Fixed Income

# Understanding Interest Rate Risk and Duration


Buying a fixed income security can offer many benefits to the purchaser. Generally, with a fixed coupon and a defined maturity, fixed income securities offer a more definitive schedule and can be a useful tool for investors seeking cash flow consistency. However, fixed income instruments are not without risk. Whether the borrower is a government, state, municipality, or corporation, all fixed income securities inherently carry risk. One of those risks is interest rate risk.

Interest rate risk exists in a security when the bond's price fluctuates due to a change in interest rates. By definition, a fixed income security pays a fixed amount over a fixed schedule. As interest rates change in the overall market, the secondary market value of the existing cash flows also change.

The relationship between a fixed coupon bond's price and interest rates are inversely related; when interest rates go up, the bond price falls and when interest rates go down, the bond price rises. The amount by which the price changes is primarily affected by the coupon rate, the bond's price/yield, and the time left to maturity. Measuring the amount of change allows an investor to analyze their potential exposure to interest rate risk.

There are a few different methods of calculating this risk. For the purposes of this discussion, we're going to be focusing on **Modified Duration. Modified Duration** measures the sensitivity of a bond's price in response to a change in interest rates, and is expressed in percentage.

Normally when duration is quoted, it is most often referring to **Modified duration**, but there are other types of Duration formulas including Macaulay, Effective, and Key-Rate duration. The below explanation and figures all use the **Modified Duration** formula.

***"Modified Duration measures the sensitivity of a bond's price in response to a change in interest rates."***

**Table 1 – Maturity Effect on Duration**
**Same coupon bonds that have different maturities will have different durations.**

| Term | Coupon | Price | Yield | Duration | New Price / New Yield (Assuming 1% Rate Rise in Overall Market) | |
|---|---|---|---|---|---|---|
| 5 Year | 5% | 109.22 | 3% | 4.512 | 104.491 | 4% |
| 10 Year | 5% | 100.00 | 5% | 7.989 | 92.561 | 6% |
| 30 Year | 5% | 86.162 | 6% | 14.77 | 75.055 | 7% |

**The longer the bond, the higher duration and the more sensitive a bond's price is to a change in interest rates. In this example, interest rates rise by 1% for every maturity. The 30-year bond's price falls much more than the 10-year and the 5-year bonds.**

**Table 2 – Coupon Effect on Duration**
**Same maturity bonds that have different coupons will also have different durations.**

| Term | Coupon | Price | Yield | Duration | New Price / New Yield (Assuming 1% Rate Rise in Overall Market) | |
|---|---|---|---|---|---|---|
| 30 Year | 0% | 22.728 | 5% | 30.000 | 16.973 | 6% |
| 30 Year | 4% | 84.546 | 5% | 16.602 | 72.324 | 6% |
| 30 Year | 7% | 130.909 | 5% | 14.857 | 113.838 | 6% |

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The lower the coupon, the higher the duration and the more sensitive a bond's price is to a change in interest rates. In this example, interest rates rise by 1% in the 30-year term. The lower coupon bonds prices fall by a much higher percentage than the higher coupon bonds.

In certain market scenarios, it may make sense to increase or decrease your portfolio's duration in order to deliberately increase or decrease the risk profile of your fixed income assets. Knowing, understanding, and implementing the proper use of duration weighting can have a significant effect on the performance of your portfolio. If interest rates are expected to go up, you may want to shorten duration to reduce your exposure to interest rate risk.

If interest rates are expected to fall, increasing duration may allow for a higher degree of appreciation of your fixed income assets. Talk to your financial advisor to learn more.

It is also important to understand other risks associated with your fixed income portfolio. For more information on credit risk, liquidity risk, call risk, and other relevant topics involving your fixed income assets, speak to your financial advisor today.

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