



Beta'm Up

What is market beta in FX?

30 Aug 2013

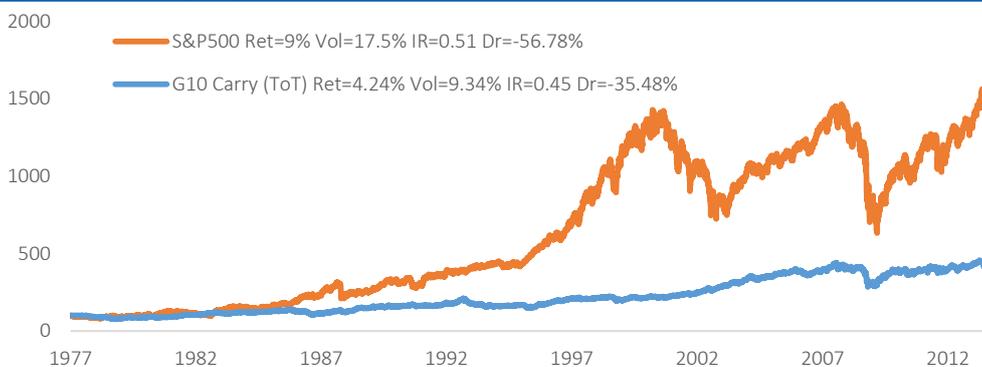
In asset classes such as equities, the market beta is fairly clear. However, this question is more difficult to answer within FX, where there is no obvious beta. To help answer the question, we discuss generic FX styles that can be used as a proxy for the returns of a typical FX investor. We also look at the properties of a portfolio of these generic styles. This FX styles portfolio has an information ratio of 0.64 since 1976. Unlike its individual components, the FX styles portfolio returns are relatively stable with respect to underlying regimes in S&P500. Later we replicate FX fund returns using a combination of these generic FX styles. We show that a combination of FX trend and carry, can be used as a beta for the FX market. Later, we examine the relationship between bank indices and these generic FX styles. We find that there is a significant correlation in most instances, with some exceptions.

Introduction

Within asset classes, the market beta which can be used as a proxy for the returns of most investors is relatively clear, and is usually a broad based index. For example in equities, we can consider S&P500 as a market beta. For the bond market, there are also several contenders, such as the JP Morgan bond indices. However, in FX, the question is more difficult. Unlike in equities or bonds, we cannot simply say that investors are mostly "long FX"! Without an obvious beta which can represent the returns of a typical FX investor, we instead need to think about creating proxies. The idea of these proxies is to represent the typical types of generic FX trading styles that are used by many FX investors. Later, we shall investigate the properties of the portfolio of these generic FX styles. We shall also see how we can use our generic FX styles to replicate FX fund returns, to show that they can indeed be used a market betas for FX. Lastly, we shall look at indices created by banks designed to proxy these generic FX trading strategies.

In terms of the generic FX trading strategies we shall examine in some detail, foremost amongst them is the carry trade (see Figure 1). Purely, on a visual basis, there does appear to be some relationship with S&P500, if we consider that the largest drawdown in both strategies occur around the Lehman crisis in 2008.

Figure 1: FX carry style



Source: Thalesians, Bloomberg

Saeed Amen

Quantitative Strategy

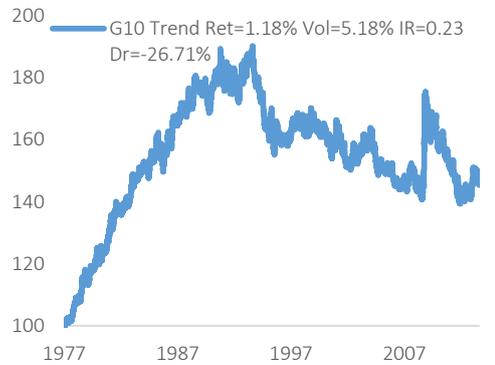
+44 20 3290 9624

saeed@thalesians.com



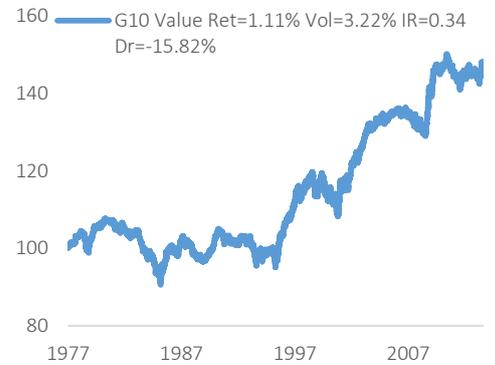
As well as carry, we shall also examine a generic FX trend following strategy (Figure 2) and a generic FX value trading strategy (Figure 3). We shall describe these strategies in more detail following the introduction.

Figure 2: FX trend style



Source: Thalesians, Bloomberg

Figure 3: FX value style

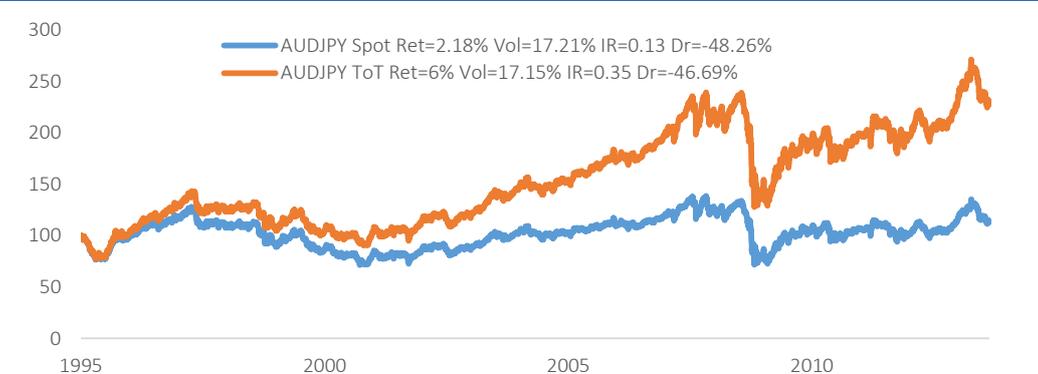


Source: Thalesians, Bloomberg

FX carry strategies

The idea of a carry strategy within FX, as most readers are likely aware is to buy high yielding currencies, funded by selling low yielding currencies. Essentially, it is a way of harvesting risk premium, since generally higher risk assets, tend to be higher yielding. One proxy for the carry trade is to look at long AUD/JPY returns. Generally, Australian interest rates have been much higher than Japanese interest rates. Hence, long AUD/JPY positions have historically formed a large part of the carry trade. One question we might wish to ask is how large are carry returns in such a trade compared to spot returns? In Figure 4, we have plotted the spot returns for AUD/JPY and also the total returns (inclusive of both carry and spot returns) since 1995. Note, that the majority of returns actually come from carry, as opposed to spot returns historically. So whilst, on a daily basis, carry accrued is relatively insignificant, over long periods of time it can be considerable and explained the popularity of the carry trade historically. As essentially a risk premium trade, it is perhaps not surprising that during times of risk aversion, it suffers considerable drawdowns.

Figure 4: Large difference between spot and total returns for AUD/JPY



Source: Thalesians, Bloomberg

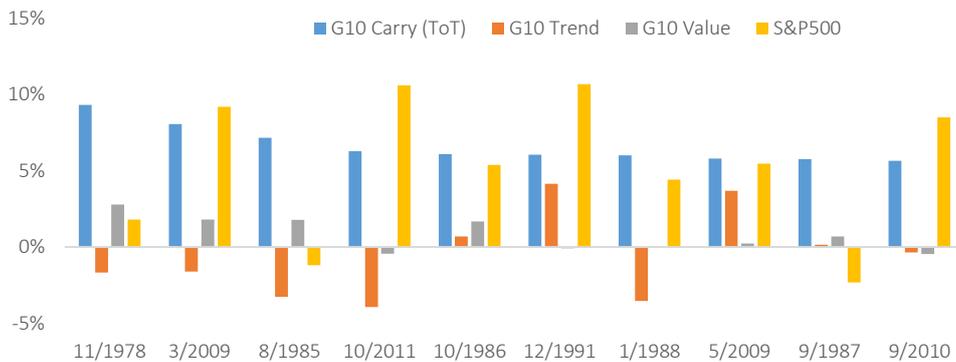
In Figure 1, we plotted a generic carry strategy. The rule we have used is relatively simple. We buy the 3 highest yielding currencies within G10 and sell 3 lowest yielding currencies. We have omitted EM currencies, given that our data history would be comparatively small.



Also, even today, as a percentage of volume traded, EM currencies still represent a smaller segment of the FX market. We reweight our basket at the beginning of every month. Our metric for yield is the average over the past month of 1M deposit rates (for the older data, we have used proxied). It is obviously possible to create more complicated carry models, for example through the creation of risk filters. Our objective is however, to create a relatively generic framework, so that it can be more representative of what a typical investor might do. On a risk adjusted basis, the returns of G10 carry model are very similar to S&P500¹, performing relatively well during the history. Our next step is to delve into the returns more closely, to identify the periods of outperformance (and later underperformance) and furthermore how to do the other generic FX strategies perform.

In Figure 5, we have plotted the 10 top performing months for the FX carry strategy. We note, that these tend to coincide with strong months with S&P500, which fits in with notion that both are essentially “risk on” trades. However, we find that the performance of both FX trend and value strategies does not bear much of a correlation with strong carry months.

Figure 5: Best months for FX carry



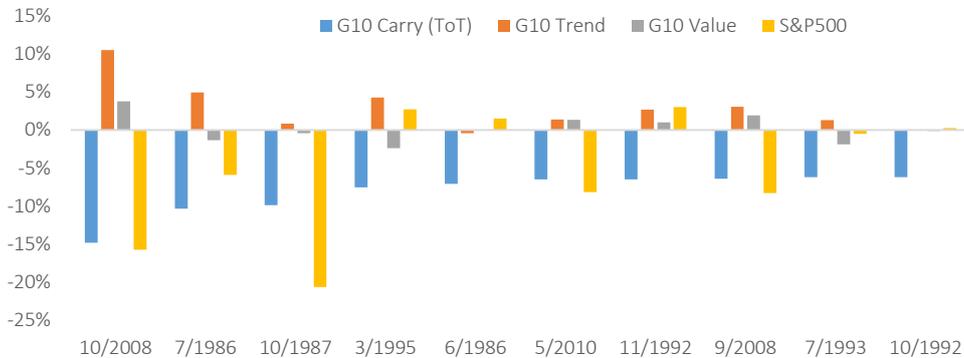
Source: Thalesians, Bloomberg

In Figure 6, we repeat the exercise but this time examining the 10 worst performing months for the FX carry strategy. Again we note that S&P500 performance seems to coincide. Large monthly drawdowns for FX carry tend to be accompanied by large losses for S&P500. Generally, we find that FX trend and value heavily outperform carry. Hence, this suggests during risk aversion, FX trend and value strategies can be effective hedges against typical risk on trades such as long S&P500 and long FX carry.

¹ We haven't included funding costs or dividends in our S&P500 returns.



Figure 6: Worst months for FX carry



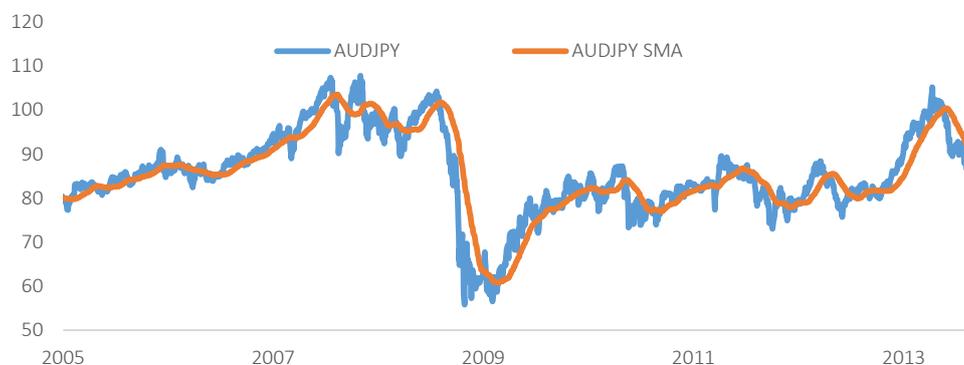
Source: Thalesians, Bloomberg

FX trend following strategies

As well carry, another popular strategy without FX is the use of trend following. Trend following can be seen as a subset of technical based strategies, which also encompasses mean-reversion based strategies. Even for investors who primarily use fundamental based analysis to trade, very often they will use technicals to help time trades, as well as to decide where to put their stop loss and take profit levels. One of the main reasons cited for why technical based strategies should work, is that they can become self-fulfilling. If many investors are jumping on to a trend, then it attracts more investors in a virtuous circle (until the “smart money” starts to take profit and the trend is exhausted).

The very simplest trend following rules generally involve moving averages, which can be seen as a simple form of reducing the noise of a series (albeit in a lagged way), to better gauge its direction. When spot is above a moving average it generally interpreted as a buy signal whilst when it is below the moving average it is seen as a sell. Typically moving averages of 20D, 55D and 200D are often used by investors. A monthly cycle can be covered by 20D, whilst 55D can be interpreted as following a quarter.

Figure 7: Moving average crossover are simplest trend following rule



Source: Thalesians, Bloomberg

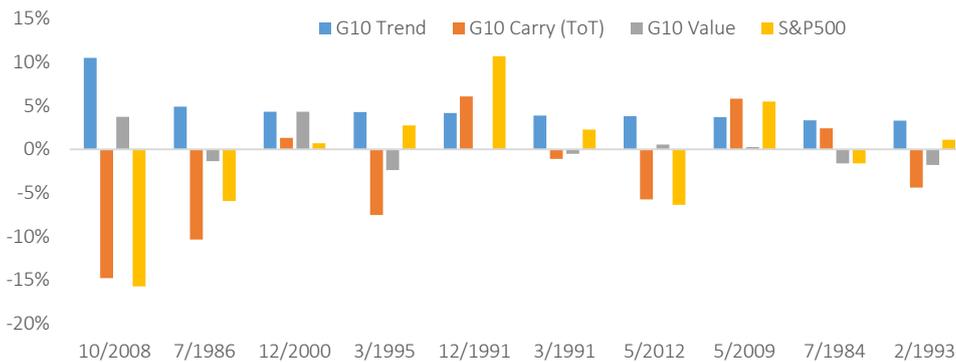
If we want to create a generic FX trend following model which proxies the behaviour of most FX market participants, one approach could be to use a combination of these popular



moving averages. We instead follow a similar approach to Lequeux and Acar (1998)², who noted that a combination of using 32D, 61D and 117D moving averages for FX, effectively acted as a reasonable proxy for FX fund returns. 1/3 of capital is invested in each trading rule. In our case, we use a different universe of currencies, namely the USD, EUR and JPY crosses in G10, but using a similar trading rule which they describe. From Figure 2, we note, that the generic trend strategy performed well during much of the history, however, over the past 10 years, with the exception of during the Lehman crisis, returns have been worse. It is likely that the market has become more crowded with such strategies, reducing their effectiveness.

We can look at the returns of the FX trend following strategy in more detail, in a similar way to how we examined FX carry, namely looking at the “extreme” months. In Figure 8, we plot the top 10 months for the FX trend following strategy and the returns of the other strategies during those same months. In particular, we see that during the top 3 months for trend in our sample, both S&P500 and FX carry underperformed, which tallies with our observations from Figure 6.

Figure 8: Best months for FX trend following



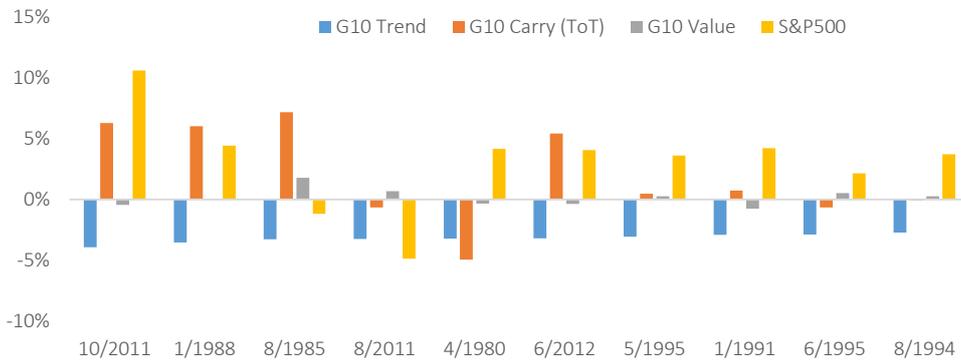
Source: Thalesians, Bloomberg

In Figure 9, we plot the worst 10 months for FX trend. We note that there doesn't appear to be a strong pattern, in terms of the performance of the other strategies, unlike in Figure 8 (at least outside the very worst months). In general, we would expect our FX trend following strategy to underperform when markets are range bound. In such a scenario, the signal can get whipsawed, which results in poor returns, from buying at the top of the range and selling at the bottom of a range.

² P. Lequeux and E. Acar (1998) - [A dynamic index for managed currencies funds using CME currency contracts](#) - The European Journal of Finance 4, 311–330



Figure 9: Worst months for FX trend following



Source: Thalesians, Bloomberg

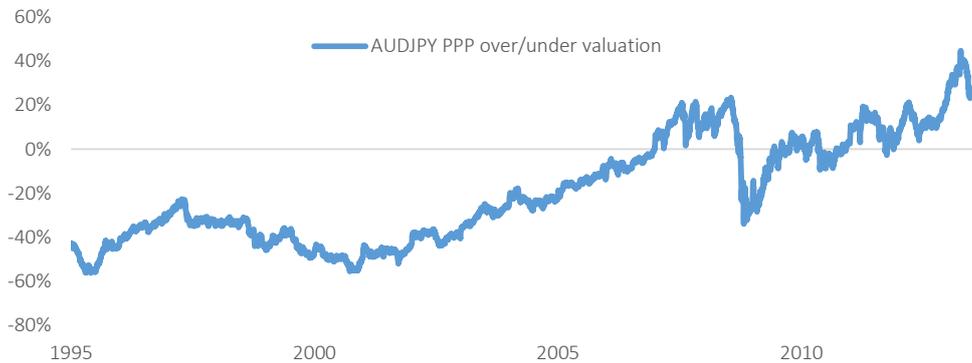
FX value strategies

The concept of a “value” model is totally different to that of trend following. With trend following, we essentially buy high and sell low, on an expectation of a continuation of the trend. With value meanwhile, we seek to buy “cheap” currencies and sell “expensive” currencies. However, how do we determine this? One of the simplest currency valuation models is PPP (purchasing power parity), which can accomplish this. The most well-known version of this is the Big Mac index, which is published by the Economist. It takes the price of Big Mac burgers from across the world and converts the prices to USD. Theoretically, a Big Mac should cost the same everywhere in the world, hence a difference would suggest that some element of over/undervaluation of the currency in question. Obviously, this is somewhat of a simplification, because, Big Macs are not freely traded across the world (and would likely go cold if they travelled across the world!). For our purposes, we have used the OECD PPP measures³, which are published on an annual basis. In Figure 10, we have plotted the relative over/undervaluation of AUD/JPY spot versus the theoretical estimation using OECD PPP metrics. We note that currencies can remain heavily over/undervalued for extended periods of time. Hence, any attempt to trade FX value requires a very long time horizon. Recall in Figure 3, we plotted the returns for our FX value strategy. The returns from the strategy reflect this. For much of the first part of the sample, the returns from FX value are relatively range bound. It is only in the past 10 years, in particular over the Lehman crisis, that FX value has performed well. Our value rule is relatively generic, we sell currency crosses which are more than +20% overvalued. We buy those currency crosses which are more than -20% undervalued. In other instances we remain flat. We trade all the USD, EUR and JPY crosses in our value model.

³ In practice, they can be revised, although we conjecture this is unlikely to change our trading signal much.



Figure 10: Currencies can be over/undervalued for extended periods



Source: Thalesians, Bloomberg

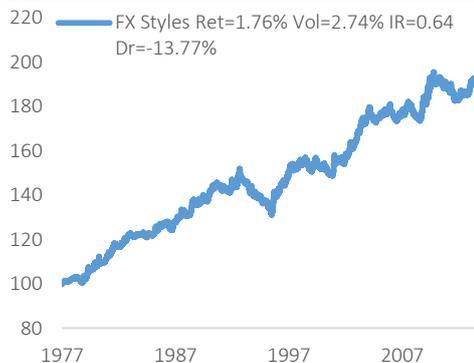
Creating an FX styles portfolio

We have examined the various FX styles in some detail, noting both the benefits and drawbacks of them. FX carry can suffer from severe drawdowns, whilst FX trend can be impacted by ranging markets. FX value meanwhile needs to have a long term time horizon to be traded. At the same time, we have seen that we can for example use FX trend as a hedge for FX carry during times of severe risk aversion. Furthermore, FX trend can profit from large moves in FX markets.

Hence, it seems reasonable to combine the three styles into a portfolio. One approach would be to use equal weighting. However, this seems to overweight FX carry, given the long term volatility of the strategy is much higher than both FX trend and FX value. Hence, we have opted for a relatively simple way of weighting, which takes into account this different in volatility, assigning a half weight to FX carry, whilst giving a weight of one to both FX trend and FX value. In Figure 11, we have plotted the returns of the FX styles portfolio, we note that the long term risk adjusted returns of 0.64 exceed that of any of our three strategies individually. Furthermore, the maximum drawdowns of -14% are far lower.

In Figure 12, we have plotted the long term correlations between the various styles and also the portfolio. Given it uses daily data, the correlations might understate the relationship between the various strategies. Indeed, the correlation between S&P500 seems relatively low with the FX styles, which masks what we saw in the top/bottom 10 months for FX carry (see Figures 5 and 6).

Figure 11: FX styles portfolio



Source: Thalesians, Bloomberg

Figure 12: Correlations between styles

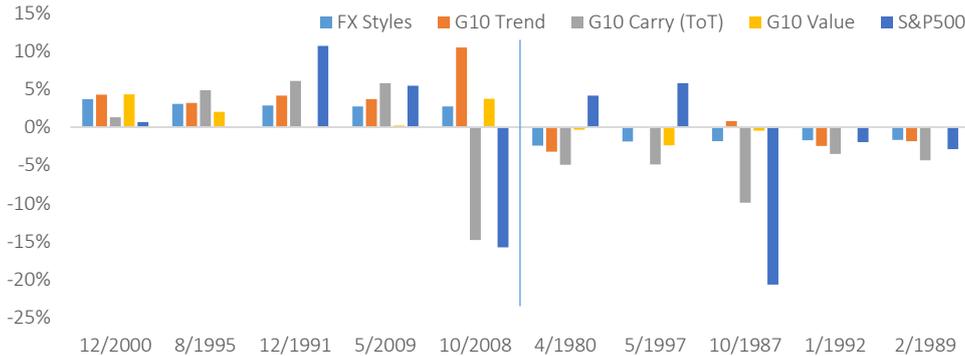
	G10 Trend	G10 Carry (ToT)	G10 Value	FX Styles	S&P500
G10 Trend		-23%	-22%	50%	-18%
G10 Carry (ToT)	-23%		21%	61%	30%
G10 Value	-22%	21%		45%	7%
FX Styles	50%	61%	45%		10%
S&P500	-18%	30%	7%	10%	

Source: Thalesians, Bloomberg



As we did for both FX carry and FX trend, in Figure 13, we look at the best/worst months of returns for our FX styles portfolio, and we examine the other strategy returns during these months. Whilst, in general, the other individual strategies tend to outperform during the best months of the FX styles portfolio, importantly, during the worst months for the FX styles portfolio, the losses are much more stable than the individual strategies.

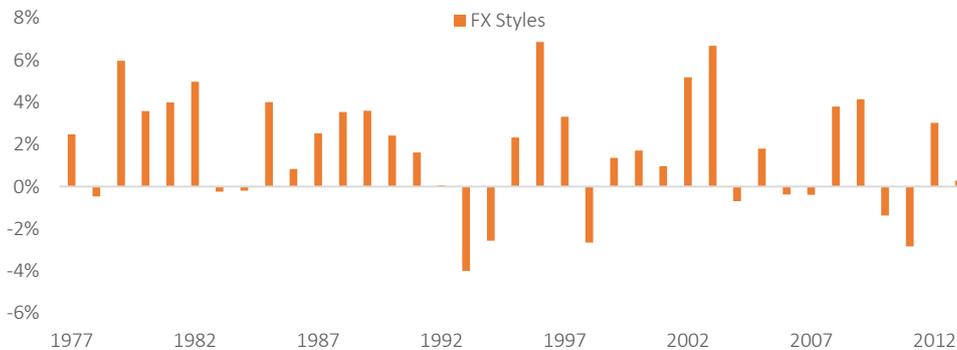
Figure 13: Best (LHS)/worst (RHS) months for FX styles portfolio



Source: Thalesians, Bloomberg

In Figure 14, we have examined the returns of the portfolio on a year on year basis. We note that returns have declined somewhat in recent years. In 2013, returns are close to flat. However, given the difficulty some quant funds have had this year⁴, the fact that such a simple and generic model is only slightly down, is noteworthy.

Figure 14: Year on year returns of FX styles portfolio



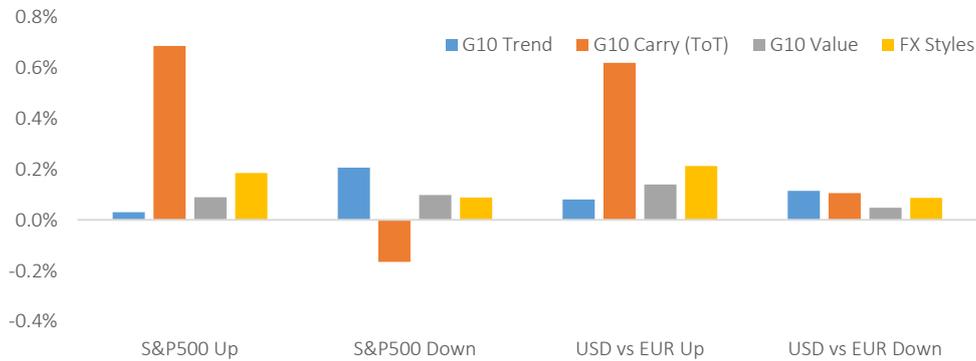
Source: Thalesians, Bloomberg

Finally, we take a look at the stability of the FX styles portfolio with respect to regimes in S&P500 and USD (vs. EUR). We calculate the returns of the portfolio and individual strategies within it, in months where S&P500 has gone up (and down). We repeat the exercise for USD (vs. EUR) regimes. We find that generally, the FX styles portfolio is the most stable in the various market regimes. This compares to for example, FX carry, which loses money in months when S&P500 loses money, but makes money during up months for S&P500.

⁴ FT: [Quant funds battered by US bond yields sell-off](#) - 5 June 2013



Figure 15: Sensitivity of various FX styles to other markets



Source: Thalesians, Bloomberg

Comparing FX styles to FX fund returns

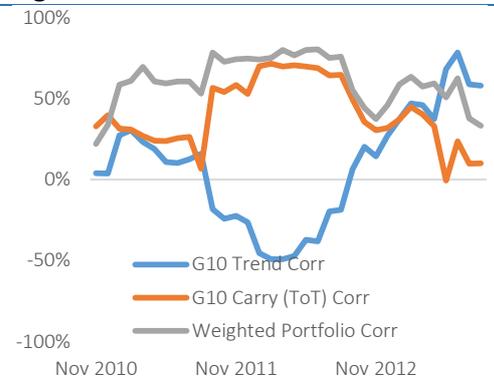
So far, we have looked at various generic FX trading strategies. Furthermore, we have discussed the benefits of combining them into a portfolio. However, we have not shown how they relate to real FX fund returns, to show that they can be used as a market proxy. In this section, we delve into this area. We ascertain how our generic FX trend and FX carry strategies can be related to FX fund returns. We use as our proxy for FX fund returns, HFRX Macro Currency Index. In Figure 16, we display the results of a linear regression between the FX fund index (y variable) and FX trend and carry models (x variable). We use a 12 month window (using monthly data). We have then created a portfolio using these weights. In practice, this portfolio is not tradable given we are not lagging weights. In Figure 17, we have then given the rolling 12 month correlation between the FX fund index, the weighted portfolio, FX trend and FX carry. We find that for nearly all the whole sample, our weighted portfolio has a higher correlation, suggesting that this combination explains FX fund returns better than FX trend or FX carry in isolation. For a large part of our (admittedly short sample) this correlation is also fairly significant, and above 50%. This suggests we can use a combination of FX trend and carry as a proxy for FX market beta. We also note that general the correlation between carry and FX funds is higher than between trend and FX funds. This suggests that FX carry is more prevalent than FX trends.

Figure 16: Rolling weights of FX styles



Source: Thalesians, Bloomberg

Figure 17: Correl vs. FX fund rets



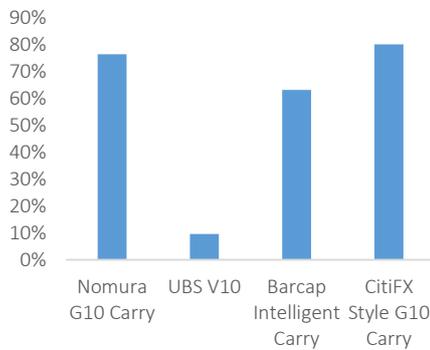
Source: Thalesians, Bloomberg



Bank FX indices

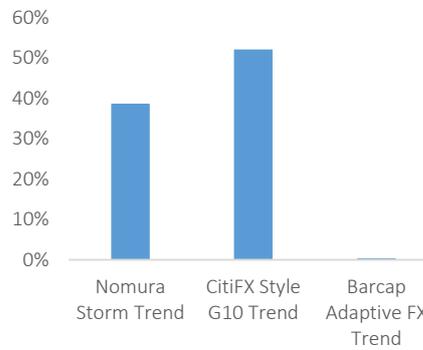
Many banks have created their own indices to represent styles such as FX trend and FX carry. The question is, how close are they to the generic strategies such as the ones we have presented in our paper? Using weekly data since 2002, we have calculated the long term correlations between them and our generic strategies. In Figure 18, we have looked at FX carry, whilst in Figure 19, we have examined FX trend. Our first observation is that there is generally a large amount of correlation with our generic indices. However, for UBS V10 the correlation is relatively low, with our generic strategy, suggesting it is less like our generic strategy compared to the other bank carry indices. For trend, we see that Barcap's index exhibits relatively little correlation, again suggesting that it has more complicated rules than our generic trend model.

Figure 18: Correlation vs. carry



Source: Thalesians, Bloomberg

Figure 19: Correlation vs. trend



Source: Thalesians, Bloomberg

In Figure 20, we have taken each of the bank trend indices and calculated rolling correlations with our generic trend model. We find that there are considerable periods of time, when the Barcap index has a large negative correlation. This suggests that in effect, it has active rules to trade mean-reversion as well as trend.

Figure 20: Rolling correlations of FX trend indices with generic trend

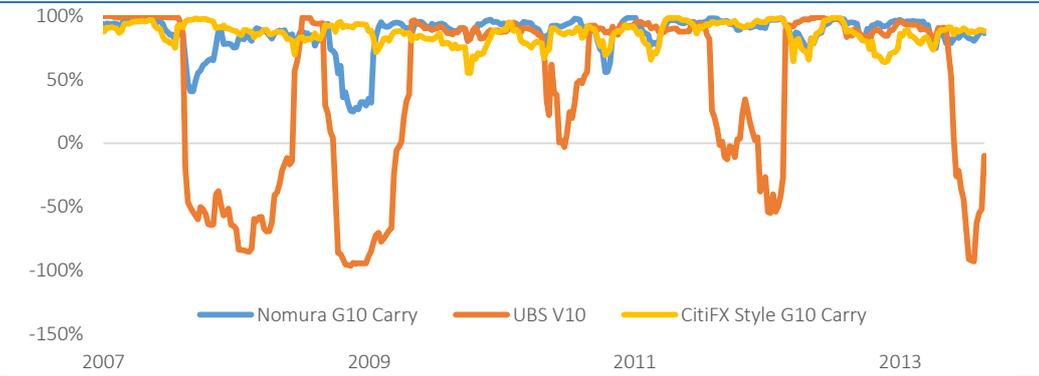


Source: Thalesians, Bloomberg

In Figure 21, we have calculated the rolling correlations of some of the bank carry indices we examined earlier with our generic carry strategy. We note that the UBS V10 index, exhibits large periods when it has a negative correlation with our generic carry strategy. This seems to indicate that it is likely to be short carry over these periods, as opposed to purely long carry.



Figure 21: Rolling correlations of FX carry indices with generic carry



Source: Thalesians, Bloomberg

Conclusion

We noted that in FX unlike other asset classes there is no obvious market beta, which can represent the typical returns of FX investors. Instead, we looked at typical FX trading strategies to proxy FX market beta. We focused on generic FX carry, FX trend and FX value models in some detail, looking at their individual properties. We showed that a FX styles portfolio exhibited more stable returns than any of its individual components. Our FX styles portfolio had risk adjusted returns of 0.64.

We later showed we could use a combination of FX carry and FX trend, to create a weighted portfolio which had a high correlation with FX fund returns. Hence, a proxy for FX market beta could use such a portfolio.

Lastly, we examined the relationship between bank indices for FX carry and FX trend, in many cases there was considerable correlation with our generic indices. However, in some instances the correlations were quite volatile, suggesting that certain bank indices likely to have more active based rules than a simple generic version of carry or trend.

References

Handbook of Exchange Rates (Wiley) – Jessica James (Editor), Ian Marsh (Editor), Lucio Sarno (Editor) – 2012 (in particular chapter I co-wrote on FX beta)



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Thalesians Ltd., PO Box 309, 56 Gloucester Road, London SW7 AUB, UK

Tel +44 20 3290 9624, e-mail saeed@thalesians.com

web <http://www.thalesians.com>

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