

Municipal bond funds and individual bonds

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Executive summary. For the vast majority of investors in municipal bonds, mutual funds have a number of advantages over individual bond portfolios. Individual bonds do provide certain benefits compared with bond mutual funds, and these advantages revolve primarily around control issues. The price for the advantages can be thought of as a “control premium” that is paid through generally higher (or additional) transaction costs, lower liquidity, more limited return opportunities, and higher risks.

Some investors may be willing to pay that premium and forgo alternative strategies to receive the control benefits. However, an investor who chooses to create an individual bond portfolio must assign a very high value to the control aspects to justify the higher cost and additional risk involved. Vanguard believes that the vast majority of investors are better served through mutual funds. Only investors with enough resources to build a portfolio of comparable scale to a mutual fund can likely afford to put these control advantages ahead of the benefits of a mutual fund.

This paper first outlines general factors to be considered when investing in municipal bonds. We then review the advantages of investing in municipal bond funds over individual municipal bonds.

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Municipal bonds—overview and investment considerations

Municipal bonds are initially issued in the primary market, where pricing is based on market conditions and demand. It is generally more cost-effective to buy these bonds in the primary market, but institutional buyers dominate that market, and historically, it has been difficult for individual investors to compete with them for the limited bond supply. As a result, most noninstitutional trading is relegated to the secondary market, in which existing bonds are resold.

Drawbacks of trading municipal securities in the secondary market

Trading in the secondary market for municipal securities can be very problematic and expensive. Unlike most other financial markets, in which price and execution are transparent to the investor via real-time bid-ask quotes, the secondary municipal market provides limited real-time pricing and execution. Nor are there any solid price-discovery methods on which to base investment decisions. As a result, to be successful in this market requires deep knowledge, understanding, and experience in how it operates.

Compounding the problem is that, in the secondary market, purchases or sales in less than “round lot” quantities are marked up or down to reflect the unattractiveness of these sizes for bond dealers. In addition, municipal bonds are not as actively traded as taxable bonds, such as U.S. Treasury or corporate issues. As a result, municipal bonds are less liquid than taxable bonds and have higher transaction costs.

Further complicating the bond-selection process is that the municipal market is very fragmented, with a multitude of issues available for purchase. For example, the Barclays Capital Municipal Bond

Index—a proxy for the liquid portion of the municipal market—represented more than 44,000 bonds as of December 31, 2008. By contrast, the Barclays Capital U.S. Aggregate Bond Index, which represents the entire market of investment-grade, taxable U.S. bonds, contained only 9,168 issues as of that date.

In sum, the complexities of the municipal bond market and the hefty transaction costs it entails make investing in individual municipal bonds a special challenge for most investors.

Bond pricing

Although municipals trade differently from other bonds, the pricing process is identical. The following formula applies:

$$P_o = \frac{CF}{(1+y)^1} + \frac{CF}{(1+y)^2} + \frac{CF}{(1+y)^3} + \dots + \frac{CF}{(1+y)^n} + \frac{M}{(1+y)^n}$$

Where: P_o = price of the bond;
 CF = cash flow (coupon in \$);
 M = maturity value (in \$);
 n = number of periods;
 y = yield to maturity.

As the formula shows, the main factors that influence bond prices are the coupon, the value at maturity (M), and the number of periods in which the bond will earn interest (n). The price of any financial instrument is determined by the present value of the cash flows from the investment. Discounting back to the present value takes the time value of money into account and utilizes the market rate of return (the yield to maturity, represented by y in the equation) for holding such financial instruments. For a bond, these cash flows are the periodic interest payments plus the maturity value.

Notes on risk: An investment in a money market fund is not insured or guaranteed by the Federal Deposit Insurance Corporation or any other government agency. Although a money market fund seeks to preserve the value of your investment at \$1 per share, it is possible to lose money by investing in such a fund. Investments in bond funds are subject to interest rate, credit, and inflation risk. Diversification does not protect against a loss in a declining market or ensure a profit. Mutual funds are subject to risks, including possible loss of principal. All investments are subject to risk. Past performance is not a guarantee of future results. U.S. government backing of Treasury or agency securities applies only to the underlying securities and does not prevent share-price fluctuations.

Figure 1. When evaluating bonds, compare the yields to maturity

	Municipal bonds with 15 years to maturity			
Coupon (annual interest payment)	6%	4%	2%	0%
Price (percentage of face value)	122.24%	100%	77.76%	55.53%
Yield to maturity	4%	4%	4%	4%

Note: This hypothetical illustration does not represent the return on any particular investment.

Source: Vanguard.

A bond's price is inversely related to the change in interest rates: When interest rates rise, a bond's price falls. This is because a bond's coupon payments are typically fixed at issuance, leaving the price as the only variable that can be adjusted to make the bond's yield competitive with that of newly issued bonds. When interest rates change, the price of each bond shifts so that comparable bonds with different coupon rates provide the investor with the same yield to maturity.

This price adjustment dismisses the common myth that holding a bond to maturity will provide an economic benefit to the investor. Absent transaction costs, when interest rates are rising, the total return and present value of the cash flows will be equal regardless of whether the bond is held to maturity or sold at a loss prior to maturity with the proceeds reinvested in a bond with a comparable maturity date, but a higher coupon. An investor who holds the bond to maturity and regains the principal earns the coupon rate of interest but forgoes the higher coupon rates that could be obtained by selling the bond at a discount before maturity.

When evaluating bonds with the same characteristics but with different coupon payments, it is always best to compare the yield to maturity of the bonds. This is illustrated in **Figure 1**. If 15-year bonds are currently yielding 4%, the price of the 2% bond—to be competitive—must decline to a level that results in a 4% yield to maturity. In this example, that price is

77.76% of face value (or \$777.60 per \$1,000 face value). The 2% bond would provide the same return as the 4% bond at par, but some of the return would come from the bond's appreciation from \$777.60 to its \$1,000 value at maturity, as opposed to the coupon payments.

This example also illustrates why investors holding discount bonds are wise not to try to "trade up" to current-coupon bonds. Because the 2% bond's price has already adjusted to compensate for the lower coupon, from that point forward the yield to maturity would be the same—4%—whether an investor holds the 2% bond to maturity or buys the 4% par bond. Because the yield-to-maturity calculation does not incorporate transaction costs, an investor's yield would actually be lower if the 2% bond were sold and replaced with the 4% bond than if the 2% bond were held to maturity.

The hold-to-maturity myth typically surfaces only when interest rates are expected to rise. Reversing the expectation may underscore the flaw in the myth. When interest rates fall, an individual bond can be sold at a premium, which would lock in the gain in principal. On the other hand, holding the bond to maturity would bring the investor only the par value, with no gain in principal. But selling the bond specifically to get the premium has no economic benefit, because the investor will be reinvesting the proceeds in lower-coupon bonds—which leaves him or her with the same yield to maturity in either case. If there were an economic benefit, an active strategy such as that of a mutual fund would be the preferred vehicle (over a buy-and-hold, laddered municipal bond portfolio) in a declining interest rate environment. Ironically, this environment has been the norm for the past 15 to 20 years. Since this argument is not valid on its own, this concept has not been endorsed by the investment community.

Figure 2. Structural advantages of municipal bond funds compared with individual municipal bonds

	Municipal bond funds	Individual municipal bonds (professionally managed separate accounts and self-directed accounts)
1. Diversification Diversification advantage		
a. Among issuers, credits, and term structure.	+	
2. Cash-flow treatment and portfolio characteristics Cash-flow/characteristics advantage		
a. Timely initial and periodic investments.	+	
b. Management fees.	+	
c. Ease of partial liquidations.	+	
3. Costs Cost advantage		
a. Bid-ask spreads.	+	
b. Management fees.	+	+
	(Versus professionally managed separate accounts)	(Self-directed)
4. Direct control of portfolio Control advantage		
a. Security selection (AMT-free, state-specific).		+
b. Realized loss pass-through (for taxable investors).		+
c. Principal at maturity.		+

Note: A plus sign (+) indicates which alternative has the advantage. There may be other material differences that should be considered before investing.

Source: Vanguard.

Comparison of municipal bond funds and individual bond portfolios

Several factors should be considered when evaluating the suitability of municipal bond funds versus individual bonds for a portfolio. These factors include diversification, cash-flow treatment and portfolio characteristics, costs, and direct control of the portfolio (see Figure 2). Vanguard has analyzed each of these factors.

Diversification

We evaluated diversification among issuers, credit qualities, yield curves, time, and tax lots.

- a. **A bond fund provides broader diversification than a portfolio of individual bonds.** Bond funds typically provide substantially more diversification among issuers, credit qualities, and maturities, as well as in the range of individual bond characteristics (for example, callable, noncallable, prerefunded, discount, and premium). Much of this is possible because a bond fund has a larger pool

of investable assets, along with the professional staff needed to conduct credit analysis. Greater diversification, when attained in a very cost-effective manner, permits the portfolio manager to enhance return opportunities by purchasing securities across the credit-quality spectrum. Bonds rated below "AAA/insured" must pay a premium for the additional level of risk. For example, assuming an average spread of 25 basis points between AAA bonds and AA/A bonds, a broadly diversified fund able to allocate 40% of assets to below-AAA issues would capture 10 basis points (or more) of additional yield, a significant portion of the expense ratio for many low-cost funds.

For a self-directed individual, creating a well-diversified bond portfolio typically requires a significant capital investment to obtain exposure across issuers, credit qualities, maturities, and so on. For example, a 15-year laddered bond portfolio with two bonds in each year of the ladder would require 30 bonds. Purchasing at \$1 million lot sizes would necessitate a \$30 million investment; \$500,000 lot sizes would require a \$15 million investment; and \$250,000 lot sizes, a \$7.5 million investment. Even if an individual were able to invest at these high capital minimums, his or her portfolio would still be substantially less diversified than that of a typical mutual fund.

In addition, purchasing smaller lots of municipal bonds leads to significantly higher transaction costs. As a result, many self-directed bond portfolios exhibit a quality bias to help compensate for their lack of diversification. While the quality bias can help lower the credit risk in the portfolio, the trade-off is generally lower returns.

For a professionally managed separate account: Separately managed accounts (SMAs) typically are not as diversified as mutual funds, and they often require a more significant capital requirement. Many SMAs (either directly through the portfolio

manager or through a financial intermediary) impose high minimum investment thresholds. In addition, SMAs typically have operating expense ratios three to four times more expensive than those of lower-cost mutual funds.

Cash-flow treatment and portfolio characteristics

In comparing bonds and bond funds, we also considered the timing of initial and periodic investments, the need to maintain the portfolio's risk characteristics, and the ease of partial liquidations.

- a. **Bond funds provide more timely investments of initial principal and periodic income cash flow.** Bond funds typically can implement both the initial investment and the periodic investments of cash flows more readily than can a separately managed bond portfolio; often this translates into higher returns through reduced cash drag.
- b. **Bond funds provide more consistent risk characteristics (the most important of which is duration).** Because of their more regular, ongoing cash flows, mutual funds are better able than alternative vehicles to maintain more stable portfolio risk characteristics over time. In an individual laddered bond portfolio, the duration drifts down over time and jumps back up as cash flows are reinvested. A portfolio with fewer bonds, or with concentrated positions, is especially prone to this effect.
- c. **Bond funds make liquidations, especially partial liquidations, notably easier.** Liquidating bond-fund shares does not change the characteristics of the fund's bond exposure. By contrast, liquidations from an individual bond portfolio may require selling a whole bond, which alters the characteristics of the portfolio. To properly maintain the portfolio's strategy and makeup, a small percentage of each bond would need to be sold; obviously, this is not a viable solution. In addition, liquidating a portion of an individual bond can be expensive because of bid-ask spreads and transaction costs.

Figure 3. Trade size minimizes bid–ask spread (spreads in municipal bonds on February 24, 2009)

Trade size	Number of trades	Price bid–ask spread (in basis points)	Spread relative to trades of more than \$1 million (in basis points)	Yield bid–ask spread (in basis points)	Spread relative to trades of more than \$1 million (in basis points)
More than \$1 million	130	31	—	11	—
\$100,000 to \$1 Million	743	99	67	35	25
\$50,000 to \$99,999	386	159	128	60	50
\$0 to \$49,999	1,625	216	184	61	50

Sources: Vanguard Fixed Income Group and Municipal Securities Rulemaking Board.

Costs

Our review of costs included bid–ask spreads, management fees, and sales charges or commission costs (collectively, “transaction costs”). Costs are important because they directly reduce a portfolio’s total return. For fixed income investments, as opposed to equity investments, costs tend to be a more significant drag on performance, and therefore exert one of the greatest influences on returns.

Even when an investor consciously attempts to minimize the impact of transaction costs, he or she may still surrender return. An investor who concentrates purchases in a few bonds (to attempt to minimize the bid–ask spread) will sacrifice diversification. Without diversification, the investor will likely choose to hedge default risk by focusing on bonds of the highest quality or on insured bonds and will pass up the returns normally available from lower-quality or uninsured issues.

- a. **Bond funds typically pay significantly lower bid–ask spreads than individual investors.** Mutual funds buy and sell large blocks of bonds, with individual trades routinely exceeding \$1 million. The considerable size of these trades gives the fund significant leverage in minimizing bid–ask spreads, since bonds are marked up or down based on the trade size, among other things.

The advantage enjoyed by mutual funds in bid–ask spreads is more pronounced in the municipal market than in the corporate or Treasury markets.

Separate-account managers can trade bonds in quantities similar to those of mutual funds and therefore can receive similar bid–ask spreads. Most individuals, however, lack this kind of clout. In the municipal bond market, the spread for a “retail” trade (trades of less than \$100,000 per bond) is typically 100 to 200 basis points higher than that for an institutional trade.¹

This is illustrated in **Figure 3**, which reflects trading that took place on February 24, 2009. The average price spread on trades greater than \$1 million that day was 31 basis points, while trades of less than \$50,000 suffered a much greater spread (216 basis points). Based on *yields*, this equates to a 50-basis-point yield advantage for the institutional bond purchase. The summary in Figure 3 is for secondary (as opposed to new-issue) municipal transactions. In terms of total investment costs for the first year, an investor would pay about 78% less for a low-cost bond fund (with a 15-basis-point expense ratio) and achieve far greater diversification than he or she would by purchasing a single \$100,000 municipal bond (if the price spread were 67 basis points).

1 Lawrence Harris and Michael S. Piwowar, February 13, 2004, Municipal Bond Liquidity; <http://ssrn.com/abstract=503062>.

Figure 4. Higher spread-costs translate into lower yields (5% coupon, 10-year municipal bond)

Amount	Price	Yield to maturity
\$1 million	\$100.00	5.0%
\$100,000	\$100.67	4.9%

Note: This hypothetical illustration does not represent the return on any particular investment.

Source: Vanguard.

In the end, higher spread-costs translate into lower yields. For example, **Figure 4** shows the varying results for two investors who purchase the same bond (5% coupon, 10-year XYZ municipal bond), but in different face amounts, resulting in different bid-ask spreads. The investor paying a higher price due to higher transaction costs (the spread) will receive a lower yield to maturity.

- b. **Bond funds charge an ongoing management fee (expense ratio) for expenses related to the operation of the fund.** The expense ratio covers the costs of:
- **Investment management, legal, and accounting services.** Although the cost of investment management is a widely recognized component of a fund's expense ratio, associated legal and accounting services are an important, though less frequently understood, operational expense.
 - **Fund and account information provided by phone and the Internet.**
 - **Printing and mailing of fund reports, prospectuses, and account statements.** Because the cost of these services is shared by a great number of investors, the services delivered can usually be provided at costs significantly lower than those that investors in either self-directed individual bond portfolios or SMAs would expect to pay for comparable expertise.

For a self-directed individual bond portfolio: While the annual expense ratio is frequently cited as a drawback for funds, in reality it is generally more cost-effective to pay the expense ratio for years, rather than to risk paying a large spread when buying a bond. Assume, for example, that an investor has the option to invest in either an intermediate-term (5-year average maturity) tax-exempt mutual fund with an expense ratio of 15 basis points per year or an individual 5-year bond. For the individual bond to be more cost-effective than the fund, the investor would have to pay a spread of less than 75 basis points (15 basis points per year over 5 years) when purchasing the individual bond. However, as shown in **Figure 3**, an investor who wants to pay less than 75 basis points in spread may need to invest more than \$100,000 in each bond.

For a professionally managed separate account: Fees for SMAs typically exceed those of the average bond mutual fund. **Figure 5** (on page 8) shows the average published fee schedule for retail SMA investors as of 2005. This fee schedule is three to four times higher than that for low-cost, professionally managed mutual funds.

Control of the portfolio

One advantage of self-directed individual bond portfolios and, to some extent, SMAs over mutual funds is the owner's ability to influence portfolio decisions.

- a. **Bond mutual funds don't offer investors the ability to influence the selection of the bonds.** An individual bond portfolio can be tailored for objectives such as income free of alternative minimum tax (AMT), credit-quality targets (for example, an all-AAA/insured portfolio), or specific state exposure. Proponents of separately managed accounts often justify their higher costs by citing the tax savings achieved by holding individual bonds exempt from AMT or the investor's state income tax.

Figure 5. Average fee schedule for bond investors

Asset level	Average management fee (in basis points)
\$5 million	91
\$10,000,000	86
\$25,000,000	75
\$50,000,000	64
\$100,000,000	59

Source: Institute for Private Investors, *The IPI Report, 2005* (New York: IPI, 2005).

Note that investors should be primarily concerned with maximizing after-tax returns, rather than with minimizing taxes. Bonds issued by states other than an investor's home state and bonds subject to the AMT often carry higher yields to maturity. As a result, including such bonds in a portfolio often provides higher after-tax returns. In either instance, diversification is gained—an important benefit.

- b. **Bond mutual funds cannot pass realized losses through to individuals.** Because the investor directly owns the bonds in an SMA or laddered individual bond portfolio (compared with the indirect ownership of underlying bonds via shares of a mutual fund), net losses from individual bond positions are passed through to the bond owner when realized and can be used for tax purposes against either earned income or realized capital gain liabilities from other investments. In a fund, realized losses are used against realized gains, and any excess losses are carried forward to be used against future gains; the fund cannot directly pass excess realized losses through to the investor. Although this may defer the pass-through of losses, it provides long-term tax efficiency to the fund structure. In addition, investors can sell mutual fund shares to realize a loss where applicable.

An important point to keep in mind is that for an investor to take advantage of losses in a managed account, transaction costs will be incurred on both the sale of the current bond and on the purchase of the new bond. Often, the round-trip transaction costs may exceed the taxes saved by realizing the loss. Figure 6 illustrates the round-trip transaction cost needed for an investor to break even with the capital gains tax savings. For example, if the \$100,000 par bond lost 10% and the investor chose to harvest the loss, the capital gains tax savings would be \$1,500. For the investor to break even, the round-trip transaction cost would need to be 83 basis points. For the investor to profit, the cost would need to fall below 83 basis points, and if the cost exceeded 83 basis points, the investor would actually be worse off as a result of harvesting the loss. Most round-trip transaction costs would exceed break-even levels and would dilute, if not eliminate, most of the advantages of such tax-swap strategies.

Mutual fund managers and separate-account managers have the ability to run their portfolios in an identical manner. Both types of managers can and do harvest losses where appropriate. The only difference is that the separate-account structure allows for the pass-through of excess losses to the individual investor, whereas the mutual fund structure does not (as noted earlier, the losses are carried forward to offset future gains). As a result, if an investor in an SMA has a capital gain from another investment that he or she wants to offset with a capital loss, the investor can request that the separate-account manager sell certain bonds in the portfolio to generate a specified dollar amount of losses. A mutual fund investor, on the other hand, cannot request that the fund manager sell certain bonds; however, the investor can sell all or a portion of the fund shares he or she owns to generate the specified loss amount.

Figure 6. Example of round-trip transaction costs required to break even with capital gains tax savings

Par value of bond	Unrealized loss	Realized loss upon sale	Capital gains tax savings	Tax swap (sale and purchase)	Round-trip transaction costs required to make the swap break even (in basis points)
\$100,000	5%	\$5,000	\$750	\$190,000	39
\$100,000	10%	\$10,000	\$1,500	\$180,000	83
\$100,000	15%	\$15,000	\$2,250	\$170,000	132
\$100,000	20%	\$20,000	\$3,000	\$160,000	188

Source: Vanguard.

Because of its scale, a mutual fund is likely to have more-frequent (and less-expensive) loss-harvesting opportunities than will occur in a separate account. From the perspective of an investor who is balancing gains and losses across a personal portfolio, the separate account may offer more direct loss-harvesting opportunities; however, the transaction costs to realize those losses will often outweigh the benefits.

Finally, it should be noted that the loss-harvesting advantages are not as significant in the fixed income markets as they are in the equity markets. As a result, the loss-harvesting argument for a separately managed municipal fixed income account is marginal. The advantages of a mutual fund structure as mentioned in this paper would, in most cases, dominate any tax advantage of a separately managed municipal fixed income portfolio.

- c. **Bond mutual funds do not have a maturity date. Therefore, the value of the fund at any point in the future is uncertain.** When an investor has a predetermined future spending need—particularly if it is a near-term need—an individual bond that matures when the money is required may be

preferable to a bond mutual fund. This is largely because an individual bond gives the investor greater certainty and control over the amount of money that will be available at that particular time.

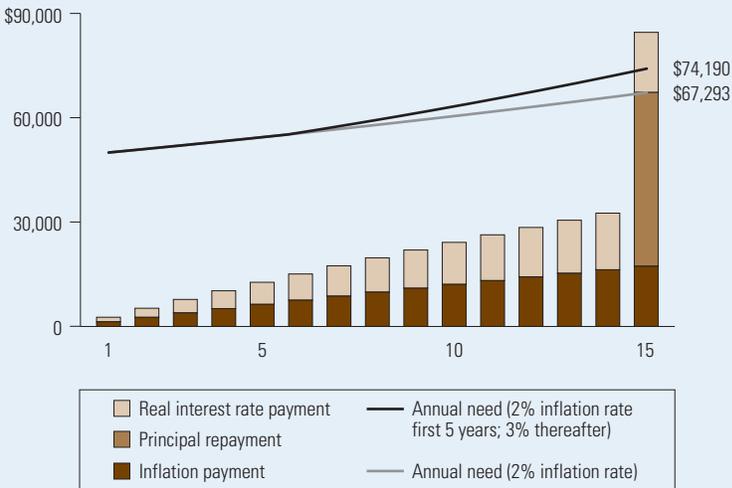
Individual bond portfolios allow investors to match the maturity and face value of a bond with a known future liability. (In this context, “liability” may mean either a specific obligation or the cost of an objective such as college tuition.)

One thing to keep in mind is the effect of inflation on the liability amount. For example, if annual college tuition is \$30,000 today for an investor’s college of choice, what should be budgeted for a \$30,000 tuition payment 15 years from now?

Matching a \$30,000 liability with a \$30,000 bond does not take into consideration the fact that, owing to inflation, the liability may be higher when it becomes payable. That said, future inflation is difficult to estimate in the short run, and significantly more difficult—if not impossible—to forecast over the long term. As a result, using individual bonds to accommodate future liabilities is more viable for short-term, rather than long-term, liabilities. Similarly, short-duration mutual funds—such as money markets or short-term municipal

Figure 7. Hypothetical bond cash-flow example

(4% coupon, 15 years to maturity, 2% expected inflation, 2% real interest rate)



Note: This hypothetical illustration does not represent the return on any particular investment.

Source: Vanguard.

bond funds—that have historically experienced little fluctuation in principal (net asset value) might be used to meet these near-term liabilities.

Liability matching requires (in almost all cases) an active bond-management strategy or a cash-flow-matching zero-coupon strategy, not a buy-and-hold laddered-maturity strategy. To implement either of the former strategies successfully is extremely complex and requires continuous management, often with higher costs. A passive approach (such as the purchase of a single bond or a bond ladder) usually results in the liability being either overfunded or underfunded, depending on the actual inflation rate experienced over the funding horizon.

That being said, some investors believe there is *economic* value to be had in receiving principal back at maturity. This is incorrect. Consider, for

example, that the total return of a laddered separate account having *characteristics identical* to those of an open-end mutual fund will deviate from the fund's return by *only the cost differential*. Naturally, to achieve cost parity, cash-flow parity, and diversification similar to those of a mutual fund would be very difficult for a separately managed account. In essence, when the principal paid at maturity or redemption is reinvested, rather than spent, a laddered portfolio functions similarly to a mutual fund, but with greater costs and less diversification.

In many cases, the certain repayment of principal should not be a primary issue in an investment strategy. Inflation—and the way it will affect the purchasing power of that principal by the time the bond matures—is the more important issue. Two factors affect whether or not the principal's purchasing power is maintained:

- (1) whether the investor spends the interest payments, and
 - (2) whether the forecast annual inflation rate is less than or equal to the actual annual inflation rate for the period.
- Figure 7** illustrates this point. At the time of initial purchase, a conventional bond's yield includes an assumption about the future inflation rate (including a risk premium that is tied to the level of uncertainty regarding future inflation). This portion of the yield (the "inflation payment") is compensation to offset the expected erosion of the purchasing power. Figure 7 illustrates the cash flows of a bond, with the coupon divided into its inflation payment and real interest rate payment, and with the principal repaid at maturity. The bottom line illustrates the inflation-adjusted purchasing power of the principal. This hypothetical example starts with

an inflation rate of 2%. If that rate continued unchanged, the goods and services that \$50,000 buys today would cost \$67,293 in 15 years.

Figure 7 also illustrates that if interest payments are being spent, the \$50,000 principal paid at maturity is far less than the \$67,293 needed to keep pace with inflation. In essence, \$50,000 15 years from now would purchase 26% less than it does today. To maintain purchasing power, therefore, only a portion of the interest payments should be spent (the portion representing their real rate), with the balance being reinvested.

What happens if the inflation rate is different from the initial 2%? The top line in the figure illustrates the inflation-adjusted principal balance if inflation were 2% for the first 5 years and increased to 3% for the remaining term. Instead of needing \$67,293 to maintain the principal's purchasing power, the investor would need \$74,190 at maturity. Since the inflation-payment portion of the yield was locked in at 2% when the bond was purchased, the bond's payments are insufficient to offset the effects of the higher-than-expected inflation. As a result, the investor's real return is diminished. In summary, if there are no targeted spending needs, the investor should focus on maintaining the portfolio's purchasing power over time.

A primary benefit of investing in a bond mutual fund is the fund's ongoing receipt and reinvestment of cash flows. In addition to smoothing yield-curve fluctuations, as discussed earlier, the cash stream allows the fund to invest in bonds that reflect changing inflation expectations, thus better enabling the portfolio to meet future inflation-adjusted liabilities.

Conclusion

Vanguard believes that the vast majority of municipal bond investors are better served using mutual funds. Only investors with resources comparable to those of a mutual fund can afford to put the control benefits of owning an individual bond portfolio ahead of the benefits of investing in a mutual fund. The advantages of mutual funds over individual bond portfolios include better diversification, generally lower costs, and more efficient management of cash flows and portfolio characteristics. The advantages of individual bonds over bond mutual funds revolve primarily around control issues that result from direct ownership. An investor must assign a very high value to those control aspects to justify the higher cost and additional risk involved in owning individual securities.



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