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Strategies for Building Real Wealth

The Laddered Bond Portfolio


A Bond Strategy for Managing Risk and
Capturing Compelling Market Returns

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Many financial advisors recommend bonds and bond funds as a part of their clients' comprehensive investment portfolios, both for their perceived safety and high yields. However, not all bonds and bond funds are the same, and investors are often lured by high yields into high-risk bond strategies, only to expose themselves to increased losses.

Bonds and bond funds are subject to certain risks including interest-rate risk, credit risk, and inflation risk. The value of a bond will fluctuate relative to changes in interest rates; as interest rates rise, the overall price of bonds fall. Unlike individual bonds, bond funds have ongoing fees and expenses.

The laddering strategy does not assure or guarantee better performance than a non-laddered portfolio and cannot eliminate the risk of investment losses.



It really doesn't matter which way interest rates move; with a laddering strategy, it's possible to get consistent returns.

The stock market crash of October 1987 was highly dramatized in the media, but during that year, more money was lost in long-term bonds and bond funds than in stocks. Interest rates fluctuated widely throughout the year, but rose dramatically by the end of that year; this caused the bond market to lose significant value. Why? When interest rates rise, market values of bonds go down because bond interest rates are fixed and the present value of a bond's stream of interest payments drops. These factors caused investors to panic and sell their bond funds, leaving fund managers with no choice but to sell these long-term bonds at depressed prices as a way to generate cash for redemptions.

We believe that the higher nominal yield of long-term bond funds has not been enough to compensate the investor for their highly volatile prices. Investors have not, historically speaking, been compensated for the higher risk of long-term bonds.

A HISTORICAL PERSPECTIVE

During the late 1980s and early 1990s, long-term bond investors enjoyed their best decade in history, with gains averaging 12.7% per year. Unfortunately, many investors continue to consider only the most recent positive period when analyzing investment options. Psychologists call this cognitive bias, the expectation that historical performance will determine future performance. It is critical to analyze all statistical evidence available in financial decision-making; investors should never dismiss data without good reason.

In contrast with the late 80s and early 90s, consider the decade of the 1950s — the worst decade for long-term bond investors — with an average annual loss of -0.1% (with reinvested interest income; substantially lower otherwise). This practical example illustrates what can happen when interest rates rise. The volatility of long-term bonds, particularly over long

time periods, approaches the volatility of common stocks. Clearly, long-term bonds do not exhibit the price stability that many fixed-income investors are seeking.

The longer the term to maturity, the longer the expected stream of interest payments to the bondholder. The market price of any bond represents the present value of this stream of payments discounted at current interest rates. As rates fluctuate, the present value of this stream of payments constantly changes. This longer stream of interest payments, as compared to those of limited-term bonds, creates higher price volatility for long-term bonds.

The higher risk of long-term bonds might be acceptable were higher rates of interest to compensate for the additional risk assumed. Note that University of Chicago Professor Eugene Fama has studied the rates of return of long-term bonds from 1964 to 1996; Fama's studies demonstrate that long-term bonds

have historically exhibited wide variance in their total rates of return without sufficiently compensating investors with higher expected returns. Fama found that bonds with maturities beyond five years had lower total returns than those with maturities of five years or less (see **figure 2**). Ibbotson Associates data in **figure 1** demonstrates that the risk return profile over the last fifty years is comparable to Fama's study.

WHY WOULD ANYONE BUY LONG-TERM BONDS?

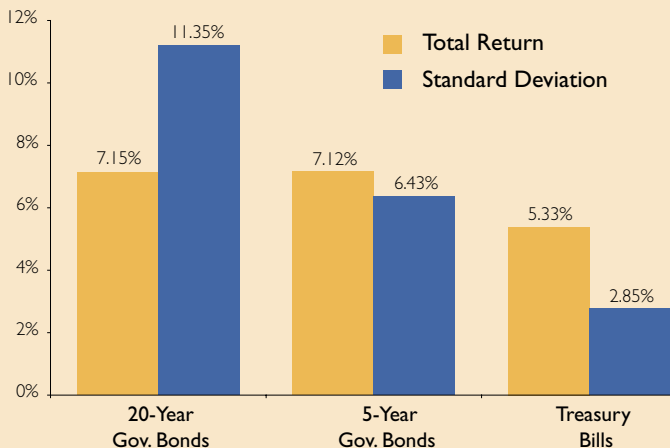
The majority of investors in the long-term bond markets are institutions, such as corporate pension plans and life insurance companies. These investors are interested in funding long-term debt obligations such as fixed annuity payments or other fixed corporate responsibilities. They are not concerned with volatility of principal or with the effects of inflation since their obligations are a fixed amount. In terms of variability of total return, long-term bonds bear more similarity to stocks than to shorter-term, fixed-income vehicles such as Treasury bills. And yet, over long time periods, their respective total returns have consistently lagged those of equities.

A look at **figure 2** will help illustrate the higher standard deviations and lower total returns of bonds with maturities beyond five years.

The Risks

There are four main risks inherent in every bond and bond fund: **credit risk**, **income**

Figure 1: Summary Statistics of Annual Returns
(50 Years 1959-2009)



Intermediate bonds, defined as those with a maturity of five years, had comparable total returns with a significantly lower standard deviation compared to long-term bonds.

Past performance does not guarantee future results.

Government bonds and Treasury bills are negotiable debt obligations of the U.S. government securities is exempt from state and local, but not federal, taxes. Government bonds are issued at various schedules and maturities. Treasury bills are short-term instruments with maturities of no more than one year.

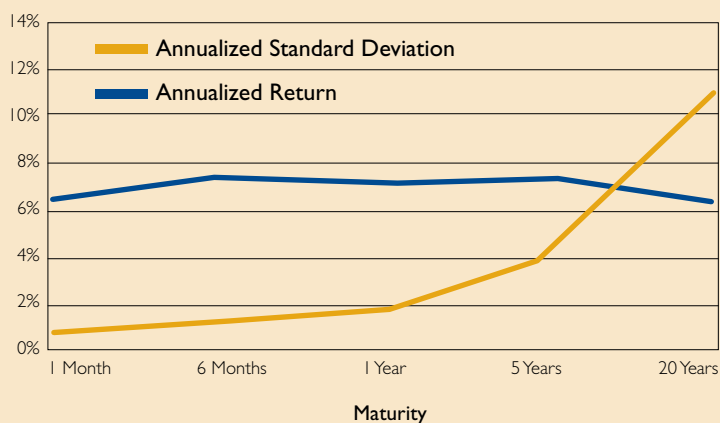
Standard deviation is a statistical measurement of dispersion about an average which, for an investment portfolio, depicts how widely the returns varied over a certain period of time. Investors use the standard deviation of historical performance to try to gauge the range of returns that are most likely for a given investment. When an investment has a high standard deviation, the predicted range of performance is wide, implying greater volatility.

Source: Ibbotson Associates

tax risk, **market price risk**, and **reinvestment risk**. It is possible to mitigate credit risk by researching and monitoring

a bond, and income tax risk can be minimized by investing in tax-free bonds or using a tax-deferred account, but **it**

Figure 2: Risk vs. Reward
(Examined for bonds 1964-1996)



Past performance does not guarantee future results.

Source: Eugene F. Fama, University of Chicago

is impossible to simultaneously master market price risk and reinvestment risk.

So, while it's true that some investments do alleviate some of the above factors, no single investment can fully manage

all of them. Market price risk (see **figure 3**), for example, can best be curtailed by owning a limited-term certificate of deposit (CD) or a money market fund, because the market price is always constant. But reinvestment risk is, as a

result, comparatively larger when investing in a CD or money market fund (see **figure 4**). Reinvestment risk can be diminished through investing in zero coupon bonds (bonds that are not contracted to make periodic coupon payments) because reinvestment is fixed until maturity, but a zero coupon bond is subject to market risk. All other bonds are subject to both market and reinvestment risk.

At best, an investor in a fixed-income vehicle other than the above instruments can hope only for a compromise solution that minimizes and manages market price and reinvestment risk, while achieving an attractive total return (see **figure 5**).

STRIKING A BALANCE: LADDERING THE PORTFOLIO

How do fixed-income investors achieve a respectable rate of return without experiencing the higher risk associated with the fluctuation of interest rates? Further, what is an adequate trade-off of higher risk for higher return?

Laddering involves building a portfolio of bonds with

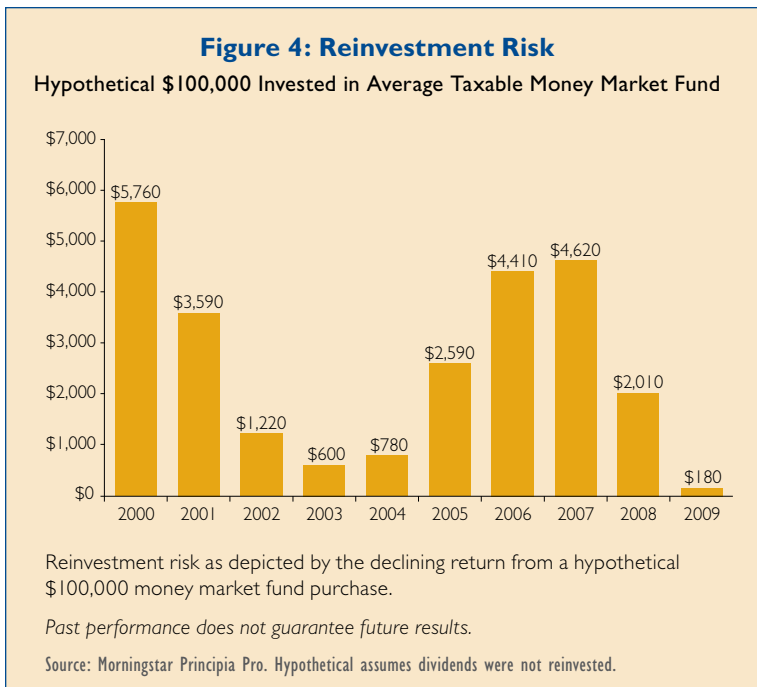


Figure 5: Risk Management Strategies

Risk	Solution
Credit Risk	Careful selection, diversification, ongoing credit review
Income Tax Risk	Municipals and tax-deferred
Market Price Risk	Strike a Balance
Reinvestment Risk	

staggered maturities so that a portion of the portfolio will mature each year (see **figure 7**). To maintain the ladder, money that comes in from currently maturing bonds is typically invested in bonds with longer maturities within the range of the bond ladder.

Laddering tends to perform very well against other bond strategies over the long term because it simultaneously accomplishes two goals:

- Captures price appreciation as the bonds age and their remaining life shortens.
- Reinvests principal from maturing limited-term bonds (low-yielding bonds) into new longer-term bonds (higher-yielding bonds).

MANAGING MARKET PRICE RISK

The primary goal of a laddered bond portfolio is to achieve a total return over all interest rate cycles that compares favorably to the total return of a long-term bond, but with less market price and reinvestment risk. This goal is pursued by maintaining an investment of approximately equal amounts of a bond portfolio

in each year of the selected maturity range.

We believe that two durations of ladders provide the best results:

- A limited-term ladder in which the average maturity is kept between three and five years.
- An intermediate-term ladder with an average maturity between six and ten years.

A bond's sensitivity to interest rates is measured by its duration. The shorter the duration, the less volatile the bond's price. When interest rates shift, a bond with a one-year maturity barely budes in price, while the price of a 30-year bond moves dramatically (as shown in **figure 6**). Long-term bond funds pay a heavy price for their marginally higher yields. As limited- and intermediate-term bonds age, their durations shorten at an

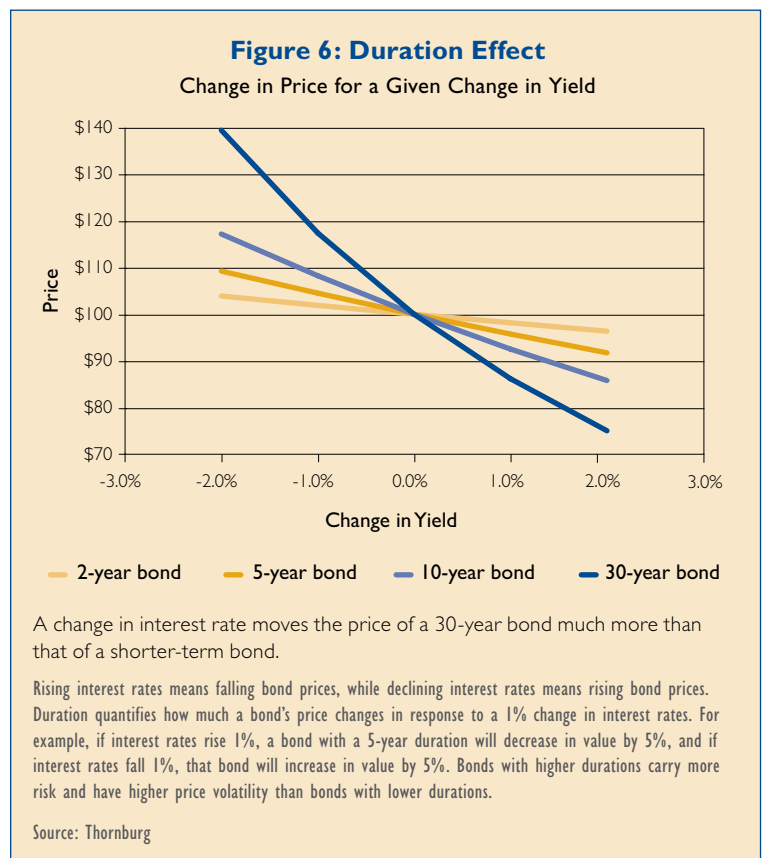


Figure 7: A Hypothetical Limited Term Bond Ladder

Laddering involves building a portfolio of bonds with staggered maturities so that a portion of the portfolio will mature each year.

The laddering strategy does not assure or guarantee better performance than a non-laddered portfolio and cannot eliminate the risk of investment losses. For illustration purposes only.

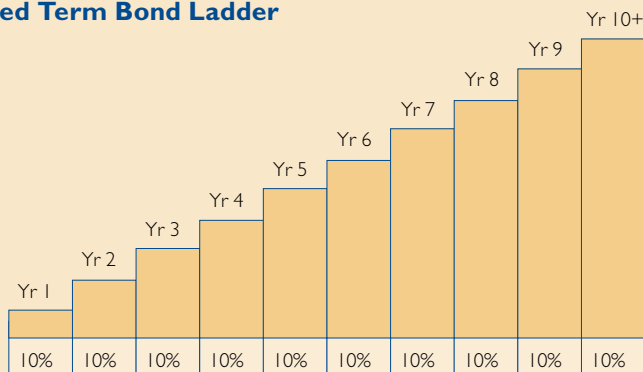


Figure 8: How Does Aging Affect Duration?

Length of Bond	Initial Duration	Duration After Five Years	Change in Duration	Percent Change in Duration
30-year	15.5	14.2	-1.3	-8%
20-year	12.6	10.5	-2.1	-17%
10-year	7.8	4.4	-3.4	-44%

Source: Thornburg

increasing rate, in a telescoping effect. A single year of aging will shorten the duration of a five-year bond more than it does a 10-year bond and will benefit a 10-year bond more than a 20-year bond. A 30-year bond's duration, on the other hand, hardly responds to a single year's passing.

MORE EXAMPLES

Figure 8 compares three identical bonds with five percent coupons. The first bond has 30 years to maturity, the second 20 years, and the third 10 years. Observe the effect on duration (the bond's sensitivity to interest rates) after five years of aging.

The shorter-duration bond carries less risk, so a potential buyer will demand less yield. If interest rates remain constant, the bond will rise in value over most of its life, as its duration shortens. If interest rates rise, the bond will recover much (if not all) of its lost value as duration shortens, and is priced to the lower yield of a shortened bond.

Figure 9 shows the price of an intermediate municipal bond from issuance until maturity (assuming that bond yields are held constant during the

investment period). Note how the price rises over most of its life. This scenario, when applied to a laddered-maturity

portfolio, reduces market price risk because there are generally more bonds rising in price than falling in price.

Figure 9: Pricing a Bond as it Approaches Maturity

Blended Average Three-Year Historical Municipal AAA Yield Curve (12/31/06–12/31/09)

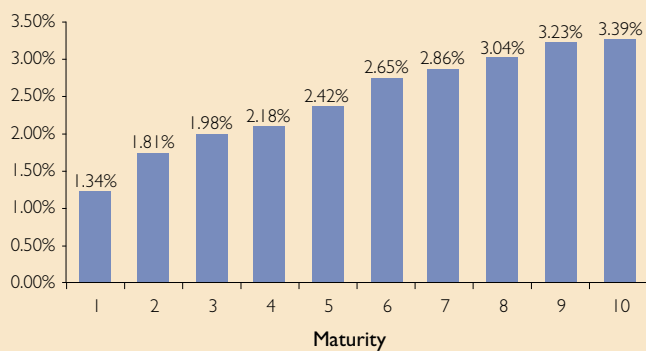


Illustration of a Bond Due in Ten Years Priced at Various Intervals Over its Term

Pricing Date	Coupon	Yield to Maturity	Dollar Price
Issue Date	3.39%	3.39%	100.000
2010	3.39%	3.23%	101.241
2011	3.39%	3.04%	102.422
2012	3.39%	2.86%	103.320
2013	3.39%	2.65%	104.062
2014	3.39%	2.42%	104.543
2015	3.39%	2.18%	104.611
2016	3.39%	1.98%	104.087
2017	3.39%	1.81%	103.083
2018	3.39%	1.34%	102.023
2019	3.39%	Matures	100.000

In this illustration, note that five years after its issuance, the 3.39% bond due in 2019 has approximately four years to maturity. Assuming constant interest rates, we price the 3.39% bond using a 2.18% yield to maturity to obtain a dollar price of 104.611, when four years remain to maturity.

Source: Municipal Market Data, 3-year Average AAA General Obligation (GO)

MANAGING REINVESTMENT RISK

In a laddered portfolio, bonds mature every year. As this occurs, the principal proceeds are reinvested at the longer end of the ladder, often at higher interest rates. The income stream will stay relatively constant because only a small portion of the portfolio will mature and be replaced each year. Over time, the portfolio should include bonds purchased in periods of both high and low interest rates. **Figure 10** demonstrates how a laddered portfolio can be expected to react to three interest rate scenarios:

Unchanged Interest Rates (The center line in the graph below represents a scenario of unchanging interest rates.)

- In this scenario, a very steady return is generated each year in the laddered portfolio. The return

will be fairly close to the highest-yielding bond in the portfolio.

Rising Interest Rates (The gold line in the graph below represents a scenario of rising interest rates.)

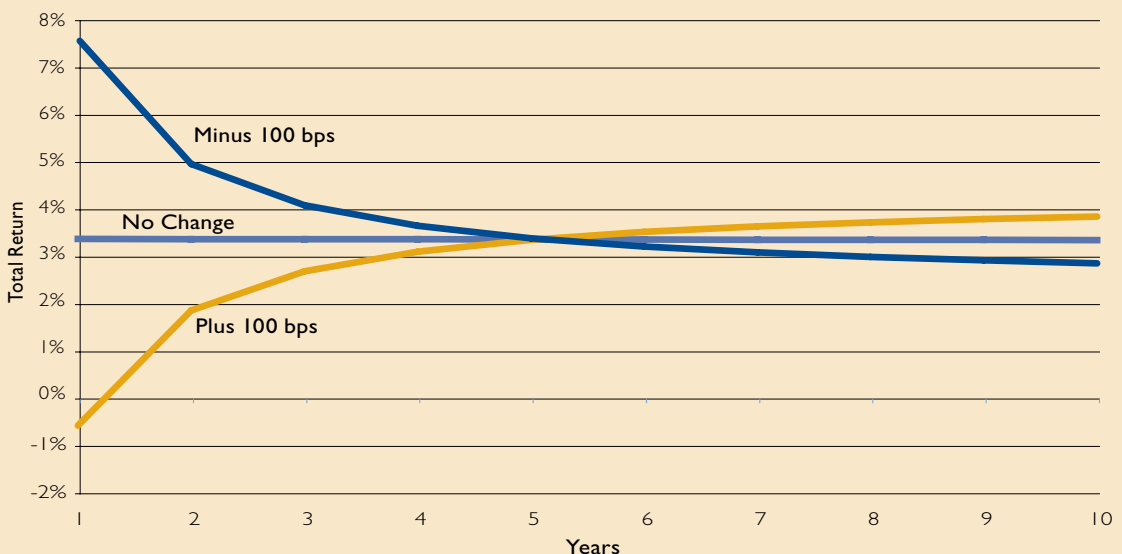
- Bond values initially drop, but recover value as they move toward their maturity at par. Unlike owning an individual bond, the ladder has maturing bonds each year, which gives the portfolio a stream of cash flow to reinvest in new, higher-yielding bonds. This creates a consistent pattern of investment, much as dollar cost averaging does for the equity market. Without maturing bonds, the manager could only sell bonds at depressed prices in order to generate cash for reinvestment. As proceeds from maturing bonds are reinvested in higher-yielding bonds at the far end of the

ladder, the portfolio's yield gradually increases. This built-in reinvestment feature works to offset some of the price depreciation that occurred throughout the ladder when interest rates rose. It also results in a rising income stream. As can be seen, after a few years, the portfolio's total return first equals its original return — then surpasses it.

What if Interest Rates Fall? (The dark blue line in the graph below represents a scenario of falling interest rates.)

- In this scenario, the portfolio's return rises as bond prices are marked up. Ultimately, as those bonds mature and proceeds are reinvested in lower-yielding bonds, the portfolio's long-term return is lower than it would have been under the first two scenarios. The income stream also

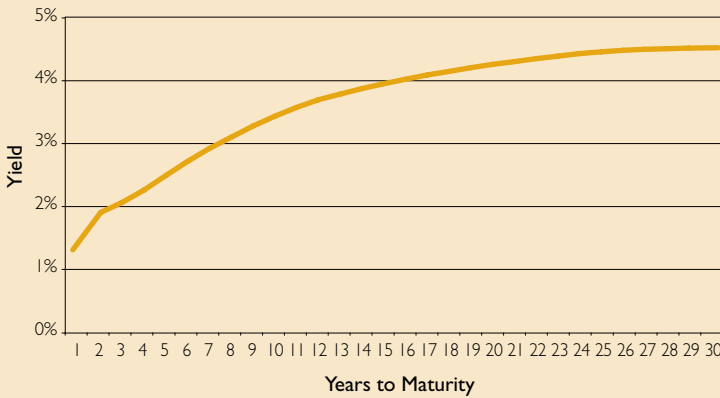
Figure 10: Effect of Interest Rate Changes on a Hypothetical Laddered Bond Portfolio



Basis Point (bp) — A unit equal to 1/100th of 1%. 1% = 100 basis points (bps)
For illustration purposes only, not representative of an actual investment.
Source: Municipal Market Data and Thornburg

Figure 11: Municipal Market Data Yield Curve

Average of Three Years Ending 12/31/09



Source: Municipal Market Data, 3-year Average AAA General Obligation (GO)

decreases, but only gradually, because the longer-term higher-yielding bonds continue to be held in the portfolio and the income generated continues to be the average of all the bonds.

WHY DOES THIS TACTIC WORK?

Let's look at an average municipal bond yield curve (shown in **figure 11**) for three years from 2007–2009. The horizontal axis represents years to maturity and the vertical axis the expected yield. A normal (positively sloped) yield curve means that the shortest investments generate the lowest yields. As years to maturity increase, yield levels rise. Yields rise substantially every year for the first 10 years of the curve in the municipal market.

As **figure 11** shows, the first five to 10 years of the curve is the steepest segment; a steep curve is good for bond investors, because yields will increase rapidly over a short time frame. Beyond 15 years, the yield curve becomes

virtually flat, and little or no increase in yield results even as maturities extend and more risk is assumed.

As maturing proceeds are reinvested at the end of the ladder, the yield of the portfolio is greater than what would be expected by the average maturity of the bonds, because of the positive slope of the yield curve. As a result, over time, a laddered portfolio of bonds tends to produce a portfolio with the income of the longer-maturity bonds but with the price stability of the middle-maturity bonds in the ladder.

Strategies which help manage both price volatility and reinvestment rates are: laddering the portfolio, focusing on short-term and intermediate-term bonds, reinvesting proceeds at the end of the ladder rather than the front, and allowing bonds to naturally age down the yield curve. We believe that the practice of laddering a portfolio throughout all market environments provides the most attractive means of managing both market price and reinvestment risk.

OTHER THINGS YOU SHOULD KNOW

Most bonds have a call provision, which means that the issuer of that bond can repay the bond early. Financial advisors frequently don't understand the issue of callability and how it can affect their clients' portfolios. A goal of a properly structured laddered bond portfolio should be to buy only non-callable bonds, or bonds that are only callable within a few years of maturity (as opposed to having 10, 15, or 20 years between the call date and the maturity of the bond).

For example, consider a New York City bond with a call provision and assume that interest rates have gone down. In this case, the city will call the bond and issue new bonds at a lower interest rate. Obviously, if the new bonds were issued with a four percent yield, the investor would prefer to retain the old bonds that are paying six percent, but if the city has a call provision, the investor must surrender the higher-rate bonds.

More than 90 percent of long-term municipal bonds issued have a 10-year call provision. Therefore, a 20- or 30-year bond paying an above-market yield will probably be called within 10 years. As such, the investor would not be compensated for assuming the greater risk, since the high-yielding bond gets called before its final maturity. Worse, if interest rates rise and the bond's yield is below market, the issuer is not likely to call the bonds and the investor would own the below-market bond all

the way to its final maturity. With a laddering strategy, which uses only limited- or intermediate-range bonds, call risk tends to be lower.

SUMMARY

Laddering short-term and intermediate-term bonds captures most of the return of longer-term bonds, with less volatility. For example, a 10-year ladder can produce the yield and return of 10-year bonds, but with lower risk because of its 5-year average maturity. The strategy also smooths out reinvestment risk since money is being reinvested incrementally throughout a full interest rate cycle. The end result is a portfolio with returns close to those of long-term bonds but with substantially less risk.

It really doesn't matter which way interest rates move. With a laddering strategy, it's possible to get consistent returns. This gives laddering investors a competitive advantage, knowing any time is a good time to build or buy into a laddered portfolio. It's the smart way to increase a portfolio's return while minimizing both market and reinvestment risk.

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