

MODIFIED DURATION



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Understanding Modified Duration



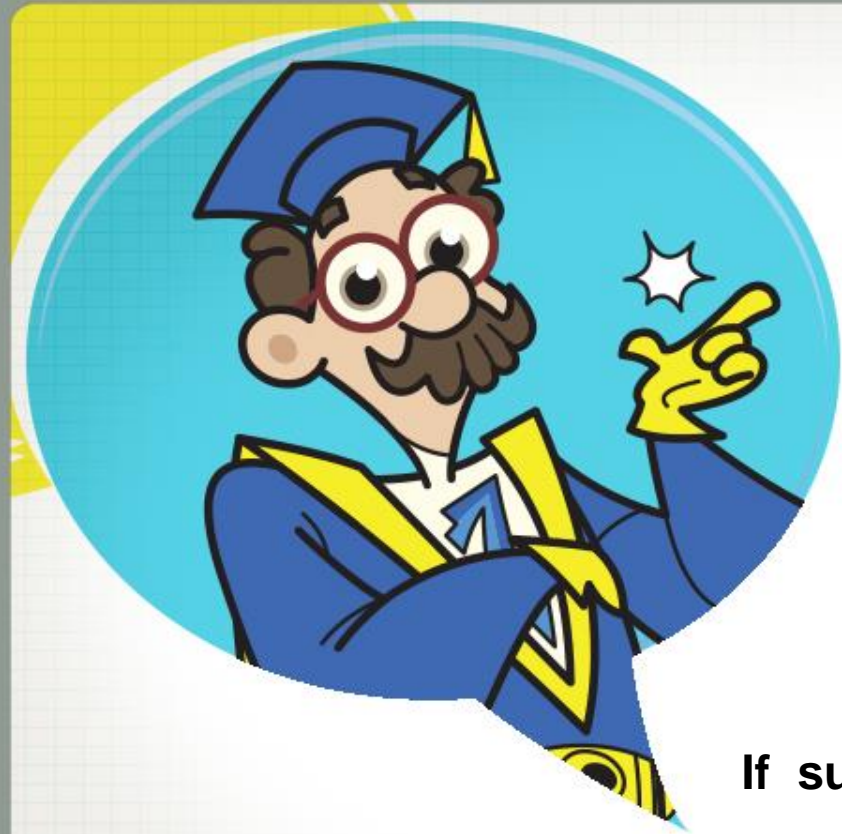
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Let's say I am a stockist of winter Clothes. In anticipation of a severe winter, I have stocked clothes in excess. My biggest concern is whether I will be able to sell all these before the onset of summer.



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If summer steps in earlier than expected, then I will have to lower the price to clear the stock



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But if winter gets more severe and prolonged, then I could charge a premium for the goods that I have in stock and since I have a large supply, I would make more money.



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Thus, the behavior of an external factor has a major impact on the prices I charge.

In the light of this example, let's understand the concept of “modified duration”.



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Modified Duration by definition expresses the sensitivity of the price of a bond to a change in interest rate. The change in interest rate can be linked with the season change as explained in the previous example.



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If the modified duration of a debt fund is less, it is similar to having less stock so that even if the interest rates were to change, the impact on price would be less.



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On the other hand, if the modified duration is higher, it would be like having excess stock so that if interest rates were to change, the impact on prices would be large.



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So higher the modified duration, higher is the risk of price fluctuation and lower the modified duration, the lower would be the price fluctuation.



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Basically, the price of a bond and the interest rate have an inverse relationship, i.e. if the interest rates rise, the price of the bond would fall and vice versa.

The modified duration explains the extent of rise or fall in bond price, given a change in interest rate.



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Mathematically, CHANGE IN PRICE OF A BOND IS THE ARITHMETIC PRODUCT OF MODIFIED DURATION OF THE BOND AND CHANGE IN EXTERNAL INTEREST RATE.



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So, if a Fund Manager feels that the interest rates are going to rise (similar to expecting the summer setting in sooner than expected), he would reduce the modified duration of the portfolio. Alternatively, if he feels that the interest rates are to fall (similar to expecting the winter to last longer), he will maintain a higher duration and benefit from the fall in interest rates.



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Having understood the concept let us now use modified duration to calculate the change in price of a bond for a given change in interest rate.



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$$\text{CHANGE IN BOND PRICE} = - \text{MODIFIED DURATION} \times \% \text{ CHANGE IN YIELD}$$



The negative sign in this equation indicates inverse relationship between change in yield and change in bond price.

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For example, if the modified duration of a bond is 5 and yield is expected to fall by 2% in a year, expected change in price of the bond (on account of change in yield) can be calculated as

$$\text{CHANGE IN BOND PRICE} = - 5 * -2\% = + 10\%.$$



Similarly, if the modified duration of a bond is 5 and yield is expected to rise by 2% in a year, expected change in price of the bond can be calculated as

$$\text{CHANGE IN BOND PRICE} = - 5 * 2\% = - 10\%.$$



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Some key points about modified duration:

1. A “Bond” with a lower “modified duration” implies that the “returns” are more from accrual income than from capital gains.
2. A “Bond” with a higher “modified duration” implies that the “returns” are more from capital gains than from accrual income.
3. Maturity remaining the same a high coupon yielding bond would have a lower duration and hence be less sensitive to changes in external interest rates as compared to a low coupon yielding bond.



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Hope you have understood
the concept of
Modified Duration.



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