Introduction to Equity Valuation

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Intrinsic value Versus Market price

The most popular model for assessing the value of a firm as a Going Concern starts from the observation that an investor of the stock picks a consistent return from dividend and price appreciation.

Suppose, ABC stock is expected to have the following information:

$E(D_1)$ = ₹4.00 P_o= ₹48.00 P_1= ₹52.00

If an investor holds 1 stock for 1 year; then 1 year holding period return would be:

$$\text{Expected HPR} = \frac{E(D1)+[E(P1)-Po]}{Po} = = \frac{4+[52-48]}{48} = 0.167 \text{ or } 16.7\%$$

Decomposing HPR;

$$\frac{E(D1)}{Po} = \text{Dividend yield} = \frac{4}{48} = 0.083 \text{ or } 8.3\ \%$$

$$\frac{[E(P1)-Po]}{Po} = \text{Price yield} = \frac{52-48}{48} = 0.083 \text{ or } 8.3\ \%$$

HPR = Dividend yield + Price Yield = 16.7 %

Expected Return versus Required Return

If a stock is priced correctly, offer the investor a fair return then *its expected return will be equal to its required return*. Required return is the return that an investor required from the investment in order to hold its risk or return from any other investment with equal risk.

Valuation of preference and Ordinary shares

Features of share

Claim: Preference shareholders have claim on assets and income of the firm prior to ordinary shares. But ordinary shareholders are the legal owners of the firm.

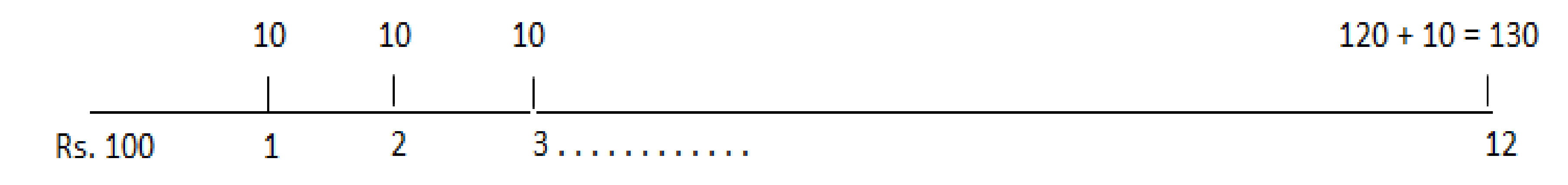
- **Dividend:** Dividend rate is fixed, certain and cumulative for preferred share, where are for ordinary share neither it is certain or known or accumulated. But both dividends are not tax detective.
- **Redemption:** Both redeemable and irredeemable preference shares are issued in India with maturity date but equity have no maturity date.
- **Conversion:** Preference shares may have conversion option to ordinary share with option.

Valuation of preference share

Suppose an investor is buying 12 years, 10% dividend, ₹100 per value preference at ₹100. The Redemption value of the preference share at maturity is ₹120.

Calculate the price of the preference share, if required rate of return is 10.5%?

Ans:



$$P_0 = Div_p \left[\frac{1}{r} - \frac{1}{r \times (1+r)^n}\right] + \frac{P_{12}}{(1+r)^n} = 10 \left[\frac{1}{0.105} - \frac{1}{0.105 \times (1.105)^{12}}\right] + \frac{120}{(1.105)^{12}} =$$

$$[10 \times (6.506)] + [120 \times (0.302)] = ₹\ 101.30$$

Formula:

$$P_0 = \left[\frac{Div_{p1}}{(1+k_p)^1} + \frac{Div_{p2}}{(1+k_p)^2} + \cdots \ldots \ldots + \frac{Div_{pn}}{(1+k_p)^n}\right] + \frac{P_n}{(1+k_p)^n}$$

$$= \sum_{t=1}^{n} \frac{Div_{pt}}{(1+k_p)^t} + \frac{P_n}{(1+k_p)^n}$$

If the preference dividend (Div_p) is expected to grow at a rate of 5% every year, then

$$P_0 = Div_p \left[\frac{1}{(K_p-g)^1} - \frac{1}{(K_p-g)^1}\frac{(1+g)^n}{(1+K_p)^n}\right] + \frac{P_n}{(1+k_p)^n}$$

$$= 10\left[\frac{1}{(0.105-0.005)^1} - \frac{1}{(0.105-0.05)^1}\frac{(1.05)^{12}}{(1.105)^{12}}\right] + \frac{120}{(1.105)^{12}} = ?$$

Valuation of Irredeemable preference share:

Irredeemable preference share looks like a perpetuity.

$$P_o = \frac{Div_p}{K_d} = \frac{10}{0.105} = ₹\,95.24$$

Valuation of ordinary share:

Valuation of ordinary share is difficult due to basic resource due to two basic reasons:

- Dividend on equity share is not known, and
- Payment of dividend is discretionary to the company

Hence cash flow of the ordinary share is uncertain. The value of the share today depends on cash inflow expected by investors and the risks associated with these cash inflows. The cash flow expected is based on dividend and price appreciation/depreciation.

- CF from a ordinary share= Dividend + Price Change

Single period Investment:

Suppose an investor buys and holds a share for 1 year then;

$$P_o = \frac{D_1 + P_1}{1 + K_e}$$

- If expected divided (D_1) = ₹ 6.00 (per share)
- If expected selling price (P_1) = ₹ 120.00 (per share)
- And Required rate of return, K_e = 15%

$$P_o = \frac{6+120}{1.15} = ₹\ 109.56$$

It implies ₹ 109.56 is the fair price for the stock based on its expected CF and the risk (K_e) associated to it.

Suppose, the investor found the share trading at ₹ 109.56 and hence bought it to hold for 1 year more. if he received ₹6 as dividend and price also appreciated to ₹120. Hence price growth rate:

Rate of growth of price (g) = $\frac{P_1 - P_0}{P_0} = \frac{120 - 109.56}{109.56} = 0.0952\ or\ 9.52\%$

i.e. $P_1 = P_0(1+ g)$ = ₹ 109.56 (1.0952) = ₹ 120

Rewriting the previous formula: $P_o = \frac{D_1 + P_1}{1 + K_e}$

Or $P_o = \frac{D_1 + P_0(1+g)}{1 + K_e}$

=> $P_0(1 + K_e) = D_1 + P_o\,(1 + g)$

=> $P_0 + P_oK_e = D_1 + P_o + P_og$ (or) => $P_0 + P_oK_e - P_o - P_og = D_1$

That is $\mathbf{D_1 = P_o\,(K_e - g)}$ **Or** $\mathbf{P_o = \frac{D_1}{(K_e - g)}}$

$$P_0 = \frac{D_1}{K_e - g} = \frac{6}{0.15 - 0.952} = ₹109.56$$

Similarly, for next year (i.e. for P_1)investor will have the expectation for a new CF.

$$P_1 = \frac{D_2 + P_2}{1 + K_e}$$

Suppose:

$E(D_2)$ = ₹6.57 $E(P_2)$ = ₹131.43, and K_e = 15%

Then $P_1 = \frac{6.57 + 132.43}{1.15}$ = ₹120

Hence, investor '1' is ready to sell because an investor '2' is now ready to buy.

Now, $P_o = \frac{D_1 + P_1}{1 + K_e}$ and $P_1 = \frac{D_2 + P_2}{1 + K_e}$

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

Or, $P_o = \frac{6}{1.15} + \frac{(6.57+131.63)}{(1.15)^2} = ₹109.56$

Similarly:

$P_2 = \frac{D_3+P_3}{1+K_e}$

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$P_n = \frac{(D_{n+1})+(P_{n+1})}{1+K_e}$

Hence;

$$P_0 = \frac{D_1}{(1+K_e)^1} + \frac{D_2}{(1+K_e)^2} + \frac{D_3}{(1+K_e)^3} + \cdots \ldots \ldots .. + \frac{D_n+P_n}{(1+K_e)^n}$$

$$\text{Or, } P_o = \sum_{t=1}^{n} \frac{D_t}{(1+K_e)^t} + \frac{P_n}{(1+K_e)^n}$$

Growth of Dividend

Dividend don’t remain constant. Earnings and dividend should grow over time and generally it is part of firm’s retention policy. Most of the firms retain substantial portion of their earning to be invested in the firm. *This policy increases equity value via increasing firm’s future earning. If number of shares doesn't increase, this policy should tend to increase earnings per share and dividend per share.*

Let's discuss the previous example.

$D_o = 6$, $D_1 = 6.57$ and $D_2 = 7.196$

Growth rate of D = $\frac{6.57 - 6}{6} = 0.0952 = 9.52\ \%$

$P_o = 109.56$, $P_1 = 120$, and $P_2 = 131.42$

Growth rate of P = 9.52 %

Note that the growth rate of dividend is broadly classified into three stages:

- **Normal growth**
- **Perpetual growth**, and
- **Super normal growth**

Normal growth

It is totally equity financed. Firm retains a constant proportion of its annual earnings (b) and reinvest it at its internal rate of return i.e. (ROE) Return On Equity, then it is expected that its dividend will grow at a constant rate equal to the product of its retention rate to return on equity that is :

$$G = b \times ROE$$

Where, G = growth rate

b = retention rate OR (1 - b) = Dividend payout rate

ROE = Return on Equity

Example:

Suppose for a firm XYZ,

Book value of equity per square = ₹100

Return on equity i.e. ROE = 10%

Detention ratio = 60%

i.e. dividend payout rate = 40%

Let's see how dividend and book value grows with growth of firm.

$BV_o = 100$, $ROE = 10\%$

Next year $EPS_1 = BV_o \times ROE = 100 \times 0.1 = ₹10$

Out of which 60% will be retained book and 40% will be paid as dividend per share.

Then $D_1 = ₹4$ and $b = ₹6$ (retained earning)

And $BV_1 = ₹\ 100 + ₹\ 6 = ₹106$

Again ROE = 10%

$EPS_2 = BV_1 \times ROE$ = ₹106 (0.1) = ₹10.6

D_2 = ₹ 10.6 × 0.4 = ₹4.24

Retained earning = ₹10.6 – ₹4.24 = ₹6.36

Then BV_2 = ₹106 + ₹6.36 = ₹112.36

Now BV_0 = ₹100, BV_1 = ₹106, BV_2 = ₹112.36

Growth rate of dividend per share = 6 %   i.e. $\frac{4.24 - 4}{4} = 6\%$

$EPS_1 = 10$, $EPS_2 = 10.6$

Growth rate of EPS (g) = 6%

And **$g = b \times ROE$** $= 0.6 \times 0.1 = 0.06$ or 6%

Note that BV, EPS and Dividend per share are growing at 6% which is Retention rate times ROE

Now, let's explore the Growth priority 'g':

$$g = \frac{Reinvestment}{Book\ Value} = \frac{Reinvestment}{Total\ Earning} \times \frac{Total\ Earning}{Book\ Value} = b \times ROE$$

Hence, b = Retention Ratio (or) Plowback Ratio

Lets Explore ROE:

$$(1)\ ROE = \frac{Net\ Income}{Equity}$$

$$= \frac{\text{NI}}{\text{Revenue}} \times \frac{Revenue}{Equity}$$ i.e. (Net Profit Margin) × (Equity Turnover)

$$(2)\ ROE = \frac{\text{NI}}{\text{Sales}} \times \frac{Sales}{Asset} \times \frac{Asset}{Equity}$$ (OR)

ROE = (Net Profit Margin) × (Asset Turnover rate) × (Financial Revenue)

$$(3)\ ROE = \frac{\text{NI}}{\text{EBT}} \times \frac{EBT}{EBIT} \times \frac{EBIT}{Revenue} \times \frac{Revenue}{Assets} \times \frac{Assets}{Equity}$$

ROE = Tax Burden × Interest Burden × EBIT Margin × Asset Turnover × Financial Leverage

The growth of dividend can also be calculated using ROC.

g = Net Reinvestment Rate × ROC

$$Net\ Reinvestment\ Rate = \frac{\mathrm{Cap.ex + NWC\ \ - Depreciation}}{\mathrm{NOPAT}}$$

$$\text{Or} \qquad = \frac{\text{Net Cap.Ex} - \text{NWC}}{\text{NOPAT}}$$

$$ROC = \frac{\mathrm{NOPAT}}{\mathrm{Invested\ Capital}}$$

And, Invested Capital = Equity + Debt - Minority Interest

Hence $g = \dfrac{Net\ Reinvestment}{Invested\ Capital}$ (OR) $\dfrac{\text{Reinvestment}}{\text{Book value}}$

Note: The growth opportunity of Firm (g) can be calculated as

(1) b × ROE i.e. $\dfrac{Reinvestment}{Total\ Earning} \times \dfrac{Total\ Earning}{Book\ Value} = \dfrac{Reinvestment}{Book\ Value}$

(2) Net Reinvestment × ROC

$$\frac{\text{Net Reinvestment}}{NOPAT} \times \frac{NOPAT}{Invested\ Capital} = \frac{Reinvestment}{Invested\ Capital} \text{ or } \frac{Reinvestment}{Book\ Value}$$

Constant Growth Model or Gordon Model :

It is seen that earning of firm will grow more if the firm retains higher portion of earnings. In such case dividend will however be reduced in spite of an attractive earning or firm's performance. Hence valuations of shares should explicitly involve growth expectation.

Let's assume dividend is expected to grow at a constant rate till infinity. Then

$$Div_1 = Div_0(1 + g)^1$$

- $Div_2 = Div_1(1+g)$ or $Div_2 = Div_0(1+g)^2$
- $Div_3 = Div_2(1+g)$ or $Div_3 = Div_0(1+g)^3$

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- $Div_n = Div_{n-1}(1+g)$ or $Div_n = Div_0(1+g)^n$
- $P_0 = \frac{Div_0(1+g)^1}{(1+K_e)^1} + \frac{Div_0(1+g)^2}{(1+K_e)^2} \dots\dots\dots\dots\dots\dots\dots + \frac{Div_0(1+g)^n}{(1+K_e)^n}$

$$= \sum_{t=1}^{n} \frac{Div_0(1+g)^t}{(1+K_e)^t}$$

Hence, $P_0 = \sum_{t=1}^{n} \frac{Div_0(1+g)^t}{(1+K_e)^t}$

By solving the above equation, we get

$P_0 = \frac{Div_0(1+g)}{(K_e - g)}$ or $\frac{Div_1}{(K_e - g)}$ **(Gorden Growth Model)**

Gordon growth model

This is a perpetual growth model. Since, dividend is expected to grow at a constant rate "g" till infinity ($t = \infty$) and value of the share is the expected on the next year expected divided by the difference between capitalization rate (K_e) and growth rate (g).

This, perpetual growth model is based on the following assumptions,

- K_e Should be greater that g ($K_e > g$)
- If K_e will be less than g, then result will be a negative price.
- $Div_1 > 0$ (i.e.) initial dividend per share must be greater than zero, otherwise price will be zero.
- The relationship between K_e and g is assumed to remain constant and perpetual.

Example of perpetual Growth Model:

- ABC corp. paid dividend of Rs 3.70 last year and the dividend is expected to grow perpetually at a rate of 8% p.a. Calculate the per share price of ABC corp. if capitalization rate (K_e) is 12%
- $P_0 = \frac{Div_0(1+g)}{K_e - g} = \frac{3.7(1.08)}{(0.12-0.08)} = \frac{4}{0.04} = Rs\ 166.50$

Example:

- Suppose book value per share for a firm is Rs 137.80, ROE=15%. If it retains 60% of its earnings and its capitalization rate is 18%, then calculate the price per share for today?

- **Ans.**

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

g= b × ROE = 0.6 × 0.15=0.09 i.e. 9%

K_e = 0.18 or 18%

D_1=?

$EPS_1 = BV_0 \times ROE$ = Rs 137.8 × 0.15 = Rs 20.67

$D_1 = EPS_1 \times (1-b)$ = 20.67 × 0.4= Rs 8.27

$$P_0 = \frac{8.27}{0.18 - 0.09} = Rs\ 91.89$$

Super Normal Growth:

The dividend of a firm may not grow at the same rate for indefinitely. It may grow at a faster rate i.e. super normal rate for few years till the firm is expecting to experience excess demand may be new product innovation or discovering new market or new mode of production or having a patent/copyright on selling the product. After that golden period, firms sales or earnings will normalize to natural level. Then tha firm may expect to experience normal growth rate. In such case, the firm have to follow a 2 stage growth model to value its share.

- Suppose a firm is experiencing the following inputs.

Present dividend = Div_0 = 3.48

Super-normal growth, g_s = 15%

Time/duration of g_s i.e. n = 6 years

Capitalization rate K_e =18%

Normal growth rate (g_n) = 8%

- $P_0 = \sum_{t=1}^{6} \frac{Div_0(1+g_s)^t}{(1+K_e)^t} + \frac{Div_6(1+g_n)}{(K_e-g_n)}[\frac{1}{(1+K_e)}]$
- P0 = P_0 of Stage 1 + P_0 of stage 2

- **Stage 1**
- $P_0 = \sum_{t=1}^{6} \frac{Div_0(1+g_s)^t}{(1+K_e)^t}$ $or\ Div_1 \times [\frac{1}{(K_e-g_s)} \times \{1 - \left(\frac{1+g_s}{1+K_e}\right)^6\}]$

$$= 3.48(1.15) \times [\frac{1}{(0.18 - 0.15)} \times \{1 - \left(\frac{1.15}{1.18}\right)^6\}]$$

$= 4.00 \times 4.772 =$ Rs 19.10

If $g_s > K_e$, then above formula would not work.

Then,

- $P_0 = \frac{3.48(1.15)}{(1.18)} + \frac{3.48(1.15)^2}{(1.18)^2} + \frac{3.48(1.15)^3}{(1.18)^3} + \frac{3.48(1.15)^4}{(1.18)^4} + \frac{3.48(1.15)^5}{(1.18)^5} + \frac{3.48(1.15)^6}{(1.18)^6}$

- $= (4\times0.8475) + (4.6\times0.7162) + (5.29\times0.6086) + (6.08\times0.5158) + (7\times0.4371) + (8.04\times0.3704)$

  $= 19.10$

Here 3.48 is an annuity that is growing at a constant rate of 15% for 6 years. Now the 2nd stage starts from 7th year where dividend grows at 8% for infinity. This can be treated as constantly growing perpetually.

- **Stage 2:**

Stage 2 starts at the end of 6th period or from beginning of 7th period. Price of the share at the end of 6th year is

- $P_6 = \frac{Div_6(1+g_n)}{K_e - g_n}$ or $\frac{Div_7}{K_e - g_n}$

$$= \frac{8.04(1.08)}{0.18-0.08} = Rs\ 86.90$$

Now discounting P_6 back to P_0

- $P_0 = \frac{86.90}{(1.18)^6} = 32.19$

$P_0 = 19.10 + 32.19$

$P_0 = Rs\ 51.29$

Hence value of the share is the discounted value of share from all the stages of dividend growth.

From the above example, if

g = 0,

- $P_0 = \frac{Div_0(1+g)}{K_e - g} = \frac{3.48(1.0)}{0.18} = Rs\ 19.33$

If g = 8% forever

- P_0 = Rs 51.29

Valuation of shares for firms paying no dividend:

Sometimes, we can also find firm’s share price commands positive value in market even though, firms paying zero dividend. It is because, share price today depends on expectation of future dividend. Non-payment of dividend may not last forever and one day these companies will start paying dividend. Inventions hold shares of such companies in expectation of higher future growth of the firm due to 100% retention policy. While valuing such firms, all the points should be evaluated and analyzed thoroughly.

- **Case I**

Suppose a firm is expected to pay dividend Rs 2.00 per share from 5th years onwards forever. If its capitalization rate or required rate of return(K_e) is 20%, then calculate the price of the share?

- $P_4 = \frac{Div_5}{K_e} = \frac{2}{0.20} = Rs\ 10.00$
- $P_0 = \frac{P_4}{(1+K_e)^4} = \frac{10.00}{(1.20)^4} = Rs\ 4.82$

- **Case II**

If the dividend (Div_4=2) is expected to grow at 5% infinitely.

- $P_4 = \frac{Div_4(1+g)}{K_e - g} = \frac{2(1.08)}{0.20-0.08} = \frac{2.16}{0.12} = Rs\ 18.00$

- $P_0 = \frac{18.00}{(1.2)^4} = \frac{18}{2.0730} = Rs\ 8.68$

Earning Capitalization:

- Other than dividend capitalization can also be used to value share. However, under two cases, the value of the shares can be determined by capitalizing earnings.
- When firms out 100% of dividend and doesn’t retained any earnings.
- When firms ROE = K_e

In the case I, earning capitalization may be used when the earnings of the firms are stable. The earnings will not grow, if the firm doesn’t retain earnings.

- When b=0 => g=0 and Div_1= EPS_1.

Hence, value of the share will be equal to the expected earnings per share divided by equity capitalization rate.

Div_1= EPS_1(1-b)

Since b = 0, Div_1 = EPS_1, g = 0 or g = rb where r =ROE

$$P_0 = \frac{EPS_1(1-b)}{K_{e-g}} = \frac{EPS_1}{K_e}$$

- When ROE = K_e, that implies dividend capitalization will yield the same result as earning capitalization when the firms lacks real growth opportunity.

- When earning equal to cost on retained earning i.e. ROE = K_e

$g = b \times ROE$ if $ROE = r$

$g = br$

- When $ROE = K_e \Rightarrow r = K_e$

Or $g = bK_e$

Substituting it

- $P_0 = \frac{EPS_1(1-b)}{K_e - g}$ $or = \frac{EPS_1(1-b)}{K_e - bK_e} \Rightarrow \frac{EPS_1(1-b)}{K_e(1-b)}$ or $\frac{EPS_1}{K_e}$

- Hence, the true growth of a firm depends on the growth opportunity to reinvent its retained earning at a rate higher than the the capitalization rate (K_e). That is

Grow opportunity = ROE > K_e

Example :

Calculate the price if

EPS = ₹2.50, b=0.4, K_e =0.10

ROE (or) r = 0.20 & ROE = 0.10

$$K_e = \frac{EPS(1-b)}{K_e - rb} = \frac{2.50-(1-0.4)}{0.10-(0.20*0.4)} = ₹\ 75.00$$

$$P_O = \frac{2.50(1-0.4)}{0.10-(0.10*0.4)} = \frac{1.5}{0.06} = ₹\ 25$$

$\therefore$ when r = K_e or ROE = K_e

$$P_O = \frac{EPS}{K_e} = \frac{2.50}{0.10} = ₹25$$