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INSIGHT INVESTMENT

A FACTOR-BASED APPROACH TO CURRENCY MANAGEMENT

APRIL 2020



EXECUTIVE SUMMARY

THREE KEY FEATURES OF INSIGHT'S CURRENCY INVESTMENT PROCESS 3

- We use factor modelling to identify appropriate currency pairs from our currency opportunity set
- A risk-adjusted basket of currencies is created, then exposure is scaled to meet the portfolio risk target
- Tailored implementation is backed by continuous monitoring and research

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- Identifying a universe that is sufficiently broad and deep for our needs

WE OUTLINE THE KEY FACTORS WE USE IN OUR FACTOR-BASED MODELLING..... 4-5

- We believe the majority of returns in currency markets can be explained by five key factors
- We describe the five factors: Carry, Momentum, Value, Volatility and Quality

A RISK ADJUSTED BASKET OF CURRENCIES IS CREATED, THEN SCALED TO MEET THE AGGREGATE RISK TARGET..... 7-8

- We examine the structural diversification benefits that are offered by a factor based approach
- From our opportunity set, we create a risk-adjusted basket of currencies
- Exposure to this basket is then scaled upwards or downwards to meet the portfolios risk target

WE OUTLINE SIMULATED RETURNS FOR TWO TYPES OF STRATEGIES 9

- Absolute return
- Dynamic hedging

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CURRENCY SOLUTIONS CAN BE DEPLOYED FOR A BROAD RANGE OF INVESTMENT GOALS, RANGING FROM ALPHA GENERATION STRATEGIES TO HEDGING. ALTHOUGH THESE STRATEGIES CAN BE VERY DIFFERENT, WE UTILISE A CONSISTENT UNDERLYING TOOLSET TO MANAGE THEM. IN THIS DOCUMENT WE OUTLINE OUR FACTOR-BASED APPROACH TO CURRENCY MANAGEMENT.

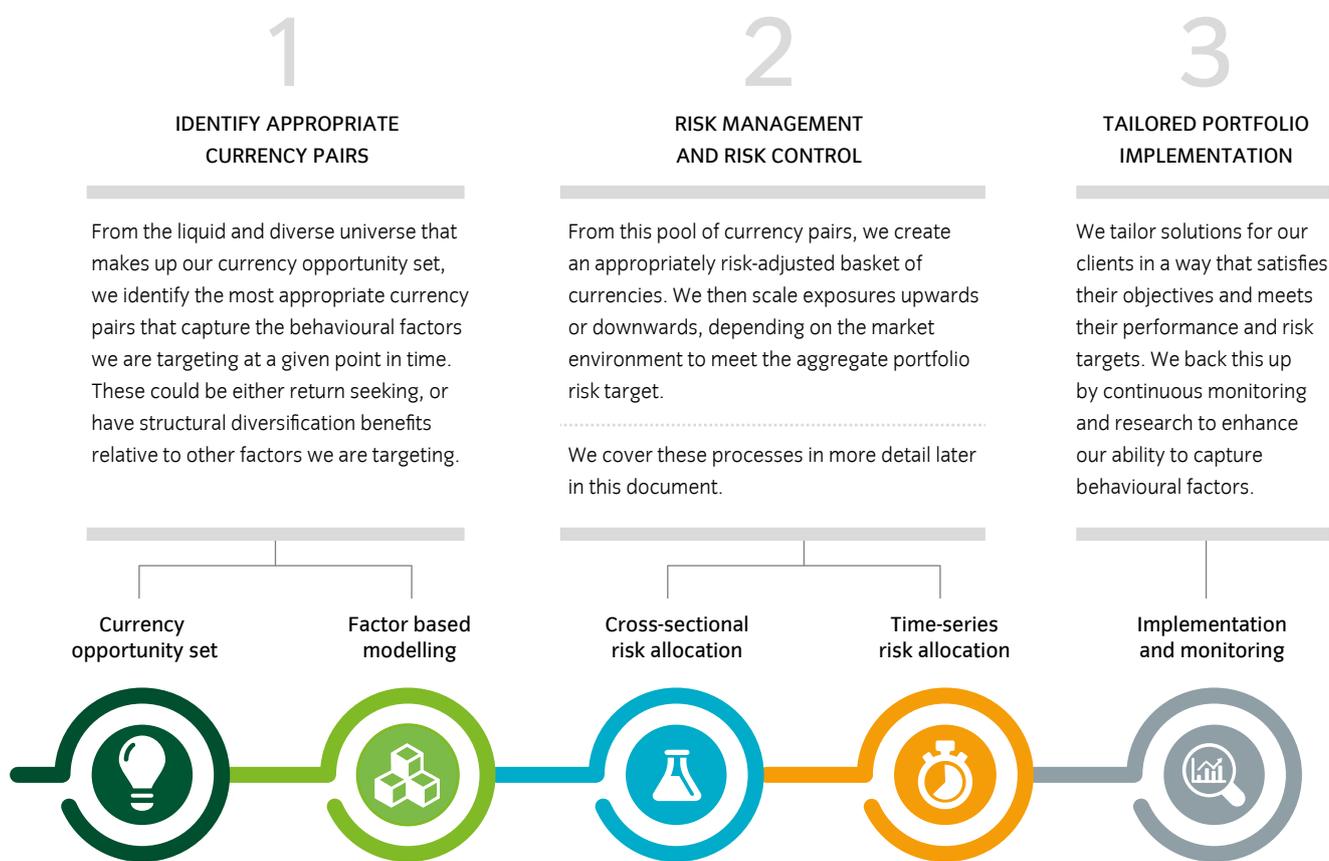
INSIGHT'S APPROACH TO CURRENCY MANAGEMENT

At Insight, we believe that investment returns can be generated via awareness of a number of persistent behavioural features that occur within currency markets. By utilising a systematic approach to capturing these behavioural features, we believe that it is

possible to achieve reliable and repeatable returns over time. This approach can be utilised within either absolute return strategies, which aim to generate returns above the risk-free rate, or to enhance the returns of hedging strategies.

Our investment process can be broken down into three key features:

Figure 1: Our investment process



THE CURRENCY OPPORTUNITY SET

When choosing our currency universe, our focus is on both liquidity and cost. The universe must be sufficiently broad to capture the factors that we believe affect all currencies, but with transactions cheap enough for us to efficiently implement trades to capture the risk premia we target.

By analysing the broad currency universe, it becomes clear that there is a subset of currencies that represent slightly less than 90% of global liquidity, but less than 10% of total implementation costs (see Figure 2). This subset, covering nine currencies plus the US dollar, and representing 45 potential currency pairs, is sufficient for diversification and is able to reliably provide access to the factor exposures that we require.

Emerging market currencies don't fit our requirements

Our aim is to exploit factors, not target specific currencies and we only need a sufficient number of currencies in the opportunity set to allow for a robust representation of factor returns.

There are a number of emerging market currencies that may appear to have acceptable liquidity, but which we have rejected, as they are not as suitable as they may first appear.

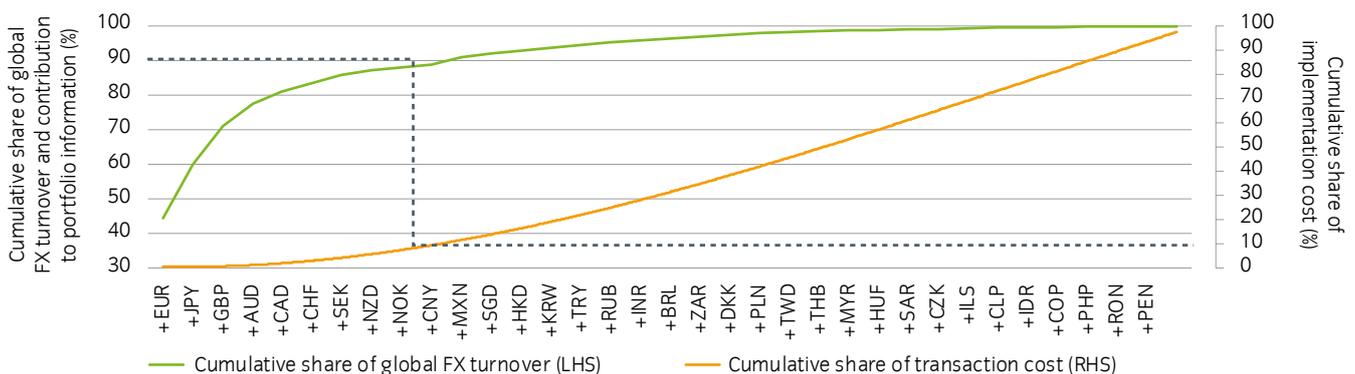
In Asia, the more managed currency regimes of China, Singapore and Hong Kong mean they do not exhibit the factors we require, and in Mexico, liquidity in the peso is not evenly distributed through time and can become unreliable.

At this stage, we believe that including emerging market currencies in our universe would not add to our ability to access the factors we target, but would reduce liquidity and increase costs. Given this, we don't believe they are suitable candidates for what we require.



By analysing the broad currency universe, it becomes clear that there is a subset of currencies that represent slightly less than 90% of global liquidity, but less than 10% of total implementation costs

Figure 2: A careful balance between liquidity and trade efficiency¹



FACTOR-BASED MODELLING

The use of factors

In our view, there are a limited number of economic, or market-based, risk factors that tend to explain the majority of returns in currency markets over time. We view currency exposure as an instrument that can be utilised to gain targeted access to these factors. These risk factors have a key role in both absolute return objectives and currency risk management, meaning that they can be used for a range of strategies, from unconstrained alpha generation to asymmetric hedging.

Alpha generation strategies: we utilise risk factors to position for expected future currency moves, combining a basket of currency positions with the aim of delivering reliable returns over time and maximising risk-adjusted returns.

Asymmetric hedging strategies: risk factors are an aid to our goal of retaining the enhanced returns that can be achieved from

investing in international assets when the currency those assets are denominated in appreciates, but limiting downside risk when they depreciate.

There are five key factors that we believe explain the majority of currency moves

We outline these five risk factors below. They are broad sources of alpha that don't exclude any currencies or any time periods. When correctly combined, we expect them to produce attractive risk-adjusted returns across global currencies with a low correlation to typical global investment portfolios.

For each of these factors, we have analysed historical returns to calculate how each factor performed across four different environments. This covers periods where markets are either trending, or mean reverting and also when volatility is either higher, or lower than normal.²

¹ Source: Insight, BIS Triennial survey 2016. ² Source: Insight. Data between 31 December 1995 and 31 December 2019.

FIVE FACTORS

1 Carry

Carry trades attempt to exploit the Interest rate differentials between currencies by looking for currencies where the achievable income is higher than any expected depreciation over time.

Carry trades can be highly leveraged and overcrowded, and can suffer significant losses during periods of global risk aversion or liquidity events. Managing risk off events is critical.

Carry factor returns

| Environment | Directional | Mean reverting |
|-----------------|-------------|----------------|
| High volatility | 1.41% | 1.93% |
| Low volatility | 3.26% | 2.01% |

2 Momentum

Currencies can experience large cumulative directional moves, which can persist for long periods as a result of herding behaviour.

For momentum trades, our goal is asymmetric returns, delivering greater upside returns than potential downside risk. Our strategy is to aggressively take exposure when directional moves occur, but reducing these positions during range-bound periods

Momentum factor returns

| Environment | Directional | Mean reverting |
|-----------------|-------------|----------------|
| High volatility | 1.55% | -1.00% |
| Low volatility | 2.49% | -0.51% |

3 Value

Long-term fair value in currency markets can be derived from variables such as terms of trade, productivity, net investment income and gross government debt. Short-term fair value can be derived from variables such as relative equity performance, implied volatility and commodity prices. Over time, there is a tendency for currencies to mean revert to fair-value anchors and we aim to capture such moves over multiple time horizons.

Value factor returns

| Environment | Directional | Mean reverting |
|-----------------|-------------|----------------|
| High volatility | 2.72% | 3.02% |
| Low volatility | 0.73% | 1.86% |

4 Volatility

Volatility in currency markets is generally related to short-term market events which impact supply and demand. This results in a premium becoming available for those willing to supply the market with short-term liquidity and allow others to hedge their risk. There are various ways this can be exploited using option strategies. Volatility trades are also structurally diversifying to momentum trades and thus can play a crucial role in diversifying the factor mix.

Volatility factor returns

| Environment | Directional | Mean reverting |
|-----------------|-------------|----------------|
| High volatility | 4.04% | 3.24% |
| Low volatility | 1.16% | 1.19% |

5 Quality

A certain subset of the currency universe can exhibit consistent behaviour related to properties such as liquidity. In these currencies investors have a tendency to systematically overpay for directional exposure. Has been a stable and consistent factor for decades.

Quality factor returns

| Environment | Directional | Mean reverting |
|-----------------|-------------|----------------|
| High volatility | 3.36% | 0.91% |
| Low volatility | 3.82% | 3.80% |

Using factor signals

In order to determine when to implement strategies relating to each risk factor, we rely on a series of factor signals. These signals can be long term or short term in nature, to account for the fact that factors can persist over different timeframes. For example:

- The value factor could be exploited using signals capturing reversion to fair value over both the long term, based on macro variables, and the short term, based on market variables.
- To capture the momentum factor, one can condition for exchange-rate momentum reactively by looking at recent price trends or proactively by examining recent changes in forward exchange-rate yield differentials.

- With the carry factor, by averaging over a range of yields, all of which satisfy the economic rationale of carry, we can increase the likelihood that the underlying economic risk factor will be realised and create a more robust strategy.

In the framework we employ, factors contain multiple factor signals, each signal being a different representation of the factor in question. This averaging approach is powerful and effective. It helps us to deliver stable true factor outcomes with reduced variability through diversification.





The true power of risk-factor investing comes at a portfolio level, where the low correlations between alternative risk factors can be used to significantly reduce portfolio volatility and tail risk

RISK MANAGEMENT

The true power of risk-factor investing comes at a portfolio level, where the low correlations between alternative risk factors can be used to significantly reduce portfolio volatility and tail risk. Figure 3 shows the monthly return correlations for the factors we employ. These correlations tend to be more reliable than the correlations

observed by traditional assets, a function of the fact that currencies are traded relative to one another – not all currencies can fall or rise at the same time. This structural diversification is an ideal platform upon which we can overlay the cross-sectional and time-series risk methodologies which we describe below.

Figure 3: Factor correlations³

| | Volatility (%) | Momentum (%) | Carry (%) | Value (%) | Quality (%) |
|----------------|----------------|--------------|-----------|-----------|-------------|
| Volatility (%) | - | -19 | -10 | -7 | 4 |
| Momentum (%) | -19 | - | 26 | -31 | -7 |
| Carry (%) | -10 | 26 | - | 1 | -22 |
| Value (%) | -7 | -31 | 1 | - | 10 |
| Quality (%) | 4 | -7 | -22 | 10 | - |

Cross-sectional risk allocation

When we are constructing our basket of factor-based currency positions, we adopt a risk-parity approach. Firstly, each of the factor signals is scaled, based on historical measures of volatility, to have an equal level of risk. The second stage depends on the type of strategy:

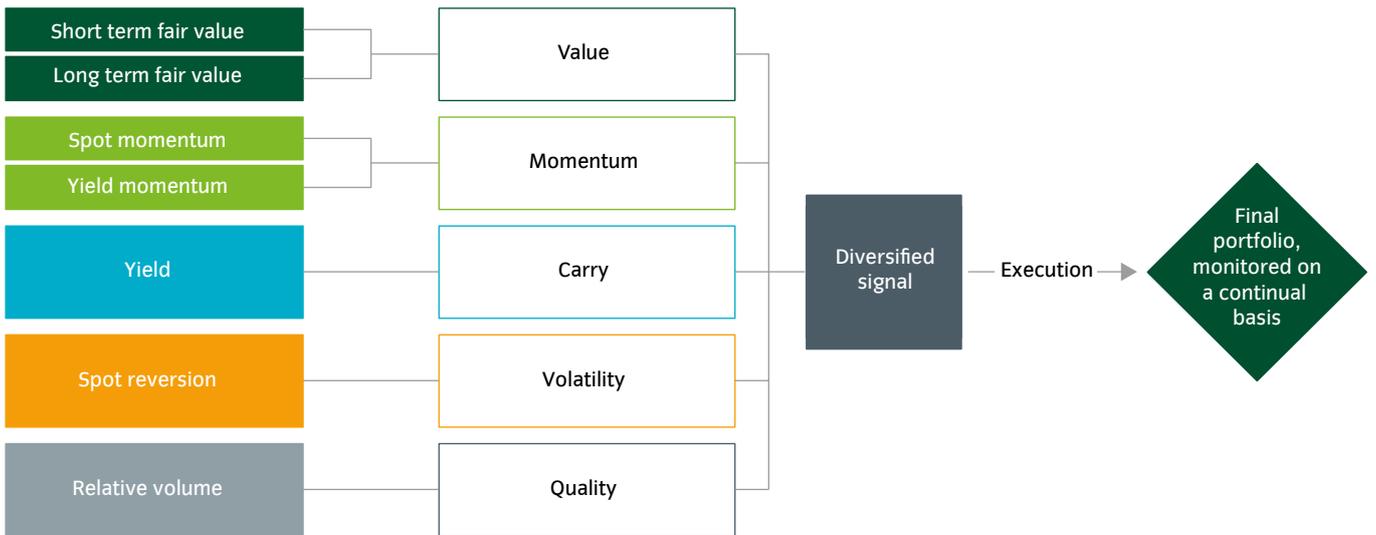
- For alpha generation strategies, positions are netted by factor, then scaled so that each factor is of equal risk. Each risk factor can be represented by many different underlying combinations of currency pairs.

- For dynamic hedging strategies, positions are netted by currency, then scaled so that each currency is of equal risk.

We then assemble a final basket of currency positions, reflecting our diversified signal.

³ Source: Insight. Data between 31 December 1995 and 31 December 2019.

Figure 4: Hierarchical risk-parity combination of signals and factors



Time-series risk scaling

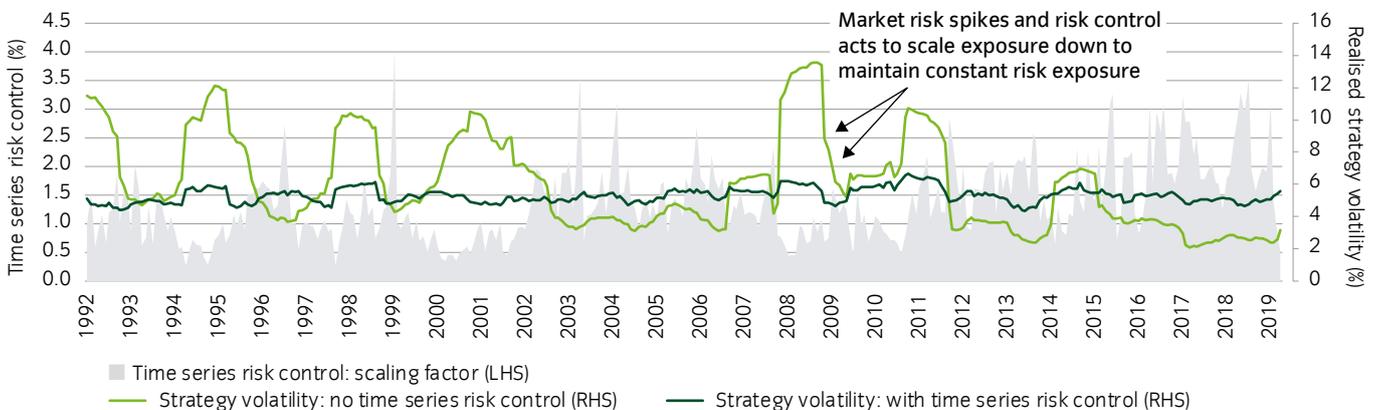
To manage the aggregate level of risk at a strategy level we use time-series risk scaling. This reduces or increases exposure to the basket of factor-based trades to achieve an appropriate level of aggregate risk. The aggregate risk of a strategy is generally specified by the client and may include specific measures such as drawdown limits.

An example of the effect of time-series scaling is outlined in Figure 5, which outlines the returns of an unconstrained alpha generating strategy, and one with a 5% annual tracking error target. The time-series risk control scales factor exposures upwards or downwards over time to maintain risk at an appropriate level – the scaling factor is represented by the grey lines within the

chart. By implementing this risk-scaling technique, the volatility of the strategy can be significantly reduced.

For active hedging strategies, time-series risk scaling can be used as part of a dynamic risk-budgeting process to try and create an asymmetric outcome – limiting downside risk but providing upside exposure. Our aim is to provide this at a cost far cheaper than would be available directly in the market. Small differences in strategic approaches to currency management can be powerful enough to drive significant performance relative to peers, especially for funds with large international asset allocations.

Figure 5: Time-series risk scaling increases or decreases factor exposures to control aggregate risk



⁴ Source: Insight. Data between 31 December 1995 and 31 December 2019.

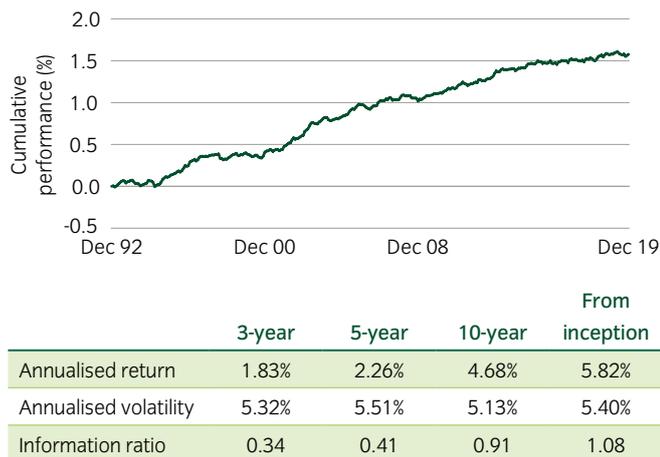
SIMULATED IMPLEMENTATION EXAMPLES

We aim to appropriately tailor structured solutions for our clients in a way that satisfies their objectives and meets their performance and risk targets. We are able to utilise our risk-factor approach in multiple ways, and to illustrate this point, we show two simple examples of potential solution designs with quite different configurations and objectives.

Absolute return

- Tracking error target of 5%
- Objective of maximising risk-adjusted returns, subject to tracking-error constraints

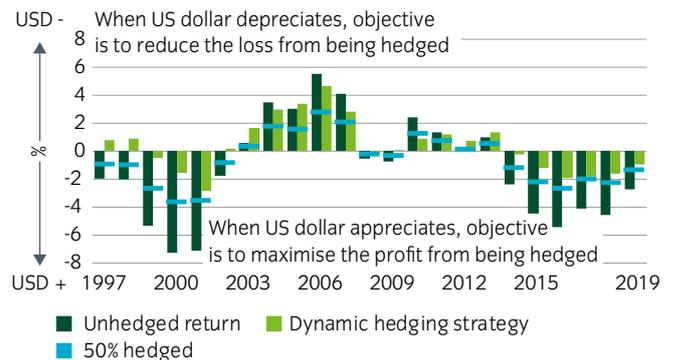
Figure 6: Absolute return G10 FX, simulated returns⁵



Dynamic hedging

- Underlying portfolio of MSCI World ex US
- Risk budget set at 3% (calendar year) relative to 50% benchmark
- Objective of maximising asymmetric returns subject to risk constraints

Figure 7: Dynamic hedging, rolling five-year effective currency return⁶



| | 3-year | 5-year | 10-year | From inception |
|-----------------------|--------|--------|---------|----------------|
| Annualised return | 0.08% | 0.40% | 0.67% | 0.90% |
| Annualised volatility | 1.37% | 1.30% | 1.23% | 1.55% |
| Information ratio | 0.06 | 0.31 | 0.54 | 0.58 |

APPENDIX

| | | |
|--|-----------------|--------------------------|
| Market Direction | Directional | > one standard deviation |
| Based on rolling 6mth unhedged G10 currency returns | Mean reverting | < one standard deviation |
| Market Risk | High volatility | > median |
| Based on rolling 6mth standard deviation of G10 currency returns | Low volatility | < median |

^{5,6} Source: Insight. Data between 31 December 1992 and 31 December 2019. Gross of any fee. Simulated performance in US dollars, based on FX spot and forward data from Datastream, WM Reuters and Insight, rebalanced daily. Returns may increase or decrease as a result of currency fluctuations.

IMPORTANT INFORMATION

RISK DISCLOSURES

Performance data refers to simulated past performance, and may not be a reliable indicator of future performance. Investment in any strategy involves a risk of loss which may partly be due to exchange rate fluctuations.

The performance results shown, whether net or gross of investment management fees, reflect the reinvestment of dividends and/or income and other earnings. Any gross of fees performance does not include fees and charges and these can have a material detrimental effect on the performance of an investment.

Any target performance aims are not a guarantee, may not be achieved and a capital loss may occur. Strategies which have a higher performance aim generally take more risk to achieve this and so have a greater potential for the returns to be significantly different than expected.

Portfolio holdings are subject to change, for information only and are not investment recommendations.

ASSOCIATED INVESTMENT RISKS

Currency risk management

Currency hedging techniques aim to eliminate the effects of changes in the exchange rate between the currency of the underlying investments and the base currency (i.e. the reporting currency) of the portfolio. These techniques may not eliminate all the currency risk.

Derivatives may be used to generate returns as well as to reduce costs and/or the overall risk of the portfolio. Using derivatives can involve a higher level of risk. A small movement in the price of an underlying investment may result in a disproportionately large movement in the price of the derivative investment.

Investments in emerging markets can be less liquid and riskier than more developed markets and difficulties in accounting, dealing, settlement and custody may arise.

Where leverage is used through the use of swaps and other derivative instruments, this can increase the overall volatility. Any event that adversely affects the value of an investment would be magnified if leverage is employed by the portfolio and losses would be greater than if leverage were not employed.

CONTRIBUTORS



Francesca Fornasari,
Head of Currency Solutions,
Insight Investment



Matteo Johnston,
Senior Quant Analyst - Quant
Strategies, Currency Solutions,
Insight Investment



James Coleman,
Head of Research – Quant Strategies,
Currency Solutions,
Insight Investment



Simon Down,
Senior Content Specialist,
Insight Investment



Chris Veldman,
Deputy Head of Research - Quant
Strategies, Currency Solutions,
Insight Investment



FIND OUT MORE

Institutional Business Development

businessdevelopment@insightinvestment.com
+44 20 7321 1552

European Business Development

europe@insightinvestment.com
+49 69 12014 2650
+44 20 7321 1928

Consultant Relationship Management

consultantrelations@insightinvestment.com
+44 20 7321 1023

 @InsightInvestIM

 company/insight-investment

 www.insightinvestment.com

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