

# MANAGING DEVELOPED COUNTRY CURRENCY RISK - A PROACTIVE APPROACH

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## INTRODUCTION

Currencies are volatile. Most US institutional investors have traditionally ignored this volatility in their portfolios, leaving a meaningful risk exposure unhedged. This practice puts American institutional investors five to ten years behind UK, European, and Canadian investors, who have generally managed foreign-currency risk proactively through hedging (given significantly smaller home country market capitalizations). Despite increasing sophistication, as US institutional investors have embraced alternatives, utilized risk budgeting, and generally raised allocations to foreign investments, currency exposure has largely been ignored, resulting in a meaningful risk allocation without positive return expectations.

A risk budgeting approach can identify sources of risk within a portfolio. When foreign asset classes and their underlying currency exposure are separated, risk budgeting reveals that developed foreign currencies are a volatile exposure within a diversified portfolio, adding risk without any increase in return expectations.

We believe that the decision of how much explicit foreign currency<sup>1</sup> to hold should be proactive and integrated within the asset allocation process, rather than a default outcome of the chosen capital allocation to foreign asset classes. Investors should understand how much explicit non-dollar exposure exists in their portfolios and the risk impact of maintaining long exposure to foreign currency by leaving positions unhedged.

This paper explores the following:

- The impact of foreign-currency exposure
- An analytical framework for evaluating foreign-currency risk

- Key considerations in addressing foreign-currency exposure

We recognize that the evaluation of foreign-currency risk through quantitative analysis must be synthesized with practical considerations. Each investor's asset allocation, resources, and governance will lead to unique solutions for addressing currency risk. These solutions can range from fully hedged to completely unhedged foreign-currency exposure.<sup>2</sup> Sophisticated investors who have utilized risk budgeting to build risk-balanced, globally diversified portfolios will find that developed

## DEVELOPED COUNTRY CURRENCY EXPOSURE RESULTS IN A MEANINGFUL RISK WITHOUT POSITIVE RETURN EXPECTATIONS

currency risk is a small but meaningful risk allocation in their portfolio risk budget. Understanding this exposure and considering solutions to manage or minimize this risk can lead to more efficient portfolio solutions, enhancing the ability of the portfolio to meet the investment program's long-term objectives.

## THE IMPACT OF FOREIGN CURRENCY EXPOSURE

### Return Impact of Foreign Currency Exposure

As sophisticated institutional investors have built more efficient investment programs, they have increasingly sought the diversification benefits of asset classes outside of the US. These include: international, developed equities; international, developed, sovereign and corporate bonds; as well as smaller but growing allocations to emerg-

<sup>1</sup> By explicit foreign currency exposure, we are referring to dedicated non-dollar investments. We recognize that foreign currency can also have an impact on the performance of domestic companies with multi-national sources of revenue but do not incorporate that in this analysis.

<sup>2</sup> Our analysis and conclusions focus on a framework for US investors; however, the framework for understanding and addressing foreign currency exposure can be easily translated and applied for non-US investors though results will likely differ depending on the level of foreign currency exposure.

ing country equities and debt.<sup>3</sup> All of these asset classes have foreign-currency exposure. In our analysis, we focus on developed markets currency as an uncompensated risk in investment programs. Please see the sidebar below for our view on maintaining unhedged exposure to emerging-market currencies.

### **Emerging Currencies - Desirable Risk Premia**

*While our analysis suggests that exposure to developed market currencies is a risk that is not compensated with a positive expected return. We draw a critical distinction when considering the role of emerging market currencies in a diversified portfolio. The pressures that have built up due to pegged currency policies, and the resistance of emerging countries' policymakers to allow their currencies to appreciate, leave emerging currencies poised for robust risk-adjusted returns. We feel strongly that investors should maintain unhedged exposure to emerging currencies because of the positive expected return over a secular time horizon. Emerging currency exposure is expected to be volatile as these countries experience growing pains, however, we expect that long-term holders of these currencies will benefit with a positive return.*

*Trading costs and size also play a role in the decision to hedge. Transaction costs have improved in emerging currency markets, but those costs are still meaningfully higher than the low costs of trading the currencies of developed countries. Emerging currencies generally benefit from much higher interest rates than developed countries, including the United States, leading to high carry costs for those choosing to hedge emerging currencies back to the dollar. Finally, the size of emerging currency exposure is still relatively small in diversified portfolios. The impact of hedging these exposures would be very small, though we would expect exposure to these markets to grow and the impact to be more meaningful over time.*

Generally, US investors hold foreign asset classes in an unhedged fashion, receiving a total return on investment that is a combination of: the underlying asset's return in local (foreign) currency terms; and return from the change in value of the foreign currency relative to the investor's home currency. The foreign-currency impact is volatile and can be positive or negative depending on the direction of the basket of foreign currencies held relative to the US dollar. A relatively strong dollar means that foreign currencies have depreciated, resulting in a negative impact on foreign-asset returns. Conversely, a relatively weak dollar means that

foreign currencies have appreciated, resulting in a positive impact on foreign-asset returns.

Analyzing only total returns of unhedged foreign investments – rather than asset returns and currency returns separately – masks the impact that changes in foreign currencies have on the performance of these assets. These two parts of a foreign security's total return can be separated. Deep, liquid markets exist to accommodate that separation at low cost in developed-market currencies (through the trading of currency forwards). Moreover, the decision of whether to take on risk to each of those exposures (foreign assets and foreign currency) should be separated as well.

Determining the role of foreign-currency exposures in a portfolio should include reflection on the premium that one expects for bearing currency risk. In other words, can one expect to be rewarded with a positive, long-term return? Academic research and empirical evidence indicate that such a risk premium does not exist – that the expected return for bearing currency risk is zero.

By holding foreign currency, an investor is selling US dollars, while the investor on the opposite side of the transaction is selling foreign currency and buying US dollars. Based on the mechanics, in order for a risk premium to exist, one must believe that the investor selling foreign currency is willing to pay a premium to buy US dollars. While we do not expect a risk premium for holding foreign currencies over the long-term, we do recognize that a premium can exist for holding one currency versus another, including the dollar, over certain periods of time. We believe this opportunity is best accessed through active currency management or through broader GTAA/global macro strategies and not through passive, long exposure to foreign currencies.

Figure 1 illustrates the cumulative differential since 1988 for an initial investment of \$1,000 in non-US equities (based on the MSCI EAFE index) or global fixed income (based on the Citigroup World Government Bond Index) in hedged-currency terms, versus leaving the positions unhedged.<sup>4</sup> Coincidentally, the impact of currency does approximately balance out over this particular period. A \$1,000 investment in the Citigroup WGBI index in January 1988 would be worth roughly \$3,000, with very little difference between hedged and unhedged currency exposure. Similarly, an investment in the MSCI EAFE index in January 1988 would be worth approximately \$4,500, again with the hedging decision having minimal impact on the total value of the invest-

<sup>3</sup> Emerging market debt is often issued in US Dollars or Euros limiting the amount of foreign currency exposure, though local currency debt markets have expanded and are expected to increase in importance in global capital markets.

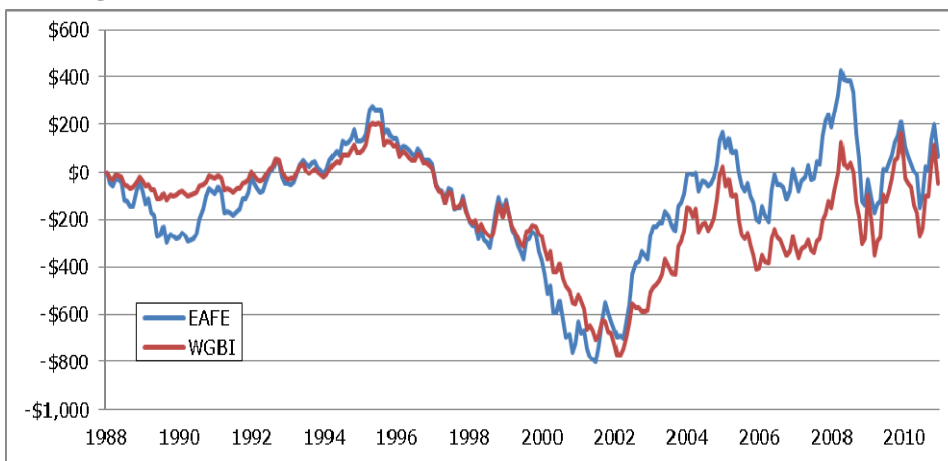
<sup>4</sup> We chose January 1988 as a starting point since hedged index price data for both equities and fixed income are readily available back to this point. MSCI publishes a currency-hedged price index. We constructed a total return index using historical dividends from the unhedged MSCI EAFE index.



ment. If the time period in this example – 23 years – can be said to adequately define the “long term,” it may be possible to move the discussion forward to whether currencies should be held for diversification.

However, examining another time horizon uncovers starkly different results. If one performs the same analysis of cumulative return differentials in 2002 (14 years of investment instead of the full 23 year horizon), this same investor with \$1,000 invested in 1988, would have \$700-800 less than a hedged investor by ignoring the risk of currencies in the portfolio.

**Figure 1 - Cumulative Return Differential (\$1,000 Starting Investment)**



Source: Bloomberg and NEPC

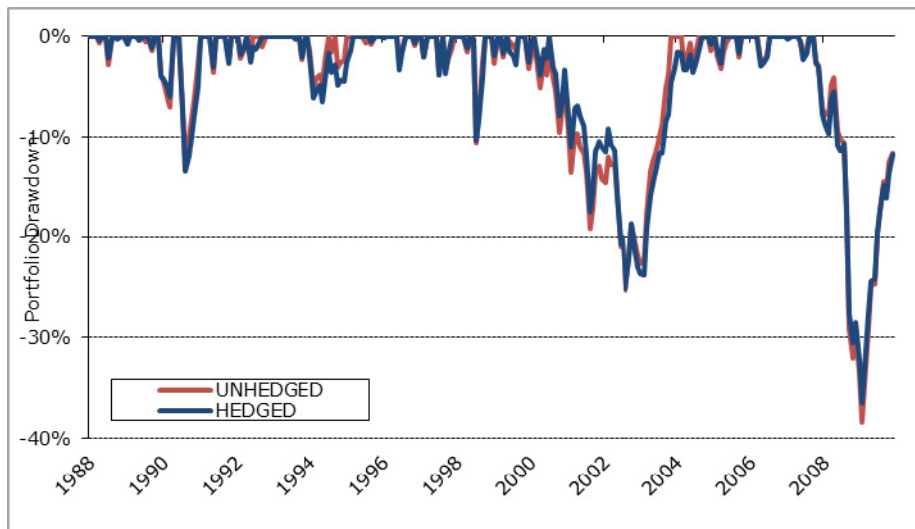
The goal of this analysis is not to “cherry pick” particular points in time when currency hedging outperformed materially. Clearly, one could choose a different starting point (such as 2001) when the cumulative benefit of hedging was most magnified and suggest that there is strong evidence that unhedged currency exposure is beneficial. This exercise illustrates the mostly uncertain and wide-ranging time frame that defines “long-term,” and the large impact that currency can have on the total returns of a foreign asset. Taking on that volatility for diversification can lead to meaningful realized underperformance relative to the proactive decision to hedge foreign-currency exposure.

This analysis focuses on the meaningful impact that currency can have on individual asset classes with explicit foreign-currency exposure. It is also important to consider currency in a total-portfolio context. We must give some thought to whether holding currency during periods where the exposure creates a cumulative drag on performance might be a necessary trade-off in order to gain diversification and protection at other times. Can investors expect currency exposure to provide some downside protection when the portfolio experiences a significant drawdown, cushioning portfolio losses by delivering a positive return?

Later in this paper, we illustrate why currency exposure is additive to risk, and not diversifying.

First, in Figure 2, we investigate the portfolio-level impact in the context of portfolio drawdowns, using an allocation of 65% equity and 35% fixed income.<sup>5</sup> This analysis reveals that asset allocation is the primary driver of exposure to drawdowns. Long foreign-currency exposure does little to mitigate this risk, adding volatility to total portfolio returns with little benefit in adverse economic environments.

**Figure 2 - Total Portfolio Drawdown Exposure (Hedged vs. Unhedged)**



Source: Bloomberg and NEPC

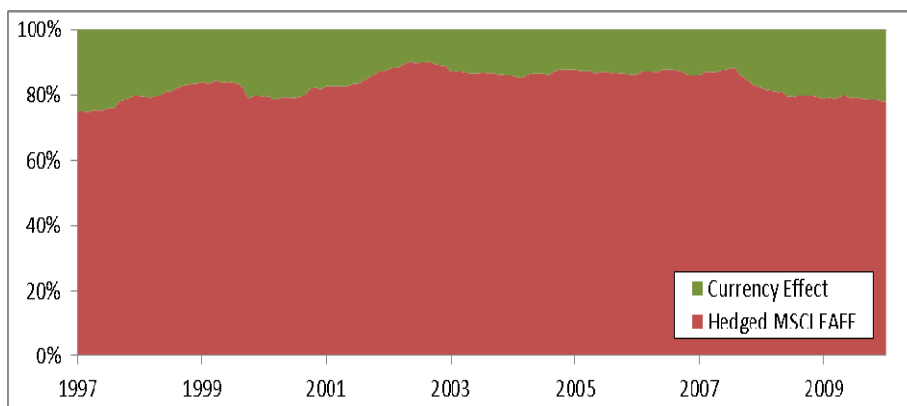


<sup>5</sup> We used this allocation as a proxy for a portfolio that will be utilized throughout this analysis of 55% equity, 35% fixed income, and 10% alternatives. We replaced the 10% alternatives exposure with equities for this analysis in order to utilize data back to 1988, for which hedge fund or private equity data were not readily available. Within these broad asset classes, we assumed: for the 65% equity allocation – 32% US large cap equity, 8% US small cap equity, 20% developed international equity, 5% emerging equity and for the 35% bond allocation – 20% core bonds, 10% global bonds, 5% US high yield bonds.

### Risk Impact of Foreign Currency Exposure

Currency exposure adds volatility to the return profile of foreign asset classes. Figures 3 and 4 quantify the contribution to volatility for the MSCI EAFE and Citigroup WGBI from both foreign currencies and the underlying security. When combined, these two exposures represent the unhedged investment in each foreign asset class. The impact of currency on developed equities (MSCI EAFE) is relatively consistent, ranging between 10%-25% of total volatility, with equity volatility overwhelming the risk contribution from currency.

**Figure 3 - Contribution to Total Volatility (MSCI EAFE - Rolling 10 year Volatility)**



Source: Bloomberg and NEPC

For global bonds (Citigroup WGBI), the contribution to total risk from currency is also consistent, but much more meaningful, averaging close to 75% of total risk. In fact, it appears that investors hoping to gain exposure to global interest rates with some residual currency exposure are holding mostly exposure to foreign currencies, with some interest rate/sovereign bond exposure left over.

**Figure 4 - Contribution to Total Volatility (Citigroup WGBI - Rolling 10 year Volatility)**



Source: Bloomberg and NEPC

Clearly, foreign currency exposure adds volatility to these asset classes. The underlying index exposure (hedged to the US dollar) is less volatile than unhedged exposure with currency risk embedded in the total returns. This is despite the low correlation characteristics of foreign currency exposure to the underlying asset classes. Some argue that, because of this low correlation, holding foreign currencies in a portfolio improves diversification. This argument is often extended further, suggesting that the currency exposure's low correlation is diversifying to other asset classes in the portfolio. We find that, for most relationships across risky asset classes, correlations change very little whether currency exposure is hedged or unhedged.<sup>6</sup> Leaving currency exposure unhedged only magnifies the volatility of the underlying allocation – it generally does not alter the correlations of foreign assets to other exposures in the portfolio. This adds risk to the total portfolio rather than reducing risk through additional diversification.

The argument for additional diversification through currency exposure ignores an important differentiation in analyzing how currency fits within a portfolio. While modern portfolio theory indicates that including an uncorrelated asset in a portfolio will improve diversification, this requires the substitution of part of the existing asset allocation for this uncorrelated asset, to maintain a total exposure of 100%. However, currency exposure is an additional risk exposure over and above 100% of invested capital across asset classes. Because the exposure to currency is additive, it generally adds risk to the overall portfolio, despite being uncorrelated.

Hedging a portion (or all) of the foreign-currency exposure can reduce the total volatility of foreign asset classes. The return volatility of a basket of currencies held through MSCI EAFE has historically been approximately 8% since 1988 (a similar level applies to bond exposure through the Citigroup WGBI). We expect elevated volatility across developed countries as these countries address structural government balance sheets, deficit chal-

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<sup>6</sup> Global bonds are an exception to this as the composition of the risk changes significantly from largely currency risk to interest rate risk. For more detail on our analysis of correlations of hedged and unhedged asset classes, please refer to the appendix.



allenges, and continued deleveraging. There also may be a case for persistence in the modest increase in correlation between currency exposure and underlying securities that we have recently witnessed as global economies move more in unison in an effort to stimulate a continued recovery from the financial crisis. Increased volatility and correlations from currency exposure can lead to a larger risk contribution from currencies and, therefore, increased total portfolio volatility. Please see the sidebar on global currency dynamics for a view on the future of global currencies.

### Currency Regimes - A Longer View

*One caution to keep in mind when considering currency hedging is that the existing US dollar-based system is unlikely to stay in place forever. Throughout history, economic growth, national debts, and inflation have helped determine the relative strength of currencies. The current system of free-floating currencies arose after several years of turmoil following the collapse of the previous "Bretton Woods" regime in 1971—which had hard pegs for all currencies relative to the dollar, backed by US gold reserves. Today's system was founded on the legacy of the US's historical role and Paul Volcker's ability to restore the dollar's value in the 1980s, and continues to rely on the strength of the US as the world's largest economy.*

*Looking forward, it is hard to imagine that the US dollar will hold its preeminent role for the long term. Many emerging countries have higher growth rates and stronger balance sheets than the US and the rest of the developed world. Increasingly, central bankers are having conversations about moving reserves towards a market basket of currencies. Should such a change take place, the US dollar would still be expected to represent the majority of reserve requirements, but the significant reduction in demand would reduce the relative value of the dollar, strengthening other currencies in the basket. While a smooth transition would be favored by investors, history suggests that a shift could be swift and traumatic.*

*Since most U.S. institutional investors pay commitments in dollars, NEPC believes that concerns over currency regime change are best addressed using the risk-management tools outlined in this paper. Clients should seek currency implementations that have some mix of long-term risk management and/or manager ability to shift exposure during any potential upheaval.*

### ANALYTICAL FRAMEWORK FOR EVALUATING FOREIGN CURRENCY RISK

Exposure to foreign currency should be evaluated within the same asset allocation framework used in developing a diversified, efficient portfolio. The return, risk, correlations, and unique attributes of each asset class should be considered. This integrated asset allocation process should include a decision about how much exposure to foreign currencies is appropriate for a given asset allocation.

Risk budgeting can help investors understand the total risk profile of an asset allocation as well as the contribution of risk from each asset class. By focusing on the risk contribution of each asset class and avoiding concentration in any one exposure, investors are able to build more diversified and balanced portfolios. We believe that this risk-budgeting framework can be extended to develop a more comprehensive understanding of currency risk. This analysis can lead to decisions on how to address and manage that exposure within a portfolio. This approach is very flexible and can be used to inform currency decisions for most asset allocations. For illustration, we rely on a traditional portfolio allocation of 55% equity, 35% fixed income, and 10% alternatives.<sup>7</sup>

#### Currency Notional Exposure

In Figure 5, the capital allocation for this traditional portfolio appears on the left. The middle column illustrates how that capital allocation maps into exposures to the US dollar, developed currencies, emerging currencies, and alternatives.<sup>8</sup> In the right column, specific underlying exposures are shown for developed and emerging currencies in the portfolio.

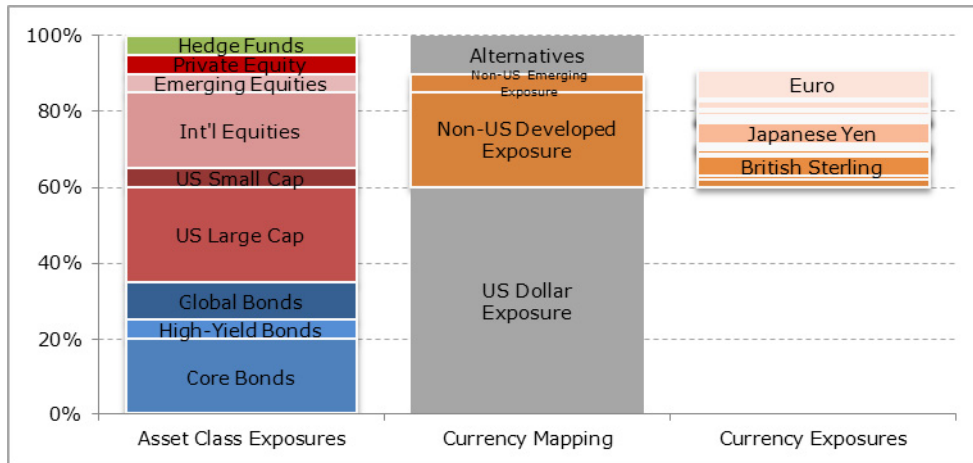
In this portfolio, the euro (8.4% of the total), the Japanese yen (5.1%), and the British sterling (4.9%) are meaningful positions at the portfolio level. With annualized volatility of 10%-12% each, these currencies are potentially the three largest single exposures in an investor's diversified portfolio. These large exposures are likely a fallout of asset allocation decisions rather than a conscious bet with a view toward the value of those currencies relative to the US dollar. This is especially problematic when considering that these exposures likely do not have a positive, long-term, expected return.

<sup>7</sup> Within these broad asset classes, we assumed: for the 55% equity allocation – 25% US large cap equity, 5% US small cap equity, 20% developed international equity, 5% emerging equity; for the 35% bond allocation – 20% core bonds, 10% global bonds, 5% US high yield bonds; and for the 10% alternatives allocation – 5% hedge funds, 5% private equity. We assume that country level exposure is index based and ignore any potential impact of active country allocations by active managers.

<sup>8</sup> In this analysis we will not focus on explicit foreign currency exposure in alternatives, making the assumption that any illiquid vehicles are domestically based and any hedge fund strategy takes active views on currencies. Certainly, many alternative investments will have explicit foreign currency exposure such as illiquid non-US investments. In those cases, those investments should be incorporated into the aggregation of foreign currency exposures.



**Figure 5 - Notional Allocation to Asset Classes and Currencies**



Source: NEPC

**Currency Risk Exposures**

By separating exposure to foreign investments from their embedded currency exposure, we can isolate the risk impact from both the underlying asset class and its foreign-currency exposure. In order to evaluate currency exposure through risk budgeting, we have developed assumptions for currency-hedged asset classes.<sup>9</sup>

We use annualized standard deviation and correlation estimates to develop a covariance matrix as our proxy for risk. We recognize, however, that these inputs do not provide a comprehensive view of risk and likely understate the impact that currency can have on the portfolio. As noted earlier in Figure 1, the performance differential due to currency exposure (relative to hedging foreign currencies to the US dollar) can be significant – multiples of the calculated volatility of non-US currency exposure embedded in foreign indices. Exposure to extremely negative, left-tail outcomes is likely magnified for US investors given the dollar’s legacy status as a safe-haven currency. When stress appears in the capital markets,

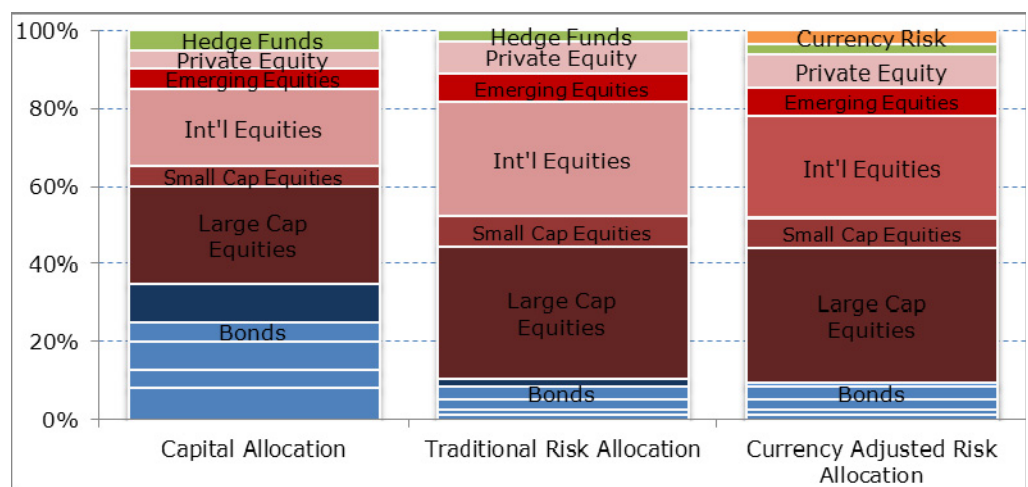
money flows into the dollar, bidding up its price while placing downward pressure on other developed foreign currencies.

Volatility can still be an important metric in understanding risk exposures; however, it is not a conclusive measure of risk. Common sense should be applied, and decisions about sizing exposures, including the exposure to foreign currency, should take into account factors not captured through standard

deviation measures (e.g., non-normal distributions, unstable correlations, etc.).

In Figure 6, the capital allocation for our traditional portfolio appears in the first column. The second column illustrates the allocation of risk, considering risk contribution from foreign asset classes as a combined exposure to both underlying asset class volatility and to currency volatility (as traditionally viewed by investors in a portfolio-risk-budgeting exercise). The third column produces an adjusted risk allocation that explicitly separates currency exposure from underlying foreign asset classes. Currency risk is 4% of total portfolio volatility<sup>10</sup> – an allocation of risk that can be minimized through currency hedging. By hedging this exposure, investors can improve the efficiency of the total portfolio.

**Figure 6 - Risk Budgeting Results When Separating Currency Risk Exposure**



Source: NEPC

<sup>9</sup> Please see the appendix for our methodology.

<sup>10</sup> For more risk balanced and globally diversified portfolios, with larger volatility contributions from bonds, currency risk may have larger impact than in this example. We have encouraged investors to embrace Risk Parity as an investment approach, often implementing this concept in a portion of the asset allocation by hiring a Risk Parity manager. We find that, in general, our preferred Risk Parity managers choose not to take on systematic developed foreign currency exposure, finding there are more efficient ways to allocate their risk budget elsewhere in the portfolio.



**Table 1 - Expectations at Various Hedge Ratios**

|                                    | Current Allocation | Developed Currency - Full Hedge | Developed Currency - 50% Hedged |
|------------------------------------|--------------------|---------------------------------|---------------------------------|
| <b>Expected Return (Geometric)</b> | 6.5%               | 6.5%                            | 6.5%                            |
| <b>Standard Deviation</b>          | 12.3%              | 11.9%                           | 12.0%                           |
| <b>Sharpe Ratio</b>                | 0.37               | 0.38                            | 0.38                            |

Source: NEPC

***Improvements in Portfolio Efficiency***

Table 1 highlights the improved portfolio efficiency that can be achieved through a reduction in currency risk for a traditional asset allocation. We believe that more efficient management of that risk can lead to improvements in portfolio efficiency. The table shows that meaningful risk reduction benefits can be achieved by hedging half of this exposure. These hedged allocations maintain portfolio expected returns at a reduced level of expected volatility. Investors choosing to maintain the same level of expected volatility as their current strategic portfolio would have increased flexibility to take on more diversified beta exposure or to invest in active strategies – adding additional expected return at the same level of current volatility.

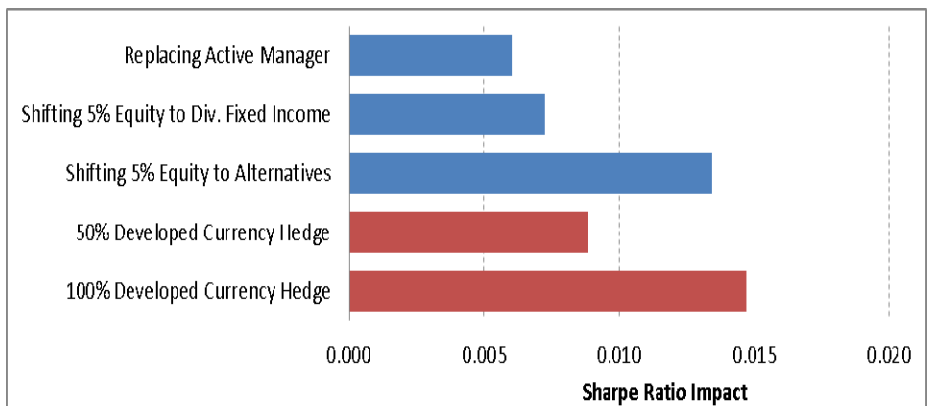
An obvious question emerges from this analysis: Is focusing on currency exposure (and potentially addressing this uncompensated risk through significant changes to the portfolio) really worth the effort in exchange for less than 10% of total portfolio volatility and potential Sharpe ratio improvement of just a few basis points? If we consider other potential decisions for an institutional investor, we find that hedging a portion or all of a portfolio’s notional exposure to currency is a highly effective decision, potentially one of the highest-impact decisions an investor can make without significantly altering the strategic asset allocation.

Figure 7 illustrates potential changes to our sample portfolio. Items that often take up hours of investment research and investment committee

focus – such as replacing a manager with a 5% allocation with a higher-information ratio strategy, adding more diversification into other asset classes, or increasing targets to alternatives – all have the potential to improve the Sharpe Ratio of an investment program.

Hedging 50% or 100% of developed currency can reduce or minimize a risk exposure, improving portfolio efficiency, while otherwise not changing the existing asset allocation, leading to a similar or perhaps even greater impact than other asset allocation decisions. Investors should evaluate a portfolio’s exposure to developed foreign currency as part, understand the impact of this exposure, and integrate this understanding with the ongoing management of an investment program.

**Figure 7 - Illustration of Improvements in Sharpe Ratio Due to Changes in Portfolio Structure<sup>11</sup>**



Source: NEPC

**KEY CONSIDERATIONS IN ADDRESSING FOREIGN CURRENCY EXPOSURE**

We recognize that, despite illustration of the sub-optimal results of maintaining passive unhedged exposure to foreign currencies, practical challenges exist in implementing solutions to better manage this risk. While we believe that currency has a meaningful risk contribution in globally diversified portfolios, we recognize that there will be many trade-offs in addressing that risk and that those challenges must be taken into account before developing a clear plan on exactly how to proceed.

Investors who find that foreign-currency exposure has a minimal impact on total portfolio risk may instead choose to focus on higher value-add deci-



<sup>11</sup> All of this analysis relied on the 55% equity, 35% fixed income, 10% alternatives portfolio illustrated throughout this paper. In the first illustration, an active strategy (with a 5% allocation), is replaced improving alpha expectations by approximately 2.5% for that allocation while keeping tracking error roughly the same. In the second illustration, 5% of US Large Cap Equity and 5% of Developed International Equity is shifted to 5% TIPS and 5% Emerging Market Debt. In the third illustration, 5% of US Large Cap Equity and 5% of Developed International Equity is shifted to 5% Hedge Funds and 5% Private Equity.

sions for the portfolio. However, the process of quantifying and understanding the impact of foreign currency on total portfolio volatility will still be beneficial to those investors because improved insight into the portfolio's exposure to currency risk will inform future asset allocation decisions – facilitating an improved decision framework for evaluating the impact of foreign currency on future portfolio outcomes. Once the contribution of developed-currency risk has been quantified, investors face a series of important questions before they can determine action steps. Some of these considerations are described below.

## HEDGING DEVELOPED COUNTRY CURRENCY REDUCES A RISK, IMPROVING PORTFOLIO EFFICIENCY

### *How much of the currency exposure should be hedged?*

An investor could perform an exhaustive optimization exercise to determine the ideal currency hedge ratio – anywhere between 0% and 100%. We find that this approach pursues an unrealistic degree of precision. Consideration of just three possible hedge ratios – 0%, 50%, and 100% – can provide the appropriate range of differentiated solutions to meet an investor's desire to maintain, reduce, or minimize the volatility impact of developed foreign currency. A starting point for evaluating these three potential hedge ratios is analysis of the expected risk, return, and Sharpe Ratio, as well as the resulting risk impact of currency. As shown with our illustrative portfolio, a 50% developed-currency hedge can provide more than two-thirds of the risk reduction benefits of a 100% hedge.

Additionally, for cost-effectiveness, an investor could consider hedging just three or four major foreign currencies to capture the majority of currency risk.<sup>12</sup> As investors develop more sophisticated insights into the role of currency in a portfolio, they may consider different hedging levels for each currency. However, as a first step into currency hedging, investors may choose to set a consistent hedge ratio across all currencies, building out the analysis of individual currencies over time.

### *How should the currency-hedging program be implemented?*

Investors must consider the internal resources

available to manage a currency-hedging program and the costs associated with setting up that program. The time and costs needed to support this effort must be compared to the costs of hiring an external manager to hedge currency exposure and monitoring the effectiveness of the external manager. For the majority of investors, management of a hedging program involving currency derivatives is best implemented through an external expert. One solution would be a dedicated overlay manager. The selection process for identifying the appropriate manager would be similar to the process employed when selecting other strategies in the investment program with appropriate due diligence conducted on the manager's investment professionals, trading discipline, risk controls, counterparty management, and other characteristics.

Another solution is to hire external foreign-equity or foreign-bond strategies benchmarked to a currency-hedged index, in place of the unhedged mandates currently offered in the marketplace.<sup>13</sup> This would require leadership from US investors as managers of non-US and global asset classes have traditionally offered unhedged products in the US to meet the demand from institutional clients for unhedged exposure. Currently, while we find many skilled global-bond managers with both hedged and unhedged offerings, the universe for currency-hedged, international, or global-equity products is less robust. Many of the managers offering unhedged products in the US have a global client base and have demonstrated currency-hedging capabilities through their currency-hedged products, or share classes hedged to a particular currency, utilized by investors in other countries. This universe could grow if some US investors are willing to lead in demanding currency-hedged products. This approach would free an investor from managing the cash needs of a currency-hedging program alongside total portfolio liquidity, delegating liquidity management of currency derivatives to the program's foreign-asset-class manager.

While active portfolio managers of foreign allocations may adjust country exposures, a view on each currency relative to the investor's domestic currency is likely no more than secondary part of the investment process. This is especially true for active managers with a bottom-up focus. These managers are probably capable of generating similar levels of alpha at reduced levels of volatility (both of total returns and tracking error) through a currency-hedged mandate, delivering more efficient results to the investor.



<sup>12</sup> These currencies would be the UK Sterling, the euro, the Japanese yen, and perhaps the Swiss franc.

<sup>13</sup> These strategies could employ active or passive investment processes depending on the philosophy of the investor and portfolio construction considerations.



### ***How much liquidity is needed to maintain the hedge?***

Most hedging programs will likely be implemented in the deep and liquid currency-forwards market. These derivatives are a straight-forward, low-cost way to hedge away currency risk. They require regular marking-to-market to minimize counterparty risk in either direction.

The process of posting collateral can work for or against the investor and, technically, will be offset by gains or losses on the long foreign-currency positions held in the portfolio. Issues can emerge in managing collateral movements if the total portfolio does not have appropriate liquidity to

## **A COMPREHENSIVE REVIEW OF LIQUIDITY SHOULD BE CONDUCTED IF IMPLEMENTING AN OVERLAY**

support the regular cash-flow needs. When foreign currencies are appreciating relative to the domestic currency, the underlying foreign asset class positions will experience currency gains. At the same time, the currency-hedging program will post collateral as short currency positions experience losses.

For those investors implementing currency hedging through an international equity or bond manager's product, decisions around liquidity levels for currency-hedging activity are minimized. The management of margin levels to maintain currency forwards is embedded within the fund or separate account and controlled by the individual manager. For investors who choose to implement a hedging program at the portfolio level (either internally or through an external overlay manager), further scrutiny and rigor is required. Unfortunately, the redemption frequency of the underlying allocation may make synchronizing the actual cash returns between the two difficult. The currency forwards may require daily marking-to-market, while the investment in the foreign exposure (the target of the hedge) may be through a fund that offers only monthly liquidity. As a result, other sources of liquidity will be needed.

A comprehensive review of all sources of liquidity should be conducted as part of implementing any overlay structure that can demand capital in order to mark synthetic positions to market. This highlights the importance of integrating any solutions for managing currency within the overall asset allocation process and with a clear understanding of the overall portfolio liquidity profile.

Investors with a significant portion of their portfolio in illiquid asset classes, or asset classes that could potentially become less liquid<sup>14</sup>, may consider hedging a lower percentage of currency exposure.

### ***Should the currency hedge be managed actively or passively?***

We believe that currency markets are inefficient, and many investors seek currency alpha through broader mandates like global tactical allocation or global macro strategies. Liquidity constraints may also be addressed through active management of currency exposures. An active currency approach could minimize cash outflows to cover losses on currency forwards if the active manager is able to effectively time exposure to various currency markets. An active approach to currency exposures would be implemented at the portfolio level, with some baseline currency exposure set at the strategic hedge ratio. An active strategy would be employed to express views on the direction of currencies, attempting to hedge higher levels of individual currencies that are expected to depreciate and lower levels of individual currencies that are expected to appreciate.

After minimizing the contribution to portfolio risk from foreign currency through hedging, the investor could replace this portion of the risk budget with the active risk of a skilled active currency strategy. The investor can target a strategic currency hedge that benefits overall portfolio efficiency while adding a potential alpha source that can potentially reduce losses from currency hedging when the home currency is appreciating. At the same time, the investor takes on the risk that the active decisions of the manager will detract from performance – negatively impacting the risk-reducing benefits of hedging currency. A thorough due diligence process to develop conviction in highly skilled strategies can minimize this risk over the long term.

### ***How should behavioral challenges be addressed?***

Deciding to reduce or minimize explicit currency exposure will be a significant change for many investors. It will differ from the way they have historically managed their portfolios and the approaches of many other investors. In cases like this, a long-term strategic asset allocation decision can feel like the expression of a directional view. Investors will sense that they have taken a strong position against foreign currencies by hedging some or all of that exposure away.

In addition, the hedging of currency exposure will cause the investor's portfolio to behave differently from those of their peers. The impact of foreign

<sup>14</sup> This can include areas of capital markets that function in fairly liquid fashion during "normal times" but could become distressed in times of market crisis.

-currency exposure on major developed market indices, such as the MSCI EAFE and Citigroup WGBI, has been as high as 20% – both positive and negative – over rolling annual periods. For a portfolio with 25% allocated to foreign assets, this would flow through to a 5% difference in total portfolio returns. It is important for investors to be prepared for differences in returns and peer rankings as a result of currency hedging. Given the potential for meaningful return differences, it is also critical that investors view outcomes in terms of risk-adjusted returns, given the lower overall volatility of portfolios with currency hedging in place.

## THE DECISION OF HOW MUCH FOREIGN CURRENCY TO HOLD SHOULD BE PROACTIVE

Because of the tendency to view decisions through a short-term lens, it will be extremely important to develop a road map for implementing and monitoring a change in approach to currency exposure. A clear plan with sound reasoning for the level of currency risk in the portfolio will help to minimize regret. Investors should be able to easily reference both the long-term portfolio risk reduction and improved efficiency through a risk-budgeting framework. A thorough understanding of the reasoning for the long-term decision will serve to minimize second-guessing.

Hedging currency exposure is a long-term strategic decision and should be evaluated over a time period sufficient to understand the effectiveness of the strategic shift. Looking back over a quarter, a year, or even several years will undermine the decision-making process. Once sufficient time has passed, investors should consider a more robust set of metrics – such as relative volatility of hedged exposures, improvements in portfolio Sharpe Ratio, and exposure to drawdowns – rather than simply taking the differential of hedged and unhedged asset classes as the signal of a right or wrong decision.

### **CONCLUSION**

For many forward-thinking investors, foreign-currency positions have grown as they have moved to more globally diversified portfolios. As a result, foreign currency's contribution to the overall risk profile of these portfolios has increased. Because foreign currency is an additional exposure in a diversified portfolio (i.e., it does not replace another exposure), it amplifies portfolio volatility despite being uncorrelated. In general, that added volatility is not compensated through a reliable expected return.

Investors should attempt to understand the magnitude of currency risk in their investment programs, the potential benefits of reducing that risk, and the associated challenges in implementing solutions. Rather than a default decision resulting from other desired asset class exposures, the decision of how much foreign currency to hold and how to manage that exposure should be a proactive, integrated decision within the asset allocation process.

A risk-budgeting framework can be used to separate the risk contributions of underlying asset classes and the risk contribution from foreign-currency exposure. By separating currency risk from the underlying asset classes, investors can determine the impact of foreign-currency exposure on total portfolio volatility. This approach can also be utilized to consider implementation solutions for reducing currency risk.

Solutions can include a passive currency overlay, an active currency strategy that attempts to add alpha above a currency-hedged baseline, or shifting active foreign stock and bond managers from unhedged to currency-hedged mandates. Any decision to implement one of these solutions should be integrated with practical considerations such as overall risk tolerance, portfolio liquidity requirements, and behavioral considerations such as deviating from the strategies of their peers and regretting risk.

Investors should integrate explicit analysis of foreign currency exposure into the asset allocation process and develop a strategy for managing and monitoring that exposure. Those who choose to reduce exposure to developed-markets currency through currency hedging will introduce long-term portfolio benefits – maintaining return expectations while reducing portfolio volatility. By minimizing developed-currency risk in the total portfolio-risk budget, the portfolio's risk allocations will be more efficiently distributed, increasing the likelihood of meeting long-term portfolio objectives.



## APPENDIX

### Assumptions for Risk Analysis

Guided by historical relationships between currency exposure and hedged foreign asset classes, along with our five- to seven-year forecast for unhedged international asset classes, we can construct risk, return, and correlation forecasts for hedged asset classes. Despite the shortcomings of static risk, return, and correlation assumptions, this analysis is a critical starting point for understanding portfolio dynamics, including the impact and magnitude of currency volatility on the overall portfolio.

Table A1 - 2011 5-7 Year Assumptions

| Asset Class               | Arithmetic Return | Geometric Return | Standard Deviation |
|---------------------------|-------------------|------------------|--------------------|
| Global Bonds (Unhedged)   | 2.14%             | 1.75%            | 9.00%              |
| Global Bonds (Hedged)     | 2.04%             | 1.92%            | 5.00%              |
| Int'l Equities (Unhedged) | 8.99%             | 7.00%            | 21.00%             |
| Int'l Equities (Hedged)   | 8.89%             | 7.25%            | 19.00%             |

Table A1 compares our 2011 risk and return assumptions for international equities and global bonds in both hedged and unhedged terms. We assume that hedged asset classes will have the same expected arithmetic return (less 10 basis points for hedging costs). Analysis of the historical contribution to volatility from the underlying asset class (equities or bonds) and from currencies was used to determine the expected reduced volatility of hedged asset classes.

Perhaps most interesting is the impact of hedging on geometric expected returns. Geometric forecasts adjust for the challenges of compounding returns for a volatile asset over time. By reducing the asset class volatility, while sacrificing just the cost of hedging in the expected return, the compounded return forecast is increased. Hedging currency exposure creates more efficient underlying asset classes.

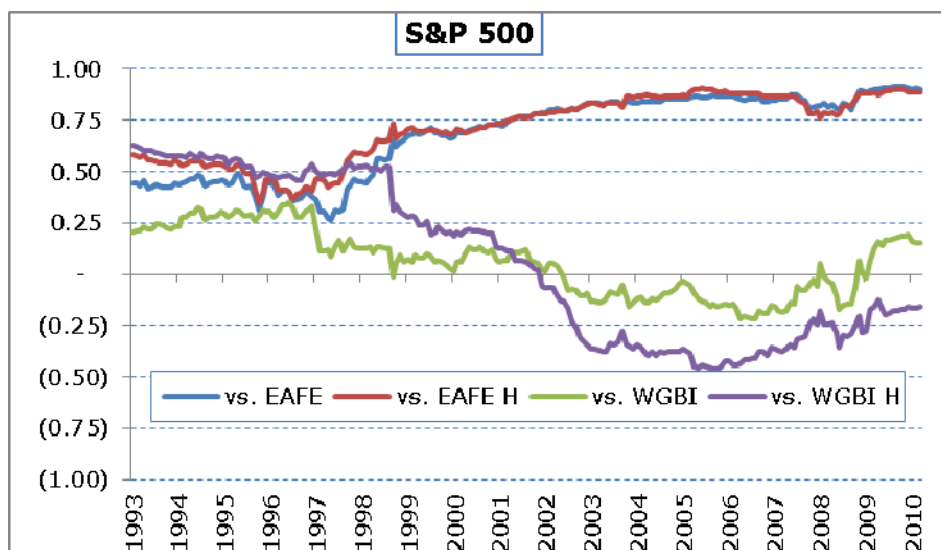
Fundamentally, it makes sense that minimizing a specific risk exposure embedded in an asset class should reduce the overall volatility of the return stream. However, expected correlations of

hedged foreign asset classes to other asset classes are much less intuitive and require further analysis. We analyzed rolling five-year correlations of both hedged and unhedged MSCI EAFE and Citigroup WGBI indices against the following major indices:

- S&P 500 Index
- Russell 2000 Index
- MSCI Emerging Markets Equity Index
- Barclays Capital Aggregate Bond Index
- Barclays Capital High Yield Index
- Barclays Capital Emerging Market Debt Index
- Goldman Sachs Commodity Index
- Credit Suisse/Dow Jones Hedge Fund Index.

While each of these indices provides exposure to unique parts of the capital markets, some consistencies did emerge when comparing the correlations of hedged and unhedged foreign index exposure. Figures A1 and A2 show the rolling five-year correlations for the S&P 500 and the Barclays Capital Aggregate Bond Index to MSCI EAFE and Citigroup WGBI, each both hedged and unhedged. These results are representative of results obtained for other asset classes.

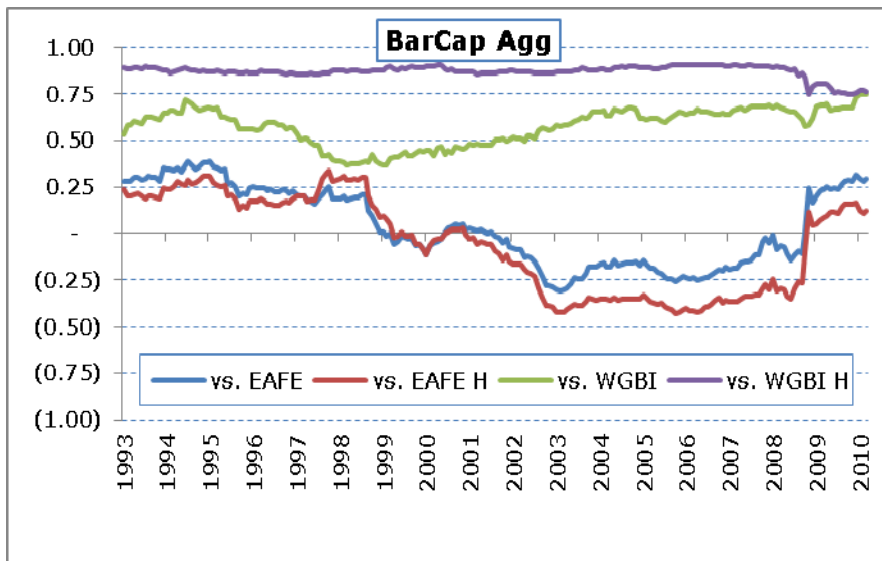
Figure A1 - Rolling Correlations of the S&P 500



Source: NEPC



Figure A2 – Rolling Correlations of the Barclays Capital Aggregate Index



Source: NEPC

This analysis leads us to several conclusions:

1. While many argue that currency exposure is diversifying within a portfolio, the inclusion or exclusion of currency exposure makes little difference in the correlation across asset classes when the underlying asset class has relatively high volatility. Relative to equity indices, highly credit-sensitive indices, and commodities, unhedged EAFE has very similar correlation characteristics as hedged EAFE.
2. Although a more significant differential exists in the rolling correlations of hedged and unhedged WGBI exposure to other asset classes, the relationship has been inconsistent. In earlier observations, leaving currency exposure unhedged appears to provide correlation benefits to many asset classes including equities (though it is unlikely that the correlation benefit is enough to offset doubling the volatility of the foreign-bond exposure). However, in the late 1990s and early 2000s, a shift occurred – causing the correlation to hedged WGBI exposure to be consistently lower than unhedged exposure. The lack of a persistent difference in correlations or an intuitive explanation for why unhedged and hedged asset classes should be significantly different – combined with the full history back to 1988 showing similar results – leads us to leave these correlations unchanged as well.
3. The significant risk impact of currency exposure on unhedged WGBI exposure, causes its relationship with other less-risky asset classes

to change when currency exposure is minimized. In particular, the correlation between the Barclays Capital Aggregate Bond Index and WGBI increases significantly when WGBI exposure is hedged. By minimizing currency risk through hedging, the WGBI exposure behaves much more like an interest-rate-sensitive portfolio, increasing its similarities and thus correlation to other interest-rate-sensitive asset classes like the Barclays Aggregate.

4. Many of these relationships across asset classes are just as inconsistent as any other set of correlations. The correlation between many asset classes and foreign asset classes appears to change meaningfully over time whether the foreign asset class has hedged or unhedged foreign-currency exposure.

Based on this analysis, we chose to leave most of our correlation assumptions for international asset classes unchanged. We adjusted correlations based on significant correlation differences between hedged and unhedged foreign exposure. Since hedged global bonds behave more like an interest-rate-sensitive asset class than a currency-sensitive asset class, we increased correlations of hedged global bonds to many fixed income asset classes. In addition, we built correlation estimates for international equity and global bonds across hedged and unhedged exposures to allow for the flexibility to blend allocations of hedged and unhedged asset classes and estimate the impact of partial hedging.



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