CHAPTER (3)
Security Valuation

Chapter Outline:

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3.1 Introduction:

- **Investment is a commitment of funds for a period of time to derive a rate of return that would compensate the investors for the time during which the funds are not available for consumption, for:**

1. **The expected rate of inflation during the period of investment, And**
2. **The uncertainty involved.**

- **Since the objective of the investment is to derive a rate of return, investors have to consider the following "3 steps" in investment decision:**

1. **specify the *desired (required) rate of return* (the required return increases along with an increase in the risk level of investment: Explained with Dr. Remond in Ch. 4 + 5).**
2. **find out the *expected rate of return* (This is normally done by comparing the initial investment required to buy the financial asset and periodic cash flows available from the asset).**
3. **an investment decision can be made if the expected rate of return is equal to or greater than the desired or required rate of return.**

- In some cases, like savings bank account or investments in fixed deposits or corporate bond, the estimation of expected return is fairly easy because the issuer of the security clearly states the cash flows available from such assets.
- Thus, decision on such investments is relatively easier than investing in equity shares.
- Investment in equity shares requires investors to estimate the cash flows based on the expected performance of the firm during the investment period.
- This is the complex and most challenging job in investment decision making process.
- In this chapter, we will discuss how an investor can take up this challenging task of estimating future cash flows.

3.2 The Three-Step Valuation Process:

- In the previous section, we explained that investment decision is made by comparing the expected or estimated return with the required rate of return.
- This investment decision process is similar to any purchasing decision you make in your day-to-day life.

For instance, when you visit a fruit shop to buy apples or automobile showroom to buy a vehicle, you always compare the price with the value, which you are going to receive by such purchases.

- There are two general approaches to the valuation process when you make an investment decision:

(1) the top-down, three-step approach, and

(2) the bottom-up stock valuation, stock picking approach.

- The difference between the approaches is the perceived importance of economy and industry influence on individual firms and stocks.
- The three-step approach believes that a firm's revenue is considerably affected by the performance of economy and industry and thus, the first step in valuation of process is to examine the economy and industry and their impact on the firm's cash flow.
- On the other hand, bottom-up approach believes that it is possible to find stocks that offer superior returns regardless of the market or industry outlook.
- In this chapter, we will primarily be discussing the three-step approach.
- Under this approach, the performance of economy is first looked into to understand its impact on industries.
- Then the analysis progress to industry level analysis to understand the likely performance of the industries during the investment horizon.
- Once industries are picked up, the analysis moves to individual stocks to examine the outlook of firms in the selected industries.

- **Thus, the three-step approach is also called economy-industry-company (E-I-C) approach.**
- **Figure 3-1 illustrates the E-I-C approach:**

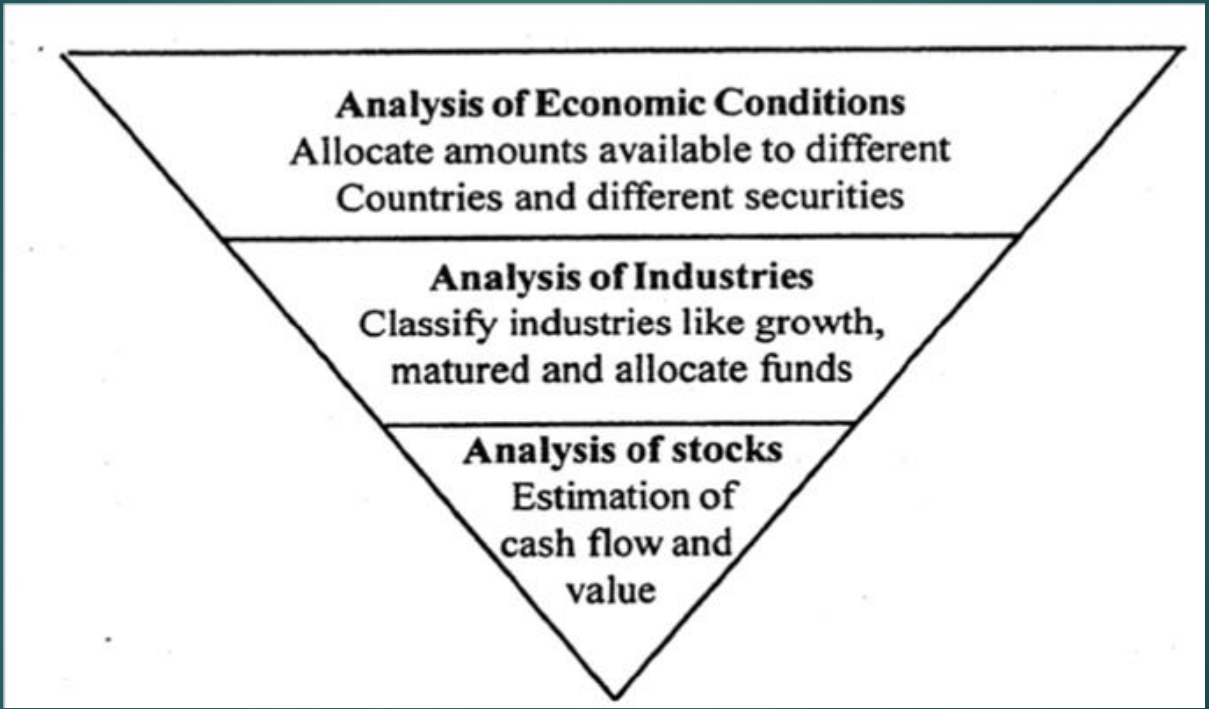


Figure 3.1: The Investment Process (E-I-C Approach)

- After determining the condition and outlook of the economy, the industry, and the company, the fundamental analyst is prepared to determine if the company's stock is overvalued, undervalued, or correctly valued.
- Several valuation models have been developed to help determine the value of a stock.
- These include:

1. dividend models which focus on the present value of expected dividends,
2. earnings models which focuses on the present value of expected earnings, and
3. asset models which focus on the value of the company's assets.

- There is no doubt that fundamental factors play a major role in a stock's price.
- However, if you form your price expectations based on fundamental factors, it is important that you study the price history as well or you may end up owning an undervalued stock that remains undervalued.

3.3 The General Valuation Framework:

- Most investors look at price movements in securities markets.
- They perceive opportunities of capital gains in such movements.
- All would wish if they could successfully predict them and ensure their gains.
- Few, however, recognize that value determines price and both changes randomly.
- It would be useful for an intelligent investor to be aware of this process.
- The present section examines this process in detail.
- We first present a brief outline of the basic valuation model and then proceed to discuss the relationship of value with price via investor-market-action.
- We shall also recall active and passive investment strategies and finally figure out the dynamic valuation model.

3.3.1 The Basic Valuation Model

- ✓ **Value of an asset is equal to present value of its expected returns.**
- ✓ **This is true particularly when you expect that the asset you own, provides a stream of returns during the period of time.**
- ✓ **This definition of valuation also applies to value of security.**
- ✓ **To convert this estimated stream of return to value a security, you must discount the stream of cash flows at your required rate of return.**
- ✓ **This process of estimation of value requires:**

(a) **the estimated stream of expected cash flows and**

(b) **the required rate of return on the investment. The required rate of return varies from security to security on account of differences in risk level associated with securities.**

- ✓ **Given a risk-adjusted discount rate and the future expected earnings flow of a security in the form of interest, dividend earnings, or cash flow, you can always determine the present value as follows:**

$$PV = \frac{CF_1}{1+r} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \text{-----} + \frac{CF_n}{(1+r)^n}$$

Where,

PV = Present value

CF = Cash flow, interest, dividend, or earnings per time period up to `n' number of periods

r = risk-adjusted discount rate (generally the interest rate)

- ✓ **Expressed in the above manner, the model looks simple.**
- ✓ **But practical difficulties do make the use of the model complicated.**
- **For instance, it may be quite difficult to assume that every investor in the market exactly measure the value of cash flows and risk adjusted required rate of return.**
- **Further, investors' expectation on compensation for risk may also different between different types of investors.**
- **A small change in these measures will also cause a change in the value.**
- **Thus, it may not be possible to generate a single value.**
- **You will realize that market operations would become tedious with a range of values.**
- **Secondly, return, risk, and value would tend to change over time.**
- **Thus, security prices may rise or fall with buying and selling pressures respectively (assuming supply of securities does not change) and this may affect capital gains and hence returns expected.**
- **Consequently, estimates of future income will have to be revised and values reworked.**
- **Similarly, the risk complexion of the security may change over time. The firm may over borrow (and face financial risk) or engage in a risky venture (and face operating risk).**
- **An increase in risk would raise the discount rate and lower value.**
- **It would then seem to be a continuous exercise.**
- **Every new information will affect values and the buying and selling pressures, which keep prices in continuous motion, would drive them continuously close to new values.**
- **The last part of this section portrays this dynamic valuation model with everchanging information inputs.**

3.3.2 Value-Price Relationship

- ✓ **Present value, also known as intrinsic value or economic value, determines price. We have said this in the preceding section. But how does it happen? Again, a hint to the answer for this question has been stated in the foregoing paragraph. You should have noted the role of `buying and selling pressures' which make prices more toward value. Now, you would ask: `what these pressures are and how do they occur? You will briefly understand that `investor action' in the wake of revisions of values spurs such pressures.**
- ✓ **You would recall that investment strategies can be `passive' or `active'. Following this, investors and investment managers can also be broadly grouped in `passive' and `active' categories. You should note that buying and selling pressures dominantly originate with active investors. And they follow certain rules of the game which are outlined below:**

Rule 1: Buy when value is more than price. This underlines the fact that shares are underpriced and it would be a bargain to buy now and sell when prices move up toward value.

Rule 2: Sell when value is less than price. In a situation like this, shares would be overpriced and it would be advantageous to sell them now and avoid less when price later moves down to the level of the value.

Rule 3: Don't trade when value is equal to price. This is a state when the market price is in equilibrium and is not expected to change.

3.3.3 The Cootner Hypothesis

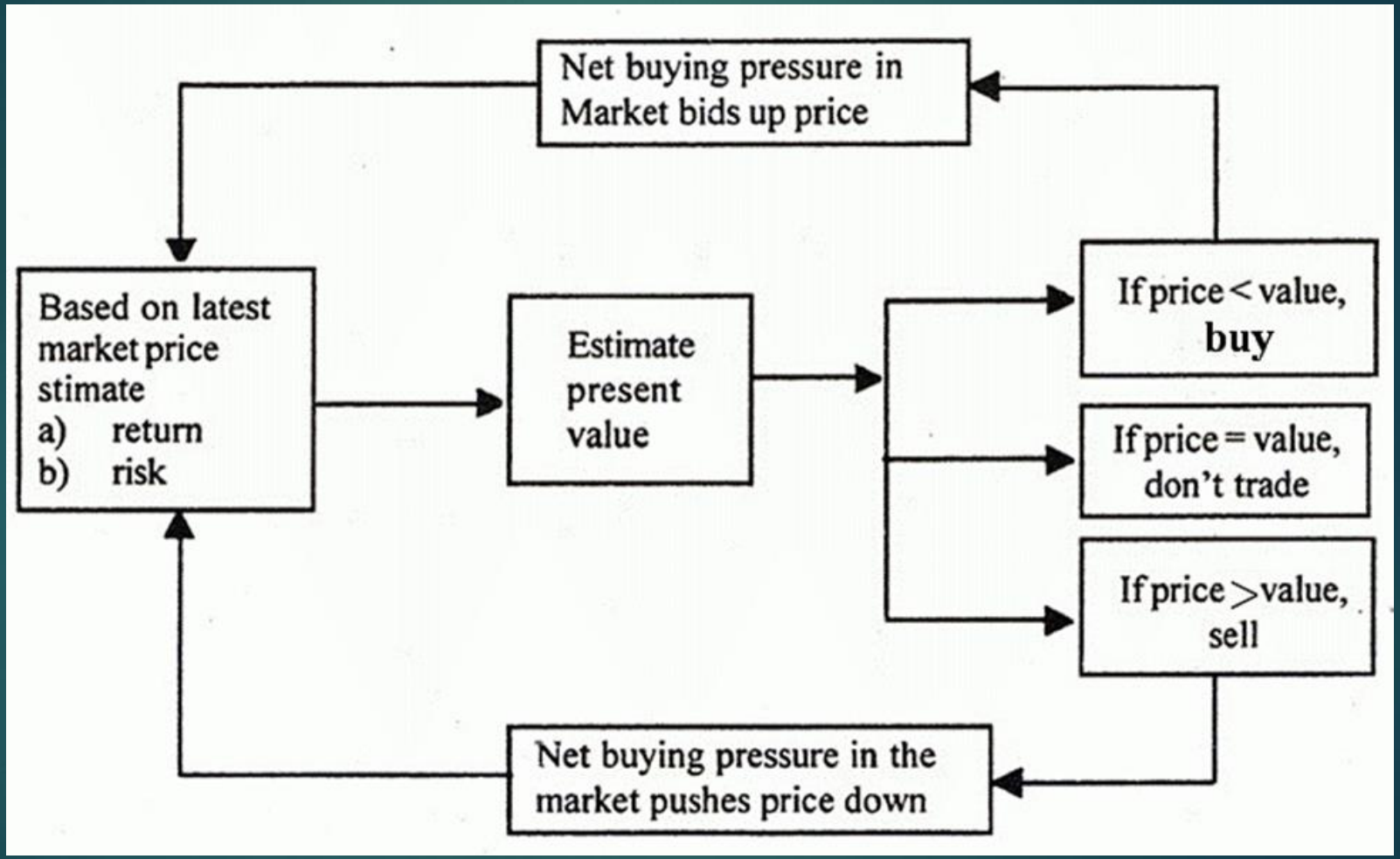
- ✓ Cootner adds one more dimension to the general view of investor action and buy-sell pressures.
- ✓ He classifies active investors further into two groups:

1. "Professional investors": are resourceful enough to discover news and develop estimates of intrinsic value even before the unsophisticated investors get the news. They will, therefore, be the first to commence market action the moment a value-price mismatch is discovered.
2. "Unsophisticated investors": including hasty speculators who act on "hot tips" would not get any news other than public news and will not have the skill to interpret even such public news. They will however, act in the market but such an action would be incompatible with true changes in intrinsic value.

For instance, some of them might have got retirement benefits and would desperately want to invest in shares and securities. And unfortunately, such an action may come up at a time when price is more than value. Likewise, some such investors may have to finance a marriage in the family and would have to sell shares held by them even if price is already ruling at a level lower than the intrinsic value. It is obvious that the action of unsophisticated investors would cut against the trading pressures needed to rectify the disequilibrium between value and price.

- ✓ It is only when their irrational action takes prices to substantial "highs" or "lows" that the professional investors re-enter the scene and pocket enormous profits even while attempting to realign the errant prices to intrinsic values.
- ✓ Paul Samuelson has supplemented the Cootner formulation of the valuation model by stressing the state of continuous equilibrium. Such a situation would be formed when prices adjust at high speed to values.
- ✓ Instantaneously adjusting prices to "vibrating values" would be known as perfectly efficient prices, which would be assumed to reflect all information.
- ✓ A security with perfectly efficient prices would be in continuous equilibrium.

- ✓ **Figure 3.2 depicts the dynamic valuation process which is an ever-continuing phenomenon:**



3.4 Valuation of Fixed Income Securities:

- Debt securities issued by governments, government and quasi-government organizations, and private business firms are fixed-income securities.
- Bonds and debentures are the most common examples.
- The intrinsic value of a bond or debenture is equal to the present value of its expected cash flows.
- The usual present value calculations are made with the help of the following equation:

$$PV = \sum_{i=1}^{n} \frac{C}{(1+r)^1} + \frac{TV}{(1+r)^n} \qquad (3.1)$$

Where,

PV = the present value of the security today (i.e., time period zero)

C = coupons or interest payments per time period `t'

TV = the terminal value repayable at maturity; this could be at part, premium, or even at discount (in extraordinary cases)

r = the appropriate discount rate or market yield

n = the number of years of maturity

- The valuation methodology implicit in the above equation can be illustrated.

- Consider a bond (Bond-A) with a face value of L.E. 1,000 was issued with a maturity of five years at par to yield 10%. Interest is paid annually and the bond is newly issued. The value of the bond would be as follows:

$$PV_A = \frac{100}{1+.10} + \frac{100}{(1+.10)^2} + \frac{100}{(1+.10)^3} + \frac{100}{(1+.10)^4} + \frac{100 + 1000}{(1+.10)^5}$$

= 999.97 or L.E. 1,000 approx.

You should recognize that the present value of the bond viz. L.E.1,000 estimated above is equal to the issue price because the bond has just been sold at par of L.E.1,000.

- Now, consider another bond (Bond-B) with a face value of L.E.1,000 issued five years ago at a coupon of 6%. The bond had a maturity period of ten years and as of today, therefore, five more years are left for final repayment at par. The current discount rate is 10 per cent as before. All other characteristics of bond-B are identical with bond-A.

It is obvious that the present value of bond-B will not be L.E.1,000 because investors will not pay this price and agree to receive L.E. 60 per year as interest for the next five years when bond-A with similar characteristics provides annual interest payments of L.E.100 for the next five years. The present value of bond-B will be determined as follows:

$$PV_B = \frac{60}{1+.10} + \frac{60}{(1+.10)^2} + \frac{60}{(1+.10)^3} + \frac{60}{(1+.10)^4} + \frac{60 + 1000}{(1+.10)^5}$$

= L.E. 847.35

Should interest payments be semi-annual, the PV equation will have to be modified as follows: divide 'C', and `r' both by 2 and multiply `n' by 2. The resultant equation will be:

$$PV = \sum_{i=1}^{2n} \frac{C_{t/2}}{(1+r/2)^t} + \frac{TV}{(1+r/2)^{2n}} \qquad (3.2)$$

Assuming semi-annual payments, present values of bonds A and B in the above examples can be solved as under:

$$PV_A = \sum_{t=1}^{10} \frac{50}{(1.05)^t} + \frac{1000}{(1.05)^{10}}$$

=L.E. 999.98 or L.E. 1,000 approx.

$$PV_B = \sum_{t=1}^{10} \frac{Rs.30}{(1.05)^t} + \frac{Rs.1,000}{(1.05)^{10}}$$

=L.E. 845.55

3.4.1 Estimating Returns on Fixed Income Securities

- ✓ Several measures of returns on bonds are available.
- ✓ They are: the coupon rate, the current yield, and the yield to maturity.
- ✓ The coupon rate is specified at the time of issue and is all too obvious.
- ✓ The other two measures can be discussed.

1) Current yield:

- This is calculated as follows:

$$\text{Current yield} = \frac{\text{Stated (coupon) interest year}}{\text{Current market price}}$$

- Example: if a 15% L.E. 200 debenture is currently selling for L.E. 220 the annual current yield would be:

$$\frac{30}{220} = 13.64\%$$

- You must notice that:

1. The 15% debenture with a face value L.E. 200 is currently selling for L.E. 220 because interest rates subsequently declined and debenture/bond prices *move inversely* with interest rates. The current yield having declined to 13.64% from the coupon rate of 15% reflects this.
2. Current yield is a *superior* measure to coupon rate because it is based on the current market price.
3. However, it *does not account* for the difference between the purchase price of the bond/debenture and its maturity value.

2) Yield-to-maturity (YTM):

- **This is the most widely used measure of return on fixed income securities.**
- **It may be defined as *the indicated (promised) compounded rate of return an investor will receive from a bond purchased at the current market price and held to maturity*.**
- **Computing YTM involves *equating* the *current market price of a bond* with the *discounted value of future interest payments and the terminal principal repayment*; thus, YTM equates the two values, viz., the market price and the present value of future payments including the principal repayment.**
- **You may note that the compounding intervals may be *annual*, *semi-annual* or *quarterly*.**
- **Equations 3(1) or 3(2), the latter being modified for compounding intervals more frequent than one year, are generally used.**
- **If you are familiar with concept called internal rate of return discussed previously, the YTM is *IRR* of initial investment (market price) and periodic payments including principal amount received at the end of the period.**

- **Example: Assume that an investor purchases a 15%, L.E. 500 fully secured non-convertible debentures at the current market price of L.E. 400. The debenture is to be repaid at the end of five years from today. The yield-to-maturity can be estimated as follows:**

$$MP = \sum_{t=1}^{n} \frac{C_t}{(1+YTM)^t} + \frac{TV}{(1+YTM)^n}$$

$$\text{or,} \quad 400 = \sum_{t=1}^{5} \frac{75}{(1+YTM)^t} + \frac{500}{(1+YTM)^5}$$

  - **What is required in this case is a value of YTM which equates L.E. 400 with the sum of present values of L.E. 75 per year for 5 years and of L.E. 500 receivable at the end of the fifth year.**
  - **Clearly, a process of *trial-and-error* is indicated.**
  - **Several values of YTM can be tried till the equating value emerges.**
  - **Trials *can be started with the coupon rate with the next trial rate increased if the present value of the preceding trial exceeds the current market price and vice versa*.**
  - **Calculators and computers have made these calculations extremely easy.**
  - **For instance, if you are familiar with Microsoft Excel, then you can use *= IRR () function* to get this value.**

- **You may further note that the *YTM is just a promised yield* and the investor cannot earn it unless the bond/debenture is held to maturity.**
- **YTM can be approximated and tedious calculations be avoided using the following formula:**

$$\text{Approximate YTM} = \frac{\text{Coupon Interest} + [(MP_n - MP_t)] / N}{[MP_n + MP_t]/2}$$

Where,
MP_n is market price at maturity and
MP is market price (or cost) at beginning.
In the above example, the approximate YTM is

$$= \frac{75 + [(500 - 400) / 5]}{(500 - + 400) / 2} = \frac{95}{450} = 21.11\%$$

3.5 Valuation of Preference Shares:

- **Preference shares are a hybrid security.**
- **They have some features of bonds and some of equity shares.**
- **Theoretically, preference shares are considered a perpetual security but there are convertible, callable, redeemable and other similar features, which enable issuers to terminate them within a finite time horizon.**
- ***Preference dividends are specified like bonds*.**
- **This has to be done *because they rank prior to equity shares for dividends*.**

- **Preference shares are *less risky than equity* because their dividends are specified and all arrears must be paid before equity holders get dividends.**
- **They are, however, *more risky than bonds* because the latter enjoy priority in payment and in liquidation.**
- **Bonds are secured also and enjoy protection of principal, which is ordinarily not available to preference shares.**
- ***Investors' required returns on preference shares are more than those on bonds but less than on equity shares*. In exceptional circumstances when preference shares enjoy special tax-shields (like in U.S., intercorporate holdings of preference shares get exemption on 80% of preference dividends) required returns on such shares may even be marginally below those on bonds.**
- **Since dividends from preference shares are assumed to be *perpetual payments*, the intrinsic value of such shares will be estimated from the following equation valid for perpetuities in general:**

$$V_p = \frac{C}{(1 + K_p)} + \frac{C}{(1 + K_p)^2} + \text{.....} = \frac{C}{K_p}$$

Where,
V_p = the value of a perpetuity today
C = the constant annual payment to be received
K_P = the required rate of return appropriate for the perpetuity.

- **You have only to substitute *preference dividend (D) for `C'* and *the appropriate required return (KPs) for 'KP'* and obtain the following equation for valuing preference shares:**

$$V_{ps} = \frac{D}{K_{ps}}$$

- **You may note that *`D' is perpetuity and is known and fixed forever*.**
- **The value of a preference share can be calculated if the dividend per share and the required rate of return are known.**
- **Similarly, the required rate of return (or yield) can be known if the value of the perpetuity and dividend per share are known.**

- **Example: Consider Firm-A issuing preference shares of L.E. 100 each with a specified dividend of L.E. 11.5 per share. Now, if the investors' required rate of return corresponding to the risk-level of Firm-A is 10% the value today of the share would be:**

$$V_{ps} = \frac{11.5}{.10} = \text{L.E. } 115.00$$

- **If the required of return increases (say in the wake of rising interest rates, and in consequence, the higher opportunity costs) to 12%, value will be:**

$$V_{ps} = \frac{11.5}{.12} = \text{L.E. } 95.83$$

- **You may note that the value changes inversely to the required rate of return. If you are an observer of market prices, you may notice the price of any preference share on any day and calculate its yield on that day using the above formula. Thus, if the current market price of the preference share in question is L.E. 125.00, then the required rate of return or yield can be calculated as under:**

$$V_{ps} = \frac{D}{K_{ps}} \text{ or, L.E.} 125.00 = \frac{11.50}{K_{ps}}$$

$$\text{or, } K_{ps} = \frac{11.50}{125.00} = 9.2\%$$

3.6 Valuation of Equity Shares:

3.6.1 The Present Value of Expected Stream of Benefits from Equity Shares:

- ✓ **Fundamental analysis is centered on presented value, which is computed as the discounted value of future stream of benefits.**
- ✓ **In the case of equity shares, the future stream of earnings poses *two problems*.**

***One*, it is *neither specified* (as in the case of preference shares) nor perfectly known in advance as an obligation (as in the case of bonds and debentures). Consequently, future benefits and their timing have both to be estimated in a probabilistic framework.**

***Two*, there are at least three other variables which are used as alternative measures of such benefits viz., *dividends*, *cash flows*, and *earnings*.**

- **Solution to the first problem is offered by *past data*, which is appropriately modified for future projections. Of course, investors need to modify the past data by taking into account the current reality and then measure the *growth rate*.**
- **The second problem can also be viewed as a case of the three alternatives not really conflicting with each other. The real question is: which cash flows are appropriate in the valuation of equity shares? Now, if you buy equity shares and place them all in a trust fund for your and your heir's perpetual benefit, what cash flows will be received in the trust fund? The answer is `dividends' because this is the only cash distribution, which a company makes to its shareholders. Even though earnings per share in any year do belong to the shareholders, companies do not distribute them all.**

- ✓ **Does it mean we should ignore earnings in valuation? Probably, No. *All dividends are paid out of earnings*. Moreover, a popular approach to valuation of equity shares known as *P/E ratio* uses earnings as its basis. Hence, earnings are important.**
- ✓ **Now, if all earnings are paid out as dividends, they will be accounted for as dividends.**
- ✓ **In the event of a part of earnings being retained and reinvested, the effect will be to increase future earnings and finally future dividends also. Present value analysis should not count earnings reinvested currently and paid later as dividends. It will lead to *double counting*. In fact, the two can be properly defined and separated in which case the two variables viz., earnings and dividends would produce the same results. Thus, it is always correct to use dividends as the numerator of the present value equation used to estimate the intrinsic value of equity shares. The present value model, which uses dividends as its variable representing the cash flow stream, is known as the dividend valuation model. This model is discussed below and is followed by a discussion of the P/E approach to equity shares valuation.**

3.6.2 Dividend Valuation Model:

- ✓ Under dividend valuation model, future dividends are discounted at the required rate to get the value of share.
- ✓ There are three possible situations on future dividend.

a) Dividends do not grow in future i.e., the constant or zero growth assumption,

b) Dividends grow at a constant rate in future, i.e., the constant-growth assumption,

c) Dividends grow at varying rates in future time periods i.e., multiple-growth assumption.

The dividend valuation model is now discussed under the above three situations

a) The zero-growth Case:

$$V = \frac{D_t}{K}$$

Consider a preference share on which the company expects to pay a cash dividend of L.E. 9 per share for an indefinite future period. The required rate of return is 10% and the current market price is L.E. 80.00. Would you buy the share at its current price?

This is zero-growth case because the dividend per share remains L.E. 9 for all future time periods. You may find the intrinsic value of the share

$$V = \frac{9.00}{.10} = \text{L.E. } .90$$

Since the intrinsic value of L.E. 90 is more than the market price of L.E. 80, you would consider buying the share.

b) The Constant Growth Case:

$$V = \frac{D_0(1+g)}{K-g} = \frac{D_t}{K-g}$$

Alfa Ltd., paid a dividend of L.E. 2.00 per share for the year ending March 31, 2002. A constant growth of 10% per annum has been forecast for an indefinite future period. Investors required rate of return has been estimated to be 15%. You want to buy the share at a market price of L.E. 60 quoted on July 1, 2002. What would be your decision?

Solution

This is a case of constant-growth-rate situation. Equation 3.14 can be used to find out the intrinsic value of the equity share as under:

$$V = \frac{D_1}{K - g} = \frac{2\,(1+0.10)}{.15 - .10} = \frac{2.20}{.05} = \text{L.E. } 44.00$$

The intrinsic value of L.E. 44 is less than the market price of L.E. 60. Hence, the share is overvalued and you would think before investing in the stock.

c) The Multiple-Growth Case:

$$V_0 = V_{T(1)} + V_{T(2)}$$

$$V_{T(2)} = V_T \left[\frac{1}{(1 + K)^T} \right]$$

$$= \frac{D_{T+1}}{(K - g)(1 + K)^T}$$

Cronecom Ltd., paid dividends amounting to L.E. 0.75 per share during the last year. The company is expected to pay L.E. 2.00 per share during the next year. Investors forecast a dividend of L.E. 3.00 per share in the year after that. At this time, the forecast is that dividends will grow at 10% per year into an indefinite future. Would you buy/sell the share if the current price is L.E. 50.00? The required rate of return is 15%.

Solution

This is a case of multiple growth. The values VT(1) and VT(2) can be calculated as follows:

$$V_{T(1)} = \frac{2}{(1+.15)^1} + \frac{3}{(1+.15)^2} = \text{L.E. } 4.1$$

$$V_{T(2)} = \frac{3.3}{(.15-.10)(1+.15)^2} = \text{L.E. } 49.91$$

$$V_o = 4.01 + 49.91 = \text{L.E. } 53.92$$

At the current price of L.E. 50.00, the share is underpriced and hence you will buy the stock.

3.6.3 The P/E Approach to Equity Valuation:

- **Unlike dividend capitalization model, the P/E approach is fairly simple and widely followed in the stock market.**
- **The first step under this model is estimating *future earnings per share*.**
- **Next, the normal *price-earnings ratio* will be found.**
- **Product of these two estimates will give the *expected price*.**
- **The most practical way of using P/E model is first computing the industry average P/E or P/E of similar firm and then multiplying the same with the expected or actual earning of the stock.**
- ***P/E of an industry is expected to be high when the industry is in high growth industry*.**
- ***P/E will be low if the industry or firm is expected to show a low growth rate*.**
- **P/E is *also affected by the risk associated with the earnings*.**