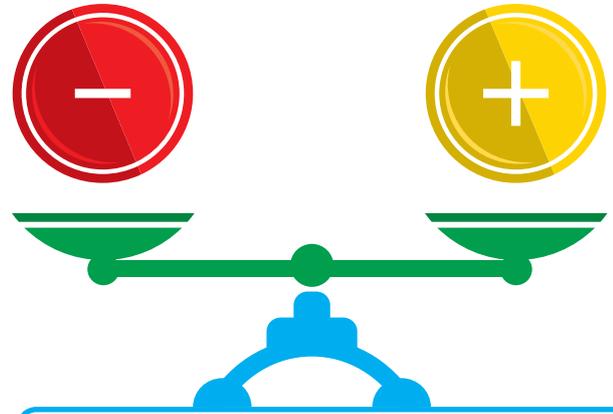


DIVERSIFIED THINKING

What is the appropriate level of currency hedging?

Recent currency market volatility, particularly the fall in the value of the pound, has highlighted the importance of determining the appropriate level of currency hedging for investors in international assets.



Jonathan Joiner is a manager in LGIM's Solutions practice and is responsible for providing client-specific investment strategy input and investment ideas.



Marcus Mollan leads LGIM's thought leadership and intellectual capital work in investment strategy and objective-driven investing.

EXECUTIVE SUMMARY

In this paper we discuss key considerations for setting the appropriate strategic level of currency hedging and the implications of recent market developments.

- Key factors to consider when setting the hedge level include an investor's asset class mix, currency exposure, costs and time horizon
- We recommend a top-down approach at a portfolio level and a bottom-up approach at an asset class level, considering asset-class specific factors and overall portfolio exposure
- For UK investors we view running some currency risk as beneficial, given its diversifying nature, tail-risk hedging qualities and the protection it can offer from inflation shocks
- Due to 'basis' effects, we expect hedging currency exposure in European and Japanese assets to continue to add to expected returns for sterling investors

TARGETING LOWER LEVELS OF VOLATILITY

For developed market currencies, most currency risk is typically viewed to be uncompensated over the long term¹. This suggests a starting strategic position where currency exposure is hedged. However, depending on the asset class or overall portfolio composition, currency exposure can mitigate risk, especially if it is negatively correlated with the underlying portfolio. A common approach is for investors to target reduced levels of

“Currency exposure can mitigate risk, especially if it is negatively correlated with the underlying portfolio”

volatility. As detailed below, this leads to differing appropriate hedge ratios depending on the portfolio of assets and currencies considered.

HEDGING 100% OF FIXED INCOME ASSETS HAS REDUCED VOLATILITY

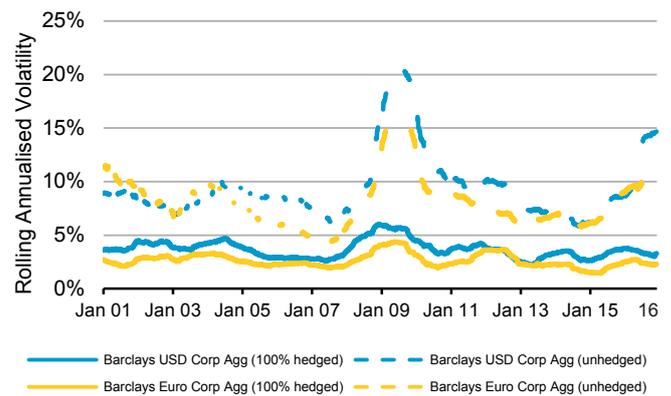
Investors in high quality nominal fixed income assets receive a relatively certain set of predefined cashflows. As a result, these assets typically exhibit low levels of volatility, particularly compared to riskier assets such as equities. However, holders of unhedged foreign denominated fixed income are unsure of the cashflows they will receive in domestic currency terms due to potential currency fluctuations. Currencies are often significantly more volatile than bond prices, meaning that unhedged foreign denominated fixed income exposure can be significantly more volatile than hedged.

“This encourages investors to hedge 100% of foreign currency exposure in developed fixed income”

This can be seen in Figure 1, where the rolling volatility of unhedged euro and dollar denominated corporate bond indices have been persistently higher than the hedged versions for a sterling investor. Under the assumption that currencies are an unrewarded risk, the higher volatility exhibited by unhedged fixed income is not compensated with extra return, and as such has a lower Sharpe ratio. This

encourages investors to hedge 100% of foreign currency exposure in developed fixed income.

Figure 1: Unhedged global fixed income has been significantly more volatile than hedged



Source: Bloomberg, as at 30 November 2016

“The target hedge ratio for foreign-denominated equities is less clear, with the equity volatility being significantly higher”

THE CASE FOR HEDGING 30% - 70% OF FOREIGN EQUITY EXPOSURE

The target hedge ratio for foreign-denominated equities is less clear,

with the equity volatility being significantly higher than bonds and often larger than the currency volatility. Additionally, equity market indices may have embedded currency exposure. For example, during the recent sharp devaluation of sterling, FTSE 100 companies notably outperformed FTSE 250 companies. A cited driver of this was that a much larger proportion of the future earnings of FTSE 100 companies are denominated in foreign currencies when compared to smaller FTSE 250 companies. In sterling terms, the value of these future earnings rose markedly as the pound depreciated.

Correlations between currency and equity market moves can result in a less than 100% hedging being optimal. Figure 2 plots the realised volatility of a range of indices at differing levels of currency hedge for a sterling investor. For the indices shown, a 100% hedge is not optimal for reducing overall volatility for the time period

2 1. While investors may be able to identify opportunities which arise from mispricing of currencies, this is not our primary focus for this paper.

“Historically, an optimal approach suggests 30-70% currency hedging for foreign equity exposure”

considered. Historically, an optimal approach suggests 30-70% currency hedging for foreign equity exposure. However, this result can vary significantly by time period

and by equity market, and often the historic volatility difference between different currency hedge ratios can be rather small. In addition, this approach ignores the costs involved. For these reasons, as we discuss in more detail later, we suggest not focusing exclusively on reducing volatility when selecting a hedge ratio.

without hedging out inflation may increase the volatility of the asset. However, the evidence for this and for the strength of PPP is mixed, even over the longer term.

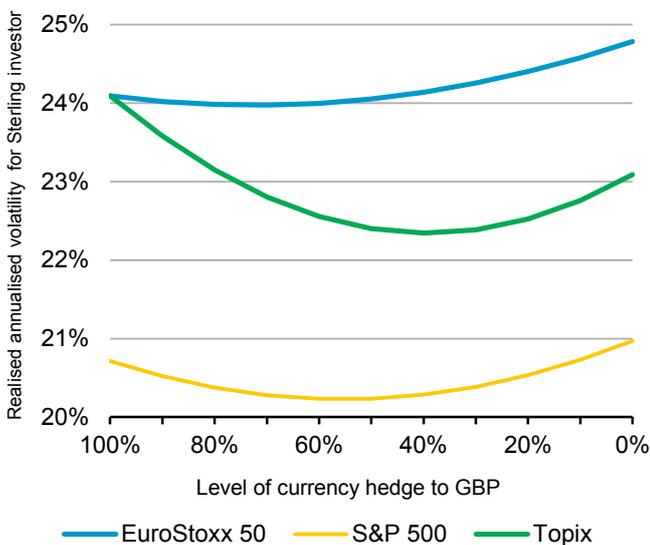
WE ADVOCATE ASSESSING CURRENCY EXPOSURE AT A TOTAL PORTFOLIO LEVEL

“In addition to assessing the appropriate level of hedge at the asset class level, we encourage incorporating a top-down view”

So far we have considered the asset classes and currencies in isolation. However the majority of investors’ portfolios

contain exposure to multiple asset classes and currencies. In addition to assessing the appropriate level of hedge at the asset class level, we encourage incorporating a top-down view. This requires looking at the portfolio as a whole and assessing the effect of differing currency hedge ratios on the portfolio’s overall volatility.

Figure 2: Hedging 100% of currency exposure in equity investments may not reduce volatility



Source: Realised volatility of 10 years of daily data, Bloomberg, as at 30 November 2016

For assets other than equities and bonds, the optimal hedge ratio in terms of reducing volatility is highly dependent on the specifics of the asset class. For real assets a low level of hedging could be appropriate, reflecting the inflation linkage and exposure to underlying economic growth. Under purchasing power parity (PPP) theory, changes in the cost of living should be reflected by moves in the currency. Therefore, currency hedging foreign denominated real assets

As with equities in isolation, correlations between assets and currencies typically lead to us not recommending hedging 100% of foreign currency exposure. However, this depends on the exact nature of the investor’s assets, liabilities and time horizon. For investors with high-risk strategies or defined benefit pension schemes with low funding levels, the marginal impact of hedging currency risk may be minimal. This could discourage hedging currency exposure. In contrast, investors who have a strong focus on mark-to-market risk may favour high hedge ratios, with currency hedging likely to help reduce short-term risk. Investors with longer-term horizons may be more comfortable having a higher exposure to currency risk and benefiting from reduced hedging costs.

To illustrate this, for domestically-based private equity, sub-investment grade credit and other high risk investments, it may be optimal to not hedge foreign currency exposure. This reflects that it could be a negligible contributor to total portfolio risk and take up valuable resources. Alternatively, for an investor hedging liability payments using overseas bonds, a

100% currency hedge ratio may be most appropriate, reflecting the potential sensitivity to mark-to-market moves.

A key benefit of incorporating a top-down approach is that it focuses attention on how the overall portfolio may act in certain scenarios, for example tail events and the interaction of currency exposure with liabilities.

USING CURRENCY EXPOSURE TO GUARD AGAINST TAIL-RISK EVENTS

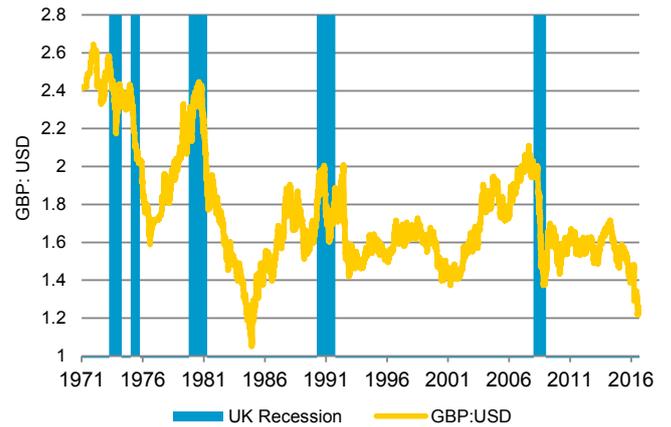
Whilst a good starting point, there are a number of drawbacks of simply targeting lower volatility. A key drawback is the reliance on historic data. The ‘optimal’ hedge ratio relies on assumed correlations which may be unstable over time. It is therefore also important to conduct scenario analysis to assess how the portfolio may react in tail events or if correlation assumptions change.

“The appreciation of unhedged overseas assets can partially offset the increased expectations for near-term inflation”

Currency risk may interact with an investor’s liabilities, particularly if they are linked to inflation. For example, unhedged overseas

assets can provide protection in an inflationary scenario if it coincides with, or is caused by, a depreciation of the domestic currency. An example of this is the sharp depreciation of sterling in the wake of the UK referendum, which led to a rise in short-term inflation expectations. For UK Pension schemes with unhedged inflation-linked liabilities, or individual investors with exposure to the cost of living, the appreciation of unhedged non-sterling assets can partially offset the increased expectations for near-term inflation. However, it is important to recognise the imperfect nature of this hedge. While currency depreciation offset the rise in short term inflation expectations, long-term inflation expectations in the UK actually fell in the immediate aftermath of the Brexit decision, though they have risen since.

Figure 3: Sterling has historically weakened in times of economic stress



Source: Bloomberg, ONS, as at 30 November 2016

Currency exposure can also act as a domestic tail-risk hedge. Historically, sterling has been positively correlated with a ‘pro-risk’ environment. Recessions, even if felt globally, often coincide with sterling falls (Figure 3). This is partly because the UK has tended to run current account deficits. Times of economic stress typically lead to a reduction in foreign investment, with sterling more vulnerable than other currencies to external financing pressures. In contrast, the US dollar and Japanese yen are regarded by many investors as ‘safe haven’ currencies and have often appreciated during times of economic stress. Unhedged exposure to these currencies could therefore potentially offset losses on risky assets such as equities.

“Relatively lower strategic hedge ratios can make sense for sterling denominated portfolios”

For UK-based investors this encourages a lower currency hedge ratio than for investors from many other regions. The

pro-risk nature of sterling leads to foreign currency exposure typically protecting against tail events. Additionally, it can act as a loose hedge of the inflation risk present in UK DB pension schemes’ liabilities and the risk for individual investors of high UK inflation eroding the purchasing power of their savings.

We therefore believe that lower strategic hedge ratios can make sense for some sterling denominated multi-asset funds when compared to euro or US dollar equivalents.

For DB pension scheme trustees, it is worth trying to understand the currency exposures and currency risks of the sponsoring company. This may allow trustees to assess whether adverse currency moves for the company are likely to be adverse scenarios for the pension scheme.

THE CASE FOR NOT HEDGING EMERGING MARKET CURRENCY EXPOSURE

For emerging markets there are significant return implications of hedging currency risk. Reflecting their lower level of visibility and higher volatility, emerging market currencies may offer a persistent risk premium to their developed counterparts. Emerging economies typically also have more scope for wage growth and productivity gains as they develop. In practice, this can lead to an appreciation in the real exchange rate (known as the Balassa-Samuelson Effect).

“Emerging market currency exposures are usually left unhedged”

A key part of the rationale for holding emerging markets assets therefore includes the investment opportunity offered by

the currency. In addition, investors need to incorporate the drag on return from transaction and management costs. For developed currencies these are typically small but may be prohibitively expensive for emerging market currencies. The combination of these factors usually argues for leaving emerging market currency exposures unhedged.

CASHFLOW AND COLLATERAL REQUIREMENTS COULD AFFECT PORTFOLIO PERFORMANCE

Explicit transaction costs for hedging developed currency exposure are typically very low. However, investors need to consider the implications for collateral and cashflows. Investors typically use short-dated currency forwards to

hedge their currency risk. This leads to a potential for regular cashflows, requiring investors to either hold a proportion of their assets in cash or regularly trade in or out of assets to meet cashflows as they fall due. This could lead to increased transaction costs or higher proportions of assets in cash, both of which could act as a drag on total portfolio performance.

“Regulatory changes under EMIR will mandate the collateralisation of currency derivatives”

Historically, collateral requirements have been less of a consideration for currency hedging investors, as it has been common not to collateralise currency forwards. However, regulatory changes under European Markets Infrastructure Regulation (EMIR) will mandate the collateralisation of currency derivatives in the near future. This could lead to investors needing to adjust their strategic allocations to increase their holdings of eligible collateral, potentially affecting future portfolio performance.

“The basis is a measure of how much the future exchange rate price deviates from this theoretical ‘fair value’”

CONSIDERING THE CROSS CURRENCY ‘BASIS’

A less well known element affecting the cost of hedging is the cross currency ‘basis’.

When trading a currency derivative, the counterparties agree the currency pair, notional size, maturity date and the future exchange rate. The first three elements are typically specified by the investor looking to hedge their currency risk. According to interest rate parity theory, however, the future exchange rate should be calculated by referencing the interest rate differential between the two regions. The basis is a measure of how much the future exchange rate price deviates from this theoretical ‘fair value’. As such, the basis can alter the expected return of a hedged foreign currency denominated asset.

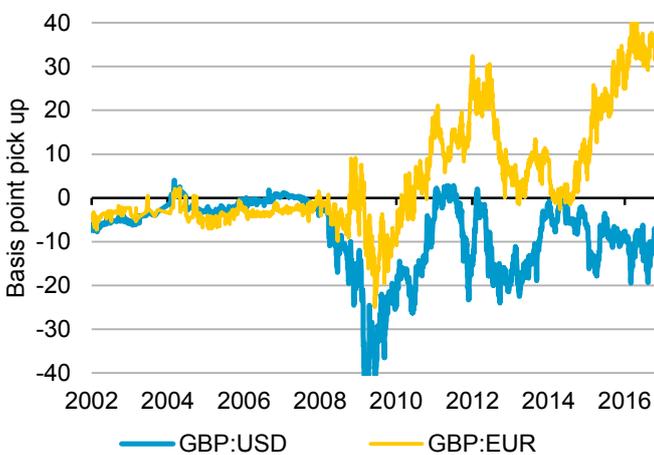
Historically, the basis for developed currencies has been small, with deviations occurring only briefly at

times of market stress. For example, at the height of the financial crisis, there was an acute demand for US dollars, putting pressure on the basis between the dollar and other developed currencies. This led to currency derivatives not pricing in line with interest rate parity and temporarily reducing the realised return of currency hedged foreign holders of US dollar-denominated assets. This, however, was only short lived. More recently there have been significant and long-lasting moves in the bases between developed currencies at times of relative market stability.

HEDGING EURO AND YEN EXPOSURE COULD BE ATTRACTIVE FOR A STERLING INVESTOR

Figure 4 plots the basis on a 10-year currency hedging instrument between sterling and both US dollars and euros. As described previously, the basis has shown strong signs of mean reversion with levels oscillating close to zero. During periods of extreme market stress the basis has deviated, but has normally reverted as markets stabilised. This is not true of recent moves however, where it can be seen that the basis has risen strongly from the beginning of 2015 for sterling investors in euro assets.

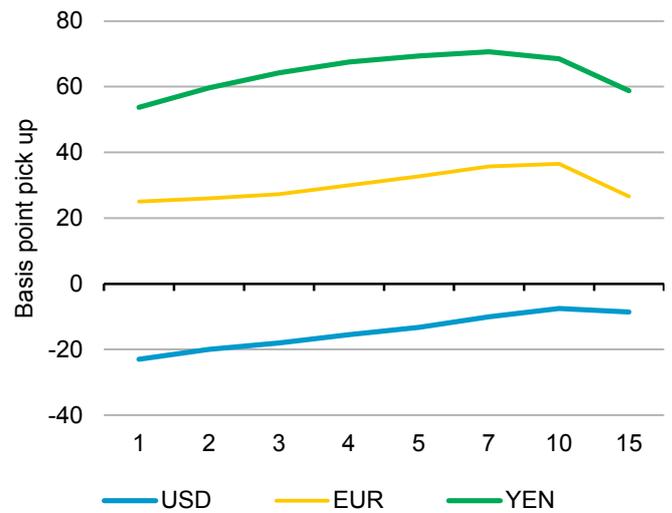
Figure 4: Significant deviations have persisted between developed currencies



Source: Cross currency basis swap levels for a sterling investor, Bloomberg, as at 30 November 2016

Figure 5 plots the basis of sterling to the US dollar, euro and yen for currency hedging instruments at a range of tenors. Currently the basis for the euro and yen is significantly positive, with a pick-up of 30 or 60 basis points a year from hedging euro and yen assets relative to the theoretical fair value for a sterling-based investor. Short-lived moves in the basis are unlikely to have material effects on an investor’s realised return over a strategic long-term time horizon. However, the longer the deviation persists, the more material the potential impact is on the realised return.

Figure 5: Currency bases at different tenors



Source: Cross currency basis swap levels for a sterling investor, Bloomberg, as at 30 November 2016

“The level of the basis is driven by supply and demand factors from market participants”

The level of the basis is driven by supply and demand factors from market participants looking to invest or raise capital in non-domestic currencies. In contrast to previous periods, we expect recent deviations in the basis to be more persistent. The extraordinary monetary policy actions of central banks have had a significant effect on the relative attractiveness of investing and raising capital in certain currencies. The quantitative easing programs in the euro

zone and Japan have led to ultra-low yields and tighter credit spreads. This encourages issuers to raise capital in those regions and investors domiciled there to look abroad for more attractive yields. Both these actions put upward pressure on the basis and lead to the potential for a basis pick-up for foreign investors.

We do not expect these monetary policy distortions to dissipate over the short term. In addition, when supply and demand imbalances have put pressure on the basis, banks have historically been able to step in and ‘arbitrage’ the basis. Where deviations were significant, banks were able to take basis risk onto their balance sheet and hold the exposure until the basis reverted towards zero. This reduced the pressure on the basis level and limited the potential for large deviations. However, due to new regulations on banks constraining the size of their balance sheets, appetite to hold these types of risk is diminished. Reflecting this, basis deviations are likely to be more common and more persistent.

“For a sterling investor, this encourages higher hedge ratios for euro and yen assets”

The continuation of the effects of extraordinary monetary policy and constraints on bank balance sheets lead us to believe that this

distortion in basis levels will be more persistent than in previous periods. For a sterling investor, this encourages higher hedge ratios for euro and yen assets. Investors may also wish to consider a broader range of currency derivatives to lock in basis exposure.

KEY FACTORS TO CONSIDER WHEN SETTING THE STRATEGIC HEDGE RATIO

Deciding the appropriate level of currency hedge is a multi-layered decision. We believe that targeting reduced volatility from both a top-down and a bottom-up approach can offer useful insights in deriving this level. However, there are a number of other factors to consider. This may lead to investors qualitatively overlaying biases, or ‘tilts’ to the target hedge ratio.

Factors supporting a lower hedge ratio	Factors supporting a higher hedge ratio
Protection in tail events, particularly for sterling investors	A focus on mark-to-market risk and/or shorter investment time horizons
The inflation-hedging characteristics of currency exposure	Low-risk portfolios where currency risk dominates
The costs of hedging, collateral and cashflow requirements	The potential pick-up from hedging euro and yen assets

Important Notice

Views and opinions expressed herein are as at January 2017 and may change based on market and other conditions. This document is designed for our corporate clients and for the use of professional advisers and agents of Legal & General. No responsibility can be accepted by Legal & General Investment Management or contributors as a result of articles contained in this publication. Specific advice should be taken when dealing with specific situations; investment decisions should be based on a person's own goals, time horizon and tolerance for risk. The information contained in this document is not intended to be, nor should be, construed as investment advice, nor deemed suitable to meet the needs of the investor. All investments are subject to risk.

© 2016 Legal & General Investment Management Limited. All rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, including photocopying and recording, without the written permission of the publishers.

www.lgim.com

Legal & General Investment Management Ltd, One Coleman Street, London, EC2R 5AA. Authorised and regulated by the Financial Conduct Authority.

M1263