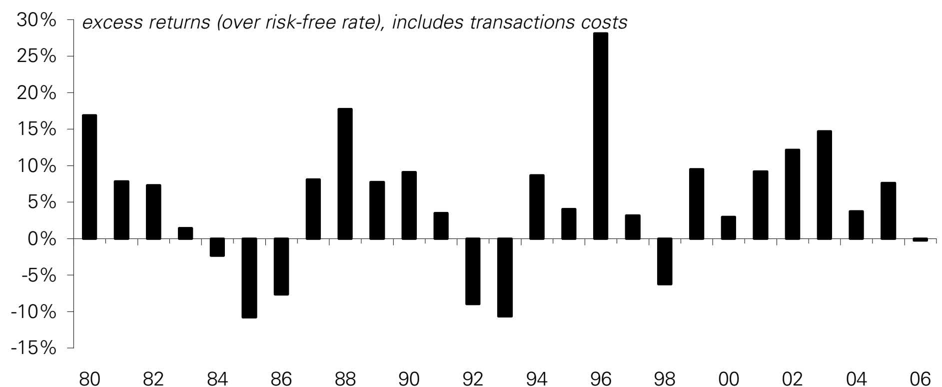
Currencies: Carry Investing

- In this paper, we outline our preferred systematic approach to carry-based investment in currencies. In earlier research, we had shown that carry strategies are one of the central sources of returns in currency markets.
- Investment in currency carry trades exploits one of the most well-known puzzles in finance; the "forward premium puzzle" or "forward-rate bias". The standard efficient markets hypothesis predicts that such trades should not be profitable, but academic studies have shown the reality does not match theory
- The latest thinking suggests that the presence of risk premia and alternative expectation formation process to the single-model rational approach typically assumed are the likely culprits to the violation of the efficient markets hypothesis.
- In practise, most approaches that are based on carry are likely to be profitable in the long-run, and therefore there is less need to over-complicate carry strategies. Not least, because additional rules may provide a false sense of security, rather than protection in the periodic losses seen in carry trades.
- Our carry strategy ranks G10 currencies by their 3-month interest rates, and buys the top-3 yielding currencies and sells the bottom-3 yielding currencies. Annual excess returns since 1980 have been 5% with a Sharpe ratio of 0.6.

Annual Excess Returns of Our Carry Strategy



Source: Deutsche Bank

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Just Like Equities, Currencies Have a Puzzle

Equities have tended to significantly outperform relatively risk-free assets over the long-run. This would be expected as equities are riskier. However, theory would suggest that US equities should outperform T-bills by 1%, yet in reality they have outperformed by closer to 7%[1]. This divergence between theory and reality has come to be known as the "equity premium puzzle". The currency markets possibly provide an even bigger puzzle; the "forward premium puzzle" or "forward-rate bias". In this case not only does theory underestimate the magnitude of a currency's performance, it also gets the direction wrong. Consequently, investors have had a consistently profitable, though at times volatile, investment strategy in the form of buying carry trades.

What Does Theory Say? And How Does Reality Compare?

According to the risk-neutral efficient markets hypothesis, the expected gain from holding one currency rather than another should be offset by the loss of interest in holding this currency rather than the other. This is generally referred to as the uncovered interest parity (UIP) condition. From an investor's perspective, this would imply that investing in currencies with high interest rates by borrowing in currencies with low interest rates (ie carry trades) should not deliver consistent profits over time. That is, the high interest currency should depreciate. The reality could not be more different.

A broad consensus has emerged that the theory does not conform to reality at least over short- to medium-term horizons. Studies that look at the sensitivity of currencies to interest rate differentials (the beta) have found values closer to -1, than the +1 that theory would predict (see first and second charts). The only time horizons over which UIP appears to hold is over the very short period that spans the time interest is paid on currency positions each day[2], and the long-run (5 years onwards, see second chart). Therefore, explanations are needed on the failure of UIP and the efficient markets hypothesis.

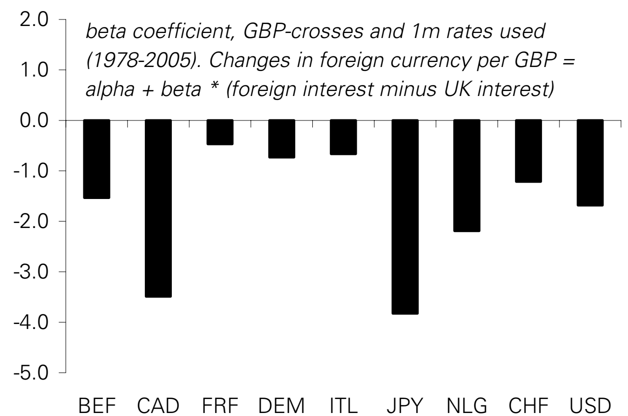
Adjusting the Assumptions Seems to Help

Underlying the efficient markets hypothesis is that market participants are risk-neutral and are endowed with rational expectations. The former implies investors care only about expected returns and not risk, while the latter generally implies investors know the true model of the underlying economy and markets, use all publicly available information and stick to the principles of logic.[3]

Much work has been done to test both assumptions. Relaxing the assumption that investors are risk-neutral, and instead assuming they are risk averse, allows for the possibility of earning excess returns (ie the forward-rate bias) to compensate for a risk premium. However, most studies show that investors must be extremely risk averse or that consumption should be highly correlated with currencies for the forward rate bias to be as large as it is[4]. Neither of which are realistic.

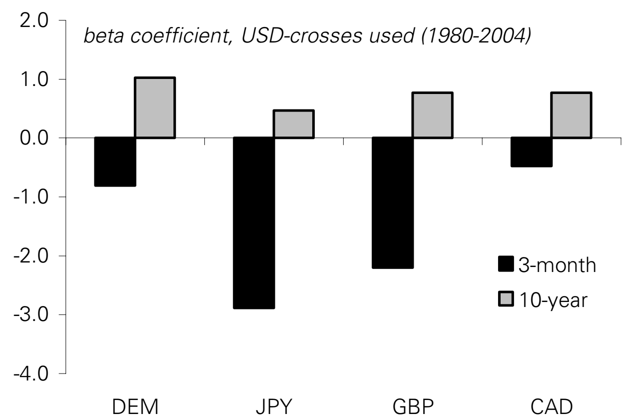
Several explanations have been posited on whether investors do not form expectations in the way that the efficient markets hypothesis would suggest[5]. Investors may be irrational, or if they are rational, they are unsure

The Sensitivity of Currencies To Interest Rate Differentials Should Be +1, But is Closer to -1



Source: Burnside, Eichenbaum, Kleschelski and Rebelo (2006), "The Returns to Currency Speculation"

Forward Bias Remains With Other Crosses, But Not Over Longer Time Horizons



Source: Chinn (2005), "The Rehabilitation of Interest rate Parity in the Floating rate Era"

[1] Mehra (2003), "The Equity Premium: Why Is It a Puzzle?"
[2] Chaboud and Wright (2002), "Uncovered Interest Parity: It Works, But Not For Long"
[3] Or more precisely the Savage axioms, which underlies a theory of expected utility, and includes axioms in addition to logic.
[4] Engel (1995), "The Forward Discount Anomaly and the Risk Premium: A Survey of Recent Evidence"
[5] This may be due the existence of rational bubbles, rational learning, peso problems or inefficiencies in information processing. See Sarno and Taylor (2002), The Economics of Exchange Rates. Chapter 2.

of the true model of the market. In the latter case, investors may come up with different models of what drives currencies even using the same data – that is, they have "rational beliefs" [6]. Investors in carry trades are therefore being rewarded for the "uncertainty" of currency markets. Finally, if market participants are different in other ways, for example by being non-profit maximisers[7] or by having different risk limits, then it may not always be possible for sufficient capital to be allocated to carry trades for the forward-rate bias to disappear. Only when expectations of positive returns are very high would that likely be the case[8].

A Carry Strategy Exploiting the "Puzzle"

Given the extent of the "forward premium puzzle", most strategies that are based on carry are likely to be profitable. However, the real challenge is to avoid the sudden large losses that occur. Discrete rules that use different tenors of interest rates, volatility or correlation are unlikely to be flexible enough to capture them. If anything they may obscure, rather than enhance, the carry strategy by giving a false sense of security. Instead, our approach would be to use the carry strategy in conjunction with other currency strategies in order to minimise downside risks[9]. This also allows us to define the core carry strategy in a simple and transparent fashion.

Therefore, our approach for a carry strategy is to use the 3-month interest rate to rank G10 currencies each quarter. We then buy the top-3 yielding currencies and sell the bottom-3 currencies. In this way, we are regularly invested in the 3 largest carry trades in the G10 world.

How Does It Perform?

The strategy delivers an annual excess return of 5% from 1980-2006 with a Sharpe ratio of 0.6 and a maximum peak-to-trough drawdown of 31%. More detailed returns are shown in the charts on the right. As touched on above, the pattern of returns for carry trade strategies is a number of positive years of returns followed by several negative years. Interestingly, the worse losses were seen in the early 1990s, rather than 1998.

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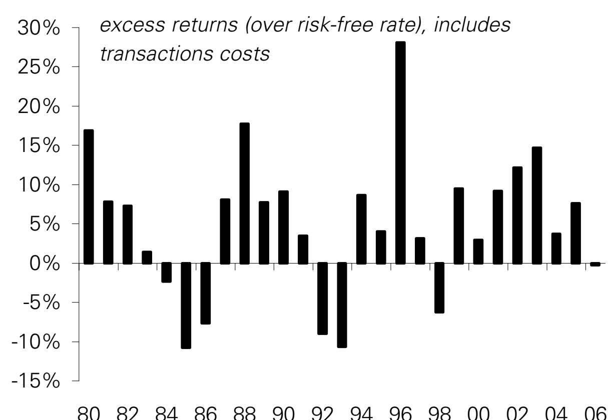
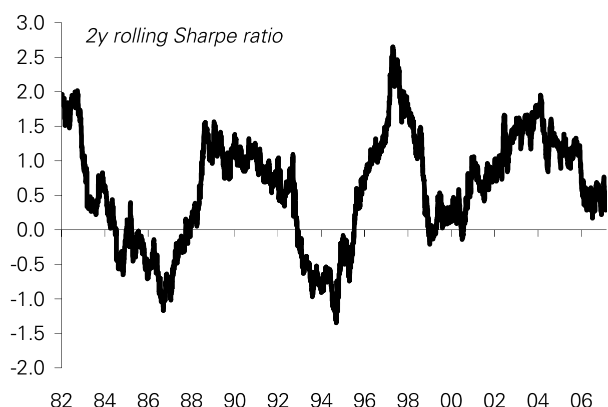
Annual Returns Carry Strategy



Source: DB Global Markets Research

Rolling 2-Year Risk-Adjusted Returns



Source: DB Global Markets Research

Summary Statistics of Carry Strategy

	1980-2006	1990-2006	2000-2006
Excess Returns*	4.9%	5.1%	7.0%
Volatility	8.4%	7.9%	7.2%
Sharpe ratio	0.59	0.65	0.98
Max. Drawdown	-31%		

** Includes transaction costs and carry, and excludes legacy Euro currencies, save DEM. Including them, would have reduce 1980-2006 returns by 0.8%*

Source: DB Global Markets Research

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[6] Kurz (97),"Endogenous Uncertainty: A Unified View of Market Volatility".
[7] Hafeez (2007), "Currency Markets: Is Money Left On the Table?"
[8] Sarno, Valente, Leon (2006),"Nonlinearity in Deviations from UIP: An Explanation of the Forward Bias Puzzle", Baillie and Bollersley (2000), "The Forward Premium Anomaly Is Not As Bad As You Think"
[9] Sarno (2007), "An Economic Evaluation of Empirical Exchange Rate Models: Robust Evidence of Predictability and Volatility Timing.", see also Hafeez (2006): "Currencies: Pension Saviour?"

Appendix 1

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