

## Chapter 8: Dividend Decision

### Dividend : Decision

Income Statement

**Sales**

(-) Variable cost  
**contribution**

(-) Fixed cost

**Earning before interest & Tax**

(-) Interest

**Earning Before Tax**

(-) Tax

**Profit After tax**

(-) Preference Divident

**Earning After Tax available for Equity Shareholder**

(÷) No. of Equity Share

**Earning Per Share**

**Earning Per Share**

Dividend Per Share

Retained Earning

$$\text{Dividend Payout Ratio} = \frac{\text{Dividend Per Share}}{\text{Earning Per Share}}$$

Dividend Rate = Dividend Per Share

EPS = Dividend per Share + Retained Earning Per Share

$$\text{Retention Ratio (b)} = \frac{\text{Retained Earning Per Share}}{\text{Earning Per Share}}$$

$$r = \text{roi (return on investment)} \rightarrow \text{Growth (g)} = b \times r$$

### Dividend Theories

#### Relevance Theory

(Dividend decision impact market price of share)

- Walter's Theory
- Gordon's Theory

#### Irrelevance Theory

(Dividend decision does not impact on market price of share)

- MM { modigliani - Miller }

#### Walter's Theory

**r**  
Return on Equity i.e return that the company can earn for its shareholders

**Ke**  
Expected return by the Equity & Shareholder

If  $r > Ke$  : retained dividend

If  $r < Ke$  : distribute dividend

$$\text{Walters Model (P)} = \frac{D + \frac{r}{Ke} (E - D)}{Ke}$$

(MPS)

Where,

D = Dividend per share (DPS)

E = Earning per share

Ke = Cost of Equity / capitalization rate

P = Market Price per share (MPS)

$\gamma$  = Internal rate of return on investment

#### Assumptions of Water Model

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>→ All Investment proposals are to be financed through retained earnings only</li> <li>→ No Taxes or no tax discrimination between dividend income and capital appreciation (Capital Gain)</li> </ul> | <ul style="list-style-type: none"> <li>→ <math>r</math> = rate of return and <math>Ke</math> = cost of capital are constant</li> <li>→ Perfect capital markets</li> <li>→ No floatation or Transaction cost</li> <li>→ Firm has perpetual life</li> </ul> |
|---|---|



## Chapter 8: Dividend Decision

According to Gordon's model, when IRR is greater than cost of capital, the price per share increases and dividend pay-out decreases. On the other hand, when IRR is lower than the cost of capital, the price per share decreases and dividend pay-out increases.

Following is the conclusion of Gordon's model:

Company	Condition of r vs Ke	Optimum dividend payout ratio
Growth	$r > K_e$	Zero
Constant	$r = K_e$	There is no optimum ratio
Declining	$r < K_e$	100%

### The "Bird-in-hand theory" - Gordon's Revised Model

The relationship between dividend and share price on the basis of Gordon's formula is shown as:

$P_0 = \frac{D_0 (1 + g)}{K_e - g}$	Where, $P_0$ = Market price per share (ex-dividend) $D_0$ = Current year dividend $g$ = Constant annual growth rate of dividends $K_e$ = Cost of equity capital (expected rate of return).
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### For Gordon's Growth Model

$P_0 = \frac{D_1}{K_e - g}$	$P_0 = \frac{D_1 \times (1 + g)}{K_e - g}$	$P_0 = \frac{E_1 \times (1 - b)}{K_e - b.r}$	$(g = b \times r)$
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### Modigliani - Miller Approach

Value of the firm is not affected by dividend decisions i.e value of firm / market price remains same irrespective whether dividend is paid or not. According to MM, Market Value of firm is based on Earning Power, not Dividend. The MM approach is based on following assumption

- |  |  |
|--|--|
| <ul style="list-style-type: none"> <li>→ Perfect capital market</li> <li>→ No Taxes / No Tax on distribution (i.e universal applicability)</li> <li>→ Fixed Investment policy i.e only equity for expansion</li> </ul> | <ul style="list-style-type: none"> <li>→ No floatation / Transaction cost</li> <li>→ Risk of uncertainty does not exist</li> </ul> |
|--|--|

#### MM Approach

What are my expectation (Returns) from purchase of Shares?

**Regular Income (D1)**  
(Equity Dividend)

**Capital Appreciation (P1)**  
(Increase in Price of Shares)

$$P_0 = \left( \frac{D_1 + P_1}{1 + K_e} \right)$$

$$P_0 (1 + K_e) = D_1 + P_1$$

$$P_1 = P_0 (1 + K_e) - D_1$$

Where,

$P_0$  = Current Market price per share

(i.e. Price of Today's share is present value of future cash inflows

i.e. Dividend + Market Price)

$D_1$  = Expected dividend in Future

$P_1$  = Expected MPS (Pa) in Future

$K_e$  = Cost of Equity

## Chapter 8: Dividend Decision

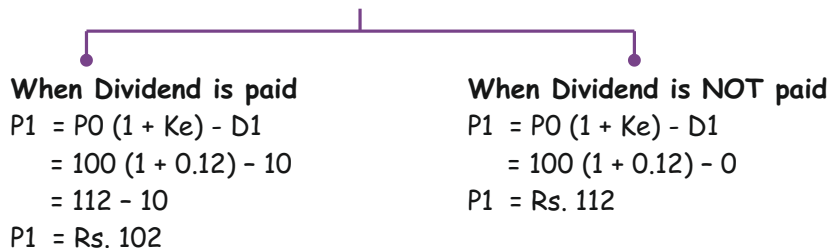
Let's Prove that Value of firm remains same in Modigliani Miller theory

**Example:**

$P_0 = \text{Rs.}100 / \text{share}$        $n$  (No. of shares) = 10,000 shares       $D_1 = \text{Rs.} 10 / \text{share}$        $K_e = 12\%$

\* Calculate the price of Equity share in future ( $P_1$ ) in below cases:

- a) Dividend is Expected to be paid.
- b) Dividend is not Expected to be paid



**Concept Proving**

Let's prove that Value of firm remains same in Modigliani Miller Theory.

**Example:**

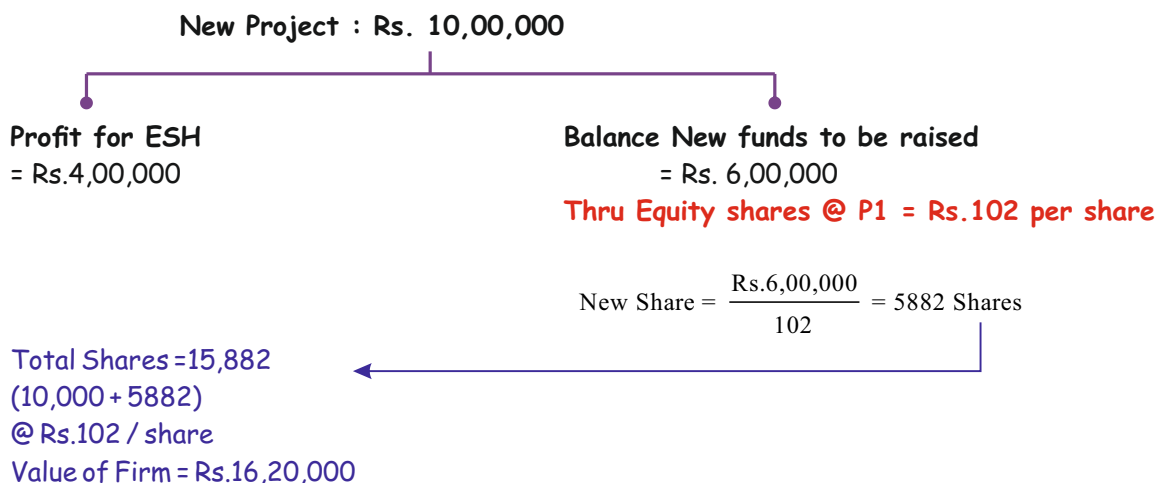
Example:

$P_0 = \text{Rs.} 100$  per share      No. of shares = 10,000 shares       $D_1 = \text{Rs.} 10 / \text{share}$        $K_e = 12\%$

\* New Project Cost                      = Rs.10,00,000  
 Earnings/ NP                              = Rs.5,00,000

**Case I:** Dividend expected to be paid = Rs.10 per share

Earnings	:	Rs.5,00,000	
(-) Dividend	:	Rs.1,00,000	(10,000 shares x 10 per share)
Profit for ESH	:	Rs. 4,00,000	(Retained Earnings)



## Chapter 8: Dividend Decision

**Case II:** If Dividend not paid

Earnings : Rs.5,00,000  
 (-) Dividend : - - - - -  
 Profit for ESH : Rs. 5,00,000 (Retained Earnings)

New Project : Rs. 10,00,000

Profit for ESH  
 = Rs.5,00,000

Balance New funds to be raised  
 = Rs. 5,00,000

Thru Equity shares @ P1 = Rs.112 per share

$$\text{New Share} = \frac{\text{Rs.5,00,000}}{112} = 4464 \text{ Shares}$$

Total Shares = 14,464 sh  
 (10,000 + 4464)

@ Rs.112 / share

Value of Firm = Rs.16,20,000

<b>Step 1</b>	Calculation of P1 using formula $P1 = P_0 (1 + K_e) - D1$
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<b>Step 2</b>	Calculation of New shares to be issued for New investment Case i] When dividend is paid Case ii] When dividend is not paid
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<b>Step 3</b>	No. of New Shares = $\frac{\text{Investment} - (\text{Earning} - \text{Dividend})}{P_1}$ i.e. $\Delta N = \left( \frac{\text{Additional funds required}}{P_1} \right)$
	Calculation of value of firm Value of Firm = $\frac{(\text{Current Equity Share} + \text{New Share to be issue}) \times P_1 + \text{Earning} - \text{Investment}}{1 + K_e} / \left[ \frac{(n + \Delta n) P_1 - i + E}{(1 + K_e)} \right]$ (np0)

Value of Asset /- Present value of future cash flows price of any share  
 Dividend discount model ---> Care Application

### I Modigliani Miller Model

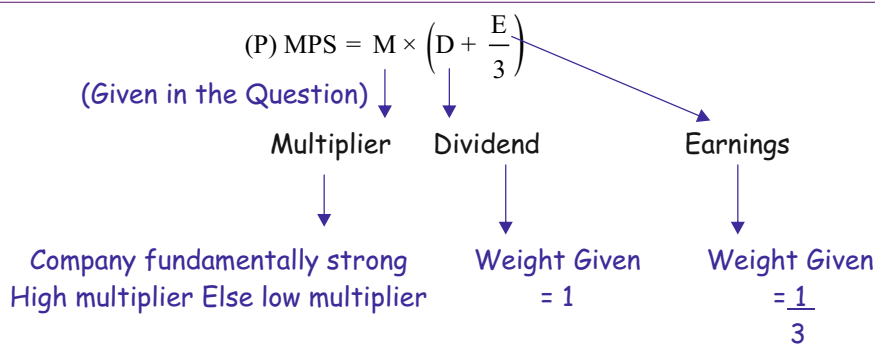
- |            |  |
|------------|--|
| <b>(a)</b> | Expected MPS = $P1 = P_0 (1 + K_e) - D1$                                   |
| <b>(b)</b> | New Shares to be issued : $\Delta n = I - [E - (D \times N)]$              |
| <b>(c)</b> | Value of Firm : $nP_0 = \frac{(n + \Delta n) \times P_1 - I + E}{1 + K_e}$ |

Where,  
 P<sub>0</sub> = Current MPS  
 D1 = Expected DPS  
 N = Existing shares  
 I = Investment

P1 = Expected MPS  
 K<sub>e</sub> = Cost of equity  
 n = New Shares  
 E = Earning

## Chapter 8: Dividend Decision

### I Graham & Dodd Model



#### Example:

Compute EPS according graham & Dodd Model:    MPS = Rs. 56;    Dividend Payout = 60% ;    Multiplier = 2

#### Solution

$(P) \text{ MPS} = M \times \left( D + \frac{E}{3} \right)$	$56 = 2 \times \left( 0.6 E + \frac{E}{3} \right)$	$28 = \frac{(3 \times 0.6 E) + E}{3}$	$84 = 1.8 E + 1 E$	$2.8 E = 84$	$E = \frac{84}{2.8} = \text{Rs.}30$
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### I Lintner's Model

Lintner's model has two parameters:

- i. The target payout ratio,
- ii. The spread at which current dividends adjust to the target.

John Lintner based his model on a series of interviews which he conducted with corporate managers in the mid 1950's. Under Lintner's model, the current year's dividend is dependent on current year's earnings and last year's dividend.

$$D_1 = D_0 + [(EPS \times \text{Target payout}) - D_0] \times Af$$

Where,                       $D_1$  = Dividend in year 1                       $D_0$  = Dividend in year 0 (last year dividend)  
                                     EPS = Earnings per share                                      Af = Adjustment factor or Speed of adjustment

#### Example

Given the last year's dividend is Rs. 9.80, speed of adjustment = 0.45, target payout ratio 0.60 and EPS for current year Rs.20.

Calculate current year's dividend using Lintner's Model.

#### Solution

$$D_1 = D_0 + [(EPS \times \text{Target Payout}) - D_0] \times AF = 9.80 + [(20 \times 60\%) - 9.80] \times 0.45 = \text{Rs. } 10.79$$

### I Dividend Discount Model

$$\frac{D_1}{(1 + K_e)} + \frac{D_2}{(1 + K_e)^2} + \frac{D_3}{(1 + K_e)^3} + \dots + \frac{D_n}{(1 + K_e)^n} + \frac{D_n (1 + g)}{K_e - g} \times \frac{1}{(1 + K_e)^n}$$

## Chapter 8: Dividend Decision

### Question 2

XYZ Ltd. earns Rs. 10/ share. Capitalization rate & return on investment are 10% & 12% respectively. DETERMINE the optimum dividend payout ratio & the price of the share at the payout.

### Solution

Since  $r > K_e$ , the optimum dividend pay-out ratio would 'Zero' (i.e.  $D = 0$ ),

Accordingly, value of a share:

$$P = \frac{D + \frac{r}{K_e} \times (E - D)}{K_e}$$

$$P = \frac{0 + \frac{0.12}{0.10} \times (10 - 0)}{0.10} = \text{Rs. } 120$$

The optimality of the above payout ratio can be proved by using 25%, 50%, 75% and 100% as pay-out ratio:

<b>At 25% pay-out Ratio</b>	$P = \frac{2.5 + \frac{0.12}{0.10} (10 - 2.5)}{0.10} = \text{Rs. } 115$	<b>At 50% pay-out Ratio</b>	$P = \frac{5 + \frac{0.12}{0.10} (10 - 5)}{0.10} = \text{Rs. } 110$
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<b>At 75% pay-out Ratio</b>	$P = \frac{7.5 + \frac{0.12}{0.10} (10 - 7.5)}{0.10} = \text{Rs. } 105$	<b>At 100% pay-out Ratio</b>	$P = \frac{10 + \frac{0.12}{0.10} (10 - 10)}{0.10} = \text{Rs. } 100$
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### Question 3

The following figures are collected from the annual report of XYZ Ltd.:

Net Profit	Rs. 30 lakhs
Outstanding 12% preference shares	Rs. 100 lakhs
No. of equity shares	3 lakhs
Return on Investment	20%
Cost of capital i.e. ( $K_e$ )	16%

COMPUTE the approximate dividend pay-out ratio so as to keep the share price at Rs. 42 by using Walter's model?

### Solution

	Rs. in Lakhs
Net Profit	30
Less: Preference dividend	12
Earning for equity shareholders	18
Earning per share	$18/3 = \text{Rs. } 6.00$

Let, the dividend per share be  $D$  to get share price of Rs. 42

$$P = \frac{D + \frac{r}{K_e} \times (E - D)}{K_e}$$

$$\text{Rs. } 42 = \frac{D + \frac{0.20}{0.16} \times (6 - D)}{0.16}$$

$$6.72 = \frac{0.16D + 1.2 - 0.20D}{0.16}$$

$$0.04D = 1.2 - 1.0752$$

$$D = 3.12$$

## Chapter 8: Dividend Decision

$$\text{D/P Ratio} = \frac{\text{DPS}}{\text{EPS}} \times 100 = \frac{3.12}{6} \times 100 = 52\%$$

So, the required dividend payout ratio will be = 52%

### Question 9

The following information pertains to M/s XY Ltd.

Earnings of the Company	Rs. 5,00,000
Dividend Payout ratio	60%
No. of shares outstanding	1,00,000
Equity capitalization rate	12%
Rate of return on investment	15%

CALCULATE:

- (i) Market value per share as per Walter's model.
- (ii) Optimum dividend payout ratio according to Walter's model and the market value of Company's share at that payout ratio.

### Solution

(i) As per Walter's model:

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e}$$

Where, P = Market price per share.  
D = Dividend per share = Rs. 3  
K<sub>e</sub> = Cost of equity capital = 12%

E = Earnings per share = Rs. 5  
R = Return earned on investment = 15%

$$P = \frac{3 + \frac{0.15}{0.12}(5 - 3)}{0.12} = \text{Rs. } 45.83$$

- (ii) According to Walter's model, when the return on investment is more than the cost of equity capital, the price per share increases as the dividend pay-out ratio decreases. Hence, the optimum dividend pay-out ratio in this case is nil.

So, at a pay-out ratio of zero, the market value of the company's share will be:

$$P = \frac{0 + \frac{0.15}{0.12}(5 - 0)}{0.12} = \text{Rs. } 52.08$$

### Question 13

The following information is supplied to you:

	(Rs.)
Total Earnings	2,00,000
No. of equity shares (of Rs. 100 each)	20,000
Dividend paid	1,50,000
Price/ Earnings ratio	12.5

## Chapter 8: Dividend Decision

Applying Walter's Model:

(i) ANALYSE whether the company is following an optimal dividend policy.

DIVIDEND DECISIONS

(ii) COMPUTE P/E ratio at which the dividend policy will have no effect on the value of the share.

(iii) Will your decision change, if the P/E ratio is 8 instead of 12.5? ANALYSE.

### Solution

(i) The EPS of the firm is Rs. 10 (i.e., Rs. 2,00,000/ 20,000),  $r = \text{Rs. } 2,00,000 / (20,000 \text{ shares} \times \text{Rs. } 100) = 10\%$ . The P/E Ratio is given at 12.5 and the cost of capital ( $K_e$ ) may be taken at the inverse of P/E ratio. Therefore,  $K_e$  is 8 (i.e.,  $1/12.5$ ). The firm is distributing total dividends of Rs. 1,50,000 among 20,000 shares, giving a dividend per share of Rs. 7.50. the value of the share as per Walter's model may be found as follows:

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e} = \frac{7.5 + \frac{0.1}{0.08}(10 - 7.5)}{0.08} = \text{Rs. } 132.81$$

The firm has a dividend payout of 75% (i.e., Rs. 1,50,000) out of total earnings of Rs. 2,00,000. Since, the rate of return of the firm ( $r$ ) is 10% and it is more than the  $K_e$  of 8%, therefore, by distributing 75% of earnings, the firm is not following an optimal dividend policy. The optimal dividend policy for the firm would be to pay zero dividend and in such a situation, the market price would be:

$$= \frac{0 + \frac{0.1}{0.08}(10 - 0)}{0.08} = \text{Rs. } 156.25$$

So, theoretically the market price of the share can be increased by adopting a zero payout.

(ii) The P/E ratio at which the dividend policy will have no effect on the value of the share is such at which the  $K_e$  would be equal to the rate of return ( $r$ ) of the firm. The  $K_e$  would be 10% ( $= r$ ) at the P/E ratio of 10. Therefore, at the P/E ratio of 10, the dividend policy would have no effect on the value of the share.

(iii) If the P/E is 8 instead of 12.5, then the  $K_e$  which is the inverse of P/E ratio, would be 12.5 and in such a situation  $K_e > r$  and the market price, as per Walter's model would be:

$$= \frac{D + \frac{r}{K_e}(E - D)}{K_e} = \frac{7.5 + \frac{0.1}{0.125}(10 - 7.5)}{0.125} = \text{Rs. } 76$$

### Question 21

Following information are given for a company:

Earnings per share	Rs. 10
P/E ratio	12.5
Rate of return on investment	12%
Market price per share as per Walter's Model	Rs. 130

You are required to calculate:

(i) Dividend payout ratio.

(ii) Market price of share at optimum dividend payout ratio.

(iii) P/E ratio, at which the dividend policy will have no effect on the price of share.

(iv) Market price of share at this P/E ratio.

(v) Market price of share using Dividend growth model.

## Chapter 8: Dividend Decision

### Solution

- (i) The EPS of the firm is Rs. 10,  $r = 12\%$ . The P/E Ratio is given at 12.5 and the cost of capital ( $K_e$ ) may be taken as the inverse of P/E ratio. Therefore,  $K_e$  is 8% (i.e.,  $1/12.5$ ). The value of the share is Rs. 130 which may be equated with Walter Model as follows:

$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e} \quad \text{OR} \quad = \frac{D + \frac{12\%}{8\%}(10 - D)}{8\%}$	or $[D + 1.5(10 - D)] / 0.08 = 130$ or $D + 15 - 1.5D = 10.4$ or $-0.5D = -4.6$ So, $D = \text{Rs. } 9.2$
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The firm has a dividend pay-out of 92% (i.e.,  $9.2/10$ ).

- (ii) Since the rate of return of the firm ( $r$ ) is 12% and it is more than the  $K_e$  of 8%, therefore, by distributing 92% of earnings, the firm is not following an optimal dividend policy. The optimal dividend policy for the firm would be to pay zero dividend and in such a situation, the market price would be:

$P = \frac{D + \frac{12\%}{8\%}(10 - 0)}{8\%}$	$P = \text{Rs. } 187.5$ So, theoretically the market price of the share can be increased by adopting a zero pay-out.
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- (iii) The P/E ratio at which the dividend policy will have no effect on the value of the share is such at which the  $K_e$  would be equal to the rate of return ( $r$ ) of the firm. The  $K_e$  would be 12% ( $= r$ ) at the P/E ratio of  $1/12\% = 8.33$ . Therefore, at the P/E ratio of 8.33, the dividend policy would have no effect on the value of the share.

- (iv) If the P/E is 8.33 instead of 12.5, then the  $K_e$  which is the inverse of P/E ratio, would be 12% and in such a situation  $k_e = r$  and the market price, as per Walter's model would be:

$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e} \quad \text{OR} \quad = \frac{9.2 + \frac{0.12}{0.12}(10 - 9.2)}{0.12} = \text{Rs. } 83.33$
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### (v) Dividend Growth Model applying growth on dividend

$K_e = 8\%$ ,  $r = 12\%$ ,  $D_0 = 9.2$ ,  $b = 0.08$

$g = b.r$

$g = 0.08 \times 0.12 = 0.96\%$

$D_1 = D_0(1+g) = 9.2(1+0.0096) = \text{Rs. } 9.2883$

$P = \frac{D_1}{(K_e - g)} = 9.2883 / (0.08 - 0.0096) = 9.2883 / 0.0704 = \text{Rs. } 131.936$
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### Alternative

Alternatively, without applying growth on dividend

$P = \frac{E(1 - b)}{(K_e - br)} = \frac{10(1 - 0.08)}{0.08 - (0.08 \times 0.12)} = \text{Rs. } 130.68$
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## Chapter 8: Dividend Decision

### Question 4

The following figures are collected from the annual report of XYZ Ltd.:

Net Profit	Rs. 30 lakhs
Outstanding 12% preference shares	Rs. 100 lakhs
No. of equity shares	3 lakhs
Return on Investment	20%
Cost of capital i.e. ( $K_e$ )	16%

CALCULATE price per share using Gordon's Model when dividend pay-out is

(i) 25%; (ii) 50% and (iii) 100%.

### Solution

	Rs. in Lakhs
Net Profit	30
Less: Preference dividend	12
Earning for equity shareholders	18
Earning per share	$18/3 = \text{Rs. } 6.00$

Price per share according to Gordon's Model is calculated as follows:

$P_0 = \frac{E_1 + (1 - b)}{K_e - br}$	Here, $E_1 = 6$ , $K_e = 16\%$
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<b>(i) When dividend pay-out is 25%</b>	$P_0 = \frac{6 \times 0.25}{0.16 - (0.75 \times 0.2)} = \frac{1.5}{0.16 - 0.15} = \text{Rs. } 150$
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<b>(ii) When dividend pay-out is 50%</b>	$P_0 = \frac{6 \times 0.5}{0.16 - (0.5 \times 0.2)} = \frac{3}{0.16 - 0.15} = 50$
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<b>(ii) When dividend pay-out is 100%</b>	$P_0 = \frac{6 \times 1}{0.16 - (0 \times 0.2)} = \frac{6}{0.16} = 37.50$
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### Question 5

X Ltd. is a no growth company, pays a dividend of Rs. 5 per share. If the cost of capital is 10%, COMPUTE the current market price of the share?

### Solution

$P_0 = \frac{D}{K_e} = \frac{5}{0.10} = \text{Rs. } 50$
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### Question 6

XYZ is a company having share capital of Rs. 10 lakhs of Rs. 10 each. It distributed current dividend of 20% per annum. Annual growth rate in dividend expected is 2%. The expected rate of return on its equity capital is 15%. CALCULATE price of share applying Gordon's growth Model.

## Chapter 8: Dividend Decision

### Solution

$$P = \frac{D_0 (1 + g)}{K_e - g} = \frac{2 (1 + 0.02)}{0.15 - 0.02} = \text{Rs. } 15.69$$

### Question 10

Taking an example of three different firms i.e. growth, normal and declining, CALCULATE the share price using Gordon's model.

Factors	Growth	Normal	Declining
	Firm ( $r > K_e$ )	Firm ( $r = K_e$ )	Firm ( $r < K_e$ )
r (rate of return on retained earnings)	15%	10%	8%
$K_e$ (Cost of Capital)	10%	10%	10%
E (Earning Per Share)	Rs. 10	Rs. 10	Rs. 10
b (Retained)	0.6	0.6	0.6
(1 - b) DPO	0.4	0.4	0.4

### Solution

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

(i) Situation-1: Growth Firm $r > K_e$	$P_0 = \frac{10 (1 - 0.6)}{0.10 - 0.15 \times 0.6} = \frac{4}{0.10 - 0.09} = \text{Rs. } 400$
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(ii) Situation-2: Normal Firm $r = K_e$	$P_0 = \frac{10 (1 - 0.6)}{0.10 - 0.10 \times 0.6} = \frac{4}{0.10 - 0.06} = \text{Rs. } 100$
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(iii) Situation-2: Normal Firm $r < K_e$	$P_0 = \frac{10 (1 - 0.6)}{0.10 - 0.08 \times 0.6} = \frac{4}{0.10 - 0.048} = \text{Rs. } 76.92$
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If the retention ratio (b) is changed from 0.6 to 0.4, the new share price will be as follows:

<b>Growth Firm</b>	$P_0 = \frac{10 (1 - 0.4)}{0.10 - 0.15 \times 0.4} = \frac{6}{0.10 - 0.06} = \text{Rs. } 150$
<b>Normal Firm</b>	$P_0 = \frac{10 (1 - 0.4)}{0.10 - 0.10 \times 0.4} = \frac{6}{0.10 - 0.04} = \text{Rs. } 100$
<b>Declining Firm</b>	$P_0 = \frac{10 (1 - 0.4)}{0.10 - 0.08 \times 0.4} = \frac{6}{0.10 - 0.032} = \text{Rs. } 88.24$

From the above analysis, it can be concluded that:

When  $r > k$ , the market value increases with retention ratio.

When  $r < k$ , the market value of share stands to decrease.

When  $r = k$ , the market value is not affected by dividend policy.

The conclusion of the Gordon's model is similar to that of Walter's model.

## Chapter 8: Dividend Decision

### Question 14

With the help of following figures CALCULATE the market price of a share of a company by using:

- (i) Walter's formula
- (ii) Dividend growth model (Gordon's formula)

Earnings per share (EPS)	Rs. 10
Dividend per share (DPS)	Rs. 6
Cost of capital (K <sub>e</sub> )	20%
Internal rate of return on investment	25%
Retention Ratio	40%

### Solution

Market price per share by

#### (i) Walter's model

$$P = \frac{D + \frac{r}{K_e} (E - D)}{K_e} = \frac{6 + \frac{0.25}{0.20} (10 - 6)}{0.20} = \text{Rs. } 55$$

#### (ii) Gordon's model

$$\text{Present Market Price Per Share (P}_0\text{)} = \frac{E(1 - b)}{k - br}$$

$$P_0 = \frac{10(1 - 0.40)}{0.20 - (0.4 \times 0.25)} = \frac{6}{0.1} = \text{Rs. } 60$$

### Question 1

AB Engineering Ltd. belongs to a risk class for which the capitalization rate is 10%. It currently has outstanding 10,000 shares selling at Rs. 100 each. The firm is contemplating the declaration of a dividend of Rs. 5 share at the end of the current financial year. It expects to have a net income of Rs. 1,00,000 and has a proposal for making new investments of Rs. 2,00,000. CALCULATE the value of the firm when dividends (i) are not paid (ii) are paid.

### Solution

**CASE 1: Value of the firm when dividends are not paid.**

Step 1: Calculate price at the end of the period

$$K_e = 10\%, \quad P_0 = 100, \quad D_1 = 0$$

$$P_0 = \frac{P_1 + D_1}{1 + K_e} \quad \quad 100 = \frac{P_1 + 0}{1 + 0.10} \quad \quad P_1 = 110$$

Step 2: Calculation of funds required for investment

Earning	Rs. 1,00,000
Dividend distributed	Nil
Fund available for investment	Rs. 1,00,000
Total Investment	Rs. 2,00,000
Balance Funds required	Rs. 2,00,000 - Rs. 1,00,000 = Rs. 1,00,000

## Chapter 8: Dividend Decision

Step 3: Calculation of No. of shares required to be issued for balance funds

$\text{No. of Shares} = \frac{\text{Funds Required}}{\text{Price at End } (P_1)}$	$\Delta n = \frac{1,00,000}{110}$
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Step 4: Calculation of value of firm

$nP_0 = \frac{(n + \Delta n) P_1 - I + E}{1 + K_e}$	$nP_0 = \frac{\left(10,000 + \frac{\text{Rs. } 1,00,000}{\text{Rs. } 110}\right) \times \text{Rs. } 110 - \text{Rs. } 2,00,000 + \text{Rs. } 1,00,000}{(1 + 0.10)} = \text{Rs. } 10,00,000$
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**CASE 2: Value of the firm when dividends are paid.**

Step 1: Calculate price at the end of the period

$K_e = 10\%$ ,       $P_0 = 100$ ,       $D_1 = 5$

$P_0 = \frac{P_1 + D_1}{1 + K_e}$	$100 = \frac{P_1 + 5}{1 + 0.10}$	$P_1 = 105$
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Step 2: Calculation of funds required for investment

Earning	Rs. 1,00,000
Dividend distributed	Rs. 50,000
Fund available for investment	Rs. 50,000
Total Investment	Rs. 2,00,000
Balance Funds required	Rs. 2,00,000 - Rs. 50,000 = Rs.1,50,000

Step 3: Calculation of No. of shares required to be issued for balance fund

$\text{No. of Shares} = \frac{\text{Funds Required}}{\text{Price at End } (P_1)}$	$\Delta n = \frac{\text{Rs. } 1,50,000}{\text{Rs. } 105}$
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Step 4: Calculation of Value of Firm:

$nP_0 = \frac{(n + \Delta n) P_1 - I + E}{1 + K_e}$	$\Delta n = \frac{1,00,000}{110}$
$nP_0 = \frac{\left(10,000 + \frac{\text{Rs. } 1,50,000}{\text{Rs. } 105}\right) \times \text{Rs. } 105 - \text{Rs. } 2,00,000 + \text{Rs. } 1,00,000}{(1 + 0.10)} = \text{Rs. } 10,00,000$	

Thus, it can be seen from the above illustration that the value of the firm remains the same in either case. In real world, market imperfections create some problems for MM's dividend policy irrelevance proposition.

### Question 19

Mr H is currently holding 1,00,000 shares of HM Ltd, and currently the share of HM Ltd is trading on Bombay Stock Exchange at Rs. 50 per share. Mr H have a policy to re-invest the amount of any dividend received into the shared back again of HM Ltd. If HM Ltd has declared a dividend of Rs. 10 per share, please determine the no of shares that Mr H would hold after he re-invests dividend in shares of HM Ltd.

## Chapter 8: Dividend Decision

### Solution

Ex-dividend price is Rs. 40 (50-10).

The total amount of dividend received is Rs. 10,00,000 which is re-invested at the rate of Rs. 40 per share.

Hence additional shares purchased would be 25,000.

Total holding would be 1,25,000 shares (1,00,000 + 25,000)

### Question 20

Following information is given pertaining to DG Ltd,

No of shares outstanding                      1 lakh shares

Earnings Per share                              25 per share

P/E Ratio    20

Book Value per share                            400 per share

If company decides to repurchase 25,000 shares, at the prevailing market price, what is the resulting book value per share after repurchasing.

### Solution

Current Market price = 20x25 = 500 per share

Book value of the company before repurchase = Rs. 4 cr (400x1 lakh shares) Amount paid for repurchase = 1.25 cr (25,000 shares x 500 per share)

Book Value of company after repurchase = Rs. 2.75 cr (4cr - 1.25cr)

No of shares after repurchase = 75,000

shares Book value per share = 367 per share.

### Question 16

A&R Ltd. is a large-cap multinational company listed in BSE in India with a face value of Rs. 100 per share. The company is expected to grow @ 15% p.a. for next four years then 5% for an indefinite period. The shareholders expect 20% return on their share investments. Company paid Rs. 120 as dividend per share for the current Financial Year. The shares of the company traded at an average price of Rs. 3,122 on last day. FIND out the intrinsic value per share and state whether shares are overpriced or underpriced.

### Solution

As per Dividend discount model, the price of share is calculated as follows:

$$P = \frac{D_1}{(1 + K_e)^1} + \frac{D_2}{(1 + K_e)^2} + \frac{D_3}{(1 + K_e)^3} + \frac{D_4}{(1 + K_e)^4} + \frac{D_5}{(K_e - g)} \times \frac{1}{(1 + K_e)^5}$$

Where, P = Price per share

Ke = Required rate of return on equity

g = Growth rate

$$P = \frac{Rs.120 \times 1.15}{(1 + 0.2)^1} + \frac{Rs.138 \times 1.15}{(1 + 0.2)^2} + \frac{Rs.158.7 \times 1.15}{(1 + 0.2)^3} + \frac{Rs.182.5 \times 1.15}{(1 + 0.2)^4} + \frac{Rs.209.88 \times 1.15}{(0.2 - 0.05)^1} \times \frac{1}{(1 + 0.2)^5}$$

$$P = 115 + 110.2 + 105.6 + 101.2 + 590.42 = Rs. 1,022.42$$

Intrinsic value of share is Rs. 1,022.42 as compared to latest market price of Rs. 3,122. Market price of a share is overpriced by Rs. 2,099.58.

## Chapter 8: Dividend Decision

### Question 17

In the month of May of the current Financial Year, shares of RT Ltd. was sold for Rs. 1,460 per share. A long term earnings growth rate of 7.5% is anticipated. RT Ltd. is expected to pay dividend of Rs. 20 per share.

- (i) CALCULATE rate of return an investor can expect to earn assuming that dividends are expected to grow along with earnings at 7.5% per year in perpetuity?
- (ii) It is expected that RT Ltd. will earn about 10% on retained earnings and shall retain 60% of earnings. In this case, STATE whether, there would be any change in growth rate and cost of Equity?

### Solution

(i) According to Dividend Discount Model approach, the firm's expected or required return on equity is computed as follows:

$$K_e = \frac{D_1}{P_0} + g = \frac{20(1+0.075)}{1.460} + 7.5% = 0.0147 + 0.075 = 0.0897 \text{ or } 8.97%$$

- (ii) With rate of return on retained earnings (r) is 10% and retention ratio is 60%, new growth rate will be as follows:  $g = br = 0.10 \times 0.60 = 0.06$

Accordingly, dividend will also get changed and to calculate this, first we shall calculate previous retention ratio (b1) and then EPS assuming that rate of return on retained earnings (r) is same.

With previous Growth Rate of 7.5% and  $r = 10%$ , the retention ratio comes out to be:

$$0.075 = b1 \times 0.10$$

$$b1 = 0.75 \text{ and payout ratio} = 0.25$$

$$\text{With } 0.25 \text{ Payout Ratio the EPS will be as follows: } = \frac{\text{Rs. } 20}{0.25} = \text{Rs. } 80$$

With new 0.40 (1 - 0.60) payout ratio, the new dividend will be

$$D1 = \text{Rs. } 80 \times 0.40 = \text{Rs. } 32$$

Accordingly, new  $K_e$  will be

$$K_e = \frac{32}{1,460} + 6.0% \text{ or } K_e = 8.19%$$