
Investing in Bond Funds: What's in YOUR bond fund?

By: Bruce A. Hyde and Steven Saunders

Summary

Investors who rely primarily on duration in choosing a bond fund may inadvertently introduce extension risk to their bond portfolio. Extension risk occurs when the low duration assigned to a portfolio's callable bonds "extends" to their respective maturities due to the unlikelihood of the bonds being called as market interest rates rise. Over the past 30 years bond market yields have trended down to a nadir reached in 2012. During this period investors correctly focused on a bond's yield to call as the likelihood of this occurrence was higher in a declining interest rate environment. Since then, the Federal Reserve's Zero Interest Rate Policy response to the Great Financial Crisis of 2008 is nearing its end as demonstrated by the Fed's end to asset purchases in October 2014. Perceptively, fixed income investors have become increasingly worried about rising interest rates and the negative impact on bond market prices. In anticipation of rising rates, investors focused on the purchase of short term, lower duration bond funds in an attempt to mitigate interest rate risk. However, investors need to understand what types of bonds are held in their fund's portfolio and should pay specific attention to the fund's allocation to callable bonds. As we will demonstrate, a rising interest rate environment could have additional negative impacts on the value of bond funds which hold a significant amount of callable bonds.

Fixed Income Investing 101

Investing in fixed income securities is generally approached in two manners: purchasing individual bonds (either by oneself or via a managed account) or purchasing bond mutual funds. Fixed income investing through mutual funds has generally been the approach for the retail investor, driven by the advantages of broad security diversification, modest cost and professional oversight. As most investors know, the movement in the price of a bond and movements in interest rates are inversely correlated. For example, if a bond was issued yielding a current market rate of 4%, but there was an immediate upward move in interest rates the next day to 5%, the bond issued yesterday would be worth less than the bond issued today at the higher current interest rate. In order to make yesterday's bond comparable in terms of its yield to today's bond, its price must be reduced such that

the purchase price and all future discounted cash flows (i.e. coupon payments) equate the yield on those cash flows to current market rates.

In addition, the magnitude of change in a bond's market price is affected by the length of time until a bond's maturity. Longer maturity bonds are more sensitive to interest rate changes than are shorter maturity bonds. This is due to the fact that there is much more time, i.e., many more interest payments in the future, that will be made at interest rates different than the current prevailing interest rate. Understanding the sensitivity to interest rates is an important aspect in knowing how safe your bond investment is and in periods of extreme interest rate movements, it is perhaps more important than the creditworthiness of the issuer of the bond.

In order to measure a bond's sensitivity to interest rates, mathematicians have devised a calculation known as duration. Although a fairly complex calculation (with several iterations explained in more detail below), duration is a measurement that can be expressed as a percentage change in the value of a bond given a 1% change in interest rates. For example, if a bond has a duration of 8.5 years, it means that if interest rates were to increase/decrease by 1%, the investor would expect that the value of the bond would decrease/increase by approximately 8.5%.

Based on this dynamic, in a period of falling interest rates, the investor will favor bonds with a greater duration since their prices will rise more than those of bonds with a lesser duration. Conversely, during periods of rising interest rates, the investor will favor bonds with a lesser duration since they will fall in value less than a bond with a greater duration.¹ Given that most investors acknowledge that we are in a period of extremely low interest rates and it is likely that interest rates will rise at some point (although central banks continue to project supporting lower interest rates for some period of time), many investors have taken the defensive position of reducing the average maturity and duration of their fixed income portfolios in an attempt to guard against rising rates. As a result, short-term to intermediate-term bond funds have seen the greatest inflows of capital over the last several years.

Based on the above generalizations, it would seem that bond investing should be easy: when rates are going up, shorten duration; when rates are going down, lengthen duration. Things are not so simple, however, as, there is another topic in the realm of fixed income that needs to be explored next: bonds that contain call options.

¹ Assuming a parallel shift in the yield curve, meaning all maturities along the yield curve increase/decrease by the same amount.

Fixed Income Investing 201

Most bonds are issued with a fixed coupon and a finite maturity date. These are generally known as bullet maturity bonds and are not callable by the issuer. Issuers have created another variety of bond that enables them to be able to repurchase the bond prior to maturity, should they desire. These are termed callable bonds. The purpose of issuing a callable bond is to provide the issuer the ability repurchase bonds during times of falling interest rates as a way to refinance their debt and reduce overall borrowing cost. This “option” exposes the investor to reinvestment risk since he/she originally bargained for a yield until final maturity, but if interest rates decline and the bond is called by the issuer, the investor will have to reinvest the proceeds in a new, lower yielding bond. Although reinvestment risk is the primary concern for holders of callable bonds, the holders are exposed to another type of risk, known as extension risk.

Extension risk generally occurs in a rising rate environment and is the risk of having to hold a bond past its call date (perhaps until its final maturity) in the event the bond is not called. In order to compensate the investor for these risks, callable bonds typically have yields to the call and to maturity that are greater than the yield for another bond of comparable final maturity date.

In the bond market, prices, yields, maturity and duration are typically quoted to their shortest time period, as if the bonds were to be called (i.e., to demonstrate the worst potential result for the investor). Mutual funds typically report their portfolio metrics in a similar manner. Therefore, if a mutual fund contained bonds that were callable, the yields, average maturity and duration of the fund would reflect the earliest of the call date or maturity for those bonds. That analysis seems fair, especially given that we have been in a declining interest rate environment for the last 30 years. But as stated earlier, it is generally thought that interest rates, at some point, will begin to rise and return to longer term averages. If this were the case, how will that affect mutual funds that hold callable bonds?

We can analyze a very popular, very large, low cost municipal bond mutual fund to demonstrate how callable bonds can impact a portfolio. The same analysis would hold true for a taxable bond fund as well.

Bond mutual funds that are segmented according to average maturity are typically in one of three categories; 1) Short-term (1-5 years), 2) Intermediate-term (5-10 years) and 3) Long-term (10+ years). The fund we will review is described as an intermediate-term fund that holds a diversified portfolio of municipal bonds. Pertinent data about the fund

as per Morningstar's website and Bloomberg are detailed below (as of 09/30/2014):

Intermediate Bond Fund	
AUM	\$39 billion
Holdings	4,268
Av. Effective Duration	4.8 years
Av. Effective Maturity	5.0 years

Source: Morningstar

Effective Maturity	
Under 1 Year	7.13%
1 - 3 Years	16.09%
3 - 5 Years	20.70%
5 - 10 Years	46.24%
10 - 20 Years	4.64%
20 - 30 Years	4.24%
Over 30 Years	0.85%

Source: Bloomberg

Upon review of this data an investor may take the view that this intermediate term fund is appropriately named and that its maturity and duration are actually on the shorter end of the maturity spectrum for an intermediate term fund. Further, an investor may come to the conclusion that the fund has limited extension risk since the maturity and duration are very similar. However, understanding that effective maturity does not mean final maturity, but rather the maturity to which the bond is priced, does not explain the possibility of extension risk. Effective maturity is derived from how the bond is trading in the current market environment (in this case most of the bonds within the portfolio are trading to their call dates due to the low interest rate environment). As we have seen, the current market environment can change very quickly, and thus the effective maturity can also change very quickly. When examining data that is available from the fund company, a different view of the fund may be derived that is more descriptive of the actual extension risk within the fund.

Upon closer inspection, many of the bonds held in this fund are callable bonds and if the above chart were prepared based upon the bonds' final maturities as per Bloomberg, the data looks quite different (as of 09/30/2014):

Stated (Final) Maturity	
Under 1 Year	2.67%
1 - 3 Years	7.53%
3 - 5 Years	8.83%
5 - 10 Years	29.21%
10 - 20 Years	44.27%
20 - 30 Years	6.06%
Over 30 Years	1.43%
Average Stated Maturity	11.0 years

Source: Bloomberg

Note that in this case, in excess of 50% of the holdings in the portfolio have final maturities of greater than 10 years; very different data than represented in the initial chart where only 10% of the bonds are represented to have maturities of greater than 10 years. So, which is the *real* average maturity of the bond fund?

The answer lies in estimating what future interest rates may be. In an environment of falling interest rates, many, if not most, of the portfolio's callable bonds are likely to be repurchased by the issuer (arguing that the lower average maturity is "more correct"). However in an environment of rising interest rates it is much less likely that the bonds would be repurchased and the true average maturity of the fund is likely to be significantly longer than advertised. And remember also that in a rising interest rate environment not only will average maturity of the fund lengthen, but as the maturity lengthens, so does the duration, i.e., the interest rate sensitivity increases. The net result to the holder of this mutual fund in a rising interest rate environment is a diminution of market value due to the direct effect of increasing interest rates, compounded by the extension risk associated with the fund's large callable bond component.

To put this theory into practice, we ran different scenarios that could happen within the bond market to illustrate the possible returns over a 90 day time period. Scenario 1 is a base case scenario in which interest rates do not change over the 90 day period and the return is largely a result of coupon payments. Scenario 2 increases interest rates by 1% along every point of the yield curve over the course of 90 days (a parallel shift). Coupon payments are still received, but the return reflects the declining value of the underlying bonds from the increase in interest rates. Scenario 3 is a more dramatic shift with interest rates increasing 2% over the course of 90 days. All scenarios are run as of 09/30/2014.

Scenario 1	% Change	Duration
No Change	0.66%	5.55 years

Scenario 2	% Change	Duration
1% increase in rates	-4.84%	5.87 years

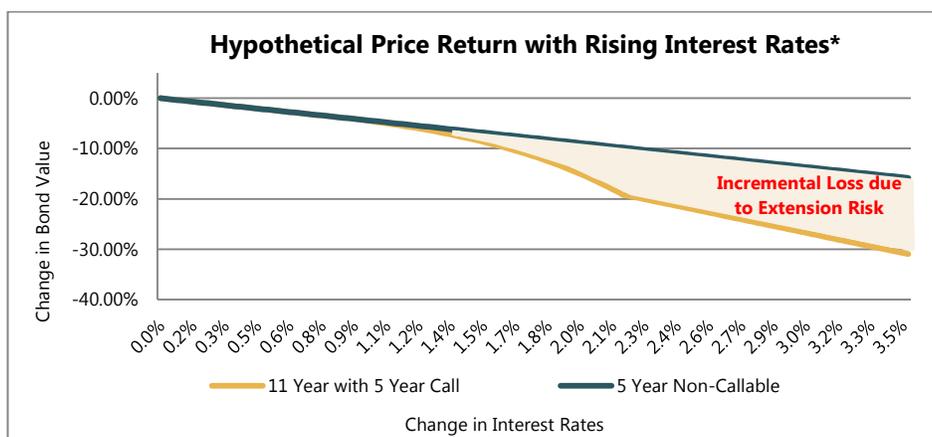
Scenario 3	% Change	Duration
2% increase in rates	-10.19%	6.07 years

*Scenarios run as of 09/30/2014
Source: Bloomberg*

As the output of these scenarios show, even a small increase of 1% can have dramatic effects on the value of the portfolio. If rates were to

increase 1% over a 90 day period (something that did happen in 2013 as the Federal Reserve began to talk about scaling back asset purchases) this fund could lose almost 5%. In addition, the duration would increase from 5.6 years to 5.9 years due to the extension risk inherent in bonds (making it more sensitive to any future rate increases). In the more dramatic Scenario 3, the fund is estimated to decline over 10% and experiences a duration increase of over 0.5 years.

While the output from the above scenarios demonstrates a substantial market price loss from a total return perspective, an increase in duration will likely occur in a more gradual manner. If rates eventually rise above the levels suggested in the scenarios and return to what are considered more “normal” rates, extension risk increases. A sustained climb in interest rates back to longer-term averages could ultimately lead to a point where almost none of the bonds within the fund would be called, resulting in losses far in excess of what is shown above. In such an outcome the final maturity increases from 5 years to 11 years and duration increases from 4.8 years to an estimated 9 years.² With long term average rates about 3% higher than today’s rates, an increase of this magnitude implies an instantaneous shock of negative 27% to the portfolio as shown in the chart below.



*Calculations assume an average coupon rate of 4.5%, average price of \$110.00, call option at 09/30/2019 and a final maturity at 09/30/2025. Changes in prices are derived from the duration of each bond and assume the probability of extension increases exponentially after a 1% increase in rates until the market rate approaches the coupon rate, at which time it is assumed that the bond will not be called and the price is calculated off the final maturity.

In practice the loss is not likely to be as high as 27% over a rate increase cycle as current bond holdings continue to pay interest and those payments and maturing bond proceeds are reinvested in fixed income

² If the entire fund were viewed as a single bond and all coupons, maturities and yields were averaged, the estimated average final maturity of the fund would have a date of 09/30/2025. This estimated final maturity paired with the fund’s average bond price of \$110.47 and average coupon of 4.46% give us the “yield to final maturity” for the fund of 3.32%. We then use all of these data points as inputs for our “duration to final maturity” calculation which yields an estimated duration of approximately 9 years.

securities with higher interest rates. Nonetheless, the protection sought after by investors through a short duration fund may prove less worthy due to the inclusion of callable bonds.

Conclusion

In conclusion, it is imperative that one spends the extra time to fully understand what resides inside the bond mutual fund that they own or are considering for purchase. The data that was presented in the case above is not always readily discoverable and the terminology may be misleading. Remember also that since there are many bond funds which compete for investors' business, yields and returns are the data points upon which investors typically focus. How does a bond fund manager generally deliver higher yields and returns? By extending average maturities or lowering credit quality. The investor needs to be aware of these issues and should be diligent in performing their own research or work with a professional financial advisor to ensure they fully understand the risks associated with their investment.

Bruce A. Hyde, CPA is a Wealth Advisor and Steven Saunders, CFA® is a Portfolio Advisor at Round Table Wealth Management. Round Table Wealth Management is a leading independent, fee-only Registered Investment Advisor (RIA) with offices in New York, New Jersey, and Connecticut. Round Table operates as a Multi-Family Office with approximately \$1 billion in assets under management (as of December 2014) and serves clients throughout the US as well as internationally. Founded in 1999 Round Table offers a wide range of advisory services and investing solutions that are tailored to the specific needs and requests of each client.