What is Interest Rate Risk?

Part Two of a Three Part Series on Fixed Income

Part 1 of our series on fixed income investing introduced the relationship between fixed income yields (that is the periodic cash flows that you receive) and the corresponding bond's price. This fundamental principle is key to understanding how bonds behave and some of the risk they have.

Recall that when yields rise, all else equal, bond prices fall—and vice versa. The risk that an investment's price will decline when yields rise is called "interest rate risk." There are other types of risk in fixed income investing, including credit risk, call risk, prepayment risk, and liquidity risk. However, these risks tend to be specific to certain sectors or securities. For example, credit risk is far greater with corporate bonds than U.S. Treasury bonds. Likewise, prepayment risk is more common in mortgage-backed bonds.

Interest rate risk, on the other hand, is common to all bonds and all fixed income investors. So, in Part 2 of our series, we're focusing on how interest rate risk is measured, and how to think about managing interest rate risk in your portfolio.

How is interest rate risk measured?

The standard measure of interest rate risk is called "duration." Duration is an estimate of a bond's price sensitivity to a given change in the benchmark interest rate. It is expressed as a number of years, which reflects the fact that bonds with longer maturities, or bond funds with longer average maturities, will be more price-sensitive to changes in interest rates.

In simple terms, the duration of a bond or bond fund is multiplied by the change in interest rates to estimate the change in price.

Example when rates increase	
Starting value of bond portfolio	$10,000
Duration of portfolio	4 years
Increase in rates	+ 1%
Decrease in price	-4%
Ending value of bond portfolio	$9,600

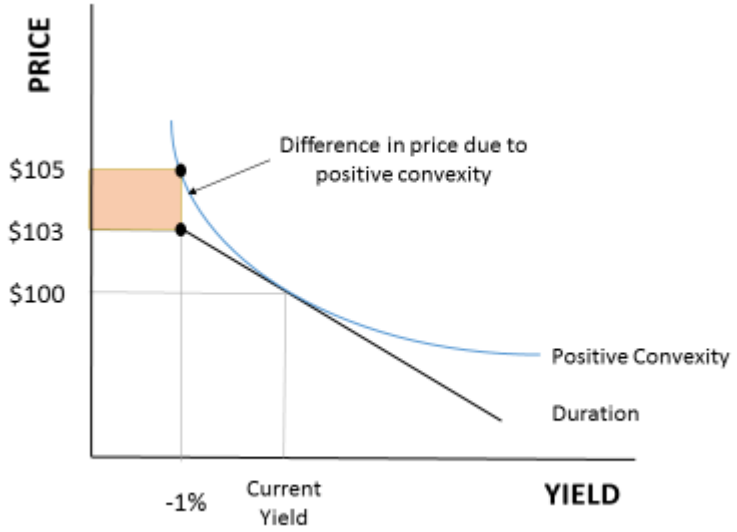
Example when rates decrease	
Starting value of bond portfolio	$10,000
Duration of portfolio	4 years
Decrease in rates	- 1%
Increase in price	4%
Ending value of bond portfolio	$10,400

Of course, it can't be that simple. In addition to changing the price of a bond, a change in interest rates actually changes duration, too. This means there can be difference between the estimated change in price and the actual change in price when rates change. This difference is called "convexity."

Convexity measures the rate of change in duration as interest rates change. It is a secondary risk factor for bond holders. For bonds with a fixed rate, convexity is always positive—a good thing for investors. Positive convexity means that the bond price will increase more than what duration implies when rates

decline, and decrease less that what duration implies when rates increase. Let's take a look at Figure 1 to get a better understanding of this concept.

FIGURE 1: UNDERSTANDING DURATION AND CONVEXITY



CONVEXITY MEASURES THE RATE OF CHANGE IN DURATION AS INTEREST RATES CHANGE. IT IS A SECONDARY RISK FACTOR FOR BOND HOLDERS.

This figure illustrates the relationship between duration and convexity. Duration is a linear measure that estimates the change in price given a change in the benchmark interest. In the example, a 1% decline in yield results in the price of the bond increasing from $100 to $103 as measured by the duration line. This means the bond has a duration of 3 years ($103/$100 – 1% = 3 years for those of you who are keeping score). However, we can see that the actual market price increased to $105. The difference is the result of the bond's positive convexity.

It's important to note that convexity is not always positive. Bonds with embedded options or floating rates create negative convexity because the timing of cash flows is no longer certain. Therefore investors and their advisors need to know when bonds have call options or other features, and the adverse effect they can have when rates move.

How should investors think about interest rate risk in their portfolios?

So, if we know that bond prices fall when interest rates rise, and the Federal Reserve is signaling that it plans to raise rates, why wouldn't we significantly shorten our duration or go to cash to avoid the loss? This is an important question on the mind of many investors in today's economic landscape.

The problem with shortening duration. Moving duration in response to what we expect to happen is a form of market timing. Much like the idea of getting out of the stock market when we expect declines, it's attractive on the surface, but extremely difficult to execute. To properly time the market, you need to be correct twice: once when you exit the market or shorten duration, and again when you re-enter the market or extend duration.

Still thinking to yourself, “So what? I follow the news, and I’ll see it coming.” If so, let’s examine an interest rate scenario called a “bear flattening.”

Bear flattening describes a market condition where short-term rates rise at a faster pace than long-term rates causing the yield curve to flatten. It is common in periods when the Federal Reserve raises short-term interest rates to combat inflationary pressures. In this scenario, shortening your portfolio’s duration actually increases the volatility in your fixed income allocation by repositioning your portfolio to the part of the curve where yields are rising the most! This may be the very scenario we find ourselves in today.

The problem with going to cash. What about the option of going to cash? Why don’t we abandon the risks within the fixed income market altogether? To answer this question we need to consider why we invest in fixed income in the first place. Fixed income plays a very important role in our portfolios. It provides us a stream of income and also reduces portfolio volatility with a lower level of risk relative to our equity allocation.

FIXED INCOME PROVIDES US A STREAM OF INCOME AND ALSO REDUCES PORTFOLIO VOLATILITY WITH A LOWER LEVEL OF RISK RELATIVE TO OUR EQUITY ALLOCATION.

By going to cash, we are foregoing yield that we would otherwise be earning by being fully invested. As rates rise, so do future expected yields. So, in spite of the short-term price volatility in a rising rate environment, future expected returns are often higher and can offset price declines with higher yields over time.

Conclusion

In short, regularly measuring and monitoring the level of interest rate risk within your investment portfolio is critical for all investors. However, trying to time the market to take advantage of short-term shifts in the interest rate landscape is not a prudent, nor optimal investment strategy.

In order to outperform the market by moving portfolio duration, you are making an explicit bet that rates will move faster than what the forward-looking yield curve already implied. In the end, you will slowly erode your potential return with frictional costs such as taxes, fees, and expenses, as well as forgoing future returns by missing out on rising yields.

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