

**One Period Valuation Model:** According to this model, the investor holds the share for one year. The value of the share is calculated here taking the sum of dividend and share price at the end of year as follows:

$$P_0 = \frac{D_1}{(1 + K_e)} + \frac{P_1}{(1 + K_e)} \text{ or } \frac{D_1 + P_1}{(1 + K_e)}$$

where,

$P_0$  = Value of share at the beginning

$D_1$  = Expected dividend at the end of year

$P_1$  = Expected share price at the end of year

$K_e$  = Expected rate of return.

**Illustration 4.** A company's equity share presently is expected to pay a dividend of Rs. 5 after one year. The share price after one year is expected to be Rs. 112. Ascertain the value of the share at the beginning of the year assuming that the required rate of return of 15%.

**SOLUTION:**

$$\begin{aligned} P_0 &= \frac{D_1}{(1 + K_e)} + \frac{P_1}{(1 + K_e)} \\ &= \frac{5}{(1.15)} + \frac{112}{(1.15)} \\ &= \frac{117}{1.15} \\ &= \text{Rs. } 101.74. \end{aligned}$$

**Two Period Valuation Model:** In a two period model, the investor buys the share, holds it for two years and then sells it. The value of share in this case can be ascertained as follows:

$$P_0 = \frac{D_1}{(1 + K_e)} + \frac{D_2}{(1 + K_e)^2} + \frac{P_2}{(1 + K_e)^2}$$

Where,

$D_2$  = Expected dividend at the end of year 2.

$P_2$  = Expected share price at the end of year 2.

**Illustration 5.** Calculate the value of equity share today if the investor holds the share for two years and sells it. The company's expected dividend in the 1st year and 2nd year is Rs. 10 and Rs. 13 respectively. The expected price of share at the end of year 2 is Rs. 460. The expected return is 18%.

**SOLUTION:**

$$\begin{aligned} P_0 &= \frac{D_1}{(1 + K_e)} + \frac{D_2}{(1 + K_e)^2} + \frac{P_2}{(1 + K_e)^2} \\ &= \frac{10}{(1.18)} + \frac{13}{(1.18)^2} + \frac{460}{(1.18)^2} \end{aligned}$$

$$= 8.475 + 9.336 + 330.364$$

$$= \text{Rs. } 348.17$$

**N Period Valuation Model:** Where the investor holds the share for  $n$  period and then sells it, the value of the share will be calculated as follows:

$$P_0 = \frac{D_1}{(1+K_e)} + \frac{D_2}{(1+K_e)^2} + \dots + \frac{D_n}{(1+K_e)^n} + \frac{P_n}{(1+K_e)^n}$$

or

$$P_0 = (D) (ADF_{i,n}) + (P_n) (DF_{i,n})$$

**Illustration 6.** A company declares a dividend of Rs. 15 per share constantly for 5 years. The investor holding the share sells it at Rs. 275 after 5 years. Calculate the present value of share if his expected rate of return is 12%.

**SOLUTION:**

$$P_0 = \frac{D_1}{(1+K_e)} + \frac{D_2}{(1+K_e)^2} + \dots + \frac{D_5}{(1+K_e)^5} + \frac{P_5}{(1+K_e)^5}$$

$$= \frac{15}{(1.12)} + \frac{15}{(1.12)^2} + \frac{15}{(1.12)^3} + \frac{15}{(1.12)^4} + \frac{15}{(1.12)^5} + \frac{275}{(1.12)^5}$$

$$= 13.39 + 11.96 + 10.67 + 9.53 + 8.51 + 156.048$$

$$P_0 = \text{Rs. } 210.10$$

**Dividend Valuation Model:** In case of equity shares, mostly the investors hold them for a longer period. Here the shares are valued based on its growth. Some shares do not have any growth in dividend and expects to offer constant dividend while other shares grow constantly or grows at extra ordinary rate. Let us examine each case separately.

**Case 1 : No Growth in dividend.**

In case of a share which do not have any growth and remain constantly in dividend in share value is as follows:

$$P_0 = \frac{D}{K_e}$$

**Illustration 7.** What is the present value of the share where the investor's expected rate of return is 14% and the share dividend is Rs. 8.

**SOLUTION:**

$$P_0 = \frac{D}{K_e}$$

$$= \frac{8}{.14} = \text{Rs. } 57.15$$

$$P_0 = 57.15.$$

**Illustrations 8.** Calculate the investor's expected return on if the company is expected to provide a dividend of Rs. 20 perpetually and the present value of share is Rs. 150. If the share price comes down to 140, what is the expected return?

**SOLUTION:**

$$P_0 = \frac{D}{K_e}$$

$$(a) \quad 150 = \frac{20}{K_e}; K_e = \frac{20}{150}$$

$$K_e = 13.33\%$$

$$(b) \quad K_e = \frac{20}{140}; K_e = 14.28\%$$

**Case 2 : Constant Growth in Dividend**

Under this case, the assumption is that the dividends will grow constantly ( $g$ ) for an indefinite period. Under this model, the value of share can be ascertained as follows:

$$P_0 = \frac{D(1+g)}{1+r} + \frac{D(1+g)^2}{(1+r)^2} + \frac{D(1+g)^n}{(1+r)^n}$$

where the period is infinity, the share price is

$$P_0 = \frac{D_1}{r-g}$$

where,

$P_0$  = Present value of share

$D_1$  = Dividend in the next year

$r$  = Expected or required rate of return

$g$  = Growth rate.

The above model is based on the following assumptions.

(1) The firm will have a stable dividend policy.

(2) The return earned by the company over the time are stable.

This model becomes useful when the security analyst, predicts and considers the next years dividend, long term growth of the firm and investors expected rate of return. Once these variables are known to the analyst, he can calculate the present value of share and compare with the prevailing price.

**Illustration 9.** XYZ company's dividend per share next year is expected to be Rs. 5.50. The dividend is expected to grow at a rate of 12% per year subsequently. What should be the present value of the share assuming that the expected rate of return is 15%. The market price is Rs. 190.

**SOLUTION:**

$$P_0 = \frac{D_1}{r-g}$$

$$D_1 = 5.50$$



$$= \frac{5.50}{0.15 - 0.12} \quad r = 0.15$$

$$= \frac{5.50}{0.03} \quad g = 0.12$$

$$= \text{Rs. } 183.33$$

It is suggested that, the investor should not buy the share as the theoretical value is less than the market price.

The decision to buy or sell is based on the following details.

### Regarding Share Value

- If the theoretical value is more than market value, buy the shares.
- If the theoretical value is less than the market value, then sell the shares.

### Regarding Rate or Return

- If the actual rate of return is more than the expected rate of return, the buy the shares.
- If the actual rate of return is less than the expected rate of return, then sell the shares.

**Illustration 10.** An investor has invested in shares of a company which is expected to grow at a constant rate of 10%. It has paid a dividend of Rs. 6.75 per share. What will be its present value if the expected rate of return is 14%?

**SOLUTION:**

$$P_0 = \frac{D_1}{r-g} \quad D_1 = 6.75$$

$$= \frac{6.75}{0.14 - 0.10} = \frac{6.75}{0.04} \quad g = 10\%$$

$$P_0 = \text{Rs. } 168.75 \quad r = 14\%$$

**Illustration 11.** The market price of a company's equity share is Rs. 200. The dividend is expected to grow at a constant rate of 6%. Calculate the expected rate of return if the company pays a dividend of Rs. 24 per share.

**SOLUTION:**

$$P_0 = \frac{D_1}{r-g} \quad D_1 = 24$$

$$200 = \frac{24}{r-0.06} \quad r = ?$$

$$200(r-0.06) = 24 \quad g = 6\%$$

$$P_0 = 200$$

**Alternatively**

$$200r - 12 = 24$$

$$r = \frac{D_1}{P} + g$$

$$\begin{aligned}
 200r &= 24 + 12 & &= \frac{24}{200} + 0.06 \\
 200r &= 36 & &= 0.12 + 0.06 \\
 r &= \frac{36}{200} & &= 0.18 = 18\% \\
 r &= 18\%
 \end{aligned}$$

The expected rate of return = 18%.

**Illustration 12.** The current share price is Rs. 350 which pays a dividend of Rs. 12 per share. Calculate the growth rate in dividend, if the expected rate of return is 14%.

**SOLUTION:**

$$\begin{aligned}
 P_0 &= \frac{D_1}{r-g} & P_0 &= \text{Rs. } 350 \\
 350 &= \frac{12}{0.14-g} & r &= 14\% \\
 350(0.14-g) &= 12 & D_1 &= \text{Rs. } 12 \\
 49 - 350g &= 12 & g &= ? \\
 49 + 12 &= 350g \\
 g &= \frac{61}{350} \\
 g &= 17.43\%
 \end{aligned}$$

**Case 3: Two Stage Model:** In this model, the growth in the dividend is extended to two periods. The constant growth will continue for some period and there will be extra growth after that period and remain same. The first stage constant growth period is called the normal growth and after that period, the growth is considered as extra ordinary growth. Hence this model is known as two stage model.

In order to determine the intrinsic value of share under this model, the following three steps may be followed.

- (1) Calculate the present value of dividends that are expected for a definite period. ( $V_1$ )
- (2) Calculate the present value of dividends that are expected after the definite period. ( $V_2$ )
- (3) Find out the intrinsic value of share by combining 1 and 2. ( $V_1 + V_2$ ).

This is expressed as follows:

$$\begin{aligned}
 P_0 &= V_1 + V_2 \\
 V_1 &= \frac{D_1}{(1+r)} + \frac{D_2}{(1+r)^2} + \dots + \frac{D_n}{(1+r)^n}
 \end{aligned}$$

This may be summarised as follows:

$$V_1 = \sum_{t=1}^n \frac{D_0(1+g)^t}{(1+r)^t}$$

$$V_2 = \frac{D_n(1+g)}{(r-g)(1+r)^n}$$

Hence,

$$P_0 = \sum_{t=1}^n \frac{D_0(1+g)^t}{(1+r)^t} + \frac{D_n(1+g)}{(r-g)(1+r)^n}$$

**Illustration 13.** According to the company report, Allied Company's rate of return for the past 5 years is 15.95%. This trend is likely to continue for the next 5 years and is assumed to have a growth rate of 10% indefinitely. The company has paid a dividend of Rs. 3.60. The expected rate of return is 20%. The current price of the share is Rs. 80. Calculate the share price using two stage model.

**SOLUTION:**

$$D_0 = 3.60$$

$$g_1 = 0.1595$$

$$g_2 = 0.10$$

$$r = 0.20$$

$$n = 5 \text{ years}$$

**Step 1: Calculate of growth in dividend in 1st stage**

$$\begin{aligned} V_1 &= \frac{D_0(1+g_1)^n}{(1+r)^n} \\ &= \frac{3.60(1+0.1595)^5}{(1+0.20)^5} \\ &= \frac{360(1.1595)^5}{(1.20)^5} \\ &= \frac{3.60(2.0958)}{2.4883} \\ &= \frac{7.5448}{2.4883} = 3.03. \end{aligned}$$

**Step 2: Calculation of growth in dividend in 2nd stage.**

$$\begin{aligned} V_2 &= \frac{D_n(1+g_2)}{(r-g_2)(1+r)^n} \\ &= \frac{7.55(1+0.10)}{(0.20-0.10)(1+0.20)} \\ &= \frac{7.55(1.10)}{(0.1)(1.20)} \end{aligned}$$

$$\begin{aligned}
 &= \frac{8.305}{0.12} = 69.21 \\
 P_0 &= V_1 + V_2 \\
 &= 3.03 + 69.21 \\
 &= \text{Rs. } 72.24.
 \end{aligned}$$

**Illustration 14.** X Ltd. has paid a dividend of Rs. 2 per share in the current year. It is expected to grow at 10% for the next 4 years and grow at 12% for further 4 years. The expected rate of return is 14%. Calculate the intrinsic value of the share.

**SOLUTION:**

$$\begin{aligned}
 D_0 &= \text{Rs. } 2.00 \\
 g_1 &= 0.10 \\
 g_2 &= 0.12 \\
 r &= 0.14 \\
 n &= 4 \text{ years}
 \end{aligned}$$

**Step 1: Growth in dividend in 1st stage**

$$\begin{aligned}
 V_1 &= \frac{D_0(1 + g_1)^n}{(1 + r)^n} \\
 &= \frac{2(1 + 0.10)^4}{(1 + 0.14)^4} \\
 &= \frac{2(1.10)^4}{(1.14)^4} \\
 &= \frac{2(1.464)}{1.689} = \frac{2.928}{1.689} = 3.38
 \end{aligned}$$

$$V_1 = 3.38.$$

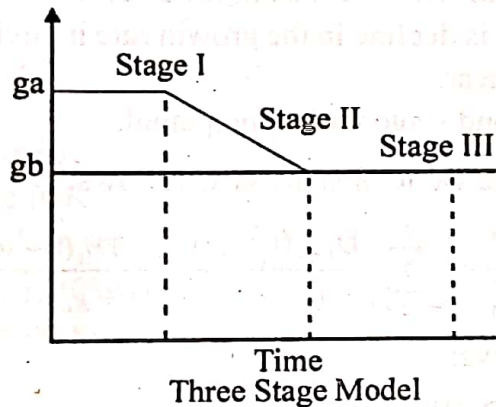
**Step 2: Growth in dividend in 2nd stage**

$$\begin{aligned}
 V_2 &= \frac{D_n(1 + g_2)}{(r - g_2)(1 + r)^n} \\
 &= \frac{2.928(1 + 0.12)}{(0.14 - 0.12)(1 + 0.14)^4} \\
 &= \frac{2.929(1.12)}{(0.02)(1.689)} \\
 &= \frac{3.28}{0.034} = 96.47 \\
 V_2 &= 96.47.
 \end{aligned}$$



$$\begin{aligned}
 &= \frac{5.50(1.12)}{(0.06)(1.18)} \\
 &= \frac{6.16}{0.07} = 88 \\
 V_2 &= \text{Rs. } 88 \\
 P_0 &= V_1 + V_2 \\
 P_0 &= 11.62 + 88 \\
 P_0 &= \text{Rs. } 99.62
 \end{aligned}$$

**Case 4: Three stage model:** Under this model, the dividends are assumed to grow at a constant rate ( $g_a$ ) for a certain number of years. After that, the dividend will grow in second stage further at a rate ( $g_b$ ). While in the third stage the dividend rate will further grow ( $g_n$ ) and the growth is perpetual in the third stage. The growth rate may generally decline from one stage to another. This can be illustrated as follows:



$$V_1 = \frac{D_0(1+g)}{(1+r)} + \frac{D_0(1+g)^2}{(1+r)^2} + \dots + \frac{D_0(1+g)^n}{(1+r)^n}$$

$$\begin{aligned}
 P_0 &= V_1 + V_2 \\
 &= 3.38 + 96.47
 \end{aligned}$$

$$P_0 = \text{Rs. } 99.58.$$

**Illustration 15.** Paras India Limited paid a dividend of Rs. 2.50 in the first year. It is expected to pay Rs. 3.00, 4.00, 4.75 and 5.50 during the next 4 years respectively, and grow at 12% per year indefinitely. Calculate the intrinsic values of equity share assuming that the investor expects a return of 18%.

**SOLUTION:**

$$V_1 = \frac{D_1}{(1+r)} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{D_4}{(1+r)^4} + \frac{D_5}{(1+r)^5}$$



$$\begin{aligned}
&= \frac{2.50}{(1.18)} + \frac{3.00}{(1.18)^2} + \frac{4.00}{(1.18)^3} + \frac{4.75}{(1.18)^4} + \frac{5.50}{(1.18)^5} \\
&= \frac{2.50}{1.180} + \frac{3.00}{1.392} + \frac{4.00}{1.643} + \frac{4.75}{1.938} + \frac{5.50}{2.288} \\
&= 2.19 + 2.15 + 2.43 + 2.45 + 2.40 \\
V_1 &= \text{Rs. } 61.62 \\
V_2 &= \frac{D_n(1 + g_2)}{(r - g_2)(1 + r)^n} \\
&= \frac{5.50(1 + 0.12)}{(0.18 - 0.12)(1 + 0.18)}
\end{aligned}$$

The intrinsic value of share can be ascertained considering the following steps:

- The growth in the dividend will be constant for a certain period in 1st stage ( $g_a$ ).
- After the first stage, there is decline in the growth rate in dividend in the second stage ( $g_b$ ) and the decline will be linear.
- The growth after the second stage will be perpetual.

The calculation of the intrinsic value of share is as follows:

$$P_0 = \sum_{t=1}^a \frac{D_0(1+g)^n}{(1+r)^n} + \sum_{t=A+1}^b \frac{D_{t-1}(1+g_b)}{(1+r)^n} + \frac{D_B(1+g_n)}{(r-g_n)(1+r)^B}$$

It can be summarised as follows:

$$P_0 = \frac{D_0(1+g_n) + D_0H(g_a - g_n)}{r - g_n}$$

**Illustration 16.** Prem Industry's is expected to grow at 12% for the first 3 years. After 3 years, the company is assumed to grow at 8% for the next 4 years. After 5 years, the company is assumed to grow at 8% infinitely. The dividend per share is currently paid at Rs. 2.50 and the expected rate of return is 15%. Calculate the value of share.

**SOLUTION:**

$$D_0 = 2.50$$

$$r = 0.15$$

$$g_a = 0.12$$

$$g_n = 0.08$$

Step 1:

$$\begin{aligned}
V_1 &= \frac{D_0(1+g_a)^n}{(1+r)^n} \\
&= \frac{2.50(1+0.12)^3}{(1+0.15)^3}
\end{aligned}$$

$$= \frac{2.50(1.405)}{1.521} = \frac{3.512}{1.521}$$

**Step 2:**

$$V_1 = 2.31.$$

$$V_2 = \frac{D_n(1 + g_b)}{(r - g)(1 + r)^n}$$

$$= \frac{3.512(1 + 0.08)}{(0.15 - 0.08)(1 + 0.15)}$$

$$= \frac{3.512(1.08)}{(0.07)(1.15)}$$

$$= \frac{3.79}{0.08}$$

$$V_2 = 47.37.$$

**Step 3:**

$$P_0 = V_1 + V_2$$

$$= .31 + 47.37$$

$$P_0 = 49.68$$

Though this is a 3 stage model, but the dividend grows perpetually at 8% from second stage itself and hence the share price is Rs. 49.68.

**Illustration 17.** ABC Ltd. is assumed to grow at 10% for the first 4 years. Then the growth rate assumed to decline to 6% linearly. After 7 years the company is assumed to grow at 6% perpetually. The current dividend is Rs. 3. What will be the value of stock, if the required rate of return is 18%?

**SOLUTION:**

$$D_0 = 3$$

$$r = 0.18$$

$$g_a = 0.10$$

$$D_b = 0.09, 0.08, 0.07, \text{ and } 0.06, \text{ in next 4 years.}$$

$$g_n = 0.06$$

**Step 1: 1st four years**

$$V_1 = \frac{3}{(1.18)} + \frac{3(1.1)}{(1.18)^2} + \frac{3(1.1)^2}{(1.18)^3} + \frac{3(1.1)^3}{(1.18)^4}$$

$$= 2.54 + 2.37 + 2.21 + 2.06$$

$$V_1 = 9.18.$$

**Step 2: Next 3 years**

$$V_2 = \frac{3(1.1)^3(1.09)}{(1.18)^5} + \frac{3(1.1)^3(1.09)(1.08)}{(1.18)^6} + \frac{3(1.1)^3(1.09)(1.08)(1.07)}{(1.18)^7}$$

$$= \frac{4.352}{2.287} + \frac{4.70}{2.700} + \frac{5.03}{3.185}$$

$$= 1.90 + 1.74 + 1.58$$

$$V_2 = 5.22$$

**Perpetual**  
Step 3:

$$V_3 = \frac{3(1.1)^3(1.09)(1.08)(1.07)(1.06)}{(0.18 - 0.06)(1 + 0.18)}$$

$$= \frac{5.33}{(0.12)(1.18)} = \frac{5.33}{0.14} = 38.07$$

**Step 4: Add all the values**

$$P_0 = V_1 + V_2 + V_3$$

$$= 9.18 + 5.22 + 38.07$$

$$P_0 = \text{Rs. } 52.47.$$

**Price Earning Ratio P/E Ratio:** It is widely used to estimate the value of stock by analyst. Almost all financial newspapers and magazines publish the PE Ratio. This ratio basically arises from constant growth model. The price earning ratio is calculated as follows:

As per the constant growth model

$$P_0 = \frac{d}{r-g} \text{ or } \frac{b \cdot E_1}{r-g}$$

Alternatively

$$P_0 = \frac{b(1+g)}{r-g}$$

as  $E_1$  may be equal to  $E(0)(1+g)$ .

$$\frac{P_0}{E_1} = \frac{(1-b)}{r-br}$$

This is because there are three drivers of P/E ratio namely  $(1-b)$ ,  $r$  and  $br$ .

where  $(1-b)$  = Dividend pay out ratio

$r$  = Expected rate of return

$b_r$  = Growth rate ( $g$ )

hence P/E ratio =  $\frac{P_0}{E_1}$ .

**Illustration 18.** XYZ Ltd. has considered three different growth rates

If growth is low, it is 5%

If growth is normal, it is 10% and

If growth is above normal, it is 15%

Earning per share in the next year is Rs. 5.



Dividend per share in the next year is Rs. 3

Expected rate of return is 18%.

As a analyst you are required to calculate under each situation the following:

- (a) Value of share ( $P_0$ )
- (b) Dividend yield,
- (c) Capital gain yield
- (d) P/E ratio in three situations.

**SOLUTIONS:**

(a) Value of share. 
$$P_0 = \frac{D}{r - g}$$

Low growth 
$$= \frac{3}{0.18 - 0.05} = \frac{3}{0.13} = \text{Rs. } 23.07$$

Normally growth 
$$= \frac{3}{0.18 - 0.10} = \frac{3}{0.08} = \text{Rs. } 37.50$$

Above normal growth 
$$= \frac{3}{0.18 - 0.15} = \frac{3}{0.03} = \text{Rs. } 100$$

(b) Dividend yield 
$$= \frac{D_1}{P_0}$$

Low growth 
$$= \frac{3}{23.07} = 13\%$$

Normal growth 
$$= \frac{3}{37.50} = 0.08 = 8\%$$

Above normal growth 
$$= \frac{3}{100} = 0.03 = 3\%$$

The dividend yield will be higher for low growth firms while it is lower for super normal growth firms.

(c) Capital gain yield 
$$= \frac{P_1 - P_0}{P_0} ; \text{ while } P_1 = P_0 (1 + g)$$

Low growth 
$$= \frac{23.07(1 + 0.05) - 23.07}{23.07}$$
  

$$= \frac{24.22 - 23.07}{23.07} = 4.98\% \text{ or } 5\%$$

Normal growth 
$$= \frac{37.50(1 + 0.10) - 37.50}{37.50}$$
  

$$= \frac{41.25 - 37.50}{37.50} = 10\%$$

$$\begin{aligned} \text{Above normal growth} &= \frac{100(1 + 0.15) - 100}{100} \\ &= \frac{115 - 100}{100} = \frac{15}{100} = 15\% \end{aligned}$$

The capital gain will be lower in case of low growth firms while it is higher for above normal growth firms.

$$(d) \text{ P/E ratio} = \frac{P_0}{E_1} \cdot E_1 = \text{earning per share.}$$

$$\text{Low growth} = \frac{23.07}{5} = 4.61$$

$$\text{Normal growth} = \frac{37.50}{5} = 7.5$$

$$\text{Above normal growth} = \frac{100}{5} = 20$$

The P/E ratio will be lower for low growth firms and it will be higher for above normal firms.

**Illustration 19.** A investor has the following details who invested in money in three different companies:

Company	EPS	Share Price
A	2.852	60
B	4.76	145.75
C	8.95	180.50

Calculate the P/E ratio for each company.

**SOLUTION:**

$$\text{P/E ratio} = \frac{P_0}{\text{EPS}}$$

$$A = \frac{60}{2.85} = 21.52$$

$$B = \frac{145.75}{4.76} = 30.62$$

$$C = \frac{180.50}{8.95} = 20.17.$$

**Illustration 20.** The equity stock of Rax Ltd. is currently selling for Rs. 30 per share. The dividend expected next year is Rs. 2.00. The investor's required rate of return on this stock is 15%. If the constant growth model applies to Rax Ltd. What is the expected growth rate?

(Jan, 2009, MBA, BU)

**SOLUTION:**

$$D_1 = 2 P_0 = \frac{D_1}{r - g}$$

$$P_0 = 3030 = \frac{2}{0.15 - g}$$

$$r = 15$$

$$g = ?$$

$$30(0.15 - g) = 2$$

$$4.5 - 30g = 2$$

$$4.5 + 2 = 30g$$

$$6.5 = 30g$$

$$g = \frac{6.5}{30}$$

$$g = 0.2166 \text{ or } 21.67\%$$

**Illustration 21.** XYZ Ltd, is assumed to grow at 12% for the first 4 years. It grows linearly to After 7 years the company is assumed to grow at 6% perpetually, The current dividend is Rs. 4. Find out the value of stock, if the required rate of return is 20%.

**SOLUTION:**

$$D_0 = \text{Rs. } 4$$

$$r = 0.20$$

$$g_a = 0.12$$

$$D_b = 0.11, 0.10, 0.9$$

**Step 1: Ist Four years**

$$V_1 = \frac{4}{(1.20)} + \frac{4(1.12)}{(1.20)^2} + \frac{4(1.12)^2}{(1.20)^3} + \frac{4(1.12)^3}{(1.20)^4}$$

$$= 3.33 + 3.11 + 2.90 + 2.710$$

$$V_1 = 12.05.$$

**Step 2: Next 2 years**

$$V_2 = \frac{4(1.12)^3}{(1.20)^5} + \frac{4(1.12)^3(1.11)(1.10)}{(1.20)^6} + \frac{4(1.12)^3(1.11)(1.10)(1.09)}{(1.20)^7}$$

$$= \frac{6.238}{2.488} + \frac{6.861}{2.985} + \frac{7.479}{3.583}$$

$$V_2 = 2.50 + 2.297 + 11.06$$

$$V_2 = 15.86.$$

**Step 3: Perpetual**

$$V_3 = \frac{4(1.12)^3(1.11)(1.10)(1.09)(1.08)}{(0.20 - 0.08)(1 + 0.20)} = \frac{8.077}{0.144} = 56.09$$

**Step 4: Add all the values;**

$$P_0 = V_1 + V_2 + V_3$$

$$= 12.05 + 15.86 + 56.09$$



$$P_0 = \text{Rs. } 84.$$

**Illustration 22.** For the first four years XYZ firm assumed to grow at a rate of 10%. After four years, the growth rate of dividend is assumed to decline linearly at 6 per cent. After 7 years the firm is assumed to grow at 6 per cent indefinitely. The next year dividend is Rs. 2 and the required rate of return is 14 per cent. Find out the value of the stock.

(Jan. 2010, MBA, Bangalore University)

**SOLUTION:**

$$D_0 = 2$$

$$r = 0.14$$

$$g_a = 0.10$$

$$g_b = 0.09, 0.08 \text{ and } 0.07$$

$$g_n = 0.06$$

Step 1: 1st four years

$$V_1 = \frac{2}{(1.14)} + \frac{2(1.1)}{(1.14)^2} + \frac{2(1.1)^2}{(1.14)^3} + \frac{2(1.1)^3}{(1.14)^4}$$

$$= 1.75 + 1.69 + 1.64 + 1.57$$

$$V_1 = 6.65.$$

Step 2: Next 3 years

$$V_2 = \frac{2(1.1)^3(1.09)}{(1.14)^5} + \frac{2(1.1)^3(1.09)(1.08)}{(1.14)^6} + \frac{2(1.1)^3(1.09)(1.08)(1.07)}{(1.14)^7}$$

$$= 1.507 + 1.427 + 1.340$$

$$= 4.27$$

Step 3: Perpetual

$$V_3 = \frac{2(1.1)^3(1.09)(1.08)(1.07)(1.06)}{(0.14 - 0.06)(1 + 0.14)} = \frac{1.7771}{0.0912}$$

$$V_3 = 19.41$$

Step 4: Add all the values

$$P_0 = V_1 + V_2 + V_3$$

$$= 6.65 + 4.27 + 19.41$$

$$P_0 = \text{Rs. } 30.33$$

## Questions

- 1) What is holding period return?
- 2) Distinguish between equity share and preference share.
- 3) Why dividends are important in determining the present value of share.
- 4) How are multiple year holding stock prices estimated with two stage and three stage growth model?
- 5) Is there any difference between the valuation of preference shares and equity shares? Explain.