

[Academic Script] [Bond Management (part-1)]

Subject:

Course:

Business Economics

B.A., 5th Semester, Undergraduate

Paper No. & Title:

Paper – 511 Investment Management

Unit No. & Title:

Unit - 1 Bond Management

Lecture No. & Title:

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Bond Management (part-1)

Bonds:

Hello friends, today in this session we will cover all about bond management. We know that as it comes to investments, stock market is a commonly known option. But we cannot deny the fact that stock market is highly risky and hence is avoided by risk-averse investors. For such investors, bonds market is the option.

So let us begin today with understanding what is Bonds?

Our Objective for this session will be broadly to cover.

- Understanding Bonds and various terms commonly used in the bond market.
- We will focus to understand Concept of Yield and valuation of bonds
- We will cover different ways of computing yield
- Lastly, we will discuss various types of yields.

Definition: Bonds are a considered as an important element of any financial plan used for investment or for growth of wealth. A bond in a lay man's term is a loan an investor makes to a corporation, government, or other organization in exchange for interest payments over a specified term along with the repayment of principal amount as on maturity date of the bond. That is, bonds are sometimes referred to as debt securities. Since bond issuers knows that investor is not going to lend his/her hard-earned money without

compensation, the issuer of the bond (the borrower) enters into a legal agreement to pay (the bondholder/investor) interest.

The bond issuer hence agrees to repay the original sum loaned at the bond's maturity date. The vast majority of bonds have a set maturity date—a specified date when the bond must be paid back at its face value, is known as **par value**. Bonds are commonly known as fixed-income securities because many pay interest based on a regular as well as predetermined interest rate that is a **coupon rate** — which is set when the bond is initially issued. Similarly, the term **"bond market"** is often used interchangeably with "fixed income market". Bonds are available in a wide range of variety, commonly known as Treasury bills, agency bonds, corporate bonds, municipal bonds etc.

Price fluctuation in bonds is considered as the most difficult part as it includes lots of calculation. In this session our major objective is to try and make it simple for you as much as possible. It might surprise you friends that a bond's price changes on a daily basis, just like that of market security traded daily on stock exchange. It is nominal to hold bond till maturity. Please note that when one holds the bond till maturity it guarantees the principal amount; however, it is not necessary to hold bond till maturity. At any time, a bond can be sold in the open market, at the price prevailing in the market, which is volatile otherwise. So let us understand how the price changes. For which we need to introduce you to the **concept of yield.**

Concept of Yield

Yield is a pictorial representation of the return that one earns on a bond for the given period. The yield is calculated using various formulas. Among which the simplest formula of yield is given as

Yield = coupon amount/price

When you buy a bond at par that is at face value, yield will be equal to the interest rate you will earn over the period of time. Yield of a bond is highly dependent on price. As the price fluctuates, so does the yield. We refer to it as the interest or dividends received from a security, generally expressed yearly as a percentage based on the investment's cost, its current market value or its face value.

For example, there are two stock dividend yields. If you buy a stock for Rs300 (cost basis) and its current price and annual dividend is Rs.330 and Rs. 10, respectively, the "cost yield" will be 3.3% (10/300) and the "current yield" will be 3% (\$10/\$330).

Bonds have four yields: *coupon* (the bond interest rate fixed at issuance), *current* (the bond interest rate as a percentage of the current price of the bond), and *yield to maturity* (an estimate of what an investor will receive if the bond is held to its maturity date). *Non-taxable municipal bonds* they are a tax-equivalent (TE) yield determined by the investor's tax bracket.

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Valuation of Bonds

Consider that we invest in a bond today at the current price of B_0 . The bond gives a coupon C_1 in the next one year. Assuming that the bond could be sold after the end of one year from now at B_1 , we can calculate the return from the bond as

Return (k) = $\frac{(B1 - B0) + C1}{B0}$ ----- eq. 1

The equation can be rearranged to find the current price of the bond B_0 as

 $B_0 = \frac{c_{1+B_1}}{1+k}$ ------ eq. 2

We interpret this equation as 'the value of the bond today in the present value of future inflows from the bond'. Assuming now that the bond has two year maturity and if buy the bond at the end of first year at B_1 and if we sell the bond at the end of second year at B_2 , after we receive the coupon C_2 , we can calculate the return earned in the second year as:

Return (k) = $\frac{(B2 - B1) + C2}{B1}$ or $B_1 = \frac{C2 + B2}{1 + k}$

Substituting for the value of B₁ in eq.2, we get the price of the two year bond today as B₀ = $\frac{c_1}{1+k} + \frac{c_1 + B_1}{(1+k)_2}$

Continuing this derivation, for a multi-year bond we would get the price of the bond equation as

$$\mathsf{B}_0 = \frac{c}{1+k} + \frac{c}{(1+k)_2} + \frac{c}{(1+k)_3} + \dots + \frac{c+Bn}{(1+k)n}$$

 B_0 is called the current 'theoretical' or 'fair' price/ value of the bond. We can see that the numerator is cash flows from the bond and the denominator represents return. Therefore, we interpret the equation as "The 'theoretical' or 'fair' price of the bond today is the present value of the promised future cash flows i.e. the interest and the maturity value". Here 'C' represents the coupon payments promised each period, as we learnt that coupons are pre-decided as per bond prospectus and B_n represent the maturity value. Also, n indicates the number of periods until maturity and 'k' indicates the return or yield from the bond expected by the investor.

Since we find the price of the bond today by discounting the coupons and maturity value, using 'k' as the yield, 'k' is also sometimes called as 'discount rate'. It has to be remembered that for an expected yield of 'k', an investor would find the 'theoretical price' of the bond. However, the market may trade this bond equal to or above or below this calculated theoretical price. If the market price is more, then the bond is termed overvalued; if it is less then undervalued and if market price equals calculated theoretical price, then we say that the bond is fairly valued in the market.

Friends it is to be remembered that coupons received every year are assumed to be re-invested at a rate equal to the expected yield.

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Therefore, we are earning interest on interest. It is part of the compounding process inherent in the nature of bond calculations.

Different ways of computing yield

Bond yields are nothing but measures of return. Most commonly used measure is **Yield to maturity**, but it is important to understand different yield measurements that are used in different practices.

1. Current Yield

Current yield can be used to compare the interest income provided by a bond to the dividend income provided by a stock. This is calculated by dividing the bond's annual coupon amount by the bond's current price. Keep in mind that this yield incorporates only the income portion of return, ignoring possible capital gains or losses. As such, this yield is most useful for investors concerned with current income only.

2. Holding Yield

Bond investors are not obligated to take an issuer's bond and hold it until maturity. There is an active secondary market for bonds. This means that someone could buy a 30-year bond that was issued 12 years ago and hold it for five years, then sell it again.

In such a circumstance, the bondholder doesn't care what the yield of the 12-year old bond will be until it matures (18 years later). If he holds the bond for five years, he only cares what yield he will earn between years 12 and 17.

The bondholder should try to calculate the bond's five-year holding period return. This can be approximated by slightly modifying the YTM formula. The bondholder can substitute the sale price for the par value and change the term to equal the length of the holding period. Hence it is also known as Holding Yield Bond.

3. Yield to Maturity (YTM)

As said earlier, yield to maturity (YTM) is the most commonly used yield measurement. It measures what the return on a bond is if it is held to maturity and all coupons are reinvested at the YTM rate. Because it is unlikely that coupons will be reinvested at the same rate, an investor's actual return will differ slightly. Calculating YTM by hand is a lengthy procedure, so it is best to use YIELDMAT functions for this computation. A simple function is also available on a financial calculator.

Yield Curve

The yield curve is a pictorial representation, which plots time in ascending order on the horizontal axis, and yield on the vertical axis showing the relationship between two. Yield curves are best used when different maturity dates for the same type of bond are plotted, that is meaning that the only major difference in the securities is their maturity date. For instance, a yield curve gives a comparative picture of treasury bonds, corporate bonds with high credit ratings, municipal bonds, or any other type of bond by plotting maturities and their respective yields from a particular state.

By comparing such yields of bonds that are similar, but differing in maturities, one can generate a graph which reflects the changes in yield with respect to the maturity date.

The Yield Curve Types

There are five types of Yield Curve, each type of yield curve has their own characteristics and is represented differently on the graph plane. We will learn briefly all these yield curves with help of a pictorial graph.

1. The Normal Yield Curve

A normal yield curve is upward sloping showing all the yields earned at different duration of the bond. The curve also reflects the fact that a bond with a longer maturity pays a higher yield than the same bond which matures early. Thus, the yield curve majority of its time in the shape of a normal upward sloping curve. As depicted in the picture.



It will be worth noting that individuals and institutions prefer to lend money for shorter periods of time as compared to longer periods of time. This is in general because of the fact that the risk the borrower will be unable to pay, rises with the passage of time and lender needs his fund back. To be precise the longer the term of the loan or bond, the greater are chance of least expected or unexpected will happen. Hence as the lenders risk increases the interest rates of the bond climb as well. That is higher the risk greater are the returns from bond.

2. The Steep Yield Curve

When an investor is expecting interest rates to rise in the future, he is ought to demand a higher rate of return especially when buying longer term bonds. However, if the returns are not high than investor would prefer safe play and will buy shorter term bonds, simply expecting that they may buy longer term bonds in next purchase when their expectations are fulfilled. Friends we as student need to understand that bonds do under perform when the economy is going through recession. However the investors' expectations are high when economy seems to recover from the recession. This is because economic recoveries are normally accompanied by corporations wanting to borrow more (for investment) which increases the demand for money, putting an upward pressure on interest rates or what we know as demand pull inflation. This results in the yield curve steepening as it is observed in the graph:



3. The Flat Yield Curve

As the name suggest the flat yield curve is horizontal. It basically represents that yields of all maturities are close to one another. This is because when inflation expectations have decreased to the point where investors find no time value for money even if they hold the bond for longer period of time. Like with the inverted yield curve, when the yield curve moves from normal to flat, this is generally a sign of a pending, or ongoing economic slowdown.



4. The Humped Yield Curve

We can observe a hump in yield curve when short and long term rates are closer to each other as compared with medium term rates. It is commonly observed when there is fluctuation observed i.e increase in demand or decrease in supply of longer term bonds. Say for example a 30 year treasury bonds is always more preferable than a 20 year treasury bonds, resulting in humped yield curve for treasuries.



5. The Inverted Yield Curve

Friends the inverted yield curve demonstrate that the longer term rates are lower than short term interest rates. However this phenomenon rarely occurs, but when it does, it is one of the surest measurement of an economic slowdown, as investors anticipate less future demand for money and therefore lower interest rates.



Summary

So friends today we learnt in detail all about bonds, like common terms used in the bond market say par value, coupon rate etc. We learnt about an important concept of yield. We observed how different interest rates and different maturity dates affect the yield curve with the help of graph. We also learnt about computation of yield of bond with three different methods. Hope you enjoyed the session. Thank you