



The Impact of Interest Rates on Bond Funds

“Fixed” Income

The supposed safety of a bond can seem very appealing. Let’s say you decide to buy a bond from an issuer with a 10 year maturity for \$100,000. Every six months you receive a coupon payment of 2% or \$2,000 (that’s 4% a year) until finally after ten years you receive back the face value of the bond – your original \$100,000 investment. It might appear that the only real risk is if the issuer can’t pay you back (default). Since bond issuers are generally governments or municipalities this risk seems palatable.

Unfortunately, this is not the sole source of risk in bonds. Suppose that after five years of holding this bond you wish to redeem the \$100,000 you initially invested. All you have to do is sell the bond to another investor– in five years he will receive the \$100,000 face value and in the meantime he will get the \$2,000 semiannual coupon payments. This bond should be worth at least \$100,000 to him, right?

Wrong. The market has changed and now the issuer is offering 5 year bonds for \$100,000 that pay 8% annually (\$4,000 every 6 months instead of \$2,000). Interest rates have risen. Why would the new investor pay \$100,000 for a bond that only pays \$2,000 every six months when he can pay \$100,000 to the original issuer and receive \$4,000 coupon payments every six months? Both investments carry the same amount of default risk and have the same initial cost, one just pays out more. He has a fair point. You are forced to sell your bond for substantially less than you paid for it, and suddenly what seemed like a “fixed” investment to you turns out to be anything but.

“...investors are led to believe that the very name ‘bond’ must carry some special assurance against loss. This attitude is basically unsound, and on frequent occasions is responsible for serious mistakes and loss.”

– Benjamin Graham, *Security Analysis*

“Fixed Income,” the very moniker conjures up the perception of safety and stability. An investment that provides both a scheduled payout- however large, small or infrequent- and returns your initial investment seems like a sure winner.

But the apparent safety of investing in bonds dissipates quickly upon further inspection. “Low risk” bonds have provided a safe haven for a generation of mutual fund investors. However, as interest rates continue towards historic lows, questions are beginning to mount about how these funds might perform in the wake of a new normal.

Exactly how much has the decline in interest rates benefited performance for bond funds over the last quarter century? And what are the implications of losing this benefit going forward?

The ensuing Figure 1 illustrates the relationship between the Fidelity Spartan Long Term Treasury Bond Index Fund (FLBAX, current duration 17.53) against the prevailing 20-year yield over the past 5 years, demonstrating how changes in the 20-year yield affect corresponding changes in the value of the fund.

A bond with an average duration of 4.0 years implies that if the prevailing interest rate drops 1% the value of the bond will increase 4.0%. If rates increase 1% the value of the holding will decrease by 4.0%.

The value of a bond held at a given point in time is highly dependent on the difference between the inherent rate of the bond and the prevailing rates offered at that time. As interest rates increase above the rate a bond pays the value of that bond decreases; the opposite is true as rates decrease. This interest rate sensitivity is known as duration.



Figure 1. Fidelity Long Term Treasury Bond Index vs. the 20- year Treasury bond yield

The shaded area in the figure above shows the period between March and June of 2012. During this timeframe the 20-year yields decreased from 3.13% to 2.13%. Over the same period, the value of the Fidelity Spartan Long-Term Treasury Bond Index (which based upon its duration, should increase approximately 17.53%) rose

from 10.80 to 12.66, a 17.22% increase.

It's important to examine the implications this can have for the investor. Figure 2 below shows historical interest rate movements since 1978.



Figure 2. Historical yields for 1-, 5-, and 10-year Treasury bonds

It's readily apparent from the chart that interest rates have steadily declined for the past 30 years. Given the inverse relationship between bond yields and bond fund prices, these funds have been riding a 3-decade bull market. But what happens if that ride ends?

Implications for the Future

Perhaps the most vital step in the investment process is establishing appropriate expectations. And while it is important to keep in mind that *past performance is not indicative of future results*, prior performance history can provide some insight as to what range of results one might experience going forward. If the future is similar to the past then the investment should perform as expected, and if the future is more favorable than the past then the investment performance should exceed expectations.

The danger arises when the future is worse than the past. Investment risk can be defined as the difference between anticipated worst loss and realized worst loss, and setting those expectations based on the past 30 years could prove to be particularly treacherous in this case.

continue on their historic pace of decline would require them crossing into negative territory.

We can already see this in the 1 - year yields which have effectively hit the "zero-floor". Even if rates did continue to decline into negative territory, in order for the future to resemble the past they would have to continue to drop well below -10%.

Now ask yourself what is the duration of the typical bond fund out there – how might they be affected if interest rates stop falling and their 30 year tailwind vanishes.

And what happens if rates increase and that tail wind becomes a headwind?

There is an estimated \$3.5 trillion allocated to bond-based mutual funds, most of which have benefitted from plummeting interest rates which have buoyed performance.

Fidelity currently offers over 50 bond funds under their name, while another 3,000 such funds from the likes of Blackrock, JP Morgan, and Vanguard are readily available for investment. In total, it is reported that approximately \$16 trillion dollars are held by mutual funds, of which 22% represent allocations to bonds funds.

The table in Figure 3 shows a listing of the bond mutual funds offered by Fidelity which have a Morningstar rating of 4 or 5. These represented the highest grade Fidelity bond funds available for investment today and total over \$94 billion in invested assets.

“Investment risk is the difference between anticipated worst loss and realized worst loss”

Why might the near future be any different?
Current rates are so low that for them to

Mutual Fund Name	Fund Ticker	Average Duration	Morningstar Rating	Net Assets (\$M)	5 Year Total Return	2% Rate Drop Return	Return Ratio	20y Yield Correlation
Fidelity Capital & Income Fund	FAGIX	4.09	★★★★★	11,311.73	51.3%	8.18%	16%	-0.4565
Fidelity Massachusetts Fund	FDMMX	6.63	★★★★★	2,202.69	25.7%	13.26%	52%	-0.7783
Fidelity Michigan Municipal Income Fund	FMHTX	5.3	★★★★★	584.82	24.3%	10.60%	44%	-0.7694
Fidelity Intermediate Treasury Bond Index	FIBAX	6.5	★★★★★	1,345.65	25.9%	13.00%	50%	-0.8782
Fidelity Intermediate Treasury Bond Index	FIBIX	6.5	★★★★★	1,345.65	25.3%	13.00%	51%	-0.8819
Fidelity GNMA Fund	FGMNX	2.09	★★★★★	6,059.94	21.3%	4.18%	20%	-0.7840
Spartan Long-Term Treasury Bond Index	FLBAX	17.53	★★★★	1,316.50	53.5%	35.06%	66%	-0.8851
Fidelity High Income Fund	SPHIX	3.44	★★★★	5,329.74	41.7%	6.88%	17%	-0.5378
Fidelity Tax-Free Bond Fund	FTABX	6.58	★★★★	2,814.78	28.7%	13.16%	46%	-0.7496
Fidelity Municipal Income Fund	FHIGX	6.49	★★★★	5,718.82	28.3%	12.98%	46%	-0.7555
Fidelity Ohio Municipal Income Fund	FOHFX	6.91	★★★★	603.76	26.2%	13.82%	53%	-0.7529
Fidelity Arizona Municipal Income Fund	FSAZX	6.17	★★★★	151.91	27.1%	12.34%	46%	-0.7586
Fidelity Strategic Income Fund	FSICX	5.02	★★★★	8,425.48	31.0%	10.04%	32%	-0.6235
Fidelity Pennsylvania Fund	FPXTX	5.94	★★★★	462.96	26.2%	11.88%	45%	-0.7547
Fidelity Total Bond Fund	FTBFX	5.13	★★★★	20,143.05	26.7%	10.26%	38%	-0.7303
Fidelity New Markets Income Fund	FNMIX	6.81	★★★★	4,519.10	38.9%	13.62%	35%	-0.7115
Fidelity Floating Rate High Income Fund	FFRHX	0.29	★★★★	11,963.12	21.2%	0.58%	3%	-0.5525
Fidelity Maryland Municipal Income Fund	SMDMX	6.47	★★★★	204.09	21.3%	12.94%	61%	-0.7913
Fidelity Connecticut Municipal Income Fund	FICNX	6.23	★★★★	452.79	22.2%	12.46%	56%	-0.7791
Fidelity Government Income	FGOVX	4.74	★★★★	4,421.91	17.9%	9.48%	53%	-0.8362
Fidelity Limited Term Municipal Fund	FSTFX	2.81	★★★★	3,906.35	10.5%	5.62%	54%	-0.7281
Fidelity Limited Term Government Fund	FFXSX	2.48	★★★★	357.07	7.6%	4.96%	65%	-0.7846
Fidelity Short-Term Treasury Bond Index	FSBAX	2.58	★★★★	863.41	8.0%	5.16%	65%	-0.7910

Figure 3. Fidelity Bond Funds with a Morningstar rating of 4 or 5

The table shows the fund ticker along with its current duration and total return over the last 5 years. For instance, the Fidelity Massachusetts Fund has returned a total of 25.7% from May of 2010 to May of 2015. Over this same time period the yield on 20 year US government bonds has fallen roughly 2% (2.16% to be exact).

The expected return of a bond due to interest rate change is given by:

$$r = -\Delta y \times D$$

where:

Δy = the change in interest rate yield

D = duration

Using the information in the table we can get a rough estimate of how much fund performance has been affected by changes in interest rates. Using a rate drop of 2% and 6.63 as a proxy for the historic duration of FDMMX we can estimate that from the 2% rate drop alone, the Fidelity Massachusetts Fund should have made at

least 13.26%. That is more than half of the total return it actually achieved.

Furthermore we can see that the correlation in the value of that fund to 20 year yields is quite strong at negative 0.7783.

Of the 23 Fidelity bond mutual funds with a 4 or 5 star rating, estimates show that 16 owe at least 40% of their 5 year total return to the recent drop in yields.

The Fidelity Massachusetts Fund is not the only fund that relied heavily upon the declining interest rates to drive performance. In fact, the average 5 year total return for these funds is 26.5%, while the current average duration across all the funds is 5.51. That implies that a yield increase as low as 2.4% (which would bring 20 year yields up to just 4.75%) could wipe out half of the gains made in the last 5 years for the entire group.

Also worth noting is that none of the highly rated Fidelity bond funds have a ‘negative’ duration – that is they are not set up to increase in value due solely to an increase in rates. This is likely to be true for the vast majority of bond funds due to short-selling regulations on mutual funds. There is also likely to be some survivorship bias as funds with a negative duration would tend to underperform and close during a period of sustained declining interest rates.

Summary

The analysis provided above is by no means meant to be exhaustive, and stands only as a prologue to more in-depth research. Of course there is no way to accurately predict what the future interest rate environment might look like, but it is pivotal to understand how this environment has affected the asset class in the past and how changes could affect the future.

It’s also important to gain some insight as to how much past performance is really attributable to manager skill vs. a ‘rising tide’ which has raised all ships.

This investigation is not intended to provide answers as much as it is designed to incite the right questions. In order for bond funds to enjoy the same tailwind they’ve had for the last generation, interest rates would have to drop below 0% in the next 5 years and continue down lower than *negative 10%* by 2045.

And while this scenario is certainly not impossible, investors should be prepared to ask-*what if the future isn’t quite as accommodating as the past?*