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Corporate Bond Fund or Individual Treasuries: Which is better?

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ABSTRACT

This paper quantitatively assesses the relative desirability of a low-cost corporate bond fund versus a portfolio of individual Treasury bonds. During the period studied, a low cost short-term investment grade corporate bond fund would have outperformed a similar portfolio of individual Treasury bonds by 71 basis points of risk-adjusted return, gross of investing fees. This suggests that such a bond fund would outperform a portfolio of individual short-term Treasury bonds during the period studied if the fund's fees were no more than 71 basis points higher than those of the Treasury bond portfolio.

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Investors often question whether to implement a bond allocation in their portfolio with individual bonds or by buying a bond fund. The relevant considerations are as follows:[1]

- An investor has more control over credit quality and duration with a portfolio of individual bonds. This is particularly important to investors who desire to implement immunization strategies.
- A bond fund should be able to negotiate dramatically lower transaction fees (i.e., commissions and bid-ask spreads) than can an individual investor.
- A bond fund automatically reinvests coupon payments. A portfolio of individual bonds may need to wait until a "critical mass" of cash has accumulated before reinvesting it cost effectively, thus causing a "cash drag" on the portfolio.
- An individual bond portfolio would avoid paying the management and administrative fees which a bond fund investor would implicitly be subject to.

[1] Note that an irrelevant, but often cited, consideration is that individual bonds, if held to maturity, guarantee return of principal. Donaldson [2005] summarizes the situation well: "We want to emphasize, first, the common misconception that there is a benefit to receiving principal back at maturity. If that principal is simply reinvested and not used to fund a cash flow, there is no benefit in holding a bond to maturity. Consider that the total return of a laddered separate account with *characteristics identical* to those of an open-end mutual fund will deviate from the fund's return *only by the transaction and operational cost differentials*." A related irrelevant argument is that bond funds can have negative returns, while a portfolio of individual bonds is guaranteed to return the principal at maturity. Again, if the portfolio of individual bonds had identical duration and credit risk characteristics to a fund, its return would fluctuate in lock-step with the fund's.

The last consideration above is typically the one which is cited by investors pondering this issue. Ultimately, investors *need to know* whether it is "worth it" to pay the additional fees necessary to buy a bond fund over those of a portfolio of individual bonds. This question is relevant to virtually all individual investors.

This paper uses a quantitative approach to answer the question, "Which is more prudent: buying a low cost bond fund or individual bonds?" For reasons we will elaborate on in the assumptions, we limit the choices of individual bonds to a portfolio of short-term Treasury bonds. However, the approach presented can be used for comparing other prospective bond fund/individual bond alternatives.

Assumptions

1. For the individual bonds, short term bonds will be used, as opposed to intermediate or long-term bonds. Several studies have shown that short-term bonds have better risk-return characteristics than longer term bonds (Domian, Maness, and Reichenstein [1998], Ilmanen, Byrne, Gunasekera, and Minikin [2004], and Plecha). Further, Plecha showed that short-term bonds tend to have lower correlations with major stock indexes than longer-term bonds, suggesting that they are better portfolio diversifiers. Because of those two considerations, this paper limits consideration only to short-term bonds for the individual bond portfolio.
2. Because few individual investors are able to cost-effectively purchase portfolios of different individual corporate bonds large enough to adequately "diversify away" credit risk, we limit consideration of individual bond portfolios to those consisting only of Treasury bonds, rather than corporate debt.

3. Within an investing style (i.e., a certain duration and credit risk level), this paper assumes that bond funds can be judged primarily on the basis of their investing fees (i.e., lower fees equals better expected performance net of fees, all else being equal). Reichenstein [1999] and Blake, Elton, and Gruber [1993] showed that the bond market is so efficient that investing fees tend to be a dollar-for-dollar drag on fund performance (i.e., active management doesn't seem to add value in bond funds).
4. The transaction costs incurred by both a bond fund and the individual Treasury bond portfolio are roughly equivalent, as a percentage of assets. If the individual Treasury bonds are bought at auction, its transaction costs may very well be zero. But the bond fund is likely to realize significant economies of scale from its buying power (i.e., it is likely to be able to negotiate dramatically lower commissions and bid-ask spreads than the individual investor). Either way, for a low cost bond fund, the transaction costs are likely to be quite small, compared to the management costs of the fund. Thus we assume the difference to be immaterial.
5. We use data from Ilmanen, Byrne, Gunasekera, and Minikin [2004].

Calculation

M^2 alpha, my preferred measure of relative risk-adjusted return, is developed in the Appendix. Equation 3, along with the data from Exhibit 1 in Ilmanen, Byrne, Gunasekera, and Minikin [2004], was used to populate Table 1

below. Because M^2 alpha is calculated relative to short-term Treasuries, the M^2 alpha for short-term Treasuries is, by definition, zero.

	1 mo LIBOR	1-3yr Treasury	7-10yr Treasury	1-3yr Corp AAA/AA	7-10yr Corp AAA/AA	1-3yr Corp A/BBB	7-10yr Corp A/BBB	1-7yr High Yield	7-10yr High Yield	Stock Market
Mean 85-02	6.27%	7.30%	9.59%	7.94%	9.60%	7.98%	9.62%	8.77%	8.79%	14.76%
Stdev 85-02	0.54%	1.90%	6.46%	1.82%	5.67%	1.86%	5.29%	5.38%	7.65%	15.48%
M^2 alpha		0.00%	-0.05%	0.71%	0.09%	0.72%	0.17%	-0.15%	-0.40%	0.01%

Table 1

The M^2 alpha values in table 1 show the increase in risk-adjusted returns – above that of short-term Treasuries – that each of the several bond categories would have earned – gross of fees – during the period studied (i.e., January 1985 through February 2002).

Discussion and Conclusion

It is clear from table 1 that *investment grade* (i.e., those rated BBB and higher) short-term corporate bonds offered the greatest increase in risk-adjusted return over that of short-term Treasuries. This is convenient because higher quality, shorter maturity bonds tend to have lower transaction costs than lower quality, longer maturity bonds (per Chakravarty and Sarkar [2003]).

However, the goal of this analysis was to compare a portfolio of individual bonds with a bond fund. Table 1 shows that, before investing fees are considered, a short-term investment grade corporate bond fund would have outperformed short term individual Treasury bonds on a risk-adjusted basis by about 0.71 percentage points annually.

If one assumes that the transaction costs in each case are similar, then using a short-term investment grade corporate bond fund is the better option if (and only if) one can be found with fees of about 71 basis points or less.[2]

There are currently several bond funds available to US retail investors which meet this criterion.[3] Therefore, for the US individual investor, it seems clear that a low cost short-term investment grade corporate bond fund was a better holding during the period studied than a short-term portfolio of individual Treasury bonds would have been.

To the extent that the period studied is representative of future results, it seems prudent for US individual investors to utilize low-cost short-term investment grade corporate bond funds rather than individual Treasury bonds to implement their portfolio's bond allocation.

[2] The "fees" referred to here are any fees which the individual Treasury bond portfolio would not be subject to. These include, but are not limited to, management fees, administration fees, and distribution fees.

[3] For example, the expense ratio on the Vanguard Short-Term Investment Grade Fund Investor Shares (VFSTX) is only 0.18%. Investors with at least $100,000 to invest qualify for Admiral Class shares of the same fund (VFSUX), which have an expense ratio of 0.11%.

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Appendix

Risk-Adjusted Return Measure

In order to analyze the risk-adjusted returns of the various alternatives, an obvious approach might be to use the Sharpe Ratio.

If you define "performance differential" as a portfolio's excess return over the "risk-free" rate, then the Sharpe Ratio is just the mean of the performance differential divided by the standard deviation of the portfolio's performance (Sharpe [1994]).[4]

$$\frac{\overline{(r_p - r_f)}}{\sigma_p} \tag{1}$$

Where r_p is the return of the portfolio, r_f is the "risk-free" return, and σ_p is the standard deviation of the portfolio's performance.

The idea is that you are measuring the portfolio's excess return per unit of risk (as measured by standard deviation).

While the Sharpe Ratio does indeed give a measure of risk-adjusted return, it does so using a dimensionless ratio. The M^2 measure (see Modigliani and Modigliani [1997]) turns this value into something more meaningful.

[4] Actually, Sharpe originally proposed using the mean of the performance differential divided by the standard deviation of the performance differential. Sharpe's version is rarely used by practitioners. In practice, both Sharpe's version and the typically used version usually give very similar results.

M^2 is a measure developed by Franco and Leah Modigliani (the "square" simply refers to the fact that two Modigliani's developed it). M^2 is simply a restatement of the Sharpe Ratio. It expresses a portfolio's risk-adjusted excess return in a manner which is quite meaningful and easy for the lay person to use – in units of percent return. The measure compares a portfolio's performance to some reference portfolio (the benchmark used is often, but not necessarily, "the market"). Thus, any M^2 statistic gives the excess return of a portfolio adjusted to a risk/volatility which is the same as some reference/benchmark portfolio.

$$M^2 = \frac{\sigma_{ref}}{\sigma_p}(\overline{r_p - r_f}) \tag{2}$$

Where r_p is the return of the portfolio, r_f is the "risk-free" return, σ_p is the standard deviation of the portfolio's performance, and σ_{ref} is the standard deviation of the "reference."

Ranking the performance of various portfolios using M^2 will always give the exact same ranking as if the Sharpe Ratio had been used. The reason one might prefer using M^2 is because it allows a more intuitive interpretation, since it is in units of percent returns, rather than being a unitless ratio.

As useful as M^2 is, it would be even more useful to convert it to a measure of risk-adjusted excess return *above that of the reference/benchmark*. I call this statistic "M^2 alpha." Thus, for example, a portfolio with a M^2 alpha of 1.5% had risk adjusted returns of 1.5 percentage points above the reference/benchmark.

$$M^2 alpha = \frac{\sigma_{ref}}{\sigma_p}(\overline{r_p - r_f}) - (\overline{r_{ref} - r_f}) \tag{3}$$

Where r_p is the return of the portfolio, r_f is the "risk-free" return, σ_p is the standard deviation of the portfolio's performance, σ_{ref} is the standard deviation of the "reference/benchmark" (which is often "the market,") and r_{ref} is the return of the reference/benchmark.

