e-Resources Module-V

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VALUATION OF DEBT INSTUMENTS

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The distribution of financial surpluses from lenders to borrowers in financial markets typically takes place through debt instruments. Such instruments are of various types as for instance there are Treasury bills and discount bonds which, by definition, are sold on discount basis whereby the price paid for them today is less than the Face Value received on their maturity. In sharp contrast, there are coupon bonds and corporate bonds which, in addition to their Face Value upon maturity, also promise an annual coupon rate on their Face Value till the maturity of the bond. The implicit return following from various debt instruments is calculated on the basis of the features offered by them. Accordingly, discount yield method is usually employed to measure the yield on Treasury bills as well as discount bonds. But since by definition, this method has an inherent downward bias, it has become a customary to alternatively employ the yield to maturity method for finding the return following from such bonds. In sharp contrast, the yield on coupon bonds and corporate bonds is generally ascertained by using either the current yield method or instead the yield to maturity method. The latter method seems to have an edge over the former in as much as the current yield method does not take into account the fact that apart from an annual coupon payment, a coupon bond as also a corporate bond also provide the Face Value of the concerned bond when it matures.

One major function of financial markets is to mobilise financial surpluses in the economy from surplus units and distribute them among productive deficit spenders as loans at terms and conditions mutually agreeable to both the parties *i.e.*, lenders as well as borrowers. Typically, such debt transactions are carried out through an instrument called “debt instrument” which is nothing but a promise by the borrower or issuer to repay the loan along with associated interest to the lender *viz.*, the holder of the instrument. In case the concerned debt instrument is sold on a *discount basis*, the interest rate is not explicitly stated but is implicit in as much as such instruments are sold at a lower price and purchased at a higher price in the future. The exact valuation of a particular debt instruments depends upon its precise nature.

Broadly speaking, debt instruments can be classified into two categories *viz.*, Treasury Bills & Discount Bonds on the one hand and Coupon Bonds & Corporate Bonds on the other. In the case of Treasury bills as also discount bonds, a single amount *i.e.*, "Face Value" is paid in the future by the issuer to the owner of the instrument. In sharp contrast, under coupon bonds and corporate bonds, apart from the single amount or Face Value at maturity, the issuer invariably makes regular interest payments to the owner till the maturity date.

The yield or return on Treasury bills and discount bonds is usually calculated either on the basis of Discount Yield method or instead the Yield to Maturity method. Likewise, the yield on coupon bonds as also corporate bonds is generally measured using either Current Yield or otherwise Yield to Maturity as is clear from Figure-I.

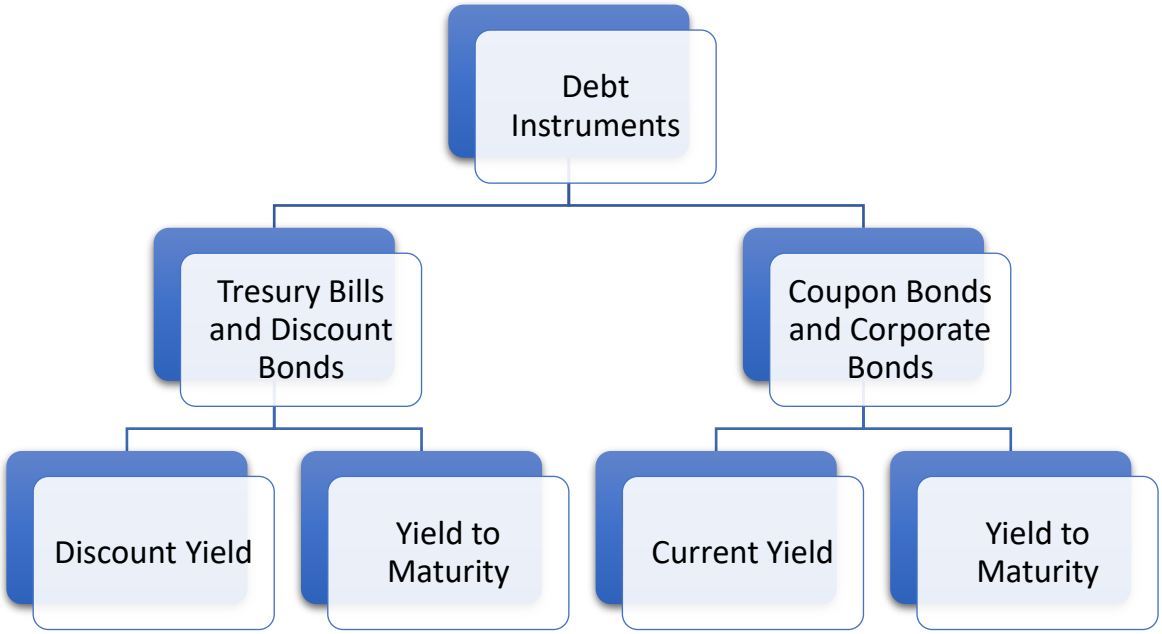

Figure-I: Prominent Debt Instruments and Methods of Measuring Yield on them.

Let us now discuss these prominent forms of debt instruments and alternative methods of measuring yield or return on them in detail.

As far as Treasury bills and discount bonds are concerned, they are by definition, sold on a *discount basis* meaning thereby that the issuer will sell them at a price lower than their "Face Value" which in turn will be paid to the owner of the instrument on the day of maturity. Let us, for instance, suppose that the Government today sells a Treasury Bill at a price P_{TB} and

promises a Face Value of FV upon maturity say after 1 year to the holder or owner such that FV is greater than P_{TB} *i.e.*, FV > P_{TB}.

Evidently, as the purchaser of the concerned instrument *viz.*, Treasury bill or a discount bond has to pay a lower price P_{TB} today and gets a higher price FV from the issuer after maturity *i.e.*, after 1 year, the difference between the FV and P_{TB} can be looked at as an implicit return that can be calculated using the Discount Yield method as follows:

$$\text{Discount Yield} = \frac{FV - P_{TB}}{FV} \times \frac{360}{\text{Days to maturity}}$$

It is often alleged, and rightly so, that the Discount Yield formula as stated above tends to *understate* the actual yield on the debt instrument as it has an inherent *downward bias*. This largely happens because it is based on a 360 days rather than standard 365 days year in the numerator and uses Face Value 'FV' rather than the price of the instrument P_{TB} in the denominator. Now since 360 < 365 whereas FV > P_{TB}, the "downward bias" in the measuring of yield on the debt instrument at hand is bound to arise in the discount yield method.

In view of this shortcoming of the formula employed in the discount yield method, an alternative method known as the Yield to Maturity method is often preferred to calculate the yield on debt instruments like Treasury bills and discount bonds. More specifically, the "yield to maturity" say "*i*" is simply the interest rate at which debt instrument purchased at the price of P_{TB} will acquire the value of FV upon maturity.

Using the compound interest formula, if "*n*" is the maturity period, then

$P_{TB}\,(1 + i)^n$ = FV

For instance, if it is a Treasury bill with one Year maturity i.e., *n* = 1,

$P_{TB}\,(1 + i)$ = FV

or $(1 + i)$ = FV / P_{TB}

When it comes to Coupon Bonds and Corporate Bonds, they not only promise the Face Value FV at maturity, but in addition also provide an Annual Coupon Payment as determined by a *coupon rate* on the Face Value (FV) of the bond till its maturity date. Accordingly, the yield

on such bonds is calculated using either of the two methods *viz.*, Current Yield or instead the Yield to Maturity.

To be specific, the Current Yield on a Coupon Bond or Corporate Bond of price P_{CB} is defined as:

Current Yield = Annual Coupon Payment / P_{CB}

It is worth noting that the current yield does not take into account that in addition to the 'coupon rate' on the Face Value of the bond under consideration, even the Face Value of the concerned bond is paid to the holder or owner of the bond when it matures.

It is with a view to overcoming this deficiency that the yield on coupon bonds and corporate bonds is often measured using the Yield to Maturity Method wherein using the compound interest formula, the Yield to Maturity say 'i' on a coupon bond of price P_{CB} with a maturity period of 1 Year and Face Value of FV is defined as:

P_{CB} (1+ i) = [Annual Coupon Payment + FV]

⇨ P_{CB} = [Annual Coupon Payment + FV] / (1+ i)

Extending the maturity period from 1 year to 'n' years:

P_{CB} = [Annual Coupon Payment] / (1+ i) + [Annual Coupon Payment] / $(1+ i)^2$

+ [Annual Coupon Payment] / $(1+ i)^3$ + … + [Annual Coupon Payment + FV] / $(1+ i)^n$