Shaping Up Your Bond Portfolio With Barbells and Ladders

A key to bond management is reducing both reinvestment rate risk and price risk. Two strategies allow for this—while keeping a passive portfolio management approach.

Risks involved in bond investing can be measured using the duration concept: Duration provides a measure for reinvestment rate risk and price risk, and investors can minimize both of these risks for a bond or bond portfolio if they set the duration equal to their investment horizon.

But interest rate changes directly affect durations; investors using this method must closely monitor market interest rate changes. When rates change, investors must reset their portfolios, and this requires active management of bonds and new cash flows. For this reason, professional and individual investors often use less precise, more passive techniques to minimize bond reinvestment rate risk and price risk.

There are two popular passive approaches to bond maturity and yield diversification: the ladder approach, and the barbell strategy.

The Ladder

The advantages of the laddered portfolio are average liquidity and average yield with little active management required. Under this strategy, equal amounts are invested in debt with staggered maturities out to some predetermined maturity date. The bonds are all held to maturity; proceeds of maturing bonds are reinvested in the most distant maturity, and the portfolio remains constantly staggered to that predetermined date to maintain the ladder. The ladder approach attempts to offset or average price risk and reinvestment rate risk over the interest rate cycle in a manner similar to the use of duration. When interest rates rise, the value of existing bond investments fall, but proceeds from maturing issues can be reinvested at a higher rate. The converse is also true: Falling rates increase bond values and liquidity but force investors to reinvest their proceeds at lower rates.

The Barbell

The barbell approach is to invest equal amounts in short-term bonds and longer-term bonds. It is designed to provide liquidity in the short term along with representation in long-term, higher-yielding bonds.

Intermediate-term bonds are not invested in because, according to the strategy, they have the illiquidity of longer-term bonds without the compensating higher yields. The approach assumes that a normal yield curve exists in the bond market, where short-term rates are lower than long-term rates. The barbell offsets price and reinvestment risk for a bond portfolio over the interest rate cycle in the same manner as the ladder approach.

> Barbells can be adjusted by putting more in the short-term or reducing the maximum long-term maturity.

Ladders and barbells can be designed to reflect the risk preferences of the investor. Under the ladder approach, this can be accomplished by lengthening or shortening the time horizon: The shorter the ladder, the shorter the weighted average portfolio maturity. The weighted average maturity of a laddered portfolio is calculated by adding up the individual bond weights, using each maturity face value as a percent of total portfolio face value times the bond's maturity in years (see the box below). Shortening the time horizon means the portfolio will have less invested in longer-term, more volatile bonds. The portfolio will be more liquid and less risky. But with lower risk comes lower return, since under a normal yield curve short-term rates average less than longer-term rates.

The barbell strategy can be adjusted for investors seeking a lower overall risk either by making the short-term end of the barbell a larger proportion of the total bond portfolio or by reducing the maximum maturity of the long-term portion, short-term portion or both portions of the barbell. Changing the proportions or the maximum maturities of the short and long ends of the barbell changes the average maturity of the portfolio. This changes the risk in the same manner as the ladder approach.

How They Work: An Example

The box below provides examples of how ladders and barbells can be constructed. The portfolios all have a total of $10,000 invested at face value.

The 10-year ladder bond portfolio is maintained by holding all bonds in the portfolio to maturity and reinvesting the proceeds of the maturing issue each year into a 10-year maturity bond. In this example, 10% of the face value of the bond portfolio matures each year and is reinvested in 10-year maturity bonds, so that the investor maintains the portfolio structure of investments out to 10 years. The laddering strategy requires no interest rate forecast and is rather mechanical. Time diversification minimizes reinvestment risk exposure over the interest rate cycle; holding all bonds to maturity eliminates the price risk. When rates are high, the proceeds of the maturing bond and the coupon payments of all the bonds—if the investor chooses—are reinvested at the higher rates. When rates are low, reinvestment is at low rates, but this process should average the reinvestment rates over an investment horizon encompassing more than one interest cycle.

ln the example, the 10-year ladder has an average maturity of 5.5 years, which is longer than the three-year average maturity for the five-year ladder. Twenty percent of the five-year laddered portfolio matures each year, compared to 10% for the 10-year ladder, and it is thus more liquid. But the expected average return on this ladder should also be on average lower than the 10-year ladder.

The investor must establish the maturity length of the ladder and the characteristics of the bonds other than maturity, such as whether they are corporate, municipal or other, what their default ratings are, etc.

Bond Strategies

Years to Maturity	50%–50% barbell	75%–25% barbell	10-year ladder	5-year ladder
1	$1,000	$1,500	$1,000	$2,000
2	1,000	1,500	1,000	2,000
3	1,000	1,500	1,000	2,000
4	1,000	1,500	1,000	2,000
5	1,000	1,500	1,000	2,000
6	—	—	1,000	—
7	—	—	1,000	—
8	—	—	1,000	—
9	—	—	1,000	—
10	—	—	1,000	—
11	—	—	—	—
12	—	—	—	—
13	—	—	—	—
14	—	—	—	—
15	—	—	—	—
16	1,000	500	—	—
17	1,000	500	—	—
18	1,000	500	—	—
19	1,000	500	—	—
20	1,000	500	—	—
Portfolio's weighted average years to maturity	10.5 years	6.75 years	5.5 years	3 years

Weighted average years to maturity: The calculation

25%–75% barbell approach

$$6.75 \text{ years} = \frac{\$1{,}500}{\$10{,}000}(1 \text{ year}) + \frac{\$1{,}500}{\$10{,}000}(2 \text{ years}) + \frac{\$1{,}500}{\$10{,}000}(3 \text{ years}) + \frac{\$1{,}500}{\$10{,}000}(4 \text{ years}) + \frac{\$1{,}500}{\$10{,}000}(5 \text{ years}) +$$

$$\frac{\$500}{\$10{,}000}(16 \text{ years}) + \frac{\$500}{\$10{,}000}(17 \text{ years}) + \frac{\$500}{\$10{,}000}(18 \text{ years}) + \frac{\$500}{\$10{,}000}(19 \text{ years}) + \frac{\$500}{\$10{,}000}(20 \text{ years})$$

Five-year ladder:

$$3 \text{ years} = \frac{\$2{,}000}{\$10{,}000}(1 \text{ year}) + \frac{\$2{,}000}{\$10{,}000}(2 \text{ years}) + \frac{\$2{,}000}{\$10{,}000}(3 \text{ years}) + \frac{\$2{,}000}{\$10{,}000}(4 \text{ years}) + \frac{\$2{,}000}{\$10{,}000}(5 \text{ years})$$

The 50%-50% barbell is maintained by reinvesting the money from the maturity proceeds of the maturing short-term bonds into a five-year maturity bond. This maintains the short-term end of the barbell, since after a year the original five-year bond has only four years remaining, and so on. The long-term end of the barbell is kept intact by reinvesting the sale proceeds of the 16-year bond when, after a year, the maturity reached 15 years. This money would be reinvested in a 20-year bond. This process would be repeated annually and all bonds in the short-term portion of the barbell would be held to maturity and all bonds in the long-term portion of the barbell would be sold before maturity. The barbell is essentially two distinct ladders that do not overlap in length of maturity.

What’s the Difference?

The barbell and ladder strategies for bond portfolio management differ practically in two important respects. First, the ladder structure incurs transaction costs only when new bonds are purchased, since no bonds are ever sold on the market but are instead held to maturity and redeemed. Secondly, since all bonds are held to maturity under the ladder (superstitions aside), no capital gains or losses, short-term or long-term, are realized.

> Laddering has lower transaction costs than barbells, but capital gains or losses are not realized.

In the long-term end of the barbell, bonds are sold each year before they reach maturity, and capital losses or gains may be realized. Also, since these bonds are sold rather than held to maturity, additional transaction costs are incurred with the barbell. It may be advantageous to swap bonds for tax purposes, selling bonds valued below face value, realizing a loss for the tax year, and reinvesting the proceeds in longer-maturity, higher-yielding bonds. But it may also be disadvantageous to sell the bonds above face value, realize a gain for the tax year, and reinvest in lower-yielding, longer-maturity bonds. If interest rates are rising and bond prices have fallen, this tax swap is to your advantage. If interest rates are falling and bond prices are rising, the cash flow required to cover your tax liability offsets in part your gain and the net proceeds are reinvested at lower rates. Importantly, this illustrates that a longer-term investment horizon—at least one interest rate cycle—is needed to make the barbell strategy, and to a lesser extent the ladder approach, an effective bond portfolio management technique.

> This is an edited version of an article written by John Markese for the April 1984 issue of the *AAII Journal*. At the time, Markese was director of research of AAII. Markese is also the former president of AAII and currently serves as AAII’s chairman.