



# Treasury Bond Funds: A Risky Riskless Investment?

By John Markese

Confused by this article's title? If so, you probably have a lot of other investors for company. Whenever the stock market seems high or starts bouncing around, thoughts often turn to fixed-income investments, and in purest form, U.S. Treasury securities. Switching to Treasuries is called a "flight to safety" by the financial press, and even foreign investors turn to our Treasury securities when their stock market or currencies tumble. And tumble they did recently in Asia. So if you want more stability in your portfolio and you do not want to bother with purchasing individual Treasury securities, then a Treasury bond mutual fund would appear to be a simple alternative.

Well, an alternative, yes. But simple? Hardly.

Table 1 categorizes by maturity all Treasury bond funds followed in AAIL's *Quarterly Low-Load Mutual Fund Update*. Short-term funds have Treasuries in their portfolios with average maturities up to the three-year range, intermediate funds hold Treasuries with over three years to 10 years in average maturity, and long-term funds hold Treasuries with an average maturity of over 10 years. All these funds are required to have at least 75% of their assets invested in Treasury securities if they want to call themselves Treasury funds, and most have all of their assets invested in Treasuries. Funds with the term "government bonds" in their fund name often carry bonds issued by agencies of the government that are guaranteed by the U.S. government but are not issued by the Treasury.

U.S. Treasury securities have no default risk—they will pay interest and principal on time. Agency issues are guaranteed by the U.S. government, and while any agency might have funding problems, ultimately the U.S. government will make good on the debt. In terms of default risks, unlike corporate and municipal debt, U.S. Treasury securities are riskless.

But a look at Table 2 will give you some hints of another important risk—interest rate risk. When interest rates rise in the bond markets, the prices of existing bonds fall so that the yield to new purchasers is higher—in other words, the same interest payment but a lower price translates to a higher yield, matching new bonds that are issued with higher interest payments. The coupon rate is the annual rate of interest specified as a percentage of face value and is fixed when a bond is issued. Because coupons do not change, bond prices must adjust when available market yields change.

Simply stated, there are two factors that affect the extent to which bond prices will change when interest rates change:

- The longer the time to maturity for a bond, the greater will be the price change if market interest rates change.
- The lower the coupon on a bond, the greater the price change of the bond when interest rates change.

Putting these two effects together, the longer the maturity and the lower the coupon, the greater the impact will be on bond prices when interest rates change. Zero-coupon bonds set the lower limit on coupons, while bonds of 30 years set the limit on maturity—although there are a few bonds of longer maturity. And remember that the relationship is inverse: If interest rates go up, bond prices fall; if interest rates go down, bond prices rise.

Why does the bond's maturity and its coupon affect bond prices? Maturity is a factor because the interest rate change affects a longer time period. Coupons are a factor because the annual coupon softens the effect of the rate change; bonds with low coupons have less to soften the blow.

Table 2 shows just what happens to two bonds, one a zero-coupon bond and one a bond with a coupon of 6% (in the range of current interest rates), when interest rates change by 1%, 2%, or 3%—that is, for a 1% change, if rates rise from a current 6% to 7%, or drop to 5%.

The table also indicates the change for each coupon based on maturity, and the impact maturity has on rate

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changes is obvious. For example, a bond with a 6% coupon and a five-year maturity will drop in price by 4.1% when rates jump by 1% to 7%, while a bond with the same coupon but a 30-year maturity would see a price drop of 12.4%. The same relationship holds for zero-coupon bonds, but the price changes are magnified. For a 30-year zero-coupon bond, a 1% interest rate rise would result in a price drop of 25%—twice the loss of the 6% coupon bond. And if rates rise by 2%, the 30-year zero has a loss approaching 50% of its value.

Keep these relationships in mind when you scrutinize Table 1. First, annual performance figures are given for one-, three- and five-year periods. These are total return numbers, interest plus any capital gains. Three performance facts leap off the page. First, there are significant

performance differences within a maturity category. Second, as you move from short to intermediate to long, returns increase substantially. And third, in each category, the funds that are noted as zero-coupon bond funds have the highest returns. Zero-coupon bond funds are designed to behave like a zero-coupon bond, but because they are a fund with redemptions allowed before maturity, they invest in “stripped” interest payments and principal payments of existing U.S. Treasuries. These “stripped” interest and principal payments of Treasuries act similarly to a zero-coupon bond in that they are purchased at a discount and mature at their stated value.

Standard deviation is a measure of volatility of return. The larger the number, the greater the volatility and, therefore, the greater the risk. The standard deviation reveals

how historically the fund’s actual returns have varied from its long-term average return: Two-thirds of all historical returns have fallen in the range of one standard deviation above and one standard deviation below the average. Look at these numbers for the funds, and you can see them rise as you move down the page to longer maturities. Stop at the largest standard deviation in each category—once again, it’s the zero-coupon bond funds.

The risk index is a relative measure of risk, comparing the standard deviation of each individual fund to the average standard deviation for all U.S. government funds. A risk index of 1.0 is average, 0.5 is only half as risky, and a risk index of 2.0 is twice as risky. The risk index of the American Century Benham Target Maturity 2020 is not a misprint. This fund, a long-term zero-coupon fund, is over five times as risky as the average U.S. government fund.

**Table 1.**  
**Treasury Bond Funds by Maturity**

| Fund Name                               | Total Annual Return* (%) |        |        | Standard Deviation* (%) | Risk Index* | Yield* (%) | Expense Ratio** (%) | Maturity*** (Years) |
|---|--------------------------|--------|--------|-------------------------|-------------|------------|---------------------|---------------------|
|   | 1-Yr.                    | 3-Yrs. | 5-Yrs. |                         |             |            |                     |                     |
| <b>Short</b>                            |                          |        |        |                         |             |            |                     |                     |
| Permanent Port: Treasury Bill           | 4.1                      | 4.4    | 3.6    | 0.2                     | 0.05        | 4.5        | 0.90                | 0.2                 |
| Columbia US Gov't Securities            | 6.0                      | 6.0    | 4.6    | 1.8                     | 0.53        | 5.0        | 0.80                | 1.9                 |
| Vanguard Fixed Inc: Short Term US Treas | 6.7                      | 6.9    | 5.3    | 2.0                     | 0.59        | 5.7        | 0.25                | 1.9                 |
| Scudder Zero Coupon 2000†               | 7.2                      | 7.6    | 6.0    | 4.6                     | 1.33        | 6.1††      | 1.00                | 2.1                 |
| Dreyfus 100% US Treas Short Term        | 6.1                      | 6.4    | 5.1    | 2.0                     | 0.58        | 6.0        | 0.70                | 2.4                 |
| INVESCO Interm Gov't Bond               | 6.5                      | 7.2    | 5.5    | 3.4                     | 0.98        | 5.2        | 1.15                | 2.9                 |
| Amer Cent Benham: Target Mat 2000†      | 7.6                      | 8.7    | 6.7    | 4.7                     | 1.35        | 0.0        | 0.53                | 3.0                 |
| <b>Intermediate</b>                     |                          |        |        |                         |             |            |                     |                     |
| T. Rowe Price US Treas Interm           | 7.6                      | 7.5    | 5.4    | 3.5                     | 1.02        | 5.9        | 0.65                | 4.8                 |
| Amer Cent Benham: Interm Term Treas     | 8.2                      | 7.5    | 5.4    | 3.4                     | 0.99        | 5.6        | 0.51                | 6.0                 |
| Dreyfus 100% US Treas Interm            | 7.0                      | 7.6    | 5.7    | 3.8                     | 1.11        | 7.0        | 0.80                | 6.3                 |
| Vanguard Fixed Inc: Interm US Treas     | 8.9                      | 9.1    | 6.6    | 5.0                     | 1.43        | 6.1        | 0.25                | 7.0                 |
| Amer Cent Benham: Target Mat 2005†      | 11.6                     | 12.5   | 9.4    | 8.7                     | 2.50        | 0.0        | 0.58                | 8.3                 |
| Galaxy Funds II: US Treas Index         | 8.7                      | 8.5    | 6.2    | 4.3                     | 1.24        | 6.1        | 0.40                | 8.3                 |
| <b>Long</b>                             |                          |        |        |                         |             |            |                     |                     |
| Amer Cent Benham: Target Mat 2010†      | 15.7                     | 15.7   | 11.4   | 12.1                    | 3.47        | 0.0        | 0.67                | 13.1                |
| Dreyfus 100% US Treas Long Term         | 8.3                      | 9.7    | 6.9    | 7.0                     | 2.02        | 6.5        | 0.80                | 16.9                |
| Amer Cent Benham: Target Mat 2015†      | 19.9                     | 18.9   | 13.4   | 15.9                    | 4.57        | 0.0        | 0.65                | 18.3                |
| Vanguard Fixed Inc: Long Term US Treas  | 12.4                     | 12.0   | 8.5    | 8.4                     | 2.42        | 6.3        | 0.25                | 20.0                |
| Amer Cent Benham: Long Term Treas       | 13.0                     | 11.8   | 8.2    | 8.5                     | 2.45        | 5.9        | 0.60                | 20.9                |
| Amer Cent Benham: Target Mat 2020†      | 23.5                     | 21.1   | 14.7   | 19.0                    | 5.46        | 0.0        | 0.61                | 23.1                |
| T. Rowe Price US Treas Long Term        | 12.6                     | 11.0   | 7.5    | 8.6                     | 2.48        | 5.8        | 0.80                | 23.2                |
| <b>Indexes</b>                          |                          |        |        |                         |             |            |                     |                     |
| Treasury Bills (30-Day)                 | 5.2                      | 5.3    | 4.4    | 0.1                     | 0.03        | 5.0        | na                  | 30 days             |
| Intermediate-Term Government Bonds      | 8.3                      | 7.8    | 5.6    | 3.9                     | 1.12        | 5.8        | na                  | 5.0                 |
| Long-Term Government Bonds              | 13.7                     | 13.0   | 9.1    | 8.9                     | 2.54        | 6.1        | na                  | 20.0                |

\*As of 9/30/97

\*\*As of fiscal year-end

\*\*\*As of 6/30/97

†Zero-coupon bond funds

††Includes short-term capital gains

**Table 2.**  
**Percentage Change in Bond Prices**

| Years to Maturity | Percentage Change in Bond Prices If Interest Rates Change by 1% (%) |            |            |            |
|-------------------|---|------------|------------|------------|
|                   | Zero Coupon   |            | 6% Coupon  |            |
|                   | Rates Rise  | Rates Fall | Rates Rise | Rates Fall |
| 1                 | -0.9  | 0.9        | -0.9       | 0.9        |
| 5                 | -4.6  | 4.9        | -4.1       | 4.3        |
| 10                | -9.1  | 10.1       | -7.1       | 7.7        |
| 15                | -13.4   | 15.5       | -9.2       | 10.4       |
| 20                | -17.4   | 21.2       | -10.6      | 12.5       |
| 25                | -21.3   | 27.2       | -11.7      | 14.1       |
| 30                | -25.0   | 33.5       | -12.4      | 15.4       |

| Years to Maturity | Percentage Change in Bond Prices If Interest Rates Change by 2% (%) |            |            |            |
|-------------------|---|------------|------------|------------|
|                   | Zero Coupon   |            | 6% Coupon  |            |
|                   | Rates Rise  | Rates Fall | Rates Rise | Rates Fall |
| 1                 | -1.9  | 1.9        | -1.8       | 1.9        |
| 5                 | -9.1  | 10.1       | -8.1       | 8.9        |
| 10                | -17.4   | 21.3       | -13.5      | 16.3       |
| 15                | -24.9   | 33.6       | -17.2      | 22.4       |
| 20                | -31.8   | 47.1       | -19.7      | 27.3       |
| 25                | -38.0   | 62.1       | -21.4      | 31.4       |
| 30                | -43.6   | 78.5       | -22.6      | 34.7       |

| Years to Maturity | Percentage Change in Bond Prices If Interest Rates Change by 3% (%) |            |            |            |
|-------------------|---|------------|------------|------------|
|                   | Zero Coupon   |            | 6% Coupon  |            |
|                   | Rates Rise  | Rates Fall | Rates Rise | Rates Fall |
| 1                 | -2.8  | 2.9        | -2.8       | 2.9        |
| 5                 | -13.3   | 15.6       | -11.8      | 13.8       |
| 10                | -24.9   | 33.7       | -19.5      | 25.7       |
| 15                | -34.9   | 54.6       | -24.4      | 36.0       |
| 20                | -43.6   | 78.8       | -27.6      | 44.8       |
| 25                | -51.1   | 106.7      | -29.6      | 52.5       |
| 30                | -57.6   | 139.0      | -30.9      | 59.0       |

The fund, with a standard deviation of 19.0%, is the leader of the risk pack. Compare this to the standard deviation of the Permanent Portfolio Treasury Bill fund, which at 0.2 is at the other end of the scale. Also, Benham 2020's average maturity of 23.1 years compares to 0.2 years for the Permanent Portfolio. Return is always hand-in-hand with risk.

Yield indicates the net income—interest in this case—after fund expenses, that is distributed to shareholders relative to the average share value of the funds. This is not total return—no capital gains or losses are included. Yield doesn't differ as much as return when maturities are different because of the current nature of the yield curve in our economic/financial environment. The yield curve plots the yield according to maturity for Treasuries. On average,

historically, long-term yields are higher than short-term yields, but the differences in those yields change over time; sometimes long-term maturities are significantly higher, and at other times, such as now, the yield differential is narrower. If you are interested in the income provided by a Treasury fund, make sure you study this relationship.

The yields for the zero-coupon funds are usually zero—no coupon, no yield, but short-term capital gains may be distributed as income. The hitch, however, is that as these bonds increase in value (remember, they were purchased at a discount from maturity value), the increase is treated as ordinary income for tax purposes even though it is not distributed. With these bonds, you can get the tax bill but not the money. If any net capital gains are realized by the fund beyond the amortization of the discount over time, you get the gain and the tax bill.

Expense ratios—fund expenses divided by average share price—eat returns and yields. An abnormally high expense ratio must be overcome by longer maturity, lower coupons, or a combination—in other words, higher risk—in order to be competitive with similar funds that have significantly lower expenses. For example, the Vanguard Fixed Income Security Short-Term U.S. Treasury fund has an expense ratio of 0.25% and an average maturity of 1.9 years compared to the INVESCO Value Intermediate Government Bond fund, with a 1.15% expense ratio and a 2.9-year average maturity. So, the INVESCO fund has a higher expense ratio and a lower yield (5.2% versus 5.7%) in spite of a longer average maturity.

For comparison purposes, at the bottom of Table 1 are performance figures for direct investment in short-term (30-day Treasury bills), intermediate-term (five years), and long-term (20 years) U.S. government securities. These, of course, do not have any continuing expenses as mutual funds do and they are unmanaged—no portfolio manager is trading securities based upon interest rate forecasts or differences in coupons or maturity.

Now perhaps the title “A Risky Riskless Investment” makes some sense:

- The riskiness of a Treasury fund depends on the fund's maturity and the average level of the coupons on the bonds held in the fund.
- If you are risk-averse but still want the “safety” of a U.S. Treasury fund, stay in the short- to intermediate-term maturity range and avoid the zero-coupon funds.
- If you have a maturity target for the money you want to invest—in other words, you will hold the fund to maturity, and price volatility doesn't bother you—then you may want to check out the zero-coupon funds, but don't forget the zero yield/tax bite problem, which is solved if the fund is held in a tax-sheltered account.
- Beware of high expense ratios, they will eat too much of your Treasury bond fund return.

Be alert and savvy enough to avoid crashing in your “flight to safety.” Make sure you check out the fund before you jump on board.

