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Reducing bonds? Proceed with caution

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Executive summary. Historically low yields from U.S. bonds and recent cautions in the media about a potential “bond bubble” have led many investors to reconsider the role, if any, that high-quality bond funds¹ should have in their portfolios. Investors’ concern is not unreasonable, given that the best predictor of bonds’ future returns—that is, their current yield to maturity—projects returns of 1%–2% over the next ten years (according to Davis, Aliaga-Díaz, and Patterson, 2013). With return expectations low and interest rates close to 0%, investors are justifiably worried about the return potential for bonds.

It’s not surprising, therefore, that investors are increasingly looking for alternative ways to improve the expected returns of their portfolios. Our analysis concludes, however, that bond substitutes, like those identified in **Figure 1**, on page 3, are unlikely to offer the same diversification potential as broad, high-quality bonds, particularly when the diversification is needed most—that is, when equities

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¹ Henceforth in this paper we use the terms *bonds* or *bond funds* to refer to broadly diversified, investment-grade bond funds (investment-grade bonds are those whose credit quality is considered to be among the highest by independent bond-rating agencies) that are benchmarked or indexed to the Barclays U.S. Aggregate Bond Index.

are performing poorly. Although bonds' ability to mitigate equity market risk in down markets is likely to persist, it's also important to understand what low bond yields mean for balanced portfolio returns. This paper reiterates Vanguard's belief that bonds remain by far the best diversifier for equity risk, but that current low yields will not provide the same portfolio amplification (i.e., high-return potential) as they have in the past. Low yields from bonds and unchanged equity market volatility will require investors to accept lower total returns and greater downside risk in their portfolios.

The recent combination of low yields and the prospect of rising interest rates have led many U.S. investors to conclude that bonds will deliver disappointing, and perhaps even negative, returns over the next decade. While we agree that the return outlook for bonds is muted, we caution investors not to abandon bonds altogether or try to time portfolio shifts around expectations of rising interest rates. Like short-term returns, interest rate movements tend to follow a "random walk" and to be driven by "new" economic events, thus making interest rate predictions little more than guesswork.²

Instead, we encourage investors to consider a strategic allocation to bonds that takes into account both an individual's risk tolerance and bonds' ability to diversify equity market risk. Figure 1 shows the monthly returns of bonds, along with those of other commonly used complements for equities (that is, bond substitutes), during periods of bottom-decile returns for U.S. stocks from 1988 through 2012. As shown, U.S. investment-grade bonds and international bonds have been a reliable cushion to equity market volatility when investors value a cushion most—that is, during sharp stock declines. On average, many of the other asset classes have had low correlations with equities, but their long-term averages have masked a relatively high correlation with stocks during short periods of market distress.³

Notes on risk and performance data: All investing is subject to risk, including possible loss of the money you invest. Past performance does not guarantee future results. Bond funds are subject to interest rate risk, which is the chance bond prices overall will decline because of rising interest rates, and credit risk, which is the chance a bond issuer will fail to pay interest and principal in a timely manner or that negative perceptions of the issuer's ability to make such payments will cause the price of that bond to decline. Diversification does not ensure a profit or protect against a loss.

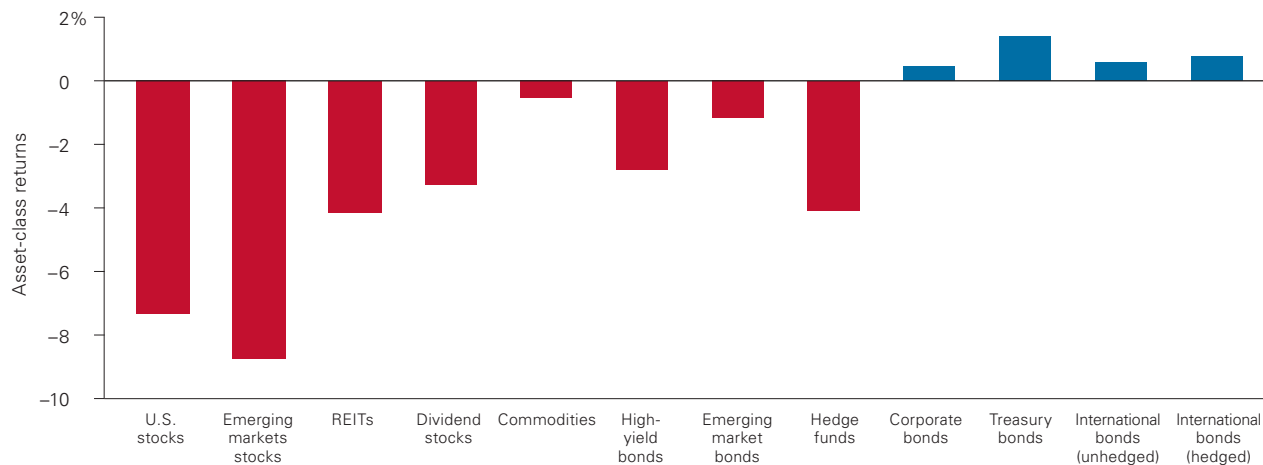
U.S. Treasury securities are guaranteed as to the timely payment of principal and interest. However, U.S. government backing of Treasury or agency securities held in a mutual fund applies only to the underlying securities and does not prevent share-price fluctuations. Some or all of the income from Treasury obligations held in a fund may be exempt from state or local taxes. High-yield bonds generally have medium- and lower-range credit-quality ratings and are therefore subject to a higher level of credit risk than bonds with higher credit-quality ratings. Note that hypothetical illustrations are not exact representations of any particular investment, as you cannot invest directly in an index or fund-group average.

² For more on the unpredictability of interest rates and the benefits of broadly diversified fixed income exposure, see Davis et al. (2010).

³ For more on the dynamic nature of correlations, see Philips, Walker, and Kinniry (2012).

Figure 1. With bonds, or their substitutes, low correlation with equities in high-risk episodes matters more than long-term averages

Median monthly asset-class returns during periods of bottom-decile returns for U.S. equities, 1988–2012



Notes: U.S. stocks are represented by Dow Jones Wilshire 5000 through April 2005 and MSCI US Broad Market Index thereafter; emerging markets stocks are represented by MSCI Emerging Markets Index; REITs by FTSE NAREIT Equity REIT Index; dividend stocks by Dow Jones U.S. Select Dividend Index; commodities by Dow Jones-UBS Commodity Index; high-yield bonds by Barclays U.S. Corporate High Yield Bond Index; emerging markets bonds by Barclays EM Sovereign USD Bond Index; hedge funds by the median fund of hedge funds from Morningstar; investment-grade corporate bonds by Barclays U.S. Corporate Index; U.S. Treasury bonds by Barclays U.S. Treasury Bond Index; and international bonds by Barclays Global Aggregate ex USD Bond Index. The Dow Jones U.S. Select Dividend Index starts in January 1992; Barclays EM Sovereign USD Bond Index starts in January 1993; hedge fund data start in 1994; and Barclays Global Aggregate ex USD Bond Index starts in January 1990. All data through December 31, 2012.

Source: Vanguard.

Loss aversion makes bonds essential, despite low returns

Investors have consistently shown a strong preference for avoiding losses, versus the benefits they acquire from realizing a gain. This phenomenon, first demonstrated by Amos Tversky and Daniel Kahneman in 1983, is called loss aversion and is why bonds remain an essential element of a balanced portfolio. Vanguard research has shown, as emphasized in Figure 1, that bonds are a more reliable diversifier—particularly in steep equity market declines—than other asset classes like high-yield bonds, emerging market bonds, or high-yield equity.

Despite bonds’ importance for diversifying equity risk, today’s low bond yields mean that balanced portfolios have more downside risk than in the past. Investors who prefer to protect downside risk will need to invest a majority of their portfolio in bonds,

accept lower future returns, and recognize that the possibility of realizing a loss is higher than it has been historically. Less-loss-averse investors who seek higher returns and are less concerned with downside risks from balanced portfolios will need to accept lower future returns and much more downside risk. **Figure 2**, on page 5, which is discussed in more detail in the upcoming section, projects expected returns from balanced portfolios with 40%–60% of their assets allocated to equities in a bear market. With returns of 1.9% expected from bonds based on their current yields, these balanced portfolios are likely to deliver returns ranging from –6.9% to –11.2% when equities decline –20%. These results are between 2%–3% lower than what these portfolios would return (–3.6% to –9.1%) in the same equity market sell-off if bonds’ expected performance matched the historical average yield of 7.3% (based on Barclays U.S. Aggregate Bond Index from January 1, 1976, through January 31, 2013).

Bonds still likely the best diversifier, but high offsetting returns unlikely

Although bonds are likely to remain a reliable diversifier in turbulent equity markets, it's important to have reasonable expectations for bonds' ability to generate high offsetting returns given low current yields. As stated, from 1976 through January 31, 2013, bonds yielded an average of 7.3%, a rate that made it possible to substantially insulate a portfolio from losses in most equity market declines and to generate attractive real returns. **Figure 2a** illustrates this by showing the maximum allocation to stocks that could be tolerated assuming that an investor required a positive rate of return (highlighted in green). Assuming a 7.3% average return from bonds—equal to the historical yield to maturity—investors could construct a portfolio of stocks and bonds that generated a positive return in any environment in which equities returned no worse than -40%.

Figure 2b repeats this exercise, but assumes a more conservative average return on bonds of 1.9%, a reasonable forward-looking expectation based on current yields (as of January 31, 2013). Based on this more conservative assumption, any exposure to equities results in a loss for the portfolio if equities decline by more than 15%. Under this scenario, investors who want to minimize their risk of loss will need to consider a bond allocation of at least 90% and be willing to accept very low returns.

In Figures 2a and b, the ability of bonds with higher yields to maturity to generate high offsetting returns is illustrated in the three portfolio combinations shaded in bold. These combinations were chosen because they represent the 40%–60% equity allocations commonly used by balanced investors and because the 20% equity market decline conforms to the widely used definition of a bear market. In each case, an allocation to bonds reduces portfolio losses in a bear market. However, the portfolio combinations with the higher-yielding (7.3%) bonds

in Figure 2a provide greater downside protection (at -9.1%, -6.4%, and -3.6%) than the downside protection afforded by the portfolio combinations in Figure 2b with lower-yielding bonds (at -11.2%, -9.1%, and -6.9%).

This analysis is extended in **Figure 3**, on page 6, and **Figure 4**, on page 7, to consider two alternative asset-class interactions. **Figure 3a** assumes a "flight to quality" in which interest rates are expected to decline in a falling equity market, a common, but not infallible, pattern. Figure 3a assumes bond returns of 17.4%, which could be realized when bonds initially yield 7.3% and interest rates decline to 5.1%. **Figure 3b** assumes bond returns of 4.9%, which could be realized when bonds initially yield 1.9%, as they did on January 31, 2013, and interest rates decline by a proportionate amount to 1.3%. The ability of this bond portfolio to generate high offsetting returns, as also described in Figure 2, is even more pronounced, as the higher-yielding bonds provide meaningful downside protection (at -5.0%, -1.3%, and +2.4%—in Figure 3a) compared to the lower-yielding bond portfolios (-10.0%, -7.6%, and -5.1%—in Figure 3b).

The flight-to-quality scenario is particularly relevant today because it highlights investors' recent historical experience in balanced portfolios. For example, at the height of the technology bubble in September 2000, bonds yielded just over 7% and provided a cumulative 22.8% return during the ensuing bear market. And at the top of the stock market that preceded the global financial crisis in 2007, bonds yielded 5.3% and provided a cumulative 7.6% return through the bottom of the equity market in March 2009. These return levels contributed meaningful downside protection to balanced portfolios during both periods. Given these past experiences, investors may be disappointed by the level of downside protection that bonds can offer when the next bear market occurs, given bonds' current yield of 1.9% (as of January 31, 2013).

Figure 2. Lower yields from bonds mean less benefit from bond returns in equity market declines

a. Historical balanced portfolio returns with 7.3% bond return

U.S. stock/bond mix	Stock return							
	-40.0%	-35.0%	-30.0%	-25.0%	-20.0%	-15.0%	-10.0%	-5.0%
90%/10%	-35.3%	-30.8%	-26.3%	-21.8%	-17.3%	-12.8%	-8.3%	-3.8%
80%/20%	-30.5	-26.5	-22.5	-18.5	-14.5	-10.5	-6.5	-2.5
70%/30%	-25.8	-22.3	-18.8	-15.3	-11.8	-8.3	-4.8	-1.3
60%/40%	-21.1	-18.1	-15.1	-12.1	-9.1	-6.1	-3.1	-0.1
50%/50%	-16.4	-13.9	-11.4	-8.9	-6.4	-3.9	-1.4	1.2
40%/60%	-11.6	-9.6	-7.6	-5.6	-3.6	-1.6	0.4	2.4
30%/70%	-6.9	-5.4	-3.9	-2.4	-0.9	0.6	2.1	3.6
20%/80%	-2.2	-1.2	-0.2	0.8	1.8	2.8	3.8	4.8
10%/90%	2.6	3.1	3.6	4.1	4.6	5.1	5.6	6.1

b. Forward-looking balanced portfolio returns with 1.9% bond return

U.S. stock/bond mix	Stock return							
	-40.0%	-35.0%	-30.0%	-25.0%	-20.0%	-15.0%	-10.0%	-5.0%
90%/10%	-35.8%	-31.3%	-26.8%	-22.3%	-17.8%	-13.3%	-8.8%	-4.3%
80%/20%	-31.6	-27.6	-23.6	-19.6	-15.6	-11.6	-7.6	-3.6
70%/30%	-27.4	-23.9	-20.4	-16.9	-13.4	-9.9	-6.4	-2.9
60%/40%	-23.2	-20.2	-17.2	-14.2	-11.2	-8.2	-5.2	-2.2
50%/50%	-19.1	-16.6	-14.1	-11.6	-9.1	-6.6	-4.1	-1.6
40%/60%	-14.9	-12.9	-10.9	-8.9	-6.9	-4.9	-2.9	-0.9
30%/70%	-10.7	-9.2	-7.7	-6.2	-4.7	-3.2	-1.7	-0.2
20%/80%	-6.5	-5.5	-4.5	-3.5	-2.5	-1.5	-0.5	0.5
10%/90%	-2.3	-1.8	-1.3	-0.8	-0.3	0.2	0.7	1.2

Notes: This hypothetical illustration does not represent the results of any particular investment. This figure and the upcoming Figures 3 and 4 use varying scenarios to show how performance of a portfolio of U.S. stocks and bonds changes as the asset mix changes. Figure 2a assumes a forward-looking bond return of 7.3%, equal to the average historical yield to maturity of the Barclays U.S. Aggregate Bond Index from January 1, 1976, through January 31, 2013. Figure 2b assumes a more conservative, forward-looking estimated bond return of 1.9%—the Barclays U.S. Aggregate Bond Index yield to maturity as of January 31, 2013. For U.S. stock returns, this figure uses a set of eight different hypothetical, forward-looking returns ranging from -5% through -40%, not based on a historical realized return, but on several potential future outcomes in a declining equity market. Overall outcomes highlighted in red have returns below -10%; those in black have returns of 0% through -10%; and those in green are positive.

Sources: Vanguard calculations, using data from Barclays.

Figure 3. Reduced ability of bonds to generate high offsetting returns is most pronounced in a flight to quality

a. Historical balanced portfolio returns in a flight to quality with 17.4% bond return

U.S. stock/bond mix	Stock return							
	-40.0%	-35.0%	-30.0%	-25.0%	-20.0%	-15.0%	-10.0%	-5.0%
90%/10%	-34.3%	-29.8%	-25.3%	-20.8%	-16.3%	-11.8%	-7.3%	-2.8%
80%/20%	-28.5	-24.5	-20.5	-16.5	-12.5	-8.5	-4.5	-0.5
70%/30%	-22.8	-19.3	-15.8	-12.3	-8.8	-5.3	-1.8	1.7
60%/40%	-17.0	-14.0	-11.0	-8.0	-5.0	-2.0	1.0	4.0
50%/50%	-11.3	-8.8	-6.3	-3.8	-1.3	1.2	3.7	6.2
40%/60%	-5.6	-3.6	-1.6	0.4	2.4	4.4	6.4	8.4
30%/70%	0.2	1.7	3.2	4.7	6.2	7.7	9.2	10.7
20%/80%	5.9	6.9	7.9	8.9	9.9	10.9	11.9	12.9
10%/90%	11.7	12.2	12.7	13.2	13.7	14.2	14.7	15.2

b. Forward-looking balanced portfolio returns in a flight to quality with 4.9% bond return

U.S. stock/bond mix	Stock return							
	-40.0%	-35.0%	-30.0%	-25.0%	-20.0%	-15.0%	-10.0%	-5.0%
90%/10%	-35.5%	-31.0%	-26.5%	-22.0%	-17.5%	-13.0%	-8.5%	-4.0%
80%/20%	-31.0	-27.0	-23.0	-19.0	-15.0	-11.0	-7.0	-3.0
70%/30%	-26.5	-23.0	-19.5	-16.0	-12.5	-9.0	-5.5	-2.0
60%/40%	-22.0	-19.0	-16.0	-13.0	-10.0	-7.0	-4.0	-1.0
50%/50%	-17.6	-15.1	-12.6	-10.1	-7.6	-5.1	-2.6	0.0
40%/60%	-13.1	-11.1	-9.1	-7.1	-5.1	-3.1	-1.1	0.9
30%/70%	-8.6	-7.1	-5.6	-4.1	-2.6	-1.1	0.4	1.9
20%/80%	-4.1	-3.1	-2.1	-1.1	-0.1	0.9	1.9	2.9
10%/90%	0.4	0.9	1.4	1.9	2.4	2.9	3.4	3.9

Notes: This hypothetical illustration does not represent the results of any particular investment. This figure and the upcoming Figure 4 use varying scenarios to show how performance of a portfolio of U.S. stocks and bonds changes as the asset mix changes. Figure 3a assumes a beginning yield to maturity of 7.3%, equal to the average historical yield to maturity of the Barclays U.S. Aggregate Bond Index from January 1, 1976, through January 31, 2013, and a hypothetical 30% drop in interest rates over that period. The combined capital gain and income generated from this hypothetical change in interest rates results in a 12-month return of 17.4%. Figure 3b assumes a beginning yield to maturity of 1.9%, based on the yield of the Barclays index as of January 1, 2013, and the same hypothetical 30% drop in interest rates. Because the interest rate change occurred in a benchmark with much lower initial yields, the projected 12-month return in this scenario is only 4.9%. For U.S. stock returns, this figure uses a set of eight different hypothetical, forward-looking returns ranging from -5% through -40%, not based on a historical realized return, but on several potential future outcomes in a declining equity market. Overall outcomes highlighted in red have returns below -10%; those in black have returns of 0% through -10%; and those in green are positive.

Sources: Vanguard calculations, using data from Barclays.

Figure 4. Higher offsetting returns from bonds can still exist when both bonds and stocks decline

a. Historical balanced portfolio returns when stocks and bonds decline and bonds return -1.8%

U.S. stock/bond mix	Stock return							
	-40.0%	-35.0%	-30.0%	-25.0%	-20.0%	-15.0%	-10.0%	-5.0%
90%/10%	-36.2%	-31.7%	-27.2%	-22.7%	-18.2%	-13.7%	-9.2%	-4.7%
80%/20%	-32.4	-28.4	-24.4	-20.4	-16.4	-12.4	-8.4	-4.4
70%/30%	-28.5	-25.0	-21.5	-18.0	-14.5	-11.0	-7.5	-4.0
60%/40%	-24.7	-21.7	-18.7	-15.7	-12.7	-9.7	-6.7	-3.7
50%/50%	-20.9	-18.4	-15.9	-13.4	-10.9	-8.4	-5.9	-3.4
40%/60%	-17.1	-15.1	-13.1	-11.1	-9.1	-7.1	-5.1	-3.1
30%/70%	-13.3	-11.8	-10.3	-8.8	-7.3	-5.8	-4.3	-2.8
20%/80%	-9.4	-8.4	-7.4	-6.4	-5.4	-4.4	-3.4	-2.4
10%/90%	-5.6	-5.1	-4.6	-4.1	-3.6	-3.1	-2.6	-2.1

b. Forward-looking balanced portfolio returns when stocks and bonds decline and bonds return -8.7%

U.S. stock/bond mix	Stock return							
	-40.0%	-35.0%	-30.0%	-25.0%	-20.0%	-15.0%	-10.0%	-5.0%
90%/10%	-36.9%	-32.4%	-27.9%	-23.4%	-18.9%	-14.4%	-9.9%	-5.4%
80%/20%	-33.7	-29.7	-25.7	-21.7	-17.7	-13.7	-9.7	-5.7
70%/30%	-30.6	-27.1	-23.6	-20.1	-16.6	-13.1	-9.6	-6.1
60%/40%	-27.5	-24.5	-21.5	-18.5	-15.5	-12.5	-9.5	-6.5
50%/50%	-24.4	-21.9	-19.4	-16.9	-14.4	-11.9	-9.4	-6.9
40%/60%	-21.2	-19.2	-17.2	-15.2	-13.2	-11.2	-9.2	-7.2
30%/70%	-18.1	-16.6	-15.1	-13.6	-12.1	-10.6	-9.1	-7.6
20%/80%	-15.0	-14.0	-13.0	-12.0	-11.0	-10.0	-9.0	-8.0
10%/90%	-11.8	-11.3	-10.8	-10.3	-9.8	-9.3	-8.8	-8.3

Notes: This hypothetical illustration does not represent the results of any particular investment. This figure shows how the performance of a portfolio of U.S. stocks and bonds changes as the asset mix changes. As in Figures 2a and 3a, Figure 4a assumes a beginning yield to maturity of 7.3%, equal to the average historical yield to maturity of the Barclays U.S. Aggregate Bond Index from January 1, 1976, through January 31, 2013, but this time a hypothetical 2% increase in interest rates. This scenario results in a forward-looking return of -1.8%. Figure 4b begins with an initial yield of 1.9% and the same hypothetical 2% increase in interest rates, resulting in a forward-looking return of -8.7%. For U.S. stock returns, this figure uses a set of eight different hypothetical, forward-looking returns ranging from -5% through -40%, not based on a historical realized return, but on several potential future outcomes in a declining equity market. Overall outcomes highlighted in red have returns below -10%; those in black have returns of 0% through -10%; and those in green are positive.

Sources: Vanguard calculations, using data from Barclays.

Finally, Figure 4 considers an environment in which both stocks and bonds decline together as they did in the 1970s. In this scenario, the higher offsetting returns provided by the high-quality bond portfolios with higher initial yields are still meaningful (–12.7%, –10.9%, and –9.1%, in **Figure 4a**) and provide more downside protection compared to the lower-yielding bond portfolios (–15.5%, –14.4%, and –13.2%, in **Figure 4b**).

Each case presented in Figures 2–4 reinforces a critical element of this analysis as initially illustrated in Figure 1: It's not just bonds' higher yields that historically have contributed to their downside protection in declining equity markets but also the low correlations bonds have maintained with equities in these events. Today, broad exposure to the investment-grade bond market that includes an allocation to Treasuries, similar to that available through the Barclays U.S. Aggregate Bond Index, provides an investor with lower yields but is still likely to maintain low correlations with equities when stock markets sell off. Bonds' downside protection will probably remain, but the effect of that protection will be weaker, given today's low yields. Investors may be tempted to offset this weaker amplification from investment-grade bonds by substituting junk bonds, high-dividend stocks, emerging market bonds, or other high-yield assets. The end result of such a decision, however, may be portfolios with higher total-return potential but greater downside risk when equities decline.

Conclusion

The diversification benefits of bonds in a stock/bond portfolio will likely persist. This feature, more than projected returns, justifies a strategic allocation to bonds. That said, lower projected returns from bonds and their diminished ability to generate high offsetting returns have important implications for downside risk and the asset allocation decision. If investors have a risk tolerance that is defined by a maximum tolerable loss, then their asset allocation

should become more conservative and their return expectations must be lower. Conversely, if investors place a premium on generating higher returns, as opposed to lowering downside risk, and as a result are reducing their bond exposure in favor of more equities, they must be willing to tolerate more downside risk in their portfolios. *Investors should recognize that lower expected bond returns have not altered the fundamental relationship between risk and return or the role that a strategic bond allocation has in reducing equity market volatility.*

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