

Financial Management

Topics

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1. Valuation of Bonds and Equity
 2. Risk and Return
 3. Cost of Capital
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BOND VALUATION AND EQUITY

Valuation of Bonds

What is a bond?

Bond is a negotiable instrument which acknowledges the indebtedness of the issuer to the investor. In this arrangement the investor extends credit to the issuer and in return the issuer commits to repay the amount back at the end of the pre - determined tenure along with the interest throughout the life of the bond.

Features

Par value: Face value of the bond which will be paid back at the time of maturity

Coupon rate: is the rate of interest the bond issuer will pay on the face value of the bond, expressed as a percentage.

Maturity date: the date at which the bond holder will be paid back the principal (par value)

Redemption value: is the value paid to the bondholder, at the time of expiry of the term for which bond is issued.

Types of bonds

Basis of classification	Types
Issuer	<ul style="list-style-type: none"> • Government • Corporate
Coupon rate	<ul style="list-style-type: none"> • Fixed rate • Floating rate • Zero coupon
Location	<ul style="list-style-type: none"> • Domestic • Foreign • Euro

Bond rating	<ul style="list-style-type: none"> . Investment grade . High yield bonds
Embedded option	<ul style="list-style-type: none"> . Callable . Putable . Convertible
Maturity	<ul style="list-style-type: none"> . Short term . Medium term . Long term . Perpetual

Risks in bond investment

Interest rate risk: there is an inverse relationship between interest rates and price of bonds. So when interest rate in the economy rises, the prices of existing bonds fall to reflect the market yield. This results in notional capital capital loss.

Reinvestment rate risk: a bond poses a reinvestment risk to investors if the proceeds from the bond or future cash flows will need to be reinvested in a security with a lower yield than the bond originally provided. For example, an investor buys a Rs 1,000 bond with an annual coupon of 12%. Each year, the investor receives Rs 120 ($12\% \times 1,000$), which can be reinvested back into another bond. But if, over time, the market rate falls to 10%. Suddenly, that Rs 120 received from the bond can only be reinvested at 10%, instead of the 12% rate of the original bond.

Credit/Default risk: Default risk occurs when the bond's issuer is unable to pay the contractual interest or principal on the bond in a timely manner or at all.

Liquidity risk: **Liquidity risk** is the risk that you will not be easily able to find a buyer for a bond you need to sell.

Inflation risk: **Inflation risk** is the risk that the yield on a bond will not keep pace with purchasing power. For instance, if you buy a five-year bond in which you can realize a coupon rate of 5 percent, but the rate of inflation is 8 percent, the purchasing power of your bond interest has declined.

Call risk: Callable bonds allow the issuer to pre mature the bonds. In this case, the investor receives back the principal before the maturity and the interest income stops. Issuers usually do so to retire their old high yield bonds and sell low rate bonds.

Bond yields

Concepts of return (yield) on bond investment

Current yield: Annual interest divided by the current market price of the bond.

Yield to maturity: Total return anticipated on the bond investment if the bond is held till maturity. Includes interest income as well as capital gain/loss.

YTM of bond is similar to the internal rate of return of a capital expenditure. Mathematically, it is the discount rate which equates the present value of all future cash flows receivable from the bond to the current price of the bond.. Yield to maturity is considered a long-term bond yield but is expressed as an annual rate. In other words, it is the internal rate of return of an investment in a bond if the investor holds the bond until maturity and if all payments are made as scheduled.

Hence in the below equation Kd is the YTM and is calculated through trial and error

$$\text{Market price} = \frac{C}{\sum_{t=1}^n \frac{1}{(1+k_d)^t}} + \frac{M}{(1+k_d)^n}$$

YTM (approximation formula)

$$\underline{\text{YTM} \sim C + (M-P)/n}$$

$$0.4M + 0.6P$$

Illustration: calculating current yield and YTM

A bond of Rs. 10000 bearing coupon rate 12% and redeemable in 8 years at par is trading at Rs.10,600. Find out the current yield and YTM of the bond.

$$\text{CY} = \text{Annual interest} / \text{Market price} = (1200/10600)*100 = 11.32\%$$

$$\text{YTM} = \frac{1200 + (10000 - 10600)/8}{0.4 * 10000 + 0.6 * 10600}$$

$$= 1125/10360 = 10.86\%$$

Observe that since the bond is trading at premium to its par value,

CY and YTM both are lower than the coupon rate.

Valuation:

Determining fair price (intrinsic value) of the bond. To be compared with the current market price for buying decision.

Intrinsic value > Market price, Buy

Intrinsic value < Market price, Sell

Illustration: valuation of Straight bond

Aseem is considering buying Bond A currently quoting a price of Rs 800. Following are the salient features of the bond. Face value: Rs 1,000, maturity: 5 years, coupon rate: 6%, required yield: 12%

Advise Aseem if he should invest in the bond.

Solution: First calculate the intrinsic value and then compare the same with the market price.

$$V = \frac{\sum_{t=1}^n C}{(1+k_d)^t} + \frac{M}{(1+k_d)^n} \quad \text{OR} \quad C(PVIFA_{kd,n}) + M(PVIF_{kd,n})$$

$$V = 60 * \left[\frac{(1+0.12)^5 - 1}{0.12 * (1+0.12)^5} \right] + 1,000 * \left[\frac{1}{(1+0.12)^5} \right] = 216.29 + 567.44 = \text{Rs } 783.71$$

Since Intrinsic value (783) < Market price (800), Aseem is advised not to buy the bond. The bond is overvalued.

Illustration : valuation of perpetual bond

Mr. A has a perpetual bond of the face value of Rs. 1,000. He receives an interest of Rs. 60 annually. What would be its value if the required rate of return is 10%?

Solution:

$$V = C/K_d$$

$$= 60/0.10$$

$$= \text{Rs. } 600$$

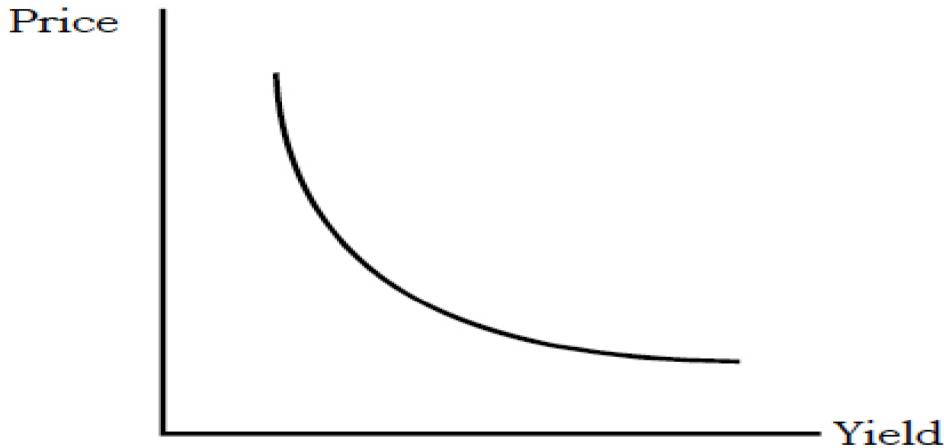
Illustration: Valuation of a Zero coupon bond

An investor is considering purchasing a 10-year zero-coupon bond of Rs 1,000 par value. Let's calculate the fair value of the bond if the current interest rate for equally risky bonds is 12.4%.

Solution: There is no interest payment received in a zero coupon bond, the only cash flow received is the maturity price. Hence only that will be discounted at YTM to arrive at the fair price.

$$\text{Bond Price} = \frac{1,000}{(1 + 0.124)^{10}} = \text{Rs } 310.70$$

Bond Price- yield relationship



<https://www.wisdomjobs.com/tutorials/price-yield-relationship.jpg>

When interest rates rise, bond prices fall, and when interest rates go down, bond prices increase.

Bonds essentially compete against one another on the interest income they provide to investors. When interest rates go up, new bonds that are issued come with a higher interest rate and provide more income to investors. When rates go down, new bonds issued have a lower interest rate and aren't as attractive as older bonds.

Unfortunately, when rates go up, the older, lower-rate bonds can't increase their interest rates to the same level as the new, higher-interest bonds. The older bond rates are locked in, based on the original terms.

As a result, the only way to increase competitiveness and value to new investors is to reduce the price of the bond. But as a result, the original bondholder may be holding an investment that has decreased in price—and doesn't pay out as much as they could get for it right now on the market.

<https://www.thebalance.com/why-do-bond-prices-go-down-when-interest-rates-rise-2388565>

Valuation of Equity

The objective of financial management is to maximize the value of a firm. This makes the valuation of equity and bonds an important concept to understand and applied by both the investors and the companies who borrow funds by way of equity and bonds.

EQUITY VALUATION: DIVIDEND DISCOUNT MODEL

The Dividend Discount Model puts forth that the value of an equity share is the present value of future expected dividends and the present value of the sale price of the share when sold.

The following assumptions are made while using the Dividend Discount Model:

1. Dividends are paid annually and
2. The first dividend is received one year after the purchase of the equity share.

Single Period Valuation Model

1. The first case is where the investor expects to hold the equity share for one year. The price of the equity share is:

$$P_0 = D_1 / (1+r) + P_1 / (1+r)$$

Where:

P_0 - current price of equity share

D_1 - dividend expected one year hence

P_1 - price of equity share one year hence r

- rate of return required on equity share

EQUITY VALUATION: THE P/E APPROACH

The P/E ratio or earnings multiplier approach is estimated as follows:

$$P_0 = E_1 \times E_0 / r_1$$

Where E

P_0 is the estimated price

E_1 is the estimated earnings per share

P_0 / E_1 is the justifies price to earnings ratio

The determinants of the P_0 / E_1 can be derived from the dividend discount model:

$$P_0 = D_1 / (r - g)$$

In this model:

$$D_1 = E_1(1 - b), \text{ where}$$

b is the retention ratio

$g = ROE \times b$ where ROE is Return on Equity

Hence substituting:

$$P_0 = E_1(1 - b) / (r - ROE \times b)$$

Dividing both sides by E_1 , we get:

$$P_0 / E_1 = (1 - b) / (r - ROE \times b)$$

Factors that determine P/E ratio are:

Dividend Payout Ratio: $(1 - b)$

Required rate of return: r

Expected growth rate: $ROE \times b$

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RISK AND RETURN

Concept of Risk and Return:

A person making an investment expects to get some returns from the investment in the future.

However, as future is uncertain, the future expected returns too are uncertain. It is the uncertainty associated with the returns from an investment that introduces a risk into a project. The expected return is the uncertain future return that a firm expects to get from its project. The realized return, on the contrary, is the certain return that a firm has actually earned.

Return can be defined as the actual income from a project as well as appreciation in the value of capital. Thus there are two components in return—the basic component or the periodic cash flows from the investment, either in the form of interest or dividends; and the change in the price of the asset, commonly called as the capital gain or loss.

RISK AND RETURN OF A SINGLE ASSET(HOLDING PERIOD RETURN)

$$Return = \frac{C + (P_E - P_B)}{P_B}$$

Where,

R is the total return over the period, **C** is the cash payment received during the period, **P_E** is the ending price of the investment, and **P_B** is the beginning price.

Example- Calculate the return if: Price at the beginning of the year: Rs. 60, Dividend paid at the end of the year: Rs.2.40 and Price at the end of the year: Rs. 69 **Solution:** The total return on this stock is calculated as follows:

$$\frac{2.40 + (69.00 - 60.00)}{60.00} = 0.19 \text{ or } 19 \text{ percent}$$

HISTORICAL RISK AND RETURN CALCULATION

Average annual return of an investment during a given historical period is simply the arithmetic mean of the realised returns for each year during that period. The arithmetic mean is defined as:

$$\bar{R} = \frac{\sum_{i=1}^n R_i}{n}$$

Where, **R** is the arithmetic mean, **R_i** is the *i*th value of the total return (*i* = 1, ... *n*), and **n** is the number of total returns.

STANDARD DEVIATION OF RETURN

Risk refers to the dispersion of a variable. It is commonly measured by the variance or the

$$\sigma^2 = \left[\frac{\sum_{i=1}^n (R_i - \bar{R})^2}{n-1} \right]$$

$$\sigma = \sqrt{\sigma^2}$$

Standard deviation.

Example

The variance and standard deviation of returns are calculated below:

Period	Return R_i	Deviation	Square of deviation
		$(R_i - \bar{R})$	$(R_i - \bar{R})^2$
1	15	5	25
2	12	2	4
3	20	10	100
4	-10	-20	400
5	14	4	16
6	9	-1	1
$\Sigma R_i = 60$		$\Sigma (R_i - \bar{R})^2 = 546$	
$\bar{R} = 10$			
$\sigma^2 = \left[\frac{\sum(R_i - \bar{R})^2}{n-1} \right] = 109.2 \quad \sigma = \left[\frac{\sum(R_i - \bar{R})^2}{n-1} \right]^{1/2} = \left[\frac{546}{6-1} \right]^{1/2} = 10.45$			

PROBABILITY DISTRIBUTION AND EXPECTED RATE OF RETURN

Expected value is the benefit which an investor anticipates by investing his funds. It is the weighted average or the mean of probability distribution of the possible future benefits that can be derived out of a scheme of investment.

$$E(R) = \sum_{i=1}^n p_i R_i$$

$E(R)$ is the expected return, R_i is the return for the i th possible outcome, p_i is the probability associated with R_i and n is the number of possible outcomes.

$$\sigma^2 = \sum p_i (R_i - E(R))^2$$

where σ^2 is the variance, R_i is the return for the i th possible outcome, p_i is the probability associated with the i th possible outcome, and $E(R)$ is the expected return.

Economy	p_i	R_i	$p_i R_i$	$R_i - E(R)$	$(R_i - E(R))^2$	$p_i (R_i - E(R))^2$
1. Boom	0.30	16	4.8	4.5	20.25	6.075
2. Normal	0.50	11	5.5	-0.5	0.25	0.125
3. Recession	0.20	6	1.2	-5.5	30.25	6.050
$\sum p_i R_i = 11.5$					$\sum p_i (R_i - E(R))^2 = 12.25$	
$\sigma = [\sum p_i (R_i - E(R))^2]^{1/2} = (12.25)^{1/2} = 3.5\%$						

Oriental Shipping Stock

1. Boom	0.30	40	12.0	27.0	729.0	218.7
2. Normal	0.50	10	5.0	-3.0	0.25	4.5
3. Recession	0.20	-20	-4.0	-33.0	1089.00	217.8
$\sum p_i R_i = 13.0$					$\sum p_i (R_i - E(R))^2 = 441.0$	
$\sigma = [\sum p_i (R_i - E(R))^2]^{1/2} = (441.0)^{1/2} = 21.0\%$						

Portfolio Risk and Return

A portfolio is a bundle or a combination of individual assets or securities. The return of a portfolio is equal to the weighted average of the returns of individual assets (or securities)

The following formula can be used to determine expected return of a portfolio:

$$\bar{R}_P = \sum_{j=1}^m w_j R_j$$

where \bar{R} = Expected return of a portfolio

\bar{P} = The proportion, or weights of total funds invested in security j

R_j = The expected return for security j

m = The total number of different securities in the portfolio

Let's say the returns from the two assets in the portfolio are R_1 and R_2 . Also, assume the weights of the two assets in the portfolio are w_1 and w_2 . Note that the sum of the weights of the assets in the portfolio should be 1. The returns from the portfolio will simply be the weighted average of the returns from the two assets, as shown below:

$$R_P = w_1 R_1 + w_2 R_2$$

Let's take a simple example. You invested Rs 60,000 in asset 1 that produced 20% returns and Rs 40,000 in asset 2 that produced 12% returns. The weights of the two assets are 60% and 40% respectively.

The portfolio returns in this case will be: $R_P = 0.60*20\% + 0.40*12\% = 16.8\%$

Portfolio Risk:

Let's now look at how to calculate the risk of the portfolio. The risk of a portfolio is measured using the standard deviation of the portfolio. However, the standard deviation of the portfolio will not be simply the weighted average of the standard deviation of the two assets. We also need to consider the covariance/correlation between the assets.

$$\text{COV}_{AB} = \sum^n [R_A - E(R_A)][R_B - E(R_B)] \times P_i$$

where COV_{AB} = The covariance of returns on securities A and B

R_A and R_B = Returns on securities A and B

$E(R_A)$ and $E(R_B)$ = Expected returns of A and B

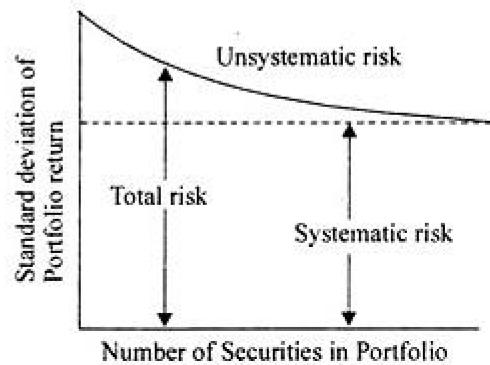
P_i = Probability of occurrence of the state of economy

$$\text{Cor}(R_i, R_j) = \frac{\text{Cov}(R_i, R_j)}{\sigma_i \sigma_j}$$

If the standard deviation of the two assets are 10% and 16% and the weights of the two assets are 60% and 40% respectively., and the correlation between the two assets is -1. The standard deviation of the portfolio will be calculated as follows:

$$\sigma_p = \text{Sqrt}(0.6^2 * 10^2 + 0.4^2 * 16^2 + 2 * (-1) * 0.6 * 0.4 * 10 * 16) = 0.4$$

Diversification:
Diversification means “Don’t put all your eggs in one basket”, spreading risk across a number of securities.



MARKET RISK VS UNIQUE RISK

$$\text{Total Risk} = \text{Unique risk} + \text{Market risk}$$

Unique risk of a security represents that portion of its total risk which stems from company-specific factors.

Market risk of security represents that portion of its risk which is attributable to economy-wide factors.

MEASUREMENT OF MARKET RISK

The sensitivity of a security to market movements is called Beta (β). Beta for the market portfolio is 1. Beta reflects the slope of a linear regression relationship between the return on the security and the return on the portfolio.

CALCULATION OF BETA

For calculating the beta of a security, the following market model is employed:

$$R_{jt} = a_j + b_j R_{Mt} + e_j$$

Where,

- R_{jt} = return of security j in period t
 a_j = intercept term alpha
 b_j = regression coefficient, beta
 R_{Mt} = return on market portfolio in period t
 e_j = random error term

Beta reflects the slope of the above regression relationship. It is equal to:

$$\text{Beta}_j = \frac{\text{Cov}(R_j, R_M)}{\sigma^2_M}$$

Where Covariance is equal to:

$$\sum_{i=1}^n (R_{jt} - \bar{R}_j)(R_{Mt} - \bar{R}_M)/(n-1) \text{ in case of historical data}$$

The beta coefficient can be interpreted as follows:

$\beta = 1$ exactly as volatile as the market

$\beta > 1$ more volatile than the market β

$< 1 > 0$ less volatile than the market

CALCULATION OF BETA

Year	Return on security j (%)	Return on market Portfolio (%)
1	10	12
2	6	5
3	13	18
4	-4	-8
5	13	10
6	14	16

7	4		7
8	18		15
9	24		30
10	22		25

Solution:

	Year	R_{jt}	R_{Mt}	$R_{jt} - R_j$	$R_{Mt} - R_M$	$(R_{jt} - R_j)(R_{Mt} - R_M)$	$(R_{Mt} - R_M)^2$
1	10	12	-2	-1	2		1
2	6	5	-6	-8	48		64
3	13	18	1	5	5		25
4	-4	-8	-16	-21	336		441
5	13	10	1	-3	-3		9
6	14	16	2	3	6		9
7	4	7	-8	-6	48		36
8	18	15	6	2	12		4
9	24	30	12	17	204		289
10	22	25	10	12	120		144
		$\Sigma R_{jt} = 120$	$\Sigma R_{Mt} = 130$		$\Sigma (R_{jt} - \bar{R}_j)(R_{Mt} - \bar{R}_M) = 778$	$\Sigma (R_{Mt} - \bar{R}_M)^2 = 1022$	
		—	—				
		$R_j = 12$	$R_M = 13$		$Cov(R_{jt}, R_{Mt}) = 778/9 = 86.4$	$\sigma_{M^2} = 1022/9 = 113.6$	

$$\text{Beta : } \beta_j = \frac{Cov(R_{jt}, R_{Mt})}{\sigma^2_M} = \frac{86.4}{113.6} = 0.76$$

Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) is a model that describes the relationship between the expected return and risk of investing in a security. It shows that the expected return on a security is equal to the risk-free return plus a risk premium, which is based on the beta of that security.^{8/}

$E(R_i) = K_e = R_f + \beta_i * [E(R_m) - R_f]$ Where: $E(R_i)$ = Expected return on asset i , R_f = Risk-free rate of return, β_i = Beta of asset i, $E(R_m)$ = Expected market return

The market risk premium represents the additional return over and above the risk-free rate, which is required to compensate investors for investing in a riskier asset class.

Example- Let's say the beta of Company M is 1 and risk-free return is 4%. The market rate of return is 6%. We need to calculate the cost of equity using the CAPM model.

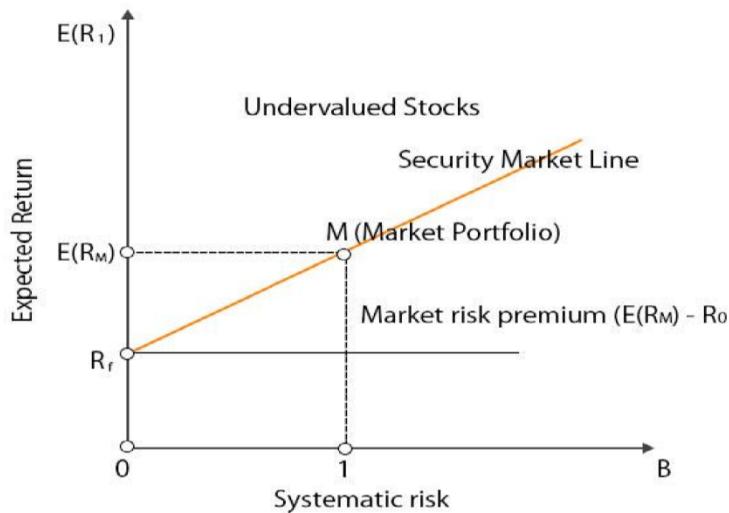
Company M has a beta of 1 that means the stock of Company M will increase or decrease as per the tandem of the market.

$K_e = \text{Risk-Free Rate of Return} + \text{Beta} * (\text{Market Rate of Return} - \text{Risk-free Rate of Return})$

$$K_e = 4 + 1 * (6 - 4) = 6\%.$$

Security Market Line

1. All the assets which are correctly priced are represented on SML
2. The assets which are above the SML are undervalued as they give the higher expected return for a given amount of risk.
3. The assets which are below the SML are overvalued as they have lower expected returns for the same amount of risk.
4. A risk-averse investor's investment is more often to lie close to y-axis or the beginning of the line whereas risk-taker investor's investment would lie higher on the SML.



Dividend Capitalization Model

The Dividend Capitalization Model only applies to companies that pay dividends, and it also assumes that the dividends will grow at a constant rate.

Dividend Capitalization Formula:

$$K_e = (D_1 / P_0) + g$$

Where: K_e = Cost of Equity

D_1 = Dividends/share next year

P_0 = Current share price g =

Dividend growth rate

Example: XYZ Co. is currently being traded at \$5 per share and just announced a dividend of \$0.50 per share, which will be paid out next year. Using historical information, an analyst estimated the dividend growth rate of XYZ Co. to be 2%. What is the cost of equity?

D₁ = \$0.50

P₀ = \$5 g =

2%

K_e = (\$0.50/\$5) + 2%

K_e = 12%

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COST OF CAPITAL

Cost of capital is the return expected by the providers of capital (i.e. shareholders, lenders and the debt-holders) to the business as a compensation for their contribution to the total capital. Generally, the sources of finance for any business entity could be either internal (savings, investments in current and non-current assets etc.) or external borrowings (loan from financial institutions, local borrowings etc.). Cost of capital is also known as ‘cut-off’ rate, ‘hurdle rate’, ‘minimum rate of return’.

SIGNIFICANCE OF THE COST OF CAPITAL

The cost of capital is important to arrive at correct amount which is payable on the total funds procured by the business entity and helps the management or an investor to take an appropriate decision. The correct cost of capital helps in the following decision making:

(i) Evaluation of investment options: The estimated benefits (future cashflows) from the selected investment (business or project) are converted into the present value of benefits by discounting them with the relevant cost of capital. It is necessary to remember that every investment option may or may not have same cost of capital, hence it is very important to use the cost of capital which is relevant to the options available. Here Internal Rate of Return (IRR) is that rate of discounting where NPV is nil which is used for evaluation of two options (projects).

(ii) Performance Appraisal: Cost of capital is used to appraise the performance of a particular project or business. The available earnings of the Company for different stakeholders also depends on the cost of procuring the funds. Cost of capital gives the exact picture as to how much minimum earnings an organisation should earn so as to mitigate the financial obligations.

(iii) Designing of optimum credit policy: The credit policy of the Company will decide the credit period to be allowed to the customers. The cost of allowing credit period (Bad debts, discount, opportunity cost of investment etc) is compared against the benefit/ profit earned by providing credit to customer of segment of customers

Cost of capital : The cost of capital can either be explicit or implicit.

- Explicit cost of capital:
 - The cash outflow of an entity towards the utilization of capital which is clear and obvious is termed as explicit cost of capital.
 - These outflows may be interest payment to debenture holders, repayment of principal amount to financial institution or payment of dividend to shareholders etc.
- Implicit cost of capital:
 - On the other side, implicit cost is the cost which is actually not a cash outflow but it is an opportunity loss of foregoing a better investment opportunity by choosing an alternative option.

The two factors which are considered to determine the cost of capital are:

- i. Source of Finance ii. Reciprocal payment of the using finance.

Debentures

Following are the different features of debentures/bonds:

i) Face Value: Debentures or Bonds are denominated with some value, called as the face value of the debenture. The interest paid on debentures is always calculated on the face value of the debentures.

E.g. If a company issue 8% Non-convertible debentures of ` 100 each, this means the face value is `100 and the interest @ 8% will be calculated on this face value.

The payment of interest to the debenture holders is tax deductible expenses. Hence, interest paid to the debenture holders save the tax liability of the company.

ii) Maturity period: Debentures or Bonds has a fixed maturity period for redemption.

However, in case of irredeemable debentures maturity period is not defined and it is taken as infinite. I.e. it will continue till the time the Company is into operations.

iii) Redemption Value: It is the value at which the debentures of the Company will get redeemed
Redemption value may vary from the face value of the debenture.

Cost of Irredeemable Debentures

The cost of debentures which are not redeemed by the issuer of the debenture is known as irredeemable debentures. Cost of debentures not redeemable during the life time of the company is calculated as below:

$$\text{Cost of Irredeemable Debenture (} K_d \text{)} = I (1-t) / NP$$

K_d = Cost of debt after tax

I = Annual interest payment

Net proceeds of debentures or current market price (As
 NP = reduced by the flotation cost*)

t = Tax rate

* Flotation cost: The new issue of a security (debt or equity) involves some expenditure in the form of underwriting or brokerage fees, legal and administrative charges, registration fees, printing expenses etc.

Cost of Redeemable Debentures (using approximation method) The cost of redeemable debentures will be calculated as below:

$$\text{Cost of redeemable Debenture (} K_d \text{)} = \frac{I (1-t) + (RV-NP) / n}{RV+NP}$$

2

Where,

I = Interest payment

NP = Net proceeds from debentures in case of new issue of deb or Current market price in case of existing debt.

(As reduced by the flotation cost)

- RV = Redemption value of debentures t
= Tax rate applicable to the company N
= Life of debentures.

Preference Share Capital

- The preference shareholders are paid dividend at a fixed rate on the face value of preference shares.
- Payment of dividend to the preference shareholders is given priority over the equity shareholder.
- The payment of dividend to the preference shareholders is considered as appropriation of profit and thus it is not a tax-deductible expense.
- Like the debentures, Preference share capital can be categorized as redeemable and irredeemable.

Cost of Redeemable Preference Shares

Preference shares issued by a company which are redeemed on its maturity is called redeemable preference shares. Cost of redeemable preference share is similar to the cost of redeemable debentures with the exception that the dividends paid to the preference shareholders are not tax deductible. Cost of preference capital is calculated as follows:

$$\text{Cost of Reedemable Preference Share (K_p)} = \frac{\text{PD} (1+D_t) + (\text{RV}-\text{NP})}{\text{RV}+\text{NP}} \quad \text{N}$$

Where

- PD = Annual preference dividend
RV = Redemption value of preference shares
NP = Net proceeds on issue of preference shares
= (As reduced by the flotation cost)
N = Life of preference shares

Cost of Irredeemable Preference Shares

The cost of irredeemable preference shares is similar to calculation of perpetuity. The cost is calculated by dividing the preference dividend with the current market price or net proceeds from the issue. The cost of irredeemable preference share is as below:

$$\text{Cost of Irredeemable Preference Share (K)} = \text{PD}_{(1+D_t)} / P_0$$

Where,

PD = Annual preference dividend

P₀ = Net proceeds in issue of preference shares

Equity Share Capital

- It is important source of Own funds, which once issued will be there till the buy-back or dissolution of the Company.
- The dividend is not paid at a fixed rate but it is declared every year based on the earnings of the Company.
- Equity shareholders are given the last priority while making Payment of dividend, The Equity shareholders get dividend when all other parties are paid off.
- The payment of dividend to the equity shareholders is considered as appropriation of profit and thus it is not a tax-deductible expense.

COST OF EQUITY SHARE CAPITAL

It may prima facie appear that equity capital does not carry any cost. But this is not true. The market share price is a function of return that equity shareholders expect and get. If the company does not meet their requirements, it will have an adverse effect on the market share price. Also, it is relatively the highest cost of capital. Due to relative higher risk, equity shareholders expect higher return hence, the cost of capital is also high.

In simple words, cost of equity capital is the rate of return which equates the present value of expected dividends with the market share price. In theory, the management strives to maximize the position of equity holders and the effort involves many decisions.

Different methods are employed to compute the cost of equity share capital.

- i) **Dividend OR Dividend Price Approach:** In this approach dividend is constant, which means there is no-growth or zero growth in dividend.

$$(K_e) = D/ P$$

Where,

D= Annual dividend

P = Net proceeds in issue of equity shares

- ii) **Constant growth model (Gordan Model):** Where earnings, dividends and equity share price all grow at the same rate, the cost of equity capital may be computed as follows:

$$K_e = (D_1 / P) + g$$

Where,

D_1 = Expected Annual dividend

P = Net proceeds in issue of equity shares

G = Growth rate

- iii) **Earnings / Earnings Price Approach:** This approach links the earnings of the company with the market price of its share. Accordingly, the cost of equity share capital would be based upon the expected rate of earnings of a company.

$$(K_e) = EPS / P$$

Where,

EPS= Earnings Per Share

P = Net proceeds in issue of equity shares

- iv) **Realised Yield Approach :** According to this approach, the average rate of return realized in the past few years is historically regarded as ‘expected return’ in the future.

$$(K_e) = 1 / PE \text{ ratio}$$

Where, PE= Price Earnings Ratio

- v) **Capital Asset Pricing Model (CAPM):** According to the CAPM approach, the expected return of a security or a portfolio equals the rate on a risk-free security plus a risk premium. The risk-free rate of return is the return from a Government security which has no risk or very low risk. Risk premium is calculated based on the Beta factor of the company which measures the systematic risk.

$$K_e = R_f + \beta (R_m - R_f)$$

Where K_e = Cost of equity capital

R_f = Risk – free rate of return

R_m = Return on market portfolio

β = Beta of Security (Measure systematic risk)

Types of Risk: A security is exposed to different types of risks. These risks can be broadly classified into two groups as below:

i. Unsystematic Risk:

- This is also called company specific risk as the risk is related with the company's performance.
- This type of risk can be reduced or eliminated by diversification of the securities portfolio.
- This is also known as diversifiable risk.

ii. Systematic Risk:

- It is the macro-economic or market specific risk under which a company operates.
- This type of risk cannot be eliminated by the diversification hence, it is nondiversifiable.
- The examples are inflation, Government policy, interest rate etc.

Weighted Average Cost of Capital:

It is the average of the costs of several of sources of financing. It is also known as composite or overall or Average Cost of Capital. After computing the cost of individual sources of finance, the Weighted Average Cost of Capital is calculated by putting weights in the proportion of the various sources of funds to the total. Weighted average cost of capital is computed by using either of the following two types of weights:

While using weights we have a choice between the book value & market value as explained below:

1. Book Value (BV): ◦ These weights are operationally easy and convenient.

- While using BV, reserves such as share premium and retained profits are included in the BV of equity, in addition to the nominal value of share capital.
- Here the value of equity will generally not reflect historic asset values, as well as the future prospects of an organization.

2. Market Value (MV):

- Market value weights are more correct and represent a firm's capital structure. It is preferable to use MV weights for the equity.
- While using MV, reserves such as share premium and retained profits are ignored as they are in effect incorporated into the value of equity.
- It represents existing conditions and also takes into consideration the impacts of changing market conditions and the current prices of various securities.
- Similarly, in case of debt MV is better to be used rather than the BV of the debt, though the difference may not be very significant.

Average cost of capital is computed as follows:

$$K_w = W_e K_e + W_d K_d + W_p K_p + W_r K_r$$

Where, K_w = Weighted Average Cost of Capital

K_e = Cost of Equity

K_r = Cost of Reserves

K_d = Cost of Debt

K_p = Cost of preference share capital

W = weights (proportions of specific sources of finance in the total)

The following steps are involved in the computation of Weighted Average Cost of Capital:

- (i) Multiply the cost of each sources with the corresponding weight.
- (ii) Add all these weighted costs so that weighted average cost of capital is obtained.

Marginal Cost of Capital:

The weighted average cost of capital can be worked out on the basis of marginal cost of capital than the historical costs. The weighted average cost of new or incremental capital is known as the marginal cost of capital. This concept is used in capital budgeting decisions. The marginal cost of capital is derived, when we calculate the weighted average cost of capital using the marginal weights. The marginal cost of capital would rise whenever any component cost increases. The marginal cost of capital should be used as the cut off rate. The average cost of capital should be used to evaluate the impact of the acceptance or rejection of the entire capital expenditure on the value of the firm.

Cost of Equity =

$$\text{Div paid} = 4 * 50\% = 2$$

$$\text{Div expected} = 2 + 2 * 10\% = 2.2$$

$$\text{Div Growth} = K_e = [DPS_1/MPS * 100] + g$$

$$= [2.2/44 * 100] + 10\% = 15\%$$

Particulars	Amount (Rs.)	Weight (W)	Cost (K)	Weighted Cost (W*K)
Equity Capital	4,90,000	0.49	15%	7.35%

Retained Earnings	2,10,000	0.21	15%	3.15%
10% Debt	1,80,000	0.18	5%	0.90%
16% Debt	1,20,000	0.12	8%	0.96%
Total	10,00,000		WACC	12.36%