

Q.1

The following information relates to Navya Ltd:

Earnings of the company	₹ 20,00,000
Dividend pay-out ratio	60%
No. of Shares outstanding	4,00,000
Rate of return on investment	15%
Equity capitalization rate	12%

Required:

- (i) DETERMINE what would be the market value per share as per Walter's model.
- (ii) COMPUTE optimum dividend pay-out ratio according to Walter's model and the market value of company's share at that pay-out ratio.

Ans

Navya Ltd.

- (i) Walter's model is given by –

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

Where, P = Market price per share,

E = Earnings per share = ₹20,00,000 ÷ 4,00,000 = ₹ 5

D = Dividend per share = 60% of 5 = ₹ 3

r = Return earned on investment = 15%

K_e = Cost of equity capital = 12%

$$\therefore P = \frac{3 + (5 - 3) \times \frac{0.15}{0.12}}{0.12} = \frac{3 + 2 \times \frac{0.15}{0.12}}{0.12} = ₹ 45.83$$

- (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 payout ratio of zero, the market value of the company's share will be:-

$$\frac{0 + (5 - 0) \times \frac{0.15}{0.12}}{0.12} = ₹ 52.08$$

Q.2 The earnings per share of a company is ₹ 10 and the rate of capitalisation applicable to it is 10 per cent. The company has three options of paying dividend i.e. (i) 50%, (ii) 75% and (iii) 100%.

CALCULATE the market price of the share as per Walter's model if it can earn a return of (a) 15, (b) 10 and (c) 5 per cent on its retained earnings.

Ans Market Price (P) per share as per Walter's Model is:

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

Where,

P = Price of Share

r = Return on investment or rate of earning

K_e = Rate of Capitalisation or Cost of Equity

Calculation of Market Price (P) under the following dividend payout ratio and earning rates:

		(i)	(ii)	(iii)
	Rate of Earning (r)	DP ratio 50%	DP ratio 75%	DP ratio 100%
(a)	15%	$5 + \frac{\left(\frac{0.15}{0.10}\right)(10 - 5)}{0.10}$ $= \frac{12.5}{0.10} \text{ ₹125}$	$7.5 + \frac{\left(\frac{0.15}{0.10}\right)(10 - 7.5)}{0.10}$ $= \frac{11.25}{0.10} \text{ ₹112.5}$	$10 + \frac{\left(\frac{0.15}{0.10}\right)(10 - 10)}{0.10}$ $= \frac{10}{0.10} \text{ ₹100}$
(b)	10%	$5 + \frac{\left(\frac{0.10}{0.10}\right)(10 - 5)}{0.10}$ $= \frac{10}{0.10} \text{ ₹100}$	$7.5 + \frac{\left(\frac{0.10}{0.10}\right)(10 - 7.5)}{0.10}$ $= \frac{10}{0.10} \text{ ₹100}$	$10 + \frac{\left(\frac{0.10}{0.10}\right)(10 - 10)}{0.10}$ $= \frac{10}{0.10} \text{ ₹100}$
(c)	5%	$5 + \frac{\left(\frac{0.05}{0.10}\right)(10 - 5)}{0.10}$ $= \frac{7.5}{0.10} \text{ ₹75}$	$7.5 + \frac{\left(\frac{0.05}{0.10}\right)(10 - 7.5)}{0.10}$ $= \frac{8.75}{0.10} \text{ ₹87.5}$	$10 + \frac{\left(\frac{0.05}{0.10}\right)(10 - 10)}{0.10}$ $= \frac{10}{0.10} \text{ ₹100}$

Q.3

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

Net Profit	₹30 lakhs
Outstanding 12% preference shares	₹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%.

Ans:

	₹ in lakhs
Net Profit	30
Less: Preference dividend	12
Earning for equity shareholders	18
Therefore earning per share	$18/3 = ₹ 6.00$

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

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

Here, $E_1 = 6$, $K_e = 16\%$

(i) When dividend pay-out is 25%

$$P_0 = \frac{6 \times 0.25}{0.16 - (0.75 \times 0.2)} = \frac{1.5}{0.16 - 0.15} = 150$$

(ii) When dividend pay-out is 50%

$$P_0 = \frac{6 \times 0.5}{0.16 - (0.5 \times 0.2)} = \frac{3}{0.16 - 0.10} = 50$$

(iii) When dividend pay-out is 100%

$$P_0 = \frac{6 \times 1}{0.16 - (1 \times 0.2)} = \frac{6}{0.16} = 37.50$$

Q.4

The following information pertains to SD Ltd.

Earnings of the Company	₹ 50,00,000
Dividend Payout ratio	60%
No. of shares outstanding	10,00,000
Equity capitalization rate	12%
Rate of return on investment	15%

- COMPUTE the market value per share as per Walter's model?
- COMPUTE the optimum dividend payout ratio according to Walter's model and the market value of Company's share at that payout ratio?

Ans

(i) Walter's model is given by

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

Where

P = Market price per share.

E = Earnings per share = ₹ 5

D = Dividend per share = ₹ 3

R = Return earned on investment = 15%

K_e = Cost of equity capital = 12%

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

(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:

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

Q.5 Following information relating to Jee Ltd. is given:

Particulars

Profit after tax	₹ 10,00,000
Dividend pay-out ratio	50%
Number of Equity Shares	50,000
Cost of Equity	10%
Rate of Return on Investment	12%

- (i) CALCULATE market value per share as per Walter's Model?
(ii) What is the optimum dividend pay-out ratio according to Walter's Model and Market value of equity share at that pay-out ratio?

Ans (i) **Walter's model is given by –**

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

Where,

P = Market price per share,

E = Earnings per share = ₹ 10,00,000 ÷ 50,000 = ₹ 20

D = Dividend per share = 50% of 20 = ₹ 10

r = Return earned on investment = 12%

K_e = Cost of equity capital = 10%

$$\therefore P = \frac{10 + (20 - 10) \times \frac{0.12}{0.10}}{0.10} = \frac{22}{0.10} = ₹ 220$$

- (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:

$$\frac{0 + (20 - 0) \times \frac{0.12}{0.10}}{0.10} = \frac{24}{0.10} = ₹ 240$$

Q.6 The following information is given for QB Ltd.

Earnings per share	₹ 120
Dividend per share	₹ 36
Cost of capital	15%
Internal Rate of Return on investment	20%

CALCULATE the market price per share using

- (a) Gordon's formula
(b) Walter's formula

Ans

8. (a) As per **Gordon's Model**, Price per share is computed using the formula:

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

Where,

P_0 = Price per share

E_1 = Earnings per share

b = Retention ratio; ($1 - b$ = Pay-out ratio)

K_e = Cost of capital

r = IRR

br = Growth rate (g)

Applying the above formula, price per share

$$P_0 = \frac{120(1-0.7)}{0.15 - 0.7 \times 0.2} = \frac{36}{0.01} = ₹ 3,600$$

- (b) As per **Walter's Model**, Price per share is computed using the formula:

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

Where,

P = Market Price of the share.

E = Earnings per share.

D = Dividend per share.

K_e = Cost of equity/ rate of capitalization/ discount rate.

r = Internal rate of return/ return on investment

Applying the above formula, price per share

$$P = \frac{36 + \frac{0.20}{0.15}(120 - 36)}{0.15}$$

$$\text{Or, } P = \frac{36 + 112}{0.15} = ₹ 986.67$$

Q.7 The following information is supplied to you:

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

Applying Walter's Model:

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

Ans

- (i) The EPS of the firm is ₹ 10 (i.e., ₹ 2,00,000/ 20,000) and $r = 2,00,000 / (20,000 \text{ shares} \times ₹100) = 10\%$. 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 ₹ 1,50,000 among 20,000 shares, giving a dividend per share of ₹ 7.50. the value of the share as per Walter's model may be found as follows:

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

The firm has a dividend payout of 75% (i.e., ₹ 1,50,000) out of total earnings of ₹ 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-

$$= \frac{0 + \frac{0.1}{0.08}(10 - 0)}{0.08} = ₹ 156.25$$

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:

$$P = \frac{D + \frac{r}{K_e}(E - D)}{K_e} = \frac{7.5 + \frac{0.1}{0.125}(10 - 7.5)}{0.125} = ₹ 76$$

Q.8

Aakash Ltd. has 10 lakh equity shares outstanding at the start of the accounting year 2021. The existing market price per share is ₹ 150. Expected dividend is ₹ 8 per share. The rate of capitalization appropriate to the risk class to which the company belongs is 10%.

- (i) CALCULATE the market price per share when expected dividends are: (a) declared, and (b) not declared, based on the Miller – Modigliani approach.
- (ii) CALCULATE number of shares to be issued by the company at the end of the accounting year on the assumption that the net income for the year is ₹ 3 crore, investment budget is ₹ 6 crores, when (a) Dividends are declared, and (b) Dividends are not declared.
- (iii) PROOF that the market value of the shares at the end of the accounting year will remain unchanged irrespective of whether (a) Dividends are declared, or (ii) Dividends are not declared.

Ans (i) Calculation of market price per share

According to Miller – Modigliani (MM) Approach:

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

Where,

Existing market price (P_0) = ₹ 150

Expected dividend per share (D_1) = ₹ 8

Capitalization rate (k_e) = 0.10

Market price at year end (P_1) = to be determined

(a) If expected dividends are declared, then

$$₹ 150 = \frac{P_1 + ₹ 8}{1 + 0.10}$$

$$\therefore P_1 = ₹ 157$$

(b) If expected dividends are not declared, then

$$₹ 150 = \frac{P_1 + 0}{1 + 0.10}$$

$$\therefore P_1 = ₹ 165$$

(ii) Calculation of number of shares to be issued

	(a)	(b)
	Dividends are declared (₹ lakh)	Dividends are not Declared (₹ lakh)
Net income	300	300
Total dividends	(80)	-
Retained earnings	220	300
Investment budget	600	600
Amount to be raised by new issues	380	300
Relevant market price (₹ per share)	157	165
No. of new shares to be issued (in lakh) (₹ 380 ÷ 157; ₹ 300 ÷ 165)	2.42	1.82

(iii) Calculation of market value of the shares

	(a)	(b)
	Dividends are declared	Dividends are not Declared
Existing shares (in lakhs)	10.00	10.00
New shares (in lakhs)	2.42	1.82
Total shares (in lakhs)	12.42	11.82
Market price per share (₹)	157	165
Total market value of shares at the end of the year (₹ in lakh)	12.42 × 157 = 1,950 (approx.)	11.82 × 165 = 1,950 (approx.)

Hence, it is proved that the total market value of shares remains unchanged irrespective of whether dividends are declared, or not declared.

Q.9

Rambo Limited Has 1,00,000 equity shares outstanding for the year 2022. The current market price of the shares is ₹ 100 each. Company is planning to pay dividend of ₹ 10 per share. Required rate of return is 15%. Based on Modigliani-Miller approach, calculate the market price of the share of the company when the recommended dividend is 1) declared and 2) not declared.

How many new shares are to be issued by the company at the end of the year on the assumption that net income for the year is ₹ 40 Lac and the investment budget is ₹ 50,00,000 when dividend is declared, or dividend is not declared.

PROOF that the market value of the company at the end of the accounting year will remain same whether dividends are distributed or not distributed.

Ans

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

Step 1: Calculate price at the end of the period

$$K_e = 15\%, \quad P_0 = ₹100, \quad D_1 = 0$$

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$₹100 = \frac{P_1 + 0}{1 + 0.15}$$

$$P_1 = ₹115$$

Step 2: Calculation of funds required for investment

Earning	₹ 40,00,000
Dividend distributed	Nil
Fund available for investment	₹ 40,00,000
Total Investment	₹ 50,00,000
Balance Funds required	₹ 50,00,000 - ₹ 40,00,000 = ₹ 10,00,000

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

$$\text{No. of shares} = \text{Funds required}/P_1$$

$$\Delta n = ₹10,00,000/₹115$$

Step 4: Calculation of value of firm

$$nP_0 = [(n+\Delta n)P_1 - I + E]/(1+K_e)$$

$$nP_0 = [(100000 + 1000000/₹115) ₹115 - ₹5000000 + ₹4000000]/(1.15)$$

$$= ₹1,00,00,000$$

CASE 2: Value of the firm when dividends are paid.

Step 1: Calculate price at the end of the period

$$K_e = 15\%, \quad P_0 = ₹100, \quad D_1 = ₹10$$

$$P_0 = \frac{P_1 + D_1}{1 + K_e}$$

$$₹100 = \frac{P_1 + 10}{1 + 0.15}$$

$$P_1 = ₹105$$

Step 2: Calculation of funds required for investment

Earning	₹ 40,00,000
Dividend distributed	10,00,000
Fund available for investment	₹ 30,00,000
Total Investment	₹ 50,00,000
Balance Funds required	₹ 50,00,000 - ₹ 30,00,000 = ₹ 20,00,000

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

$$\text{No. of shares} = \text{Funds Required}/P_1$$

$$\Delta n = ₹2000000/₹105$$

Step 4: Calculation of value of firm

$$nP_0 = [(n+\Delta n)P_1 - I + E]/(1+K_e)$$

$$nP_0 = [(100000 + 2000000/₹105) ₹105 - ₹5000000 + ₹4000000]/(1.15) = ₹1,00,00,000$$

Thus, it can be seen from the above calculations that the value of the firm remains the same in either case.

Investment Decisions

Q.10 PQR Limited is considering buying a new machine which would have a useful economic life of five years, at a cost of ₹ 40,00,000 and a scrap value of ₹ 5,00,000, with 80 per cent of the cost being payable at the start of the project and 20 per cent at the end of the first year. The machine would produce 80,000 units per annum of a new product with an estimated selling price of ₹ 400 per unit. Direct costs would be ₹ 375 per unit and annual fixed costs, including depreciation calculated on a straight- line basis, would be ₹ 10,40,000 per annum.

In the first year and the second year, special sales promotion expenditure, not included in the above costs, would be incurred, amounting to ₹ 1,25,000 and ₹ 1,75,000 respectively.

EVALUATE the project using the NPV method of investment appraisal, assuming the company's cost of capital to be 12 percent.

Ans

Calculation of Net Cash flows

Contribution = $(400 - 375) \times 80,000 = ₹ 20,00,000$

Fixed costs = $10,40,000 - [(40,00,000 - 5,00,000)/5] = ₹ 3,40,000$

Year	Capital (₹)	Contribution (₹)	Fixed costs (₹)	Promotion (₹)	Net cash flow (₹)
0	(32,00,000)				(32,00,000)
1	(8,00,000)	20,00,000	(3,40,000)	(1,25,000)	7,35,000
2		20,00,000	(3,40,000)	(1,75,000)	14,85,000
3		20,00,000	(3,40,000)		16,60,000
4		20,00,000	(3,40,000)		16,60,000
5	5,00,000	20,00,000	(3,40,000)		21,60,000

Calculation of Net Present Value

Year	Net cash flow (₹)	12% discount factor	Present value (₹)
0	(32,00,000)	1.000	(32,00,000)
1	7,35,000	0.893	6,56,355
2	14,85,000	0.797	11,83,545
3	16,60,000	0.712	11,81,920
4	16,60,000	0.636	10,55,760
5	21,60,000	0.567	12,24,720
			21,02,300

The net present value of the project is ₹**21,02,300**.

Q.11 HM Ltd. is listed on Bombay Stock Exchange which is currently been evaluated by Mr. A on certain parameters.

Mr. A collated following information:

- (a) The company generally gives a quarterly interim dividend. ₹ 2.5 per share is the last dividend declared.
- (b) The company's sales are growing by 20% on a 5-year Compounded Annual Growth Rate (CAGR) basis, however the company expects following retention amounts against probabilities mentioned as contention is dependent upon cash requirements for the company. Rate of return is 10% generated by the company.

Situation	Prob.	Retention Ratio
A	30%	50%
B	40%	60%
C	30%	50%

- (c) The current risk-free rate is 3.75% and with a beta of 1.2 company is having a risk premium of 4.25%.

You are required to help Mr. A in calculating the current market price using Gordon's formula.

Ans 8. Market price using Gordon's formula

$$P_0 = \frac{D_0(1+g)}{k_e - g}$$

$D_0 = 2.5 \times 4 = 10$ per share (annual)

$g = br$ or retention ratio \times rate of return

Calculation of expected retention ratio

Situation	Prob.	Retention Ratio	Expected Retention Ratio
A	30%	50%	0.15
B	40%	60%	0.24
C	30%	50%	0.15
Total			0.54

$$g = 0.54 \times 0.10 = 0.054 \text{ or } 5.4\%$$

$$P_0 = \frac{D_0(1+g)}{K_e - g}$$

$$P_0 = \frac{10(1+0.054)}{0.0885 - 0.054} = \frac{10.54}{0.0345} = 305.51$$

$K_e = \text{Risk free rate} + (\text{Beta} \times \text{Risk Premium})$

$$= 3.75\% + (1.2 \times 4.25\%) = 8.85\%$$

Q.12

The following information is supplied to you:

Particulars	Amount (₹)
Total Earnings	4,50,000
No of Equity Shares (of ₹ 100 each)	25,000 shares
Retention ratio	40%
MPS	198

Applying Walter's Model:

- (i) ANALYSE whether the company is following an optimal dividend policy.
- (ii) COMPUTE P/E ratio at which the dividend policy will have no effect on the value of the share. Also calculate the MPS at such P/E ratio
- (iii) Will your decision change if the P/E ratio is 4.5? ANALYSE.

Ans

(i) As per Walter,

If $ROI > K_e$, firm should retain everything and distribute nothing to maximize the share price. On the contrary, if $ROI < K_e$, firm should distribute everything and retain nothing to maximize the wealth of the equity owners.

$$\begin{aligned} ROI &= \text{Total Earnings} / \text{Equity Share capital} \\ &= 4,50,000 / 25,00,000 \end{aligned}$$

$$\text{ROI} = 18\%$$

$$K_e = \frac{1}{PE}$$

$$\text{P.E Ratio} = \text{MPS} / \text{EPS} = 198 / 18 = 11$$

$$\text{Therefore } K_e = 1/11 = 9.091\%$$

Since $ROI > K_e$, optimal dividend policy of the firm should be to retain everything and distribute nothing. However, the firm has retained 40% and distributed 60%, hence it is not having an optimal dividend policy as per Walter's model.

(ii) When $ROI = K_e$, dividend policy of the company will have no effect on the value of the share as per Walter's model

Therefore, in that case, K_e should be equal to 18%

$$\text{P.E Ratio} = \frac{1}{K_e} = \frac{1}{0.18}$$

$$\text{P.E Ratio} = 5.56 \text{ times}$$

$$\text{MPS at the above P.E Ratio} = 18 \times 5.56 = ₹ 100.08$$

(iii) If P.E Ratio is 4.5,

$$K_e = \frac{1}{4.5} = 22.22\%$$

Since, ROI < K_e, optimal dividend policy of the firm should be to distribute everything and retain nothing, as the value of share would be maximum at that point thereby maximizing the wealth of the shareholder

