Bonds issued in currencies other than the U.S. dollar constitute more than half of the taxable bond market, yet U.S. investors generally have little, if any, exposure to foreign bonds in their portfolios.

For the average investor seeking to further mitigate volatility in a diversified portfolio, this paper finds that foreign bonds can play such a role.

For investors looking to add exposure to foreign bonds, we show the substantial benefits of hedging the impact of foreign exchange movements.

Although no one optimal allocation fits all portfolios, U.S. investors considering international bonds should balance the diversification benefits against both the costs involved and the inherent benefits of preserving a core allocation to the U.S. bond market.

Note: This paper is an updated version of one originally published in 2006 by the same authors and titled International Equity: Considerations and Recommendations; the paper was also updated in 2009, 2011, and 2012.

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International bonds can be defined as debt securities issued by non-U.S. governments and corporations. Although these securities have always represented a significant part of the global investable market, historically they have entailed very real practical challenges that prevented widespread use by U.S.-based investors (both institutional and individual). Typically these markets have been illiquid, costly, and generally difficult to navigate.

However, the first decade of the 2000s brought an acceleration of globalization, increased access to information, a general liberalization of world credit markets, and widespread growth of debt issuance abroad, primarily by governments. The net result, in terms of the global investable market (global equities and fixed income), has been a near doubling of the relative weight of the non-U.S. bond market from approximately 19% in 2000 to approximately 32% in 2013 (Figure 1). And, in a reflection of the easing of investment barriers, investors today have access to vehicles such as broadly diversified, low-cost exchange-traded funds (ETFs), which make adding an international bond allocation to a portfolio easy. The implication is clear: Investors can now view global bonds as an accessible and viable asset class with the potential to help reduce portfolio return volatility in a manner similar to the potential diversification benefit of international equities.

IMPORTANT: The projections or other information generated by the Vanguard Capital Markets Model® regarding the likelihood of various investment outcomes are hypothetical in nature, do not reflect actual investment results, and are not guarantees of future results. VCMM results may vary with each use and over time. The VCMM projections are based on a statistical analysis of historical data. Future returns may behave differently from the historical patterns captured in the VCMM. More important, the VCMM may be underestimating extreme negative scenarios unobserved in the historical period on which the model estimation is based.

Notes on risk: All investments are subject to risk, including the possible loss of the money you invest. Past performance is no guarantee of future returns. Investments in bond funds are subject to interest rate, credit, and inflation risk. Investments in securities issued by non-U.S. companies are subject to risks including country/regional risk and currency risk. These risks are especially high in emerging markets. Currency hedging transactions incur extra expenses, may not perfectly offset foreign currency exposures, and may eliminate any chance to benefit from favorable fluctuations in those currencies. While U.S. Treasury or government agency securities provide substantial protection against credit risk, they do not protect investors against price changes due to changing interest rates. 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. Diversification does not ensure a profit or protect against a loss. The performance of an index is not an exact representation of any particular investment, as you cannot invest directly in an index. ETF shares must be bought or sold in the secondary market with the assistance of a stockbroker. In doing so, the investor may incur brokerage commissions and may pay more than net asset value when buying and receive less than net asset value when selling.

1 While recognizing that usage varies widely, for the purposes of this paper we use the terms international and foreign to refer to bonds issued in currencies other than the U.S. dollar. However, because most of these bonds are investment-grade securities issued by developed countries, we focus on emerging-market bonds separately (see box on page 15).

2 The implications of such growth in government debt are widely debated, but are one reason investors may shy away from a globally market-weighted bond portfolio.
Throughout this analysis we use the terms risk, volatility, and standard deviation of returns interchangeably.

As with international stocks, international bonds expose investors to interest rate fluctuations, inflation and economic cycles, and issues associated with changing or unstable political regimes. Although these risk factors may seem worrisome to U.S. investors, it is important to view them in the appropriate context. For example, while the bonds of any one country may be more volatile than comparable bonds in the United States, an investment that includes the bonds of all countries and issuers could benefit from imperfect correlations across those issuers. In fact, our analysis shows that in aggregate, and with the appropriate hedging of currency risk, an investment in the broad international bond market can be less volatile than an investment in the broad U.S. bond market. For this reason, investors might consider approaching the international bond markets through a broadly diversified index fund or ETF that is weighted according to market capitalization (see the box on page 4).

Notes: International bonds represented by Barclays Global Aggregate ex-USD Bond Index; U.S. bonds represented by Barclays U.S. Aggregate Bond Index; U.S. stocks represented by MSCI USA Index; international stocks represented by MSCI All Country World Index ex USA. All data through December 31, 2013.
Sources: Vanguard, Thomson Reuters Datastream, Barclays, and MSCI.

3 Throughout this analysis we use the terms risk, volatility, and standard deviation of returns interchangeably.
Perhaps even more important, exposure to international risk factors may be worthwhile if the outlook for the U.S. fixed income market is poor. In addition, exposure to international bonds could offer clear long-term diversification benefits if international and U.S. market factors are sufficiently different, on average, over time. Figure 2 indicates that this is the case: It shows the degree to which various countries’ levels of interest rates and inflation—the two most important drivers of bond returns—have correlated with the U.S. levels since 1990. These low and varied correlations are evidence of the potential diversification benefit of adding international bonds to a U.S.-only bond portfolio.

Doesn’t a market-cap-weighted index overweight the most indebted countries?

The short answer to this question is yes, in the sense that any market-cap-weighted bond index will provide greater exposure to issuers with more debt outstanding. However, it is our view that market forces are generally efficient in demanding appropriate compensation for the expected risk of any investment. No government can simply dump its debt on the market without an expectation of a negative impact. Instead, the market sets a price and yield based on the risks of the issuer. A cap-weighted index approach ensures that investors are matching the risk-and-return profile assigned by the broad global bond market.

This issue has received much attention since the European sovereign-debt crisis began in 2010. Many have questioned the wisdom of tying investments to an index with explicit exposure to issuers such as Greece, a country viewed as having serious difficulties in repaying its obligations over the next few years. In such cases, bond market participants adjust prices to reflect the expected risks and return of a country’s debt, including any prospect of a default or restructuring event. This means that investors receive a level of yield in line with the market’s assessment of the risks attending a given country’s debt, as with any other bond.

A departure from market-cap-weighted exposure to international bonds assumes that the market is incorrect in its valuation and that there is a better way to invest. Alternative structures, such as indexes weighted by GDP, population, or land mass, may sound appealing, but lack any theoretical or real economic rationale as a method for investing. In addition, these metrics constitute freely available information and are therefore priced into the current value of a given issue. Choosing an investment strategy other than a cap-weighted index may involve a significant departure from the market’s expectation of risk and return, and is therefore something that investors may want to consider carefully before implementing.

The impact of adding international bonds to a diversified portfolio

Investing in international bonds entails exposure to the movements of global currencies. Although currency movements tend to be driven by fundamental factors over long horizons, it is well documented that currencies can and do deviate significantly from fair value in the short to intermediate term. These deviations create return volatility above the level inherent to the underlying investment. For example, if a U.S. investor were to purchase a German bund denominated in

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4 For a discussion of the potential outcomes of the Eurozone sovereign debt crisis, see What’s Next for the Eurozone? (Lemco, Aliaga-Díaz, and Thomas, 2010).

5 See Philips et al. (2011) for a discussion of alternative methodologies used to construct equity indexes and Thomas and Bennyhoff (2012) for a similar analysis concerning fixed income benchmarks.

6 Two theoretical 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 country 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 notion that the interest rate differential between the home and foreign 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.
euro, both the interest payments and the principal repayment would need to be converted from euro into U.S. dollars. The conversion would take place at the future exchange rate, which can change in ways either adverse or favorable to the bondholder. If the U.S. dollar were to appreciate, the investor would receive fewer dollars when the payment in euro was exchanged. The opposite would be true if the dollar depreciated.

**Figure 3**, on page 6, plots the volatility, defined here as the rolling 36-month standard deviation of returns, inherent to the U.S. dollar versus three major currencies, as well as the volatility inherent to the broad U.S. stock market and the broad investment-grade U.S. bond market. *(Note: We define investment-grade bonds as those fixed income securities rated Baa3 and above by Moody’s Investors Service.)* It’s clear that, while the value of the dollar has cycled between periods of lower and higher volatility, on average its volatility has been between that of U.S. bonds and stocks. Because international bonds entail exposure to currency exchange rates, which in themselves are more volatile than the broad U.S. bond market, then adding international bonds to a portfolio would likely lead to a fixed income allocation with greater volatility than is traditionally associated with U.S. bonds. The key question is whether the low correlation of currency to traditional financial assets offers enough benefit to investors to overcome the inherent volatility of currency.\(^7\)

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\(^7\) Portfolio variance is a function of the weight and variance of each asset in the portfolio, as well as the covariance of each asset with every other asset:  
\[
\sigma^2_{\text{portfolio}} = (w_d^2 \sigma_d^2) + (w_f^2 \sigma_f^2) + (w_c^2 \sigma_c^2) + (2w_d w_f \text{cov}_{df}) + (2w_d w_c \text{cov}_{dc}) + (2w_f w_c \text{cov}_{fc}),
\]  
where \(w_d, f, c\) represents the weights of domestic bonds, international bonds, and currency in the portfolio; \(\sigma_d, f, c\) represents their respective variances; and \(\text{cov}_{df, dc, fc}\) represents the respective covariances among the returns on the domestic bonds, international bonds, and the currency basket.
In Figure 4 we evaluate the historical impact of adding both unheded international stocks and unheded international bonds to a 60% U.S. stock/40% U.S. bond portfolio. Portfolio volatility, defined as the annualized standard deviation of monthly returns, is minimized in areas with the darkest green shading. The coloring of the figure implies that adding any amount of unheded international bonds to any combination of U.S. stocks, international stocks, and U.S. bonds would have resulted in a portfolio more volatile, on average, than one without international bonds. In fact, the least-volatile portfolio, highlighted at the top of the chart, has no international bonds at all—it is 42% U.S. stocks, 18% international stocks, and 40% U.S. bonds. Given an objective of minimizing volatility, Figure 4 also shows that as investors increase their allocation to unheded international bonds, international stocks may be replaced, so that an investor allocating 100% of a fixed income portfolio to international bonds might want to consider a 0% allocation to international equities.

8 For the purposes of this and other analyses in this paper, we define the returns of each asset class as follows: U.S. stocks are represented by the MSCI USA Index. U.S. bonds are represented by the Barclays U.S. Aggregate Bond Index. International stocks are represented by the MSCI World ex USA Index through 1987 and the MSCI All Country World Index ex USA through 2013. International bonds are represented by the Citigroup World Government Bond Ex-US Index through 1989 and the Barclays Global Aggregate ex-USD Bond Index through 2013.

9 Actively managed global bond portfolios may partially hedge their exchange-rate exposure as part of a currency overlay strategy. This paper considers only passively managed international bond portfolios.

10 Because investing in unheded international bonds has a direct impact on the allocation to international equities, investors choosing to invest in international bonds should carefully consider the consequences to their entire portfolio. For more on the decision to invest in international equities, see Vanguard’s research paper Global Equities: Balancing Home Bias and Diversification (Philips, 2014).
This chart shows how the average volatility changes for a 60% stock/40% bond portfolio when unhedged international securities are added by degrees, based on data for the period 1985–2013. Numbers in the chart represent the annualized standard deviation of monthly returns, with green indicating the lowest average volatility (i.e., the best outcome) and red the highest (i.e., the worst). The least-volatile portfolio, highlighted in the top row, contains no international bonds.
Of particular interest is the contrast between Figure 2 and Figure 4. Intuitively, if the components of international bond returns are imperfectly correlated with those of U.S. bond returns, it stands to reason that a diversification benefit should ensue: Overall portfolio volatility should be reduced. However, Figure 4 reflects the reality that any such correlation benefit is overwhelmed by the sheer magnitude of the currency volatilities shown in Figure 3. In other words, the currency exposure inherent in international bonds dominates their volatility, negating any diversification benefits that might be expected otherwise. This results in a negative correlation between unhedged international bonds and the U.S. dollar, and further demonstrates that any allocation to unhedged international bonds represents a bearish view about the performance of the U.S. dollar, whether that is the investor’s intended objective or not (see Figure 5).

Although an allocation to unhedged international bonds would be expected to increase a portfolio’s average volatility over time, there may be circumstances in which such an allocation would be desirable. First, perceived diversification benefits may depend more on physical exposure than on volatility: Some investors may consider the latter to be a marginal concern compared with the implications of excluding the world’s single largest asset class from a diversified portfolio. In addition, some investors may have liabilities denominated in foreign currency that they wish to more closely match with their assets. For example, an institution may have a foreign-domiciled pension requirement that could be better managed through the use of unhedged foreign bonds. Finally, investors may not have the desire or capability to manage currency risk. In any case, the implications of

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**Figure 5.** An inverse relationship exists between U.S. dollar and unhedged international bond returns

![Graph showing the inverse relationship between U.S. dollar and unhedged international bond returns.](image)

Notes: International bonds represented by Citigroup World Government Bond Ex-US Index through 1989 and Barclays Global Aggregate ex-USD Index thereafter. The U.S. dollar is represented by the Federal Reserve’s Nominal Major Currencies Trade-Weighted Dollar Index. The correlation of monthly returns for unhedged international bonds to the U.S. dollar index is –0.6. All data through December 31, 2013.

Sources: Vanguard, Thomson Reuters Datastream, Barclays, Citigroup, and U.S. Federal Reserve.

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11 The return volatility of a global bond portfolio is a function of the volatility of the U.S. portion of the portfolio, the volatility of the local-currency international bond returns, the volatility of the international bonds’ currency basket, and the covariances among those components. See footnote 7 for the equation outlining the relationship.

12 Generally speaking, a U.S. pension following a liability-driven investment strategy would use long-duration U.S. bonds to minimize tracking error relative to its pension liability. International bonds are inappropriate for this investment objective unless the pension liability is computed using an international reference rate or contains a foreign currency component (or both). For additional discussion on investing using a liability-driven strategy, see Vanguard’s research paper *Liability-Driven Investing: A Tool for Managing Pension Plan Funding Volatility* (Stockton, Donaldson, and Shtekhman, 2008).
including international bonds in a portfolio, with or without hedging, depend on each investor’s specific objective.

The case for hedging currency risk
When investing in any foreign asset, investors must decide whether to leave the currency exposure intact or attempt to remove it through hedging. Choosing to hedge will tie the investment return to the performance of the underlying asset alone (less the costs of hedging). For example, Figure 6 shows that when the effect of currency exposure is removed, international bonds assume a return profile that is much more “bond-like.”

Figure 7, on page 10, shows the historical impact of including a hedged international bond allocation in a balanced portfolio. As in Figure 4, portfolio volatility is minimized at the area with the darkest-green shading. It is interesting that, once the currency risk is removed through hedging, the least-volatile portfolio is 42% U.S. stocks, 18% international stocks, and 40% international bonds. Further, with bond currency risk negated, the inclusion of international bonds has relatively little effect on the allocation decision regarding international stocks. In other words, a 30% allocation to international stocks within the equity portion of the portfolio (18% divided by 60%) remains optimal for reducing volatility over the period analyzed, regardless of the level of international bond allocation. This makes it easier for investors to assess the impact of adding international bonds to a portfolio. In addition, we find that hedged international bonds historically have offered consistent risk-reduction benefits: Portfolio volatility decreases with each incremental allocation to international bonds.
This chart shows how the average volatility changes for a 60% stock/40% bond portfolio with the addition of hedged international bonds and unhedged international stocks. Like Figure 4, it is based on data for the period 1985–2013; the numbers represent the annualized standard deviation of monthly returns, with green indicating the lowest volatility and red the highest. Unlike Figure 4, in this chart the least-volatile portfolio (highlighted) holds only international bonds for its fixed income portion.

Notes: U.S. stocks represented by MSCI USA Index; U.S. bonds represented by Barclays U.S. Aggregate Bond Index; international stocks represented by MSCI World ex USA Index through 1987 and MSCI All Country World Index ex USA thereafter; international bonds represented by Citigroup World Government Bond Index Ex-US Hedged Index through 1989 and Barclays Global Aggregate ex-USD Hedged Index thereafter. All data through December 31, 2013.

Sources: Vanguard, Thomson Reuters Datastream, Barclays, Citigroup, Dow Jones, and MSCI.

### Figure 7

Adding hedged international bonds historically has decreased the volatility of balanced portfolios

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A framework for asset allocation

Figure 7 shows that, on the basis of historical data, a volatility-minimizing investor would have been better off over the last 28 years with a sizable allocation to hedged international bonds. It is, however, important to consider the economic and financial environment in the quarter-century that produced these results. During this period, the United States and other developed markets experienced falling interest rates, disinflation, and the anchoring of long-term inflation expectations. Together these trends created a favorable return environment for bond investors (returns averaged 7.5% annually for diversified U.S. bonds, 8.6% annually for unhedged international bonds, and 6.7% annually for hedged international bonds). Given the environment today, bond investors must ask:

1. Are return expectations based on history reasonable?
2. Should hedging currency risk be expected to lead to lower returns?
3. Do asset allocation conclusions change as return expectations change?

To address the first question, it is important to note that interest rates today are much lower than they were in 1985. Absent high yields at the start, the historical return scenario is not likely to be repeated. In addition, current inflation expectations, arguably the most important driver of interest rate levels, are largely stable across developed markets. This suggests that a scenario in which interest rates climb significantly to the levels seen in the 1980s— though possible—may be viewed as having a low probability. Given the market and economic conditions in 2013, a likely forward-looking scenario is one in which nominal yields across developed markets rise gradually, creating a drag on bond returns in the short term, but compensating investors with higher yields over time. As a result, investors may want to start with current levels of yield as the baseline for forward long-term return expectations and then possibly factor in a modest premium to account for an increase in income as yields rise to more normal levels.

The 28 years through 2013 also were characterized by long-term depreciation of the U.S. dollar. This is why unhedged international bonds outperformed hedged bonds by 1.9 percentage points a year, on average. Since unhedged bonds heighten portfolio volatility and suggest a bearish view on the U.S. dollar, the critical questions then are: Should investors expect the U.S. dollar to continue a long-term slide, and would such depreciation effectively counter the higher volatility? Investors considering these points should note that short-term currency movements are widely thought to follow a random walk (Solnik, 1974; Meese and Rogoff, 1983; Perold and Schulman, 1988). Although there is evidence that over a long-enough time horizon, structural differences between countries can force currencies to a fundamental equilibrium (Meredith and Chinn, 1998; Mark, 1995), these structural factors—price levels and trade flows, for example—are inherently long-term in nature, and changes in them therefore tend to be anticipated and priced in by securities markets. As a result, we believe that an allocation to unhedged international bonds that is driven by views on potential currency returns should be considered with care.

13 For more on Vanguard’s outlook for the U.S. fixed income market, see Vanguard’s Economic and Investment Outlook (Davis et al., 2014).
Why hedge international bonds and not international stocks?

A natural question arising from this report is whether currency risk should also be hedged within an international equity allocation. When considering this question, it’s essential to recall the relationship between asset volatility and currency volatility. As explained in footnote 7 (page 5), the correlations of the assets combine with the volatilities of the assets to result in a total volatility statistic. In the case of bonds, currency exposure adds significant volatility to an asset that is relatively stable in price. Stocks, on the other hand, already have high volatility, so the effect of adding currency volatility is less pronounced. These relationships are shown in Figure 8. For international stocks, the benefit of hedging is smaller, while the costs remain the same. On the other hand, the benefits of hedging currency risk in international bond portfolios generally outweigh the costs.

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Figure 8. Hedging currency risk has much greater impact on bonds than on stocks

Mitigating currency volatility would have had a modest effect on the overall volatility of stocks, but a meaningful effect on the volatility of bonds. This chart reflects annualized returns and volatility for the period 1985–2013.

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<th>Volatility</th>
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Notes: International stocks represented by MSCI World ex USA Index through 1987 and MSCI All Country World Index ex USA thereafter; international bonds represented by Citigroup World Government Bond Ex-US Hedged Index through 1989 and Barclays Global Aggregate ex-USD Hedged Index thereafter. All data through December 31, 2013.

Sources: Vanguard, Thomson Reuters Datastream, Barclays, Citigroup, Dow Jones, and MSCI.

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14 For more on the decision of whether to hedge currency in an international stock portfolio, see Vanguard’s research paper Currency Management: Considerations for the Equity Hedging Decision (LaBarge, 2010).
Finally, we turn to the question of how return expectations might affect our previous volatility-focused analysis. For this purpose it is useful to construct an efficient frontier, a graph showing the entire set of asset combinations that would achieve a given expected return with the least expected risk under specified assumptions.

As risk inputs to this analysis, we took the historical volatilities and correlations between global stocks, unhedged global bonds, and hedged global bonds (based on the data and time period listed in the appendix). Using these inputs, we generated the full range of efficient portfolios and then evaluated what amount of foreign currency appreciation, beyond the “expected” movement that might be captured in the forward premium through hedging, was needed for unhedged bonds to become a viable investment. We began with the assumption that both hedged and unhedged global bonds generate the same long-run return (in other words, unexpected currency return is 0% and currency return equals the forward premium over the long run). We then tested the viability of unhedged bonds by successively adding an assumed “unexpected” currency return and examining whether unhedged bonds appeared on the frontier in any meaningful allocation.

Figure 9, on page 14, displays the results for the particular range of assumed foreign currency appreciation in which unhedged bonds begin to appear as a viable investment. We found that, until one assumes greater than 1.75% average annual unexpected currency return (that is, more than 1.75% average annual foreign currency appreciation beyond that realized through hedging), unhedged bonds do not appear to be an asset class with expectations for meaningful return and risk impact to a globally diversified portfolio. For fixed-income-oriented investors, hedged bonds remained the more viable option under all of the currency scenarios we examined, with unhedged bonds appearing only in modest allocations under any assumed unexpected currency return. It takes very aggressive assumptions regarding unexpected dollar depreciation for unhedged bonds to become a viable long-term investment under our framework, and even then only for more equity-oriented investors. A follow-up question is: How reasonable is it to expect any additional yearly return from exposure to a basket of currencies over the long term, relative to a hedged investment? Note that this additional return would have to result from unexpected future dislocations between the U.S. and global economies. That is because securities markets are forward-looking. In other words, if investors collectively believed currencies would head in a certain direction, the anticipated currency return would be factored into intermediate- and long-maturity bond prices today. That said, given the elevated levels of uncertainty in the global economic environment, unexpected future developments could result in sizable currency movement.

15 The projections discussed here represent outcomes generated by the Vanguard Capital Markets Model for U.S. stocks, U.S. bonds, and international stocks. For both hedged and unhedged international bonds, we assumed that starting yields represented the best approximation for future returns. However, to account for the likelihood of rising interest rates, we added a 100-basis-point premium to expected bond returns. We assumed that historical volatilities and correlations were reasonable expectations going forward. For more information about the Vanguard Capital Markets Model, see the appendix.
Investors wishing to position their portfolios for the possibility of such extreme, unexpected dollar depreciation may consider using unhedged international bonds. For example, although both U.S. stocks and U.S. bonds historically have performed well during periods of significant dollar depreciation, there is no clear and consistent relationship, as one finds between unhedged international bonds and the dollar during such periods.\footnote{16}

\begin{figure}[h]
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\includegraphics[width=\textwidth]{figure9.png}
\caption{Significant long-term unexpected dollar depreciation is needed to make unhedged bonds a viable strategic investment}
\end{figure}

Notes: Figure displays proportion of the global bond allocation that is allocated to unhedged bonds versus hedged bonds under several assumptions on long-term foreign currency return, based on results of a portfolio optimization using inputs described on page 13 of this paper. U.S. stocks represented by MSCI USA Index; U.S. bonds represented by Citigroup World Government Bond Index Ex-US Hedged Index through 1989 and Barclays Global Aggregate ex-USD Hedged Index thereafter. All data through December 31, 2013.

Sources: Vanguard and Thomson Reuters Datastream.

\footnotetext{16} Since 1985, dollar returns have explained less than 6% of the variance in both U.S. stocks and bonds (measured as the R-squared between security returns and those of the Federal Reserve’s trade-weighted dollar index), while the movement of the dollar explained 80% of unhedged international bonds’ returns, making them a much better hedge against adverse dollar scenarios. Over the same period, U.S. stocks and bonds returned 1.4% and 0.9%, respectively, on average during months in which the dollar declined by more than 1%. Unhedged international bonds returned 3.5% during those same months. Note: R-squared refers to a measure of how much of a security’s past returns can be explained by the returns from a given index.
Emerging-market bonds

Like emerging-market stocks, fixed income securities issued by governments and companies in emerging markets may have a role in a diversified portfolio. However, to the extent that emerging-market bonds are rated investment grade, they may be found in traditional broad indexes. For example, as of December 31, 2013, 2% of the Barclays U.S. Aggregate Bond Index was allocated to emerging-market bonds. Similarly, 4% of the Barclays Global ex-USD Aggregate Bond Index constituted emerging-market bonds.

Emerging-market bonds are typically offered in two variations, denominated in a major currency such as U.S. dollars, euro, or pounds sterling, or denominated in a country’s local currency. Traditionally, bonds denominated in U.S. dollars were more common; however, in recent years bonds issued in other major currencies and local currencies have increased their market share. In fact, today local-currency issues are more common (in terms of market capitalization) than issues denominated in major currencies.

Emerging-market bonds generally carry higher yields than developed-market bonds because they carry greater risks, such as political instability or uncertainty about inflation. For the same reason, emerging-market bonds have also experienced significantly higher volatility than developed-market bonds. However, because the two types of markets tend to have quite different risks, we would expect correlations between their securities to be relatively low, implying a potential diversification benefit. Figure 10 presents the historical correlations between traditional financial assets and both U.S. dollar-denominated and local-currency-denominated emerging-market bonds. Because of these bonds’ place in the global market, as well as the potential for additional diversification, allocating some assets to emerging-market bonds as part of a broadly diversified international bond investment can make sense for certain investors. For more on the role of emerging-market bonds in a diversified portfolio, see Philips et al. (2013).

Figure 10. Emerging-market bonds can provide additional diversification benefit

Emerging-market bonds, regardless of their country or currency of issue, showed attractively low correlations with major asset classes, both hedged and unheded, over the period 2002–2013.

![Correlation Chart]

Notes: U.S. stocks represented by MSCI USA Index; U.S. bonds represented by Barclays U.S. Aggregate Bond Index; developed international stocks represented by MSCI World ex USA Index; international bonds represented by Barclays Global Aggregate ex-USD Index (Unhedged and Hedged); emerging-market stocks represented by MSCI Emerging Markets Index; emerging-market bonds represented by J.P. Morgan Emerging Markets Bond Index and J.P. Morgan Global Bond Index—Emerging Markets. All data through December 31, 2013.

Sources: Vanguard, Thomson Reuters Datastream, JPMorgan Chase, Barclays, Dow Jones, and MSCI.
Impact of the forward premium

Investors may also consider accounting for the cost of hedging a currency that is trading at a forward premium (or discount) to its spot exchange rate, a result of a “no arbitrage” relationship in short-term interest rate differentials between two countries. This effect can be thought of as a “haircut” (or a “premium”) to the yield. Consider this example: A U.S. investor wants to purchase a 1-year German bund and hedge his exposure to the euro. The investor would convert his dollars to euro at the spot rate and purchase the bund. To hedge his euro exposure, the investor would enter into a 1-year 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. A loss on the forward contract could be considered a haircut to the bond’s yield, while a gain may be considered a boost. Of course, the dollar may also be trading at a forward discount relative to other currencies, thus reducing the potential for a large haircut due to hedging when investing across several international markets.

Generally speaking, hedging is implemented over a shorter horizon than in the above example (typically over a one- to three-month horizon). The short-term rates used to set forward exchange rates at these horizons reflect a country’s current monetary policy, while intermediate- and long-term rates reflect economic fundamentals such as inflation differentials. Because long-term currency trends are driven by the fundamentals reflected in long rates, any forward premium or discount due to short-term interest rate differentials between countries may be expected to wash out over time. This is especially true when comparing the United States to a multilateral group of countries that are likely to be in different stages of their business cycles.

Practical considerations for a long-term strategic investor

Beyond empirical analysis, additional qualitative factors such as portfolio objectives, costs, and other operational considerations could influence the decision to include international bonds in a diversified portfolio. For example:

- Holding no U.S. bonds (as observed in Figure 7) would represent a significant deviation not only from the capitalization weightings in the global bond market but also from the standard asset allocation framework for U.S. investors.
- Ignoring the U.S. fixed income market in favor of bonds issued abroad leaves no exposure to U.S. Treasury securities, a proven diversifier during economic and financial downturns.
- Correlations across developed markets have displayed a persistent rising trend in both equity and fixed income markets. If this trend continues, the diversification benefits of international securities will likely decrease in magnitude (though not disappear).
- International bonds are generally government bonds. For investors seeking higher yields, U.S. corporate bonds may be a better fit.
- Foreign fixed income markets are still not as easily accessed as foreign equity markets, as demonstrated by generally higher transaction costs.

The costs of hedging

An important consideration for an investor weighing the benefits of international bonds is the potential cost of implementing a currency hedge. To examine this issue, Figure 11 shows the historical annualized bid-ask spread on 1-month currency forward contracts, a reasonable approximation of the annual trading costs of hedging. Notwithstanding the spike in 2008–2009 as the global recession took hold, spreads have trended downward and remain at low levels, suggesting that investors might expect minimal drag on their returns relative to the diversification benefits that can be achieved.
Conclusion

International fixed income securities make up a significant portion of the global investable market. While investors in international bonds are exposed to the risk of interest rate movements, the political landscape, and the economies of many different markets, we’ve shown that the primary factors driving international bond prices are relatively uncorrelated to the same U.S. factors, which implies a diversification benefit. Of course, investors are also exposed to currency movements, which have an important role in determining the risk of international bonds. We’ve shown that on average, the volatility of currencies can overwhelm any diversification benefit that international bonds may bring to a diversified portfolio. On the other hand, with that currency risk hedged, an allocation to international bonds can lead to lower average portfolio volatility over time.

To make the strategic decision to include international bonds in a diversified portfolio, an investor should weigh the trade-offs among several factors: the potential to reduce portfolio volatility, exposure to the largest global asset class, the costs of implementation, and the investor’s own views on the future path of the U.S. dollar. Based on our findings, we believe that most investors should consider adding hedged foreign bonds to their existing diversified portfolios.
The Vanguard Capital Markets Model (VCMM) is a proprietary financial simulation tool developed and maintained by Vanguard’s Investment Strategy Group. The VCMM forecasts distributions of future returns for a wide array of broad asset classes. These include U.S. and international equity markets, several maturities of the U.S. Treasury and corporate fixed income markets, international fixed income markets, U.S. money markets, commodities markets, and certain alternative investment strategies. The results shown in this paper are drawn from 10,000 VCMM simulations based on market data and other information available as of December 31, 2013.

The VCMM is grounded in the empirical view that the returns of various asset classes reflect the compensation investors receive for bearing different types of systematic risk (or beta). Using a long span of historical monthly data, the VCMM estimates a dynamic statistical relationship among global risk factors and asset returns. Based on these calculations, the model uses regression-based Monte Carlo simulation methods to project relationships in the future. By explicitly accounting for important initial market conditions when generating its return distributions, the VCMM framework departs fundamentally from more basic Monte Carlo simulation techniques found in certain financial software. The reader is directed to the research paper Vanguard Capital Markets Model (Wallick, Aliaga-Díaz, and Davis, 2009) for further details.

The primary value of the VCMM is in its application to analyzing potential client portfolios. VCMM asset-class forecasts—comprising distributions of expected returns, volatilities, and correlations—are key to the evaluation of potential downside risks, various risk-return trade-offs, and diversification benefits of various asset classes. Although central tendencies are generated in any return distribution, Vanguard stresses that focusing on the full range of potential outcomes for the assets considered, such as the data presented in this paper, is the most effective way to use VCMM output.
References


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