Schroders

Marketing material for professional investors and advisers only

Multi-Asset Investments: What is the appropriate currency hedge ratio?

February 2019

Lesley-Ann Morgan
Head of Multi-asset Strategy

Ben Popatlal
Multi-asset Strategist

A well-formulated strategic asset allocation is the first and most important step towards meeting the goals of an investment plan. Given the importance of currency as an asset class in globally invested portfolios, it follows that the proportion of currency exposure that the portfolio hedges back to the base currency, or the 'strategic currency hedge ratio'[1], should be consistent with those goals. In this paper we discuss the factors to consider in setting the strategic currency hedge ratio, and propose that an ability to deviate from the strategic position is beneficial for a portfolio. Specifically in this paper we are seeking to identify the strategic hedge ratio that decreases uncompensated volatility.

We find that the results differ significantly for different base currencies and when evaluated over different time periods. As a result, the optimal strategic currency hedge ratio ranges between 0-100%, with results for different currencies clustering in groups with similar characteristics.

The factors to consider

Factors to consider in setting the strategic hedge ratio can be variable or fixed. Those factors which are fixed or slow-moving should heavily influence the choice of strategic hedge ratio. Those factors which are variable or transitory should influence the strategic position to a lesser degree, but will feature more heavily in the course of active currency management, that is, taking positions that may deviate from the strategic allocation.

The factors to consider in determining the strategic hedge ratio are:

- The **base currency** of the portfolio, including the correlation between asset class and currency returns
- The **asset split** between bonds and equities in the benchmark
- The **types of risk** about which the investor is concerned, including the **time horizon** over which risk is considered
- The **amount of risk** that the investor is willing and able to tolerate
- The **explicit cost** of running the currency hedging programme

1 The currency hedge ratio is measured as the proportion of currency exposure hedged back to the base currency; 100% hedge ratio means fully hedged to the base currency

After the strategic hedge ratio has been set, the decision to tactically deviate from the strategic position in the course of active portfolio management will depend on a multitude of factors, including:

- The portfolio manager's active view of the **investment landscape**
- The portfolio manager's **outlook for individual currencies**
- The portfolio manager's assessment of the **characteristics of individual currencies**[2].

We will only discuss the third of these considerations, as the first two are outside the scope of this paper.

2 For example, the carry and roll impact that results from using currency forwards, which is driven by the interest rate differential. This is an implicit cost (or benefit) of currency hedging and is explained in more detail later in the paper

The strategic hedge ratio

Globally invested portfolios invest in assets that are denominated in currencies other than the base currency of the portfolio. The return and risk profiles of such assets are made up of two components: the risk/return profile of the 'international' asset, and the risk/return profile of the 'non-base' currency. Left unhedged, the risk/return profile of a non-base currency exposure is determined by changes in the spot exchange rate between the non-base currency and the base currency of the portfolio. If hedged, the spot exchange rate exposure to the non-base currency is eliminated, but a cost of hedging is incurred, which we will discuss later in this paper.

Risk tolerance determines propensity to hedge

Currency risk will impact different asset class risk/return profiles to differing degrees. For an international bond portfolio, the volatility of the currency exposure will be much greater than the volatility of the local bond exposure. For this reason, international bond portfolios are generally currency hedged. Indeed, if the purpose of having bonds in the portfolio is to reduce volatility, then in order to preserve the role of bonds in the portfolio, many institutional investors may choose to hedge all their non-domestic bond exposure irrespective of the cost of doing so. The exception is emerging market debt where the costs of hedging are higher than for developed markets. We discuss this later in the paper. However, currency hedging may not always be suitable as correlations between the asset classes and currency can change over time.

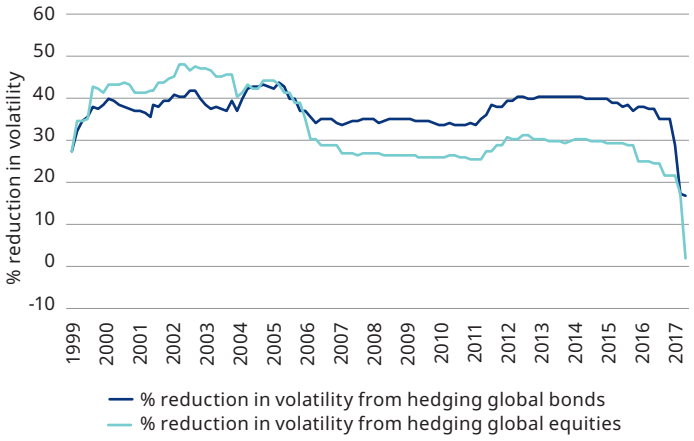
For assets with higher local price volatility, such as equities, the volatility of the currency exposure is generally relatively less dominant. For this reason, an international equity investor may leave some or all currency exposure unhedged.

We compare the volatility-reduction benefits of currency hedging for US dollar-based global equity and global bond investors on a rolling 10-year basis in Figure 1 below. We use a 10-year lookback because it is generally a long enough period to smooth out outlying observations. Given the greater volatility reduction benefits, it is usually the case that the higher the weight of bonds in a portfolio, the greater the propensity to hedge currency exposure. We show this in Figure 2 right with an example US dollar-based portfolio.

Generalising this, the higher the weight of low-volatility assets in the portfolio, the greater the relative impact of currency volatility, and the higher the propensity to hedge currency risk, all else equal. It follows that the lower the investor's tolerance for absolute amount of risk in the portfolio, the higher the strategic hedge ratio is likely to be.

Figure 1: The volatility reduction benefit of hedging is much greater for bonds than for equities

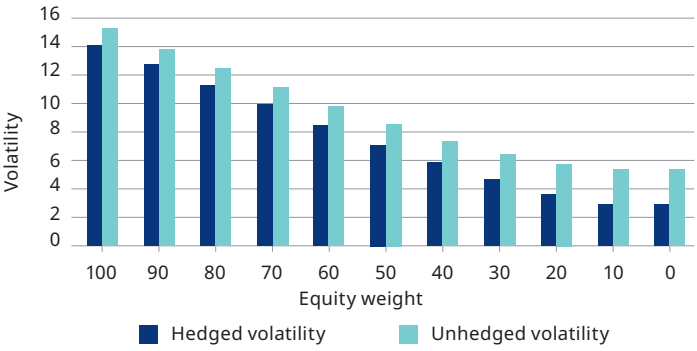
Reduction in volatility from currency hedging, 10Y p.a.



Source: Schroders, Datastream

Figure 2: Currency hedging reduces the volatility of balanced portfolios, especially for portfolios with a higher weight in bonds

Balanced portfolio volatility with hedged and unhedged currency exposure, USD, 29Y p.a. to 30 November 2018



Source: Schroders, Datastream. Equities is MSCI AC World hedged and unhedged. Bonds is Bloomberg Global Aggregate hedged and unhedged

Since the strategic hedge ratio is likely to be close to 100% for international bond investors based in any currency, we focus the remainder of this paper on the equity portion of portfolios.

The choice of strategic currency hedge ratio has a limited impact on portfolio returns. The more important impact is on portfolio volatility. With this in mind, the strategic hedge ratio should be set to minimise portfolio volatility, subject to the cost of doing so.

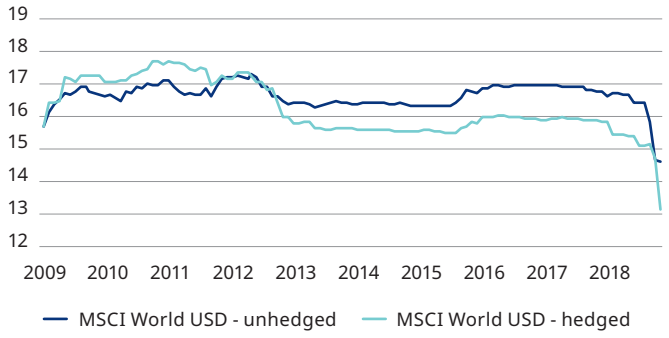
Hedging has a different effect on different groups of currencies

We compare in Figures 3-16 below the 100% currency hedged and unhedged (i.e. 0% currency hedged) volatility of global equity portfolios denominated in various major base currencies. We have organised the base currencies into five groups based on what we believe to be the dominant common drivers of volatility. Group 1 (e.g. USD, JPY)[3] contains those currencies which see increased demand during times of market stress, making them 'risk-off' currencies. Conversely, these currencies become 'funding currencies' during periods where investors seek exposure to riskier assets. Group 2 (e.g. GBP, EUR) contains those currencies that investors have typically used to generate returns. These currencies have switched between having 'risk-on' and 'risk-off' characteristics. Group 3 (e.g. CAD, AUD) contains the currencies of countries that have a significant exposure to commodities. Because of the correlation between commodity prices and these currencies, investors often use these currencies to gain (or reduce) commodity exposure in their broader portfolios. Group 4 (e.g. SGD) contains those liquid/readily tradeable currencies which can be used as a proxy for emerging market risk. Because emerging market currency instruments are often illiquid or not readily available in the desired specifications, investors often use proxy currencies instead. Group 5 contains emerging market currencies (e.g. BRL, MXN). We provide results for a selection of currencies from each group; other currencies that fit into these groups are likely to have similar results. We do not discuss group 5 currencies in this paper, but we have written a special paper discussing the Chinese renminbi[4].

Group 1: Risk-off/funding currencies

Figure 3: Currency hedging decreases equity volatility over rolling 10-year periods for USD-based investors

Global equity volatility hedged and unhedged in US dollars, 10Y p.a



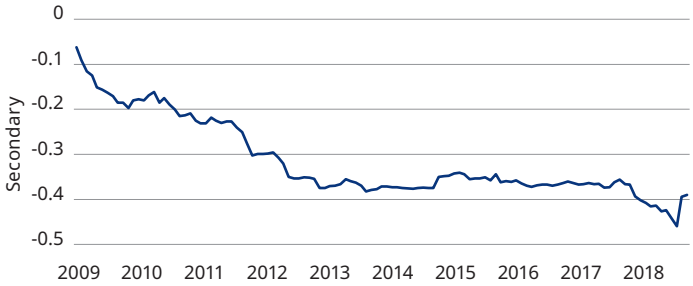
Source: Schroders, Datastream

3 USD is US dollars, JPY is Japanese yen, GBP is pound sterling, EUR is euro, CAD is Canadian dollars, AUD is Australian dollars, SGD is Singapore dollars, BRL is Brazilian real, MXN is Mexican peso

4 What is the appropriate currency hedge ratio for RMB-based investors? Schroders, January 2019. Available on request.

Figure 4: The impact of currency hedging can be explained by the currency-equity correlation

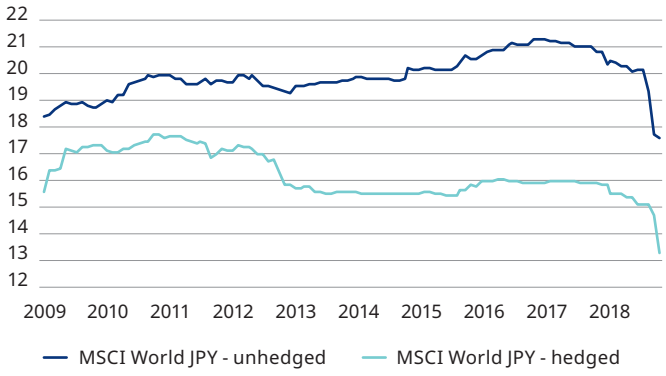
Correlation between the US dollar and global equities in local currency



Source: Schroders, Datastream.

Figure 5: Currency hedging decreases equity volatility over rolling 10-year periods for JPY-based investors

Global equity volatility hedged and unhedged in yen, 10Y p.a



Source: Schroders, Datastream.

Figure 6: The impact of currency hedging can be explained by the currency-equity correlation

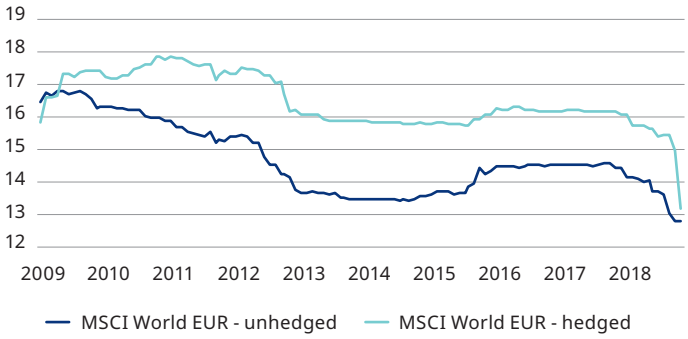
Correlation between Japanese yen and global equities in local currency

Source: Schroders, Datastream.

Group 2: Risk-on/variable risk currencies

Figure 7: Currency hedging increases equity volatility over rolling 10-year periods for EUR-based investors

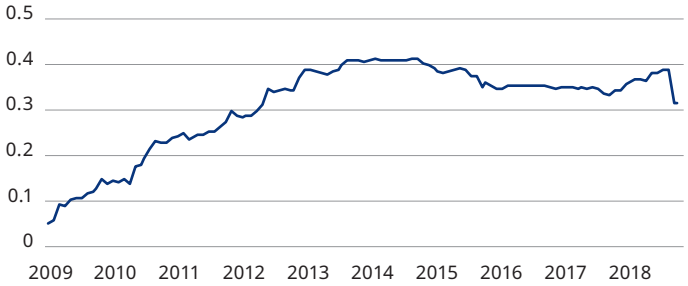
Global equity volatility hedged and unhedged in euros, 10Y p.a.



Source: Schroders, Datastream.

Figure 8: The impact of currency hedging can be explained by the currency-equity correlation

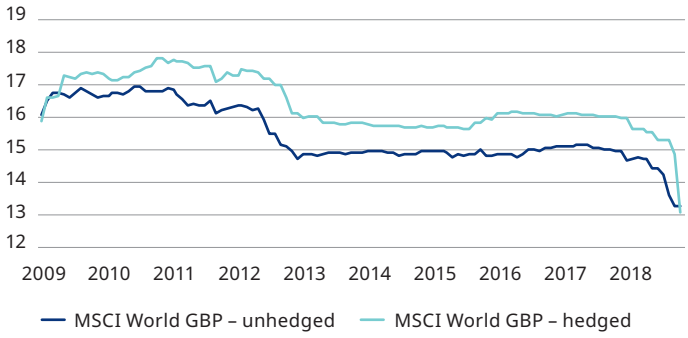
Correlation between the euro and global equities in local currency



Source: Schroders, Datastream.

Figure 9: Currency hedging increases equity volatility over rolling 10-year periods for GBP-based investors

Global equity volatility hedged and unhedged in sterling, 10Y p.a.



Source: Schroders, Datastream.

Figure 10: The impact of currency hedging can be explained by the currency-equity correlation

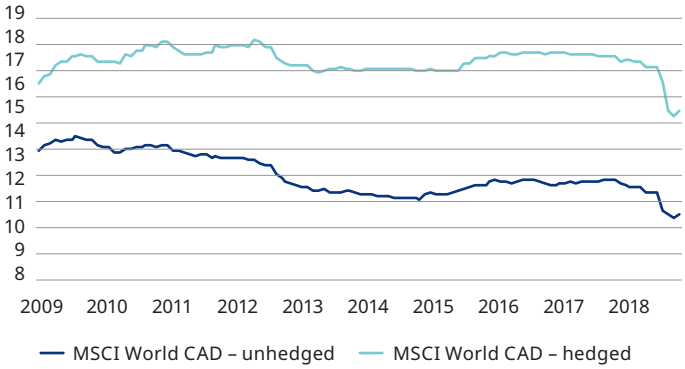
Correlation between sterling and global equities in local currency

Source: Schroders, Datastream.

Group 3: Commodity currencies

Figure 11: Currency hedging increases equity volatility over rolling 10-year periods for CAD-based investors

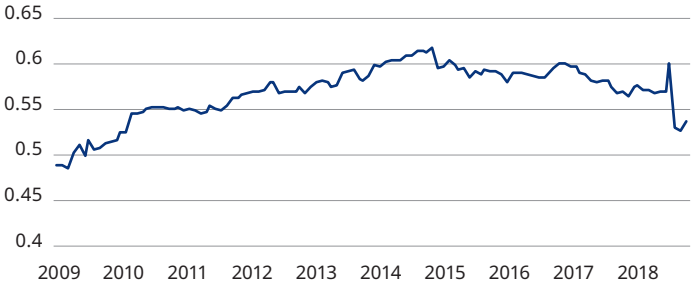
Global equity volatility hedged and unhedged in Canadian dollars, 10Y p.a.



Source: Schroders, Datastream.

Figure 12: The impact of currency hedging can be explained by the currency-equity correlation

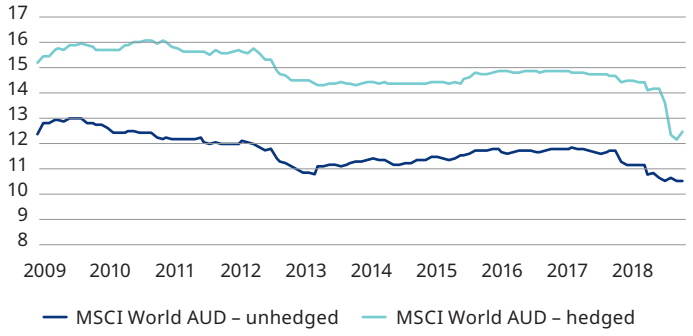
Correlation between Canadian dollars and global equities in local currency



Source: Schroders, Datastream.

Figure 13: Currency hedging increases equity volatility over rolling 10-year periods for AUD-based investors

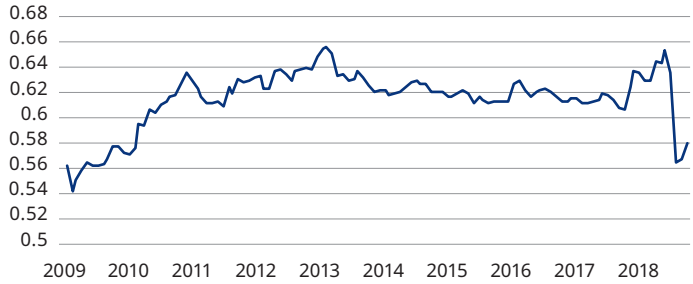
Global equity volatility hedged and unhedged in Australian dollars, 10Y p.a.



Source: Schroders, Datastream.

Figure 14: The impact of currency hedging can be explained by the currency-equity correlation

Correlation between Australian dollars and global equities in local currency

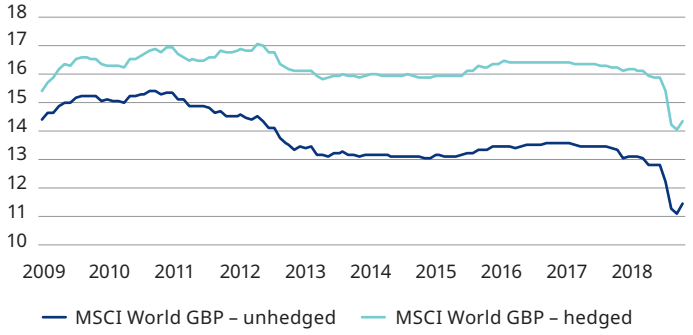


Source: Schroders, Datastream.

Group 4: EM-proxy currencies

Figure 15: Currency hedging increases equity volatility over rolling 10-year periods for SGD-based investors

Global equity volatility hedged and unhedged in Singapore dollars, 10Y p.a.



Source: Schroders, Datastream.

Figure 16: The impact of currency hedging can be explained by the currency-equity correlation

Correlation between Singapore dollars and global equities in local currency

Source: Schroders, Datastream.

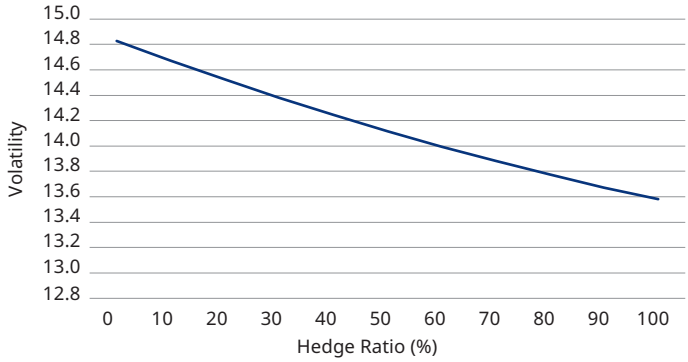
Optimal hedge ratios vary across currency groups

In the charts that follow (Figures 17-23), we calculate portfolio volatility at different hedge ratios for each of the same base currencies, using data over the 20-year period to 30 November 2018. We then show a summary of the optimal hedge ratio results over different time periods and different end dates in Figure 24.

Group 1: Risk-off/funding currencies

Figure 17: The optimal hedge ratio for USD-based investors is 100%

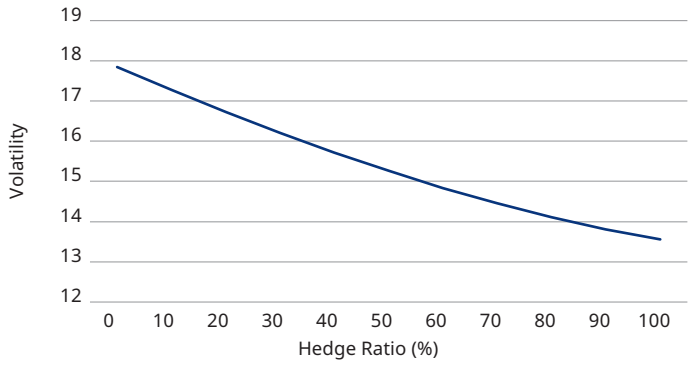
Minimum variance global equity portfolios at a range of currency hedge ratios, USD-based investors



Source: Schroders, Datastream. Calculated over 20 years.

Figure 18: The optimal hedge ratio for JPY-based investors is 100%

Minimum variance global equity portfolios at a range of currency hedge ratios, JPY-based investors

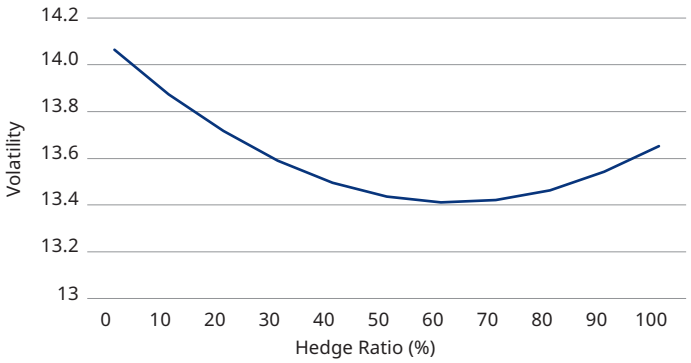


Source: Schroders, Datastream. Calculated over 20 years.

Group 2: Risk-on/variable risk currencies

Figure 19: The optimal hedge ratio for GBP-based investors is 62%

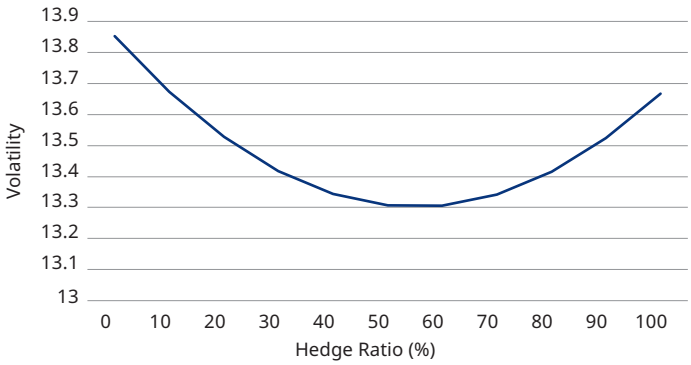
Minimum variance global equity portfolios at a range of currency hedge ratios, GBP-based investors



Source: Schroders, Datastream. Calculated over 20 years.

Figure 20: The optimal hedge ratio for EUR-based investors is 55%

Minimum variance global equity portfolios at a range of currency hedge ratios, EUR-based investors

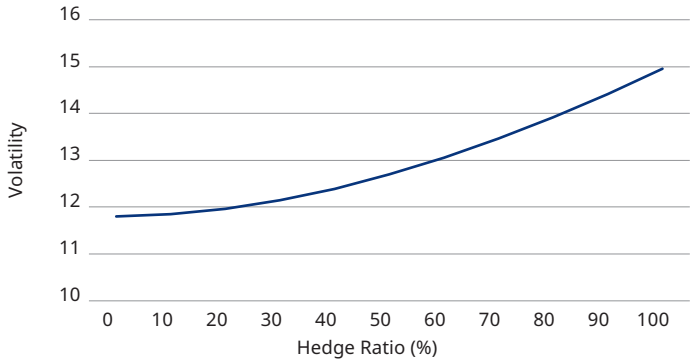


Source: Schroders, Datastream. Calculated over 20 years.

Group 3: Commodity currencies

Figure 21: The optimal hedge ratio for CAD-based investors is 0%

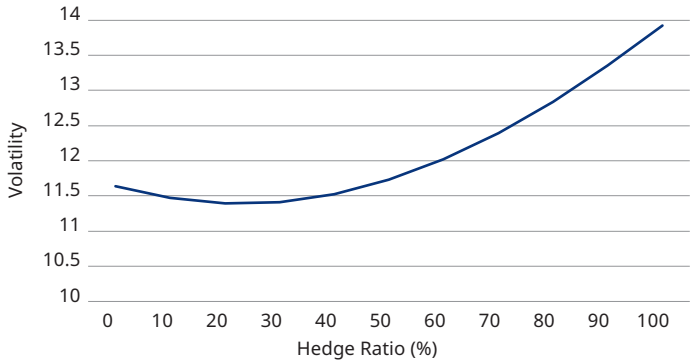
Minimum variance global equity portfolios at a range of currency hedge ratios, CAD-based investors



Source: Schroders, Datastream. Calculated over 20 years.

Figure 22: The optimal hedge ratio for AUD-based investors is 23%

Minimum variance global equity portfolios at a range of currency hedge ratios, AUD-based investors

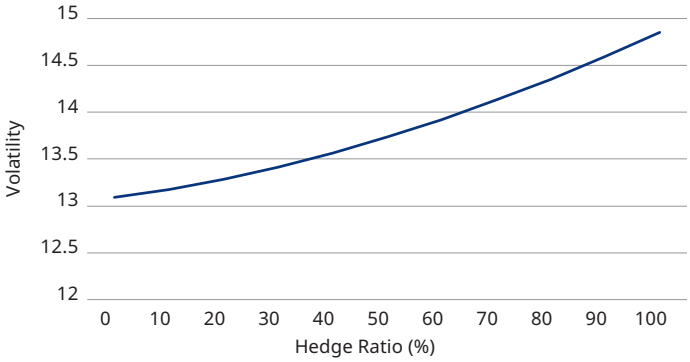


Source: Schroders, Datastream. Calculated over 20 years.

Group 4: EM-proxy currencies

Figure 23: The optimal hedge ratio for SGD-based investors is 0%

Minimum variance global equity portfolios at a range of currency hedge ratios, SGD-based investors



Source: Schroders, Datastream. Calculated over 20 years.

Figure 24: Optimal hedge ratios are more variable for risk-on currencies than for risk-off

	Minimum-variance currency hedge ratio				
	20Y to 2018	10Y to 2018	5Y to 2018	10Y to 2008	5Y to 2008
USD	100%	100%	100%	100%	100%
EUR	55%	28%	78%	79%	16%
GBP	62%	55%	45%	83%	48%
JPY	100%	100%	100%	100%	100%

Source: Schroders, Datastream

In reality, it is unlikely that investors will always be positioned at the optimal hedge ratio; some pragmatism will be required in order to determine whether or not the marginal risk reduction benefits are worth the marginal cost.

Figure 24 reveals that while the optimal hedge ratios for US dollar- and Japanese yen-based investors are consistently 100% in recent times, the optimal hedge ratios are much more variable for euro- and sterling-based investors.

Optimal hedge ratios for different strategic asset allocations

Optimal hedge ratios for the equity portions of portfolios appear to be of similar magnitude for those currencies that sit within the same category. In Figure 25 below, we show the minimum-variance hedge ratios for various multi-asset portfolios based in different currencies. Additionally, our result from earlier in the paper - that portfolios with a higher weight in bonds should hedge more – is evident in the table.

The cost of hedging

The decision to hedge, of course, will come with an associated cost. The cost of hedging is of particular importance in relation to emerging currencies; in the decision about whether to hedge, it is generally accepted that the cost and difficulty of hedging these generally small individual emerging currency exposures is prohibitive.

Figure 25: The optimal hedge ratio increases as bond weight increases and as currency 'riskiness' decreases

Currency hedge ratios for balanced portfolios, grouped by type

			Equity/bond allocation										
			100/0	90/10	80/20	70/30	60/40	50/50	40/60	30/70	20/80	10/90	0/100
Min-risk hedge ratio	Group 1: Risk-off/funding	USD	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		JPY	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		CHF	60%	64%	68%	72%	76%	80%	84%	88%	92%	96%	100%
	Group 2: Risk-on/variable	GBP	62%	66%	70%	74%	77%	81%	85%	89%	92%	96%	100%
		EUR	55%	60%	64%	69%	73%	78%	82%	87%	91%	96%	100%
	Group 3: Commodity	AUD	23%	31%	38%	46%	54%	61%	69%	77%	85%	92%	100%
		CAD	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	Group 4: EM-proxy	SGD	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Source: Schroders, Datastream. Optimal hedge ratio is defined as the hedge ratio that minimises portfolio volatility. Calculated over a 20-year period ending 30 November 2018. Bonds are assumed to be 100% hedged

Figure 26: The explicit costs of trading emerging market currencies are likely to be higher than those for developed market currencies

			bid/ask spread @ $100m (bps)	bid/ask spread @ $100m (bps)	bid/ask spread @ $100m (bps)
	Average daily volume	Most liquidity	1M	3M	6M
USD/CNY (NDF)	USD 0.5 billion	< 3M	6.0	9.0	–
EUR/USD	> USD 1 trillion	< 12M	2.0	2.0	2.8

Source: Schroders, 2019

Explicit costs

The cost of running a systematic currency hedging programme, that is, maintaining currency exposure at the strategically optimal level, is important to consider when deciding whether or not pursuing 'optimality' is worth the associated cost.

For major developed market currencies, the explicit hedging costs (i.e. transaction costs) are minimal, but for emerging market currencies, the costs are much higher. For example, Figure 26 compares the cost of trading USD/CNY non-deliverable forward contracts with the cost of trading EUR/USD forward contracts[5].

Implicit costs

It is outside the scope of this paper to discuss the process that portfolio management teams go through to analyse the global currency landscape and determine the active currency exposures that they take as a result. It is important, however, to discuss the structural factors that will influence the active currency management decisions, one of which is the cost of carry.

A cost of carry arises because a portfolio must hedge *spot* exchange rate exposure using *forward* exchange rate contracts. The portfolio's investments in non-base currency denominated assets expose the portfolio to *spot* exchange rate changes, but available currency hedging tools utilise the *forward* exchange rate to counter these exposures. The relationship between the spot and forward exchange rates is what drives the cost of carry. The term structure of exchange rates determines the cost of hedging *irrespective* of changes in spot exchange rates; spot exchange rate exposure emanating from ownership of international assets is eliminated by the currency hedge[6]. However, all else equal, a portfolio manager will tactically choose to hedge currency risk if the negative spot return is expected to be greater than the negative cost of carry. If the cost of hedging a currency is greater than the expected negative spot return from that currency, the portfolio may choose to leave the currency exposure unhedged. The term structure of exchange rates is in turn determined by the relative short-term interest rate environments across countries in which the portfolio is invested. The implicit cost of hedging developed market exposures (that is, the cost of carry as described in the next section) is included in the calculations in Figures 3-25.

Evidently, the cost of currency hedging depends on a multitude of variables. The global interest rate environment is impermanent and uncertain, and so the structure of exchange rates is variable. Only transaction costs can be accurately forecast into the future – and even then, not for all currencies. As a result, we would argue that the cost of carry should not feature too heavily in the strategic hedge ratio decision, because it will also feature as part of the portfolio manager's assessment of the landscape for active investment opportunities during ongoing portfolio management. We suggest that this is true for all major developed market base currency portfolios[7]. It can safely be said, however, that all else equal, a higher cost of hedging would lead to a lower propensity to hedge.

5 CNY, USD and EUR are the abbreviations for the Chinese renminbi, US dollar, and euro respectively. Non-deliverable forward contracts are currency derivatives that are settled in US dollars or another third-party currency, rather than in the target currency (e.g. CNY).

6 Subject to accurate rebalancing of the hedge.

7 For non-major or emerging market base currency portfolios, a further assessment should be made about the inclusion of international assets in the strategic allocation at all. See our paper entitled "What is the appropriate currency hedge ratio for RMB-based investors" for the example of the Chinese renminbi.

Conclusion

Our results show that the optimal strategic currency hedge ratio differs significantly for different base currencies and when evaluated over different time periods. We find that bonds should generally be 100% hedged, with the exception of emerging market exposure which tends to be expensive to hedge. For the equity portion of multi-asset portfolios, optimal hedge ratios cluster in groups of currencies with similar characteristics. From an active management perspective, we believe that managers should be given sufficient leeway to manage currency exposure away from the strategic benchmark, just as they are permitted to do with other asset classes.

Important Information. The views and opinions contained herein are those of the authors as at the date of publication and are subject to change due to market and other conditions. Such views and opinions may not necessarily represent those expressed or reflected in other Schroders communications, strategies or funds. This document is intended to be for information purposes only. The material is not intended as an offer or solicitation for the purchase or sale of any financial instrument or security or to adopt any investment strategy. The information provided is not intended to constitute investment advice, an investment recommendation or investment research and does not take into account specific circumstances of any recipient. The material is not intended to provide, and should not be relied on for, accounting, legal or tax advice. Information herein is believed to be reliable but Schroders does not represent or warrant its completeness or accuracy. No responsibility or liability is accepted by Schroders, its officers, employees or agents for errors of fact or opinion or for any loss arising from use of all or any part of the information in this document. No reliance should be placed on the views and information in the document when taking individual investment and/or strategic decisions. Schroders has no obligation to notify any recipient should any information contained herein changes or subsequently becomes inaccurate. Unless otherwise authorised by Schroders, any reproduction of all or part of the information in this document is prohibited. Any data contained in this document has been obtained from sources we consider to be reliable. Schroders has not independently verified or validated such data and it should be independently verified before further publication or use. Schroders does not represent or warrant the accuracy or completeness of any such data. All investing involves risk including the possible loss of principal. Third party data are owned or licensed by the data provider and may not be reproduced or extracted and used for any other purpose without the data provider's consent. Third party data are provided without any warranties of any kind. The data provider and issuer of the document shall have no liability in connection with the third party data. www.schroders.com contains additional disclaimers which apply to the third party data. Past performance is not a guide to future performance and may not be repeated. The value of investments and the income from them may go down as well as up and investors may not get back the amounts originally invested. Exchange rate changes may cause the value of any overseas investments to rise or fall. This document may contain "forward-looking" information, such as forecasts or projections. Please note that any such information is not a guarantee of any future performance and there is no assurance that any forecast or projection will be realised.

European Union/European Economic Area: Issued by Schroder Investment Management Limited,1 London Wall Place, London, EC2Y 5AU. Registered Number 1893220 England. Authorised and regulated by the Financial Conduct Authority.

Note to Readers in Hong Kong: Schroder Investment Management (Hong Kong) Limited, Level 33, Two Pacific Place 88 Queensway, Hong Kong. Central Entity Number (CE No.) ACJ591. Regulated by the Securities and Futures Commission.

Note to Readers in Indonesia: PT Schroder Investment Management Indonesia, Indonesia Stock Exchange Building Tower 1, 30th Floor, Jalan Jend. Sudirman Kav 52-53 Jakarta 12190 Indonesia. Registered / Company Number by Bapepam Chairman's Decree No: KEP-04/PM/MI/1997 dated April 25, 1997 on the investment management activities and Regulated by Otoritas Jasa Keuangan ("OJK"), formerly the Capital Market and Financial Institution Supervisory Agency ("Bapepam dan LK").

Note to Readers in Japan: Schroder Investment Management (Japan) Limited, 21st Floor, Marunouchi Trust Tower Main, 1-8-3 Marunouchi, Chiyoda-Ku, Tokyo 100-0005, Japan. Registered as a Financial Instruments Business Operator regulated by the Financial Services Agency of Japan. Kanto Local Finance Bureau (FIBO) No. 90.

Note to Readers in People's Republic of China: Schroder Investment Management (Shanghai) Co., Ltd., RM1101 11/F Shanghai IFC Phase (HSBC Building) 8 Century Avenue, Pudong, Shanghai, China, AMAC registration NO. P1066560. Regulated by Asset Management Association of China.

Note to Readers in Singapore: Schroder Investment Management (Singapore) Ltd, 138 Market Street #23-01, CapitaGreen, Singapore 048946. Company Registration No. 199201080H. Regulated by the Monetary Authority of Singapore.

Note to Readers in South Korea: Schroders Korea Limited, 26th Floor, 136, Sejong-daero, (Taepyeongno 1-ga, Seoul Finance Center), Jung-gu, Seoul 100-768, South Korea. Registered and regulated by Financial Supervisory Service of Korea.

Note to Readers in Switzerland: Schroder Investment Management (Switzerland) AG, Central 2, CH-8001 Zürich, Postfach 1820, CH-8021 Zürich, Switzerland. Enterprise identification number (UID) CHE-101.447.114, reference number CH02039235704. Authorised and regulated by the Swiss Financial Market Supervisory Authority (FINMA).

Note to Readers in Taiwan: Schroder Investment Management (Taiwan) Limited, 9F, 108, Sec.5, Hsin-Yi Road, Hsin-YI District, Taipei 11047 Taiwan, R.O.C. Registered as a Securities Investment Trust Enterprise regulated by the Securities and Futures Bureau, Financial Supervisory Commission, R.O.C.

Note to Readers in the United Arab Emirates: Schroder Investment Management Limited, 1st Floor, Gate Village Six, Dubai International Financial Centre, PO Box 506612 Dubai, United Arab Emirates. Registered Number 1893220 England. Authorised and regulated by the Financial Conduct Authority.

CS1142.