

Going global with bonds: The benefits of a more global fixed income allocation

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Todd Schlanger, CFA; David J. Walker, CFA; and Daren R. Roberts

- An allocation to global bond markets gives investors exposure to a greater number of securities, markets, and economic and inflation environments than they would have with a portfolio composed purely of local market fixed income. In theory, this diversification can help reduce a portfolio's volatility without necessarily decreasing its total return.
- We tested the empirical reality across five markets: the United States, Canada, the United Kingdom, the euro area, and Australia. In each market, reality confirms theory—but with a critical qualifier: The key to realizing the diversification potential of global bonds is to hedge the currency exposure back to the investor's local currency.
- Although the benefits of global bond diversification are clear, the optimal strategic allocation depends on investor-specific factors such as the desire to mitigate risk, the cost of implementation, and liability management objectives. We explore how these factors influence the size of an investment in hedged global bonds.

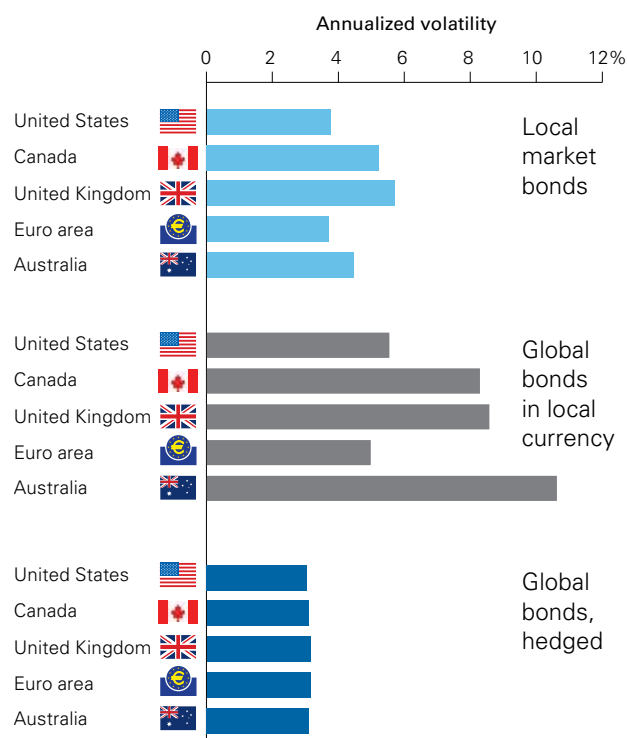
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When investors allocate more of their portfolio to global bonds¹, they gain exposure to a greater number of securities, inflation and economic environments, and cycles from a wider range of markets beyond their borders. Relative to an allocation comprising purely local market fixed income², some of these risk factors might, at first glance, seem to add risk. After all, there can often be a feeling of comfort and safety when investing in the familiar. However, investors should keep in mind that to the extent that the events affecting bonds of other markets are different from those affecting bonds in their own local market, a global bond allocation can reduce a fixed income portfolio's risk without necessarily decreasing its expected return.³

In other words, even though the bonds of any one issuer or market may be more volatile when compared with bonds in a local market, an investment that includes the bonds of all markets and issuers would theoretically benefit from the greater number of issues, securities, and markets, and their imperfect correlations through time. Therefore, considering the interactions between assets in a portfolio setting, rather than focusing on each asset in isolation, reveals their true diversification potential. For example, if one subset of the global bond market "zigs" when another "zags," the end result for a portfolio that includes both subsets can be a smoothing out of the combined returns over time.

We illustrate this concept in **Figure 1**, where we show that over roughly the last 30 years a global fixed income portfolio has had lower volatility than the local bond

Figure 1. Hedged global bonds tend to have lower volatility than local market bonds



Notes: Data cover the period from January 1, 1988, to June 30, 2017. For the United States, the United Kingdom, and Australia, global bonds are represented by the Citigroup WGBI to December 31, 1989, and the Bloomberg Barclays Global Aggregate Bond Index thereafter. For Canada and the euro area, global bonds are represented by the Citigroup WGBI to January 31, 1999, and the Bloomberg Barclays Global Aggregate Bond Index thereafter.

Sources: Vanguard calculations, using data from Bloomberg Barclays and Thomson Reuters Datastream.

Notes on risk

All investing is subject to risk, including possible loss of principal. Past performance does not guarantee future results. When interest rates rise, the price of a bond or bond fund will decline. Bonds are subject to credit risk and inflation risk. Credit risk is the risk that a bond issuer will fail to make timely payments of interest and principal. Inflation risk is the possibility that increases in the cost of living will decrease or eliminate the returns of an investment. Because high-yield bonds are considered speculative, investors should be prepared to assume a substantially greater level of credit risk than with other types of bonds. There is no guarantee that any particular asset allocation or mix of funds will meet your investment objectives or provide you with a given level of income. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index.

U.S. government backing of Treasury or agency securities applies only to the underlying securities and does not prevent share-price fluctuations. Unlike stocks and bonds, U.S. Treasury bills are guaranteed as to the timely payment of principal and interest. Although the income from the U.S. Treasury obligations held in a fund is subject to federal income tax, some or all of that income may be exempt from state and local taxes. In a diversified portfolio, gains from some investments may help offset losses from others. However, diversification does not ensure a profit or protect against a loss in a declining market.

¹ Throughout this paper, we define *global bonds* as the global investment-grade fixed income universe represented by the Citigroup World Government Bond Index (WGBI) to December 31, 1989, and the Bloomberg Barclays Global Aggregate Bond Index thereafter. We exclude floating-rate notes, private debt, U.S. municipal securities, inflation-linked bonds, and local currency emerging market bonds.

² *Local market bonds* are defined as fixed income securities within the global bond universe issued in one of the currencies associated with the five markets included in our analysis: United States (U.S. dollar), Canada (Canadian dollar), United Kingdom (British pound), euro area (euro), and Australia (Australian dollar).

³ Or, put in more technical terms: Expanding one's investment opportunity set can result in an upward shift to the forward-looking efficient frontier, allowing one to achieve better risk-adjusted return outcomes.

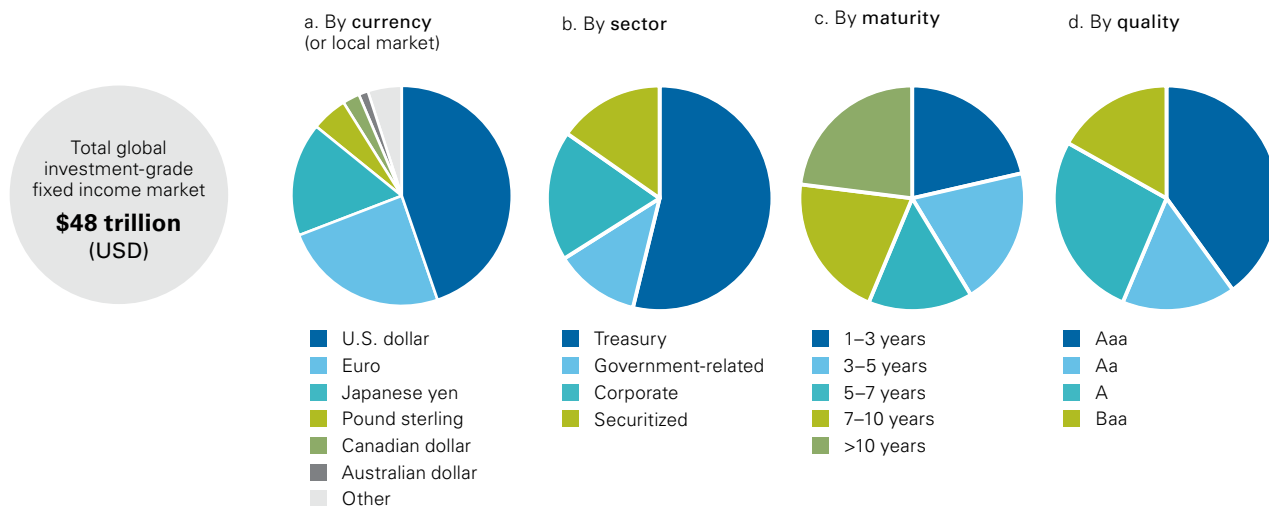
markets included in our analysis—provided that the currency risk is hedged. Because the currency translation of price changes and interest payments can add significant volatility, hedging these fluctuations is critical to preserving the risk-and-return attributes of global bonds and capturing the diversification benefits.

In this paper, we look at the benefits of allocating more of an investor’s portfolio to hedged global bonds in the United States, Canada, the United Kingdom, the euro area, and Australia. Similar points can be made for an even greater number of markets. We start by putting the current global investment-grade fixed income landscape into perspective and considering the diversification benefits that can be achieved from reducing market-specific risk factors. We then discuss the importance of hedging the currency risk from both a risk and a return perspective. Finally, we explore factors that can influence sizing a hedged global bond allocation, such as relevant home bias considerations and the potential for reducing volatility.

The global fixed income landscape

Figure 2 presents the market capitalization of the global investment-grade fixed income market broken down by the following components: currency (a proxy for the size of a country’s bond market), sector, maturity, and quality. Figure 2a shows that, regardless of which local market investors call their own, excluding bonds denominated in additional currencies will result in forgoing a significant portion of the global opportunity set. Including bonds denominated in additional currencies, on the other hand, provides for a more diverse array of bonds and risk factors that together can help to mitigate portfolio risk compared with a more concentrated single-market investment. The breakdown by sector, maturity, and quality depicted in Figures 2b, 2c, and 2d further illustrates the diversified nature of the global bond market.

Figure 2. Market capitalization of the global investment-grade fixed income market, by component



Note: Data are for the Bloomberg Barclays Global Aggregate Bond Index as of June 30, 2017.

Sources: Vanguard calculations, using data from Bloomberg.

The diversification potential of global bonds

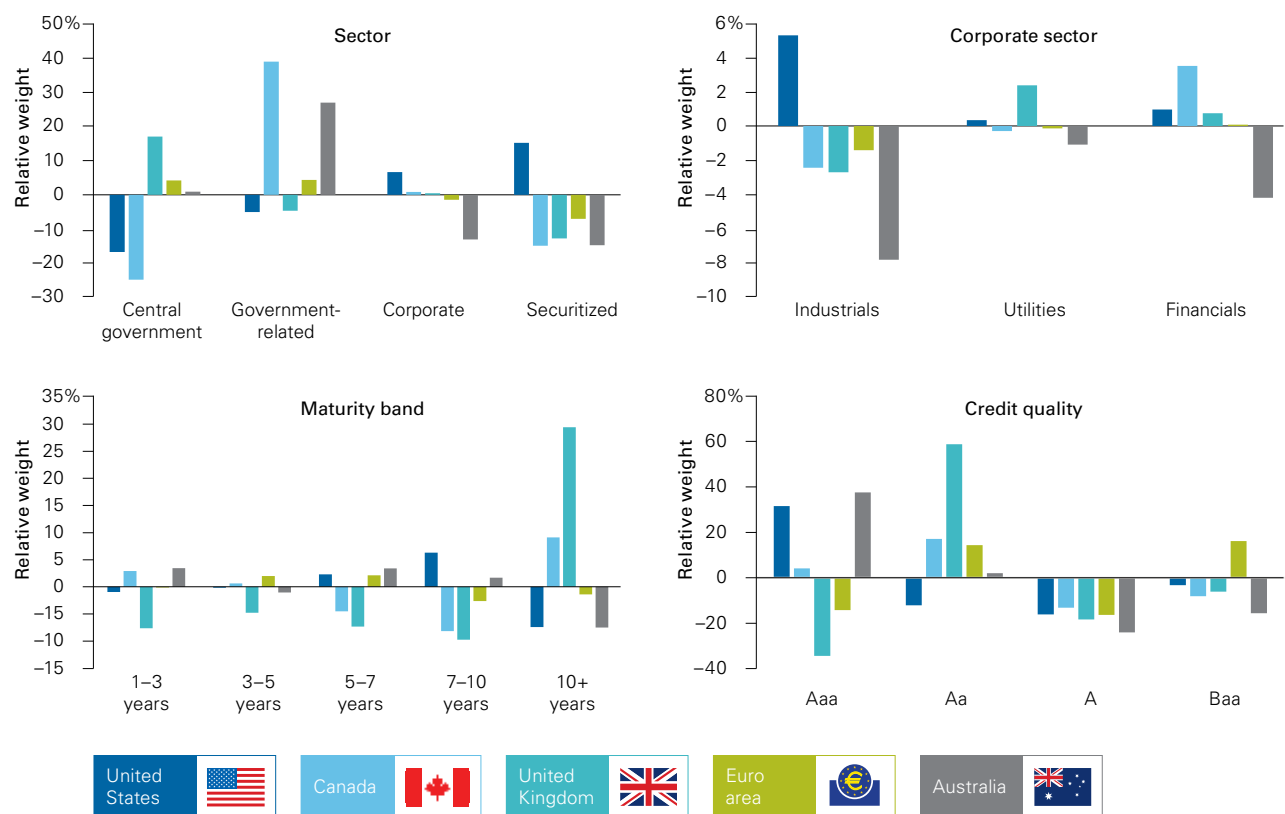
Reducing local-market-specific risk factors

Using the global fixed income landscape previously shown as a reference point, **Figure 3** displays how each local market included in our analysis compares with the global bond markets in aggregate. In many cases, the differences can be substantial, representing local-market-specific risk factors that can affect a bond portfolio's performance over time. For example, a decision to overweight the U.S. bond market is, in effect, a choice to invest less in government bonds and more in corporate and securitized debt. By a similar token, the Canadian bond market is underweight central government bonds and significantly overweight government-related

“provincial” bonds. Other overweights and underweights can be found for each local market by corporate sector, maturity, and credit quality.

The important point is that investors should be aware of and consider the impact of these risk factor differences in the context of their portfolio. An investment that, considered in isolation, appears to add risk can actually provide diversification through its interactions with other investments. A global fixed income allocation maximizes diversification across all markets and issuers. It also reduces the likelihood of the portfolio being positioned in ways that could alter its risk-and-return profile.

Figure 3. Local-market-specific risk factors relative to the global bond market



Note: Data are for the Bloomberg Barclays Global Aggregate Bond Index as of June 30, 2017.

Sources: Vanguard calculations, using data from Bloomberg.

Additional drivers of global fixed income diversification

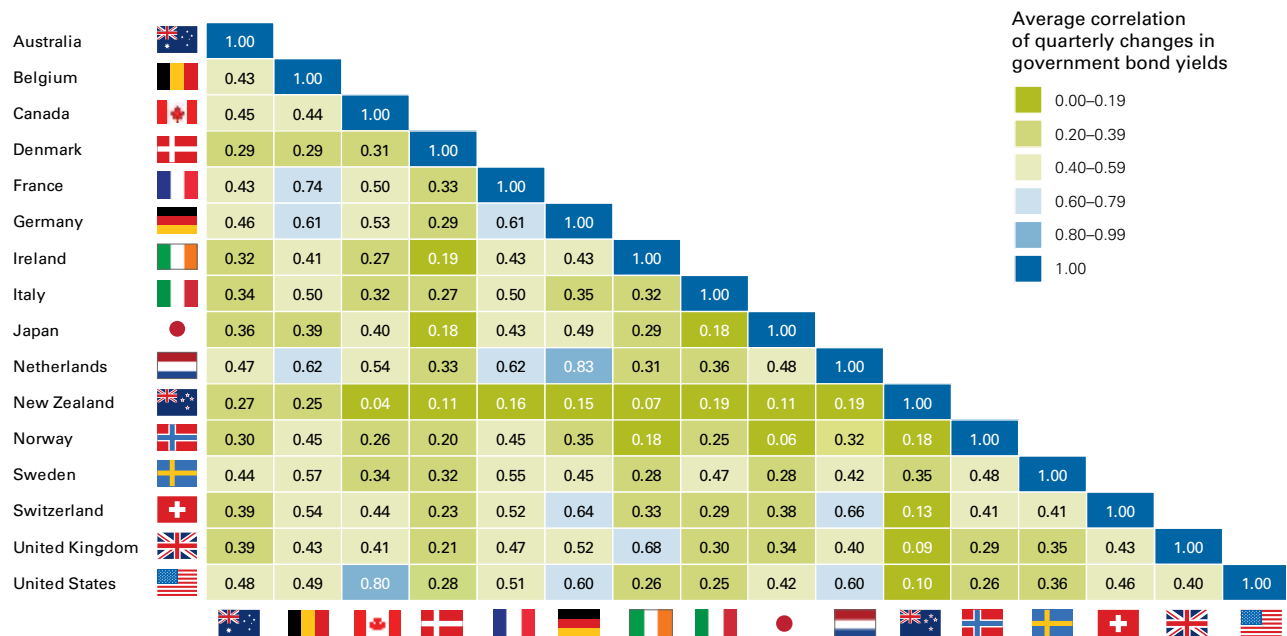
Beyond the diversification benefits of reducing exposure to a local bond market's unique sector, quality, and maturity profile, an allocation to global bonds provides exposure to additional inflation risk factors, economic environments, and market cycles. Depending on the market and sector involved, credit risk premiums can also cause variability in bond returns, and if these drivers of returns are sufficiently different across markets, exposure to global bonds can potentially offer significant long-term diversification benefits.

As Figure 4 illustrates, various local market risk factors (such as interest rates, inflation, and yield curves) have resulted in relatively low correlations of government bond yields across markets over the past 50 years, suggesting a diversification benefit to increasing the number of global markets in a fixed income allocation. For example, interest rates may be rising in one market and stable or

falling in another, the net effect of which can be a dilution of or canceling out of interest rate movements, leading to a more stable return profile.

For this reason, a global bond portfolio is typically less sensitive to changes in local interest rates than the weighted average durations of its individual bonds, which come from a wide range of different fixed income markets, would indicate. For example, in the Vanguard white paper *Fearful of Rising Interest Rates? Consider a More Global Bond Portfolio*, the authors found, using data for roughly the 18 years ending in 2013, that in periods of rising local interest rates, hedged global bonds outperformed local bond markets by a median of 1.03% in the United States, 0.86% in Canada, 1.84% in the United Kingdom, 0.54% in the euro area, and 1.64% in Australia (see Philips and Thomas, 2013).

Figure 4. The interest rate diversification of a more global bond allocation



Notes: Data cover January 1, 1970, to June 30, 2017. Each cell displays the average correlation of quarterly changes in the long-term government bond yield of one country relative to the quarterly changes in the long-term government bond yield of each other country. The cells are shaded according to the magnitude of the correlation, as noted in the legend. The countries shown reflect the largest government bond markets of developed countries with monthly historical yield data available since 1970.

Sources: Vanguard calculations, using data from the International Monetary Fund.

In **Figure 5**, we examine the long-term correlations of each of our five local bond markets to global bonds (both hedged and unhedged) and find moderate correlations, suggesting that the relationships discussed previously apply at the aggregate level. Just as was the case with volatility, however, the degree of correlation was affected by whether or not the currency risk of global bonds was hedged. Interestingly, leaving the currency risk of global bonds intact resulted in even lower correlations. As we will discuss in the next section, however, the cost of these lower correlations has been significantly higher volatility, which can change the portfolio's risk-and-return profile.

The importance of hedging global bonds' currency risk

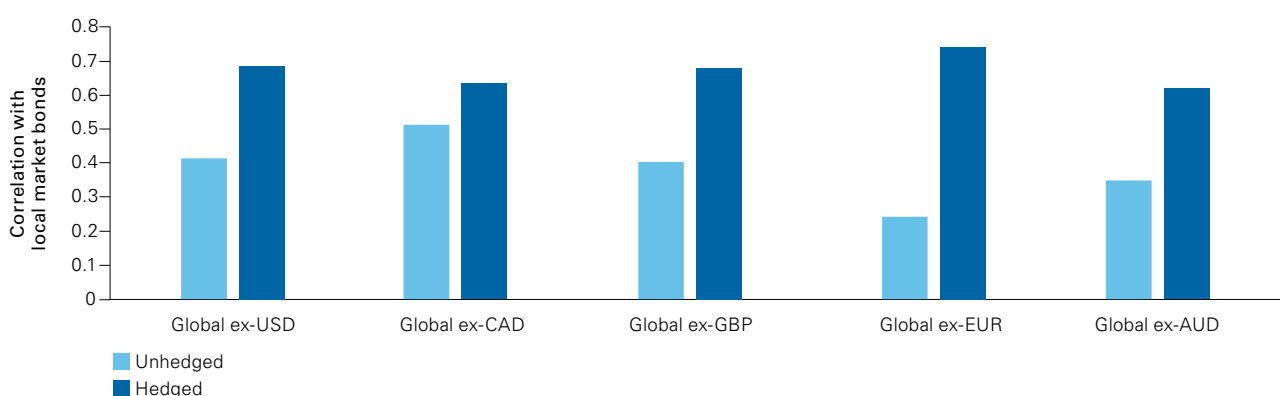
Unlike investing in bonds from an investor's own market, investing in global bonds results in exposure to two return streams, one from the underlying bonds and one from the accompanying currency translated back into the investor's currency. For example, if a U.K. investor were to purchase a U.S. Treasury bond denominated in U.S. dollars, both the interest payments and the principal repayment would need to be converted from U.S. dollars to British pounds, resulting in an additional return.

Potential impact to total returns through time

Although currency movements tend to be driven by fundamental factors over long horizons, it is well documented that currencies can and do deviate from their fair value in the short term to intermediate term. These deviations bring about returns that are negatively correlated with the movement of the underlying exchange rate, and, as **Figure 6** shows, they add significant return volatility to global bonds relative to what could be achieved through the same investment hedged back to the investor's local currency. Thus, hedging the currency of global bonds back into the investor's own currency results in a return stream that is more typical of a high-quality investment-grade bond portfolio.

With local market bonds, there is a well-understood relationship between a portfolio's starting yield and realized return. For hedged global bonds, however, the relationship between the yield and realized return is far more complicated, thanks to the associated currency returns. This is because the process of hedging currency involves using forward contracts that effectively lock in a set exchange rate today based largely on differences in the prevailing interest rates that bring about a forward premium (or discount) to the spot exchange rate. For example, consider a euro area investor who wants to purchase an Australian bond and hedge this exposure back to the euro. The investor would convert her euros to Australian dollars at the spot rate and purchase the

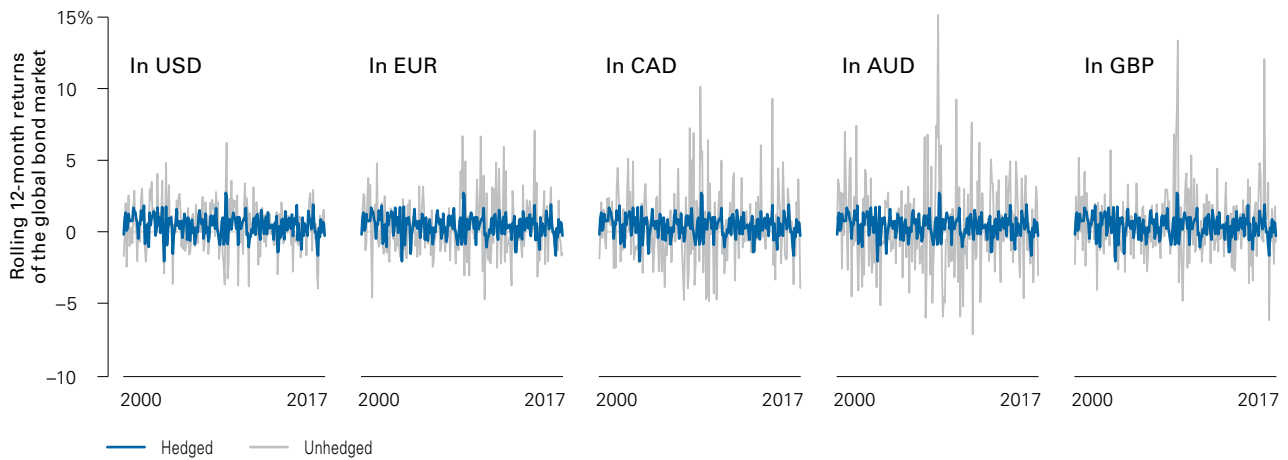
Figure 5. The moderate correlations between local and global bonds suggest diversification benefits



Notes: Data cover January 1, 1988, to June 30, 2017. For the United States, the United Kingdom, and Australia, global bonds are represented by the Citigroup WGBI to December 31, 1989, and the Bloomberg Barclays Global Aggregate Bond Index thereafter. For Canada and the euro area, global bonds are represented by the Citigroup WGBI to January 31, 1999, and the Bloomberg Barclays Global Aggregate Bond Index thereafter.

Sources: Vanguard calculations, using data from Bloomberg Barclays and Thomson Reuters Datastream.

Figure 6. Currency can significantly affect global bond returns through time



Notes: Data cover February 1, 1999, to June 30, 2017. The returns shown are represented by the monthly total returns of the Bloomberg Barclays Global Aggregate Bond Index in various currencies. For illustrative purposes, the hedged global bond return represents the hedged return from the perspective of a U.S. dollar investor; in practice, returns hedged to other currencies will differ slightly by the amount of the “currency return,” as discussed later in this paper.

Sources: Vanguard calculations, using data from Macrobond.

bond. To hedge her Australian dollar exposure, the investor would enter into a forward contract to lock in a forward exchange rate. Often, the forward contract will not be equal to the spot rate, resulting in a forward premium or discount that represents an additional currency return that, combined with the return from the underlying bonds, will make up the investor’s total return (Thomas and Bosse, 2014).

In practice, currency hedging is implemented over relatively short horizons of between one and three months. The end result of the global bond and currency returns is a total-return profile that is similar to what an investor would achieve in her local bond market, as shown in Figure 7.⁴ Historically, these currency returns have been positive in all markets included in our analysis: the United States, Canada, the United Kingdom, France (which we used as a proxy for the euro area), and Australia. For illustrative purposes, and to make the point that the currency return will not always be positive, we also include Japan, an economy that has experienced slower economic growth and lower inflation through time.

In today’s environment, the euro area and Japan have lower interest rates than the United States, Canada, and the United Kingdom, which are experiencing tighter

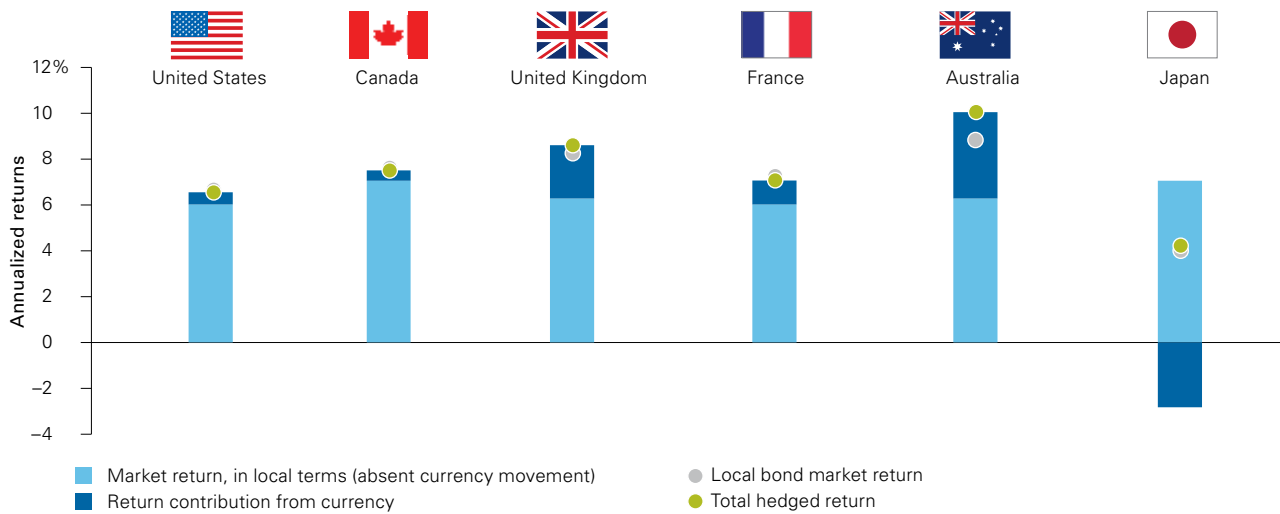
monetary policy. Because of these differentials, a U.S., Canadian, or U.K. investor who buys a German bund, for example, would have a higher expected “total return” than a euro area investor who buys the same bund. This also applies during periods of negative interest rates and bond yields. For example, consider short-term euro area bonds⁵ that had negative yields for each month of the year ended June 30, 2017: A euro area investor would have earned a total return of –0.07% over that period, while a U.S. investor holding the same portfolio hedged back to the U.S. dollar would have realized a total return of 1.63%. As theory would dictate, the difference between the two investors’ total returns was roughly the size of the differential between the discount rates of the U.S. Federal Reserve and European Central Bank at the time.

The final point worth clarifying when it comes to currency returns from global bonds is that over the long term, the currency returns from hedged and unhedged bonds would likely be similar, thanks to uncovered interest rate parity. This parity condition holds that interest rate differentials between markets will determine changes in exchange rates, so that the realized rate of return on a risk-free government bond is the same. The currency returns from hedged and unhedged global bonds will differ slightly in the long term based on

⁴ Two models of currency value involve price level and interest rate differences between countries. Purchasing power parity (PPP) states that identical goods sold in different countries must sell at the same price when translated into the same base currency. If PPP holds at the local market level, real returns will be the same across countries, as exchange-rate movements and inflation differentials will offset each other. Interest rate parity (IRP) is based on the idea that the interest rate differential between local and global markets will determine the change in the exchange rate, so that the realized rate of return on a risk-free government bond is the same in any market.

⁵ Defined by the Bloomberg Barclays 1-3 Year Pan Euro-Aggregate Index.

Figure 7. Returns from currency have tended to equalize long-term returns



Notes: Data cover January 1, 1985, to June 30, 2017. The local bond market return is defined as each country’s respective component of the Citigroup WGBI, with returns measured in that country’s currency. Market return in local terms (absent currency movement) is defined as the Citigroup WGBI excluding the stated country in local currency, if available. For Australia and Canada, we used the Citigroup WGBI in local currency. For France, we used the Citigroup WGBI ex Euro in local currency. Return contribution from hedging currency is the difference in return between the international index measured in hedged terms versus local terms. We used France as a proxy for euro area investors because of a lack of history for the broad monetary area.

Sources: Vanguard calculations, using data from Citigroup and Thomson Reuters Datastream.

unexpected developments in interest rates and associated currency movements. In the shorter term, however, big gaps between the theory and the reality of uncovered interest rate parity create significant volatility, as we will discuss next.

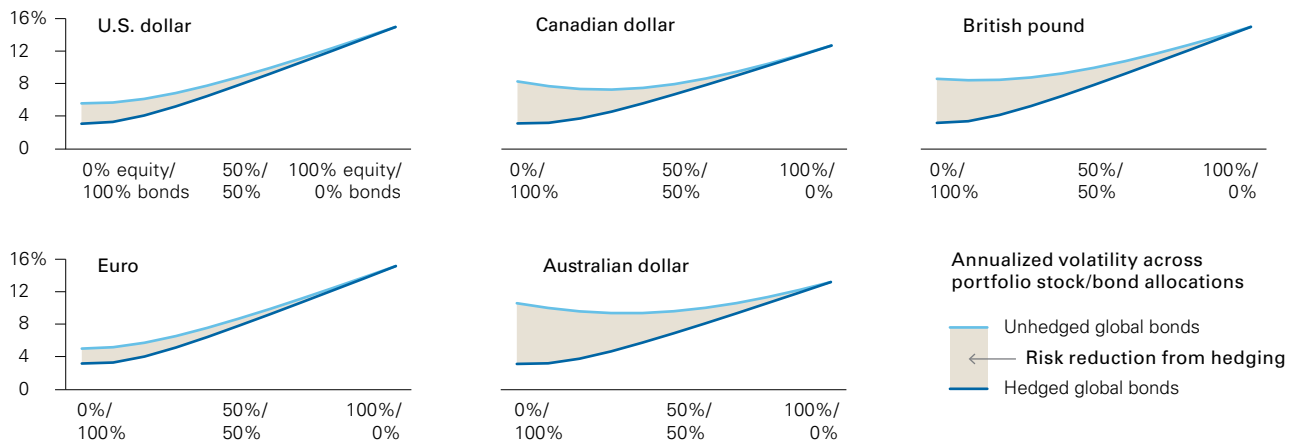
Currency risk adds portfolio volatility over time

Just as currency risk can overwhelm the return profile of global bonds, it can also significantly increase volatility—even within a balanced portfolio. **Figure 8** shows the historical annualized volatility for a range of global balanced portfolios of varying asset allocations. The

portfolios are invested according to the stated asset allocation in a combination of unhedged global equity and either unhedged or hedged global bonds. We found that regardless of equity/bond asset allocation mix, local market, or currency, hedged global bonds provided risk-reduction benefits relative to leaving the currency risk unhedged.⁶ The benefits were more pronounced for portfolios with higher fixed income allocations, because of the more comparable volatilities of global equities and currency through time (LaBarge et al., 2014, and Roberts et al., 2018).

⁶ If we allow the currency exposure of a balanced portfolio to vary independently of the allocation to global bonds (in other words, if we treat currency as a separate asset class), it is possible that some allocation to currency will provide risk-reduction benefits, depending on the specific stock/bond asset allocation of the portfolio. In this analysis, we focus on global bonds, treating the hedging decision as binary (not allowing partial hedging); thus, the topic of ideal currency exposure is beyond the scope of this paper.

Figure 8. Hedging the currency of global bonds reduces volatility



Notes: Data cover January 1, 1988, to June 30, 2017. Global stocks are represented by the MSCI All Country World Index. For the United States, the United Kingdom, and Australia, global bonds are represented by the Citigroup WGBI to December 31, 1989, and the Bloomberg Barclays Global Aggregate Bond Index thereafter. For Canada and the euro area, global bonds are represented by the Citigroup WGBI to January 31, 1999, and the Bloomberg Barclays Global Aggregate Bond Index thereafter. Each portfolio is rebalanced on a monthly basis.

Sources: Vanguard calculations, using data from Bloomberg Barclays and Thomson Reuters Datastream.

From a risk-minimization perspective, then, hedged global bonds are superior to unhedged global bonds. The return per unit of risk trade-off of currency is also unfavorable, considering that the long-run expected return from currency is approximately zero and that it adds significant volatility. For example, over our analysis period, the risk-adjusted returns of hedged global bonds were, on average, 3.1x greater than those of unhedged global bonds. However, we cannot simply ignore the possibility that long-term currency returns could be high enough to justify the additional volatility that would come from leaving the bonds unhedged, especially for investors who hold a forward-looking view of how their currency will rise or fall through time.

In this case, it is important to consider that some currency return is already captured through the currency-hedging process discussed previously and shown in Figure 7. Therefore, what we are really considering is long-term unexpected depreciation from an investor's local currency relative to a basket of global currencies. The question then becomes, how much unexpected return would be required to justify leaving the currency unhedged? The short answer is that it would require aggressive currency return assumptions. See the box on page 10 for more information.

How much unexpected depreciation would it take to justify leaving the currency unhedged?

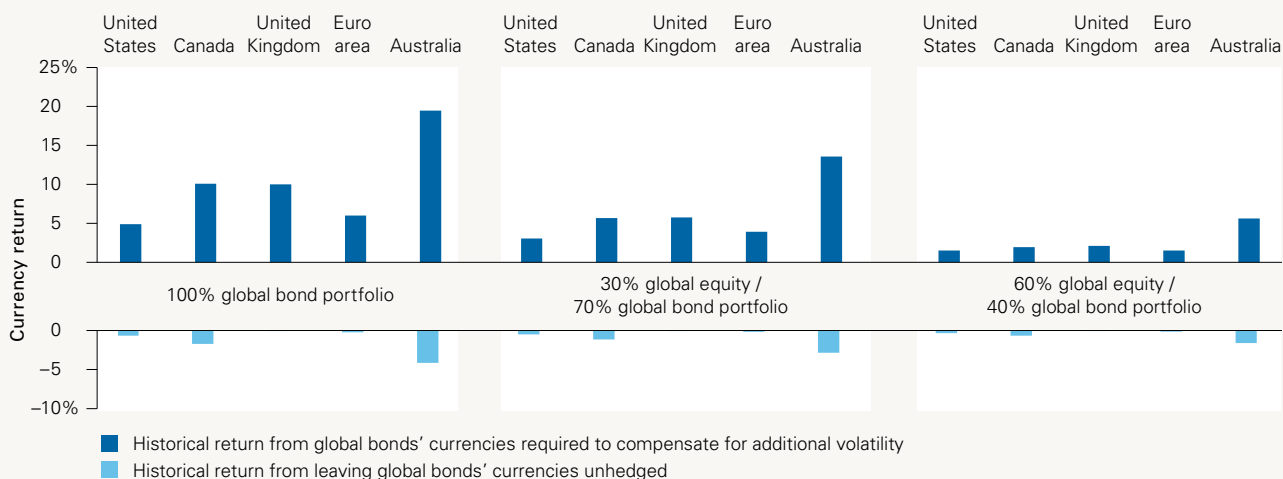
We looked at the data for roughly the last 18 years and calculated how much unexpected currency return would have been required to compensate⁷ for the additional volatility incurred from leaving the currency risk of global bonds unhedged in three asset allocations: 100% global bonds, 30% global equities/70% global bonds, and 60% global equities/40% global bonds. The results of these calculations are represented by the dark blue bars in **Figure 9**. We also calculated the actual currency returns from leaving currency risk unhedged over the same period (light blue bars in the figure). Notably, across all markets and asset allocations, the unexpected depreciation required to justify leaving the currency unhedged were positive and substantial. Even for the 60/40 balanced portfolios with higher overall levels of portfolio volatility, these currency returns ranged from 1.5% to 5.6%.

Equally striking was that the excess currency returns from leaving the currency unhedged were smaller in magnitude than those required to compensate for the additional volatility—and they were more often negative than positive. In other words, significant positive returns from currency were required to justify the additional volatility,

and on average smaller and negative currency returns were realized. And because some currency return is already captured through the hedging process, those returns would need to be derived from unexpected currency movements.

This leads to the question of how an analysis like the one described in Figure 9 might yield different results in the future—and how reasonable it is to anticipate such a high level of unexpected currency movement on a forward-looking basis, relative to history. Considering that the historical return of the global bond market over our analysis period absent any currency movements was 4.3%—significantly higher than one might expect today, given the 1.6% starting yield of the global bond market as of June 30, 2017—even greater currency movement would likely be required in a lower return outlook, as volatility dynamics are more persistent than returns through time (Davis et al., 2017). The other thing to keep in mind is that because securities markets are forward-looking, this additional return would have to result from *unexpected* future dislocations between global economies.

Figure 9. To justify the additional volatility, unexpected currency returns would need to be substantial



Notes: Data cover February 1, 1999, to June 30, 2017. *Historical return from global bonds' currencies required to compensate for additional volatility* is the annualized excess return derived from the monthly total returns of the portfolio with unhedged global bonds that would be needed—on top of the historical currency-hedged return—to maintain the same ratio of return per unit of risk as the portfolio with hedged global bonds. *Historical return from leaving global bonds' currencies unhedged* is the difference between the total returns of two identical portfolios, one with unhedged global bonds and the other with hedged global bonds. Global equities are represented by the MSCI All Country World Index in each market's respective currency. Global bonds are represented by the Bloomberg Barclays Global Aggregate Bond Index in each market's respective currency. Hedged global bonds are represented by the Bloomberg Barclays Global Aggregate Bond Index hedged to each market's respective currency.

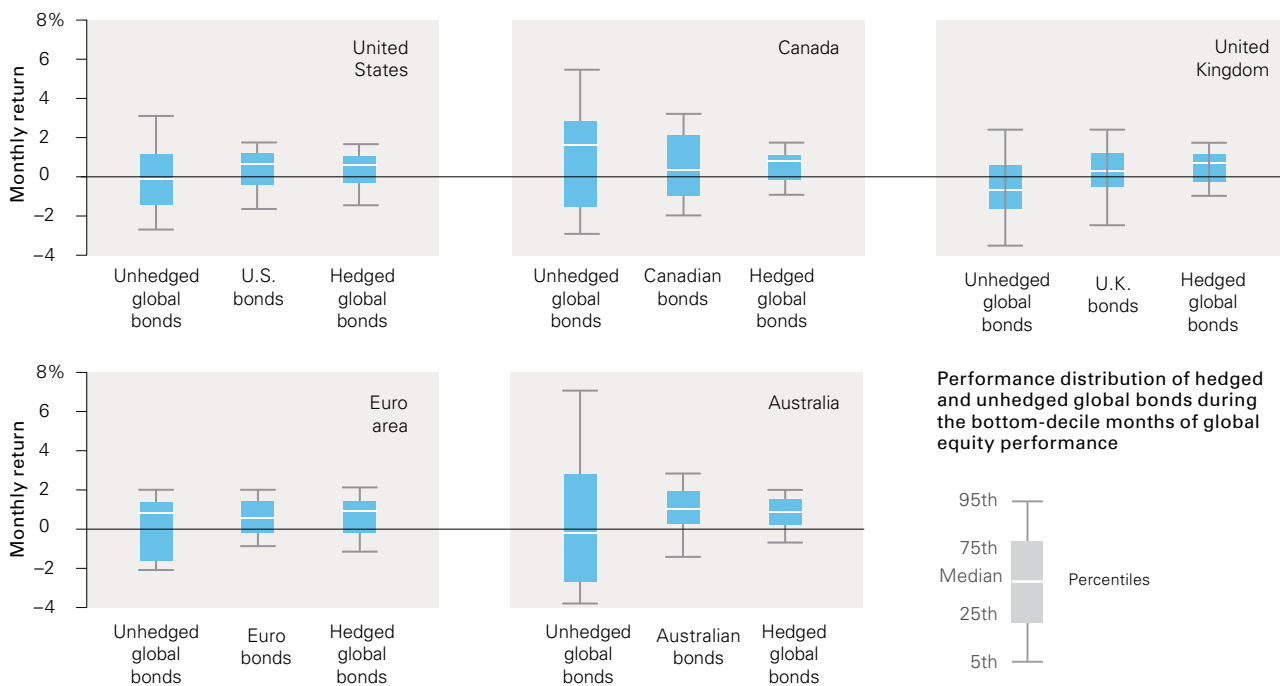
Sources: Vanguard calculations, using data from Macrobond and Bloomberg.

The relationship between currency hedging and downside protection

As we have discussed, hedging currency is critical to maintaining the risk-and-return properties of global bonds while allowing them to play the traditional diversification and risk-reduction role that has been the hallmark of high-quality investment-grade bonds. This role is especially important when equities are falling in periods of market stress. In **Figure 10**, we examine the performance of unhedged global bonds, hedged global bonds, and local market bonds in the bottom decile (the worst-performing 10%) of monthly returns for the global equity market.

We find that hedged global bonds provided more consistent returns and in many cases better levels of counterbalancing than local bond markets. Unhedged global bonds, on the other hand, had a much wider range of returns and in the majority of cases did not provide similar levels of diversification. Thus, hedging away the currency risk is necessary if global bonds are to provide the maximum level of diversification and fill the traditional role of high-quality bonds in a balanced portfolio.

Figure 10. Hedged global bonds have provided more consistent downside protection



Notes: Data cover January 1, 1988, to June 30, 2017. Global stocks are represented by the MSCI All Country World Index. For the United States, the United Kingdom, and Australia, global bonds are represented by the Citigroup WGBl to December 31, 1989, and the Bloomberg Barclays Global Aggregate Bond Index thereafter. For Canada and the euro area, global bonds are represented by the Citigroup WGBl to January 31, 1999, and the Bloomberg Barclays Global Aggregate Bond Index thereafter. U.S. bond returns are represented by the Bloomberg Barclays U.S. Aggregate Bond Index. Canadian bonds are represented by the Bloomberg Barclays Citigroup Canadian WGBl to September 30, 2002, and the Bloomberg Barclays Canadian Issues 300MM Index thereafter. U.K. bonds are represented by the Citigroup UK WGBl to December 31, 1998, and the Bloomberg Barclays Sterling Aggregate Index thereafter. Euro area bonds are represented by the Citigroup European WGBl to May 31, 1998, and the Bloomberg Barclays Euro-Aggregate Bond Index thereafter. Australian bonds are represented by the Citigroup Australian WGBl to May 31, 2004, and the Bloomberg Barclays Australian Aggregate 300MM Index thereafter. Global equity returns were deciled separately in each currency to determine the worst months for each region.

Sources: Vanguard calculations, using data from Bloomberg, Citigroup, and MSCI.

The costs of hedging global currencies

Given the importance of hedging global bonds' currency and the inverse relationship between costs and net returns, an additional consideration for a hedged global fixed income investment is any additional costs brought about through the hedging. **Figure 11** shows the historical annualized bid-ask spread on 1-month currency forward contracts to the U.S. dollar for six currencies that, along with the U.S. dollar, currently make up just over 95% of the global investment-grade bond market as defined by Bloomberg Barclays.

These bid-ask spreads can be considered a reasonable approximation of the annual trading costs needed to run a currency-hedging program, although they may differ slightly by each local market.⁸ Generally speaking, and notwithstanding the spike during the global financial crisis of 2008–2009, currency-hedging costs have declined through time on a weighted-average hedging cost basis. This suggests that investors might expect minimal drag on their net returns relative to the significant diversification benefits that can be achieved through a more global fixed income investment.

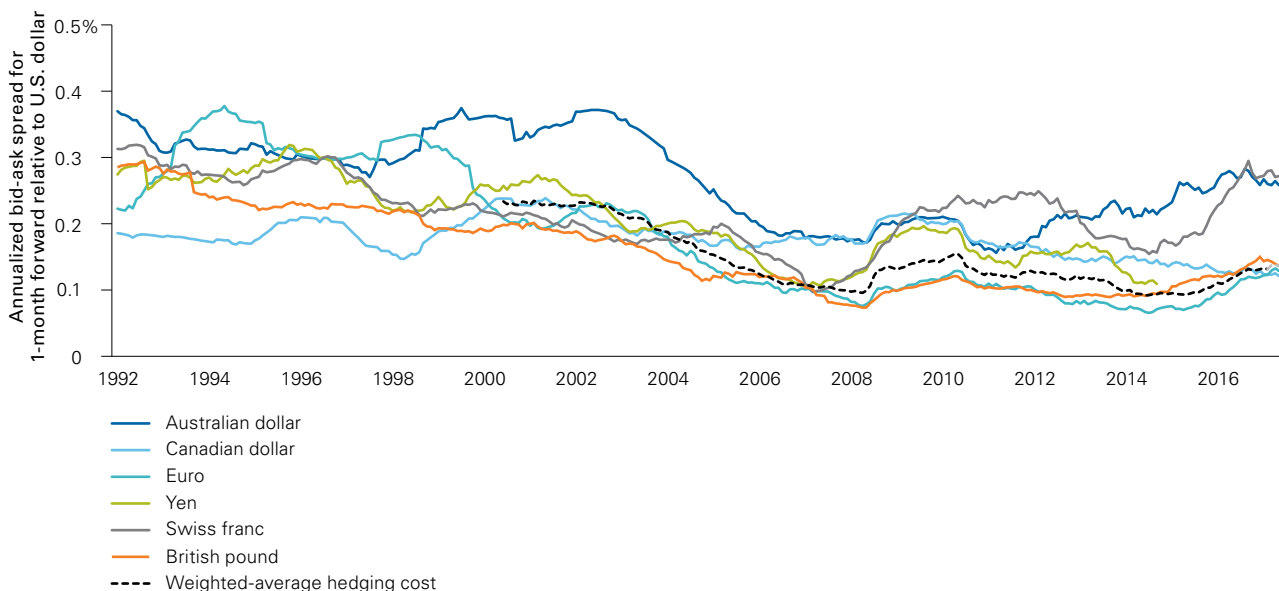
Sizing a hedged global bond investment

Factors affecting an investor's level of global diversification

Many investors may opt to maintain exposure to their local bond markets while adding diversification through an allocation to hedged global bonds. The question often centers on how large of an allocation to make. There is an argument to be made for a fully market-proportional global fixed income allocation because it provides the broadest diversification and is reflective of the forward-looking efficient frontier derived by market participants. Practically speaking, however, most investors settle on an allocation that is less than fully market-proportional.

Although there is no "right size" allocation, **Figure 12** outlines factors that would lead an investor to a larger or smaller allocation. Starting with risk-based factors, investors should weigh their desire to mitigate market-specific risk factors and reduce portfolio concentration against any desire to maintain an overweight to local bonds. The potential for volatility reduction from a more global allocation also tends to increase at a decreasing rate, as we will discuss next, making the diversification

Figure 11. The cost of hedging currency risk has declined over time



Notes: Data cover January 1, 1992, to June 30, 2017. The bid-offer spread for 1-month forward contracts relative to the U.S. dollar is shown. The spread is calculated as one-half of the difference between the weekly closing bid and ask forward point quotes, as an annualized percentage of the midpoint forward rate. The cross-currency weighted average is based on the historical market weights of each currency in the Bloomberg Barclays Global Aggregate Bond Index.

Sources: Vanguard calculations, using data from Thomson Reuters Datastream and Bloomberg.

⁸ We feel these bid-ask spreads from a U.S. dollar investor's perspective are a reasonable illustration for all markets included in our analysis, as non-USD currencies are often first hedged to the U.S. dollar, then to their local currency.

Figure 12. Factors influencing the size of an investor’s global bond allocation

	Smaller allocation	Larger allocation
Risk-based factors		
Desire to mitigate local-market-specific risk factors	Low	High
Concentration of local market by sector or issuer	Diversified	Concentrated
Potential for volatility reduction	Low	High
Total cost of implementation		
Access to low-cost hedged investment vehicles	Low	High
Local transaction costs	Low	High
Local investment taxes	Advantages	Disadvantages
Local market liquidity	High	Low
Other investor-specific factors		
Liability management objectives	Significant	Limited
Regulatory limitation	Significant	Limited

Source: Vanguard.

benefits from a more global allocation higher for smaller allocations. Beyond these risk-based factors, the total cost of implementation, including access to low-cost hedged investment vehicles, local transaction costs, taxes, and market liquidity should also be considered. Finally, liability management objectives (such as duration-matching pension liabilities with fixed income securities) that are more suited to local bonds and regulatory limitations on cross-border investment that tend to be specific to the market and investor should be carefully examined (Bosse, 2015).

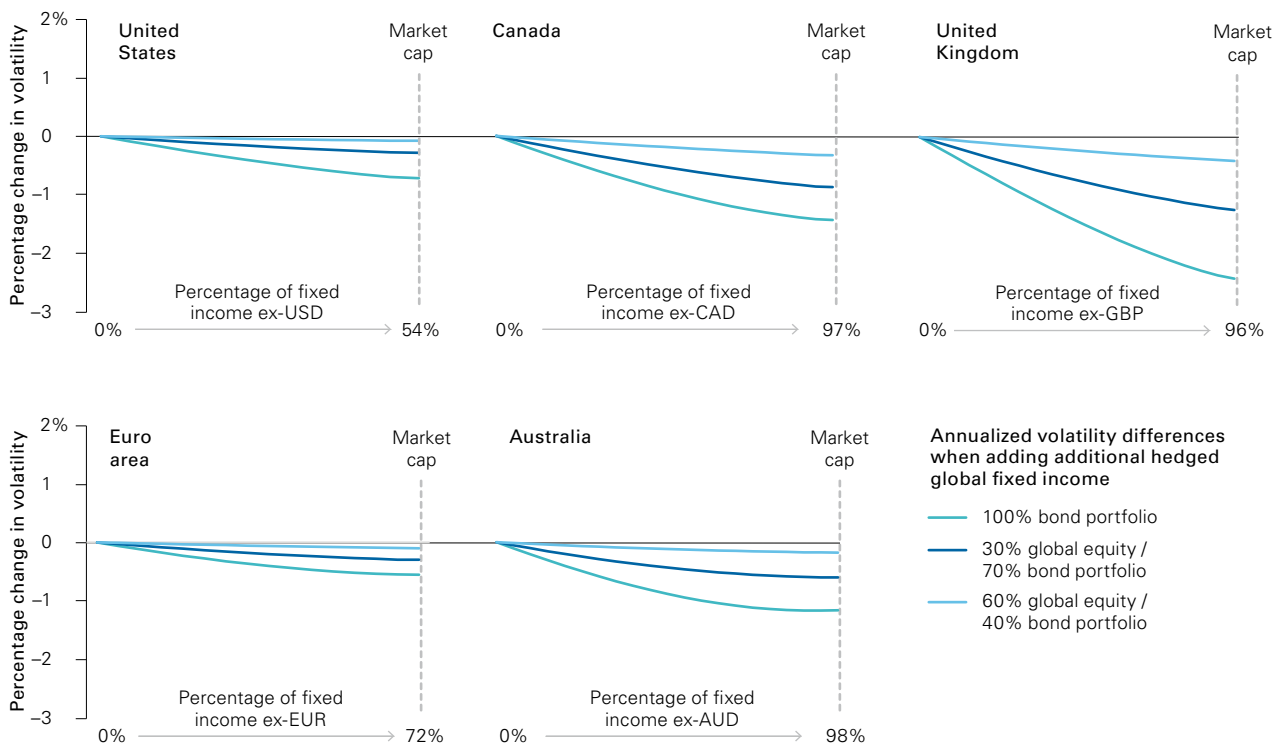
Volatility reduction from adding hedged global bonds

Figure 13 examines the historical volatility reduction from adding incremental amounts of hedged global bonds to three portfolios: a 100% bond portfolio, a 30% global equity/70% bond portfolio, and a 60% global equity/40% bond portfolio. The downward-sloping direction of all of the 100% bond portfolio lines shows that relative to any of the local bond markets we analyzed, adding more hedged global bonds tended to

lower portfolio volatility, although the level of volatility reduction increased at a decreasing rate as the allocation approached its market capitalization weight.

Although these levels of volatility reduction are modest in absolute terms, they are significant on a relative basis, given that the volatility of investment-grade bonds is typically below 5%. Volatility reduction was also achieved in the two balanced equity/bond portfolios, although the level of risk reduction was lower, as the dominant source of volatility in those portfolios was equity market risk (as discussed previously). More important, overweighting any of the local bond markets included in our analysis was not rewarded with significantly lower levels of portfolio volatility.

Figure 13. Volatility reduction benefits resulting from a more global hedged fixed income allocation



Notes: For the United States: Data cover January 1, 1988, to June 30, 2017. Global stocks are represented by the MSCI World ex United States Index. Global bonds are represented by the Citigroup WGBI ex-USD (USD hedged) to December 31, 1998, and the Bloomberg Barclays Global Aggregate ex-USD Float Adjusted Bond Index (USD hedged) thereafter. U.S. bond returns are represented by the Bloomberg Barclays U.S. Aggregate Bond Index. For the euro area: Data cover February 1, 1999, to June 30, 2017. Global stocks are represented by the MSCI World ex Europe Index. Global bonds are represented by the Bloomberg Barclays Global Aggregate ex-EUR Float Adjusted Bond Index (hedged) thereafter. Euro bond returns are represented by the Bloomberg Barclays Euro Aggregate Bond Index. For the United Kingdom, Australia, and Canada: Data cover February 1, 1993, to June 30, 2017. Global stocks are represented by the MSCI World ex United Kingdom Index, MSCI World ex Australia Index, and MSCI World ex Canada Index, respectively. For the United Kingdom, global bonds are represented by the Citigroup WGBI ex GBP (GBP hedged) to December 31, 1998, and the Bloomberg Barclays Global Aggregate ex-GBP Float Adjusted Bond Index ex-GBP (GBP hedged) thereafter. For Australia, global bonds are represented by the Citigroup WGBI ex AUD (AUD hedged) to December 31, 1998, and the Bloomberg Barclays Global Aggregate Float Adjusted Bond Index ex-AUD (AUD hedged) thereafter. For Canada, global bonds are represented by the Citigroup WGBI ex-CAD (CAD hedged) to December 31, 1998, and the Bloomberg Barclays Global Aggregate ex-CAD Float Adjusted Bond Index (CAD hedged) thereafter. U.K. bonds are represented by the Citigroup United Kingdom WGBI to January 29, 1999, and the Bloomberg Barclays Sterling Aggregate Index thereafter. Australian bonds are represented by the Citigroup Australian WGBI to June 30, 2000, and the Bloomberg Barclays Australian Aggregate Index thereafter. Canadian bonds are represented by the Citigroup Canadian WGBI to September 30, 2002, and the Bloomberg Barclays Canadian Aggregate Index thereafter.

Sources: Vanguard calculations, using data from Bloomberg Barclays, Citigroup, and MSCI.

Conclusion

Across the markets we included in our analysis, we found that including an allocation to global bonds significantly expanded a portfolio's opportunity set and diversification potential without necessarily decreasing its total return. However, with global bonds comes additional exposure to currency movements that have the potential to change a portfolio's risk-and-return characteristics. Therefore, we believe that hedging the currency is necessary to reap the true diversification benefits of a global bond investment.

When sizing an investment in hedged global bonds, investors should carefully weigh the trade-offs among several factors, including risk reduction, the total costs of implementation, and their views on the future path of their local currency relative to a basket of global currencies. Based on our analysis, we believe that investors from all of the markets we examined should consider adding hedged global bonds to their existing diversified portfolios. Although a case can be made to allocate the entire fixed income sleeve of a portfolio to hedged global bonds, diversification benefits can also be achieved at less than fully market-proportional allocations.

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