DIVIDEND DECISIONS

Learning objectives

1. Understanding dividends and its role in share valuation.
2. Understanding perpetual cash flow.
3. Types of dividends.
4. Dividend relevance models
    - Walter model
    - Gordon model
    - Graham & Dodd models.
    - 2-stage dividend model.
5. Dividend irrelavance model – Modigliani & Miller model.
6. Dividend pay out model – Linter's model.
7. Miscellaneous issues.

1. Understanding dividends.

* Value of any asset is PV of FCF discounted @ RR.
* Type of assets, their cashflows & respective disc rates are as under ———

	Debt	Preference	Equity
Cashflow	Interest	Preference dividend	Dividend.
disc. rate	Kd/YTM	Kp	Ke
Life	Pre-determined	Pre-determined	Perpetual.

* In case of share, the cashflow is "dividend". Therefore, dividend will necessarily impact the share prices.

2. Concept of perpetual cashflows.

* Perpetual CFs are those CFs which recur constantly till perpetuity.

* Shares life is perpetual. Hence, CF given by that share will also recur till perpetuity.
* To value the asset called 'share' we require, PV of perpetual CFs which are discounted @ ke. ke is already analysed in the previous chapter. In this chapter, the analysis will be on CFs.
* Formula for PV of PCF is ———

$$\boxed{\frac{\text{cash flow p.a}}{\text{Required rate}}}$$

In case of share CF p.a is dividend. Required rate is ke. So, value of share is ———

$$\boxed{\frac{D}{ke}}$$

3. Types of dividends

- Constant dividend → $P_0 = \frac{D}{ke}$
- Constant growth → $P_0 = \frac{D1}{ke - g}$
- Variable + constant 'g' → 2-stage div. model
- Single period holding → $P_0\ (mm) = \frac{D1 + P1}{1 + ke}$

4. ## Dividend relevance models.

* Dividend relevance models proposes that the div payment and non-payment will affect the share prices.
* There are 2 models which are as follows ———
  - Walter's model
  - Gordon's model
* Walter model is based on constant dividend and without growth, whereas Gordon model is based on constant growth.

Walter's model

I. Basics :-

* As per Walter's model, dividend payment/non payment will affect the price of a share.
* As per the model, dividend decision will impact the wealth of the SH.

II. Formula :-

$$P_0 = \frac{D + \frac{r}{Ke}(E-D)}{Ke}$$

* P_0 = Current MPS.
* D = DPS
* r = ROI%
* Ke = Cost of equity.
* $E-D$ = Retention/share.

Since formula has "D" in it, dividend will impact the price of the share.

III. Interpretation of formula

The formula has 2 parts namely ———

(1.) $\frac{D}{Ke}$

(2.) $\frac{\frac{r}{Ke}(E-D)}{Ke}$

* Part (1) of the formula is analysing the PV of perpetual dividends.

* Part (2) of the formula is analysing the PV of perpetual return on re-investment coming for perpetual years.

IV. Derivation of Part (1) & (2) of formula.

I

PV of perpetual CFs

$= \frac{CFp.a}{RR}$

↓

PV of perpetual dividends

↓

$= \frac{D}{ke}$

II

PV of perpetual retention

↓

	yr-1	yr-2	yr-3
E	10	10	10
-D	(4)	(4)	(4)
R (E-D)	6	6	6

Numerical analysis

yr-1

E = 10
- D = (4)
R = 6

6 → re-inv @ 'r' rate → perpetual years

↓

$6 \times \frac{r}{ke}$ → perpetual return

yr-2

E = 10
- D = -4
R = 6 (E-D)

↓

re-inv for perp years

↓

'r' rate

$\frac{6 \times r}{ke}$ → perpetual years

V. Dividend Policy using walter model

Situation	Policy	Remarks
r > ke	* 100% retention * 0% payout	since, wealth maximises in the hands of company
r = ke	Indifferent	–
r < ke	* 0% retention * 100% payout	since, wealth maximises in the hands of SH.

VI. Assumptions of walter model

* Company has constant earning
* Company has constant dividend.
* Only source of investment is retained earnings.
* No equity issue (new).
* No Taxes
* Markets are perfect.

VII. Advantages of walter model

* Easy to understand & compute.
* Different prices at different situations. By changing some factors in formula we derive different prices.

VIII. Disadvantages of walter model

* Doesn't consider all factors affecting share prices.
* No taxes.

IX. Dividend policy analysis using formula

a. If $r > ke$

co-efficient of E−D is more than co-efficient of D.

if $r > ke$, $\frac{r}{ke} > 1$

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

D → 1×D
↓
co-eff

Since co-efficiency of retention being E−D is more than co-efficiency of dividend (D), it is recommended to go by higher co-efficiency being "100% retention".

b. If $r < ke$

co-efficient of D(1) > co-efficient of E−D(<1)

c. If $r = ke$

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

If $r = ke$, $r/ke = 1$

$$P = \frac{D + 1(E-D)}{ke}$$

$P = \cancel{D} + E - \cancel{D} / ke$ $\quad P = E/ke$

Gordon's model

I. Basics

1. As per Gordon's model, dividend will have impact on share prices.
2. Model analysed that growth will be the major influencing factor in share pricing.

II. Formula

Gordon considering 2 types of formulae

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

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

- D_1 = Expected dividend
- $D_1 = D_0(1+g)$
- P_0 = Current share price
- g = growth rate.
- b = retention proportion
- r = Return on equity
- $1-b$ = payout proportion
- E = Earnings per share
- $E(1-b)$ = Dividend per share
- $b \times r = g$

III. Derivation

Value of share is PV of Future dividends disc@ke

Year	CF	PV@Ke	PVCF
1	D_1	$\frac{1}{(1+ke)^1}$	$\frac{D_1}{(1+ke)^1}$
2	D_2	$\frac{1}{(1+ke)^2}$	$\frac{D_2}{(1+ke)^2}$
3	D_3	$\frac{1}{(1+ke)^3}$	$\frac{D_3}{(1+ke)^3}$
⋮	⋮		
n	D_n	$\frac{1}{(1+ke)^n}$	$\frac{D_n}{(1+ke)^n}$
			P_0

$$P_0 = \sum \left[\frac{D_1}{(1+k_e)^1} + \frac{D_2}{(1+k_e)^2} + \frac{D_3}{(1+k_e)^3} + \cdots + \frac{D_n}{(1+k_e)^n} \right]$$

This series forms a geometric progression which can be simplified as under —

$$y = \frac{a}{1-r}$$,

y = Term to be limited = P_0

a = 1st term in series

$$r = \frac{\text{Longest term}}{\text{shortest term}}$$

$$\boxed{a = \frac{D_1}{1+k_e}}$$

$$\boxed{r = \frac{\frac{D_2}{(1+k_e)^2}}{\frac{D_1}{1+k_e}}}$$

$$r = \frac{\cancel{D_1}(1+g)}{(1+k_e)\cancel{(1+k_e)}} \times \frac{\cancel{1+k_e}}{\cancel{D_1}}$$

$$r = \frac{1+g}{1+k_e}$$

$$1 - r = 1 - \frac{1+g}{1+k_e}$$

$$= \frac{\cancel{1}+k_e-\cancel{1}-g}{1+k_e}$$

$$= \frac{k_e-g}{1+k_e}$$

$$P_0 = \frac{a}{1-r} = \frac{\frac{D_1}{1+k_e}}{\frac{k_e-g}{1+k_e}} \Rightarrow \frac{D_1}{\cancel{1+k_e}} \times \frac{\cancel{1+k_e}}{k_e-g}$$

$$\boxed{P_0 = \frac{D_1}{k_e-g}}$$

IV. Understanding growth

* Growth is a product of b×r.
* This means, the company will not keep the reserves idle, rather it invests at a place which gives "r%" return.
* This growth is assumed as constant till the perpetuity.
* Growth increases the prices of shares also.

V. Concept detailed by model

* This model clarifies that company shall follow such pay out / retention ratio which gives highest price.
* model analyzed both advantages & disadvantages of dividend & retention which are as follows —

Dividend

Adv: * Visible cash flow
* Increased confidence.

D·Adv: * Stops growth
* New issue as IPO is costly if all dividends are paid.

Retention

Adv: * Propels growth.
* $k_r < k_e$

D·Adv: * No visible cash flow.
* loss of confidence

" A Bird in a hand is better than 2 in a bush."

VI. Assumptions of the model

* Earnings are growing at a constant rate.
* Company follow stable pay out.
* Markets are perfect.
* $k_e \neq g$.
* only source of financing is retained earnings.
* No taxes.
* Company has ready investments.

VII Dividend policy as per Gordon model

Unlike walter model, Gordon model proposes to calculate price of a share at different levels of payout, RoE & Ke and follow such payout which gives highest share price.

Illustrations

2. In the given question, r>ke, which means, as per walter model, company shall follow

* 100% retention
* 0% payout

∴ EPS = ₹ 10, DPS = 0, E−D = ₹ 10

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

$$= \frac{0 + \frac{0.12}{0.10}(10-0)}{0.10}$$

$$= ₹ 120.$$

Prices at different payouts.

25% P.O & 75% Retn	50% PO & 50% Retn	75% PO 25% Retn	100% PO & 0% Retn.
$\frac{2.5 + \frac{0.12}{0.10}(7.5)}{0.10}$	$\frac{5 + \frac{0.12}{0.10}(5)}{0.10}$	$\frac{7.5 + \frac{0.12}{0.10}(2.5)}{0.10}$	$\frac{10}{0.10}$
= ₹ 115	= ₹ 110	= ₹ 105	= ₹ 100

3. **Step 1: Calculation of EAESH.**

Net profit	=	₹ 30,00,000
(−) Pref. div (₹ 1,00,00,000 x 12%)	=	(₹ 12,00,000)
EAESH	=	₹ 18,00,000
EPS	=	₹ 6 (₹ 18L/3L)

Step 2: Calculation of payout.

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

$$\Rightarrow ₹42 = \frac{D + \frac{0.20}{0.16}(₹6 - D)}{0.16}$$

$\Rightarrow ₹6.72 = D + 1.25(₹6 - D)$

$\Rightarrow ₹6.72 = D + ₹7.5 - 1.25D$

$\Rightarrow ₹6.72 = -0.25D + 7.5$

$\Rightarrow 0.25D = ₹7.5 - ₹6.72$

$\Rightarrow 0.25D = ₹0.78$

$\Rightarrow D = ₹3.12$

Payout ratio $= \frac{DPS}{EPS} = \frac{₹3.12}{₹6.00} \times 100 = 52\%.$

4. **Step 1: calculation of EAESH.**

Net profit	=	₹30,00,000
(–) Pref. div	=	(₹12,00,000)
(₹1,00,00,000 x 12%)		
EAESH	=	₹18,00,000
EPS	=	₹6 (₹18L/3L)

Step 2: Calc of P_0

Case 1 : When P.O = 25%

$$P_0 = \frac{E(1-b)}{ke - (b \times r)}$$

$$= \frac{₹6(1 - 0.75)}{0.16 - (0.75 \times 0.20)}$$

$$= \frac{₹1.50}{0.16 - 0.15} = \frac{₹1.50}{0.01}$$

$$= ₹150$$

Case – 2 : When PO is 50%

$$P_0 = \frac{E(1-b)}{k_e - (b \times r)}$$

$$= \frac{₹6(1-0.50)}{0.16-(0.50 \times 0.20)}$$

$$= \frac{₹3}{0.16-0.10} = \frac{₹3}{0.06} = ₹50$$

Case – 3 : When PO is 100%

$$P_0 = \frac{E(1-b)}{k_e - (b \times r)}$$

$$= \frac{₹6(1-0)}{0.16-(0 \times 0.20)}$$

$$= \frac{₹6}{0.16} = ₹37.50.$$

5. Since the company is a no growth company, $g = 0$. Therefore, same dividend will be paid till perpetuity.

$$P = \frac{D}{k_e}$$

$$= \frac{₹5}{0.10} = ₹50$$

6. **Calculation of P_0**

$$P_0 = \frac{D_1}{k_e - g} = \frac{D_0(1+g)}{k_e - g}$$

$$= \frac{₹2(1.02)}{0.15-0.02}$$

$$= \frac{₹2.04}{0.13}$$

$$= ₹15.69.$$

7. calc of price of share at various growth levels

As per Gordon model,

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

case-1 (g = 5%)

$$P_0 = \frac{₹2(1.05)}{0.15-0.05} = \frac{₹2.10}{0.10} = ₹21$$

case-2 (g = 8%)

$$P_0 = \frac{₹2(1.08)}{0.15-0.08} = \frac{₹2.16}{0.07} = ₹30.86$$

case-3 (g = 3%)

$$P_0 = \frac{₹2(1.03)}{0.15-0.03} = \frac{₹2.06}{0.12} = ₹17.17.$$

12. Step 1: Calculation of EPS and DPS

a) EPS

$$= \frac{₹5,00,000}{1,00,000}$$

$$= ₹5$$

b) DPS

= EPS x POR

= ₹5 x 60%

= ₹3

Step 2: Calculation of price at given payout ratio

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

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

$$= \frac{₹3 + ₹2.50}{0.12}$$

$$= ₹45.83.$$

Step 3: optimum payout & optimum price

since $r > k_e$, the company has to maintain

* 0% payout
* 100% retention

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

$$P = \frac{0 + \frac{0.15}{0.12} \times 5}{0.12}$$

$$P = \frac{6.25}{0.12}$$

$$P = ₹\,52.08$$

13\. Calculation of price per share for various firms

Particular	Growth firm	Normal firm	Declining firm
$P_0 = \frac{E(1-b)}{k_e - (b \times r)}$	₹ 400	₹ 100	₹ 76.92
	$= \frac{10(1-0.60)}{0.10-(0.6 \times 0.15)}$	$= \frac{10(1-0.60)}{0.10-(0.6 \times 0.10)}$	$= \frac{10(1-0.60)}{0.10-(0.60 \times 0.08)}$
	$= \frac{4}{0.10-0.09}$	$= \frac{4}{0.10-0.06}$	$= \frac{4}{0.10-0.048}$
	$= \frac{4}{0.01}$	$= \frac{4}{0.04}$	$= \frac{4}{0.052}$

14\. 1. Calculation of value of share using walter model

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

$$= \frac{(₹60 \times 30\%) + \frac{0.25}{0.15}(60-18)}{0.15}$$

$$= \frac{₹18 + ₹70}{0.15}$$

$$= \frac{₹88}{0.15}$$

$$= ₹586.67.$$

2\. Decision as per Gordon model

As per Gordon model, more the retention, more the growth. more the growth, higher the share price. So, to achieve optimum share price as per Gordon model in the case of $r > k_e$, company shall follow 0% payout.

Graham & Dodd model

* This traditional pricing model assumed that the SH will give 3 times more weight to the dividends than retained earnings.
* Formula under this model is ———

P = Price of Sh
m = PE multiple.

$$\boxed{P = \left[D + \frac{E}{3}\right] \times m}$$

D = Dividends
E = Earnings

8. Calc of share price under Graham & Dodd model

$$P = \left[D + \frac{E}{3}\right] \times m$$

$$= \left[(₹30 \times 60\%) + \frac{₹30}{3}\right] \times 2$$

$$= (₹18 + ₹10) \times 2$$

$$= ₹56.$$

9. Calc of EPS using G&D model

$$P = \left(D + \frac{E}{3}\right) \times m$$

$$58.33 = \left[5 + \frac{E}{3}\right] \times 7$$

$$8.33 = 5 + \frac{E}{3}$$

$$3.33 = \frac{E}{3}$$

$$EPS = 9.99 \simeq ₹10$$

Linter's model for dividend payment

* This model analysed that every company should pay atleast the dividend already paid in the last year added with some extra payment taking adjustment factor into consideration.
* Linter's formula

$$\boxed{D_1 = D_0 + [[EPS \times PR] - D_0] \times AF}$$

D_1 = Div to be paid, D_0 = Div already paid
EPS = Earnings per share, PR = Payout ratio,
AF = Adjustment factor/Speed of adjustment/Dividend velocity.

10. Calc of dividend to be paid under Linter's model

$$D_1 = D_0 + [(EPS \times POR) - D_0] \times AF$$
$$= ₹9.80 + [(20 \times 60\%) - 9.80] \times 45\%$$
$$= ₹9.80 + (2.20 \times 45\%)$$
$$= ₹9.80 + 0.99$$
$$= ₹10.79$$

(PP1:) **Calculation of P/E using G&D model**

As per traditional approach, $P = \left[D + \frac{E}{3}\right] \times m$

P = not given, D = 0.4E, E = not given, m = 9

$P = \left[0.4E + \frac{E}{3}\right] \times 9$

$P = \frac{1.2E + E}{3} \times 9 \Rightarrow 2.2E \times 3 = 6.6E$

$P = 6.6E$, $P/E = 6.6$ times.

(PP4:) **1. Price as per Walter model.**

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

$$= \frac{6 + \frac{0.25}{0.20}(10-6)}{0.20}$$

$$= \frac{6+5}{0.20} = ₹55$$

2. Price as per Gordon's model

$$P_0 = \frac{E(1-b)}{ke-(b \times r)} = \frac{₹10(1-0.40)}{0.20-(0.40 \times 0.25)}$$

$$= \frac{₹6}{0.20-0.10} = \frac{₹6}{0.10} = ₹60.$$

(PP5:) **1. Calculation of EPS**

Particular	Amount (₹)	
Net profit	50,00,000	
(-) Pref. div	(15,00,000)	(₹100L × 15%)
EAESH	35,00,000	
NOS	5,00,000	
EPS	₹7.	

2. Calc of P_0 under 3 conditions

I	II	III
POR @ 25%	POR @ 50%	POR @ 100%
$P_0 = \frac{E(1-b)}{ke - br}$	$P_0 = \frac{E(1-b)}{ke - br}$	$P_0 = \frac{E(1-b)}{ke - br}$
$= \frac{₹7(1-0.75)}{0.16-(0.75 \times 0.20)}$	$= \frac{₹7(1-0.50)}{0.16-(0.50 \times 0.20)}$	$= \frac{₹7(1-0)}{0.16-0}$
$= \frac{₹1.75}{0.01}$	$= \frac{₹3.50}{0.06}$	$= \frac{₹7}{0.16}$
= ₹175.	= ₹58.33	= ₹43.75.

(PP2)

1. Comments on present div. policy

a. Calc of ROE(r)

since, r is not given, it is calculated at BV.

BV / EQUITY = 20,000 sh x ₹100 = ₹20,00,000

Earnings (Return) = ₹2,00,000

$$ROE = \frac{Return}{Equity} \times 100 = \frac{₹2,00,000}{₹20,00,000} \times 100$$

$$= 10\%$$

b. Calc of ke

since, ke is not given, it is calculated as inverse to PE.

$\frac{P}{E} = 12.50$; $ke = \frac{E}{P}$ (as per constant earnings model)

$$\frac{1}{ke} = \frac{P}{E}$$

$$\therefore \quad ke = \frac{1}{P/E} = 1/12.50 = 8\%$$

c. Comments

In the given case, r > ke. That means, as per walter model, company shall follow 100% retention & 0% PO, to achieve optimum share price. But, in the given case, company paid 75% of earnings as dividends and therefore, dividend policy & price are not optimal.

2. Calc of PE at indifferent point

As per walter model, when $r = ke$, the dividends donot affect the price.

$\therefore$ $ke = r \Rightarrow ke = 10\%$, $PE = 1/ke = 1/0.10 = 10$ times.

3. Comments on revised ke.

* Under revised scenario, PE = 8 times. That means, $ke = 1/8 = 12.5\%$.
* In such a case, $r < ke$ and company shall follow optimum dividend policy of 100% PO & 0% retention. But in the given case, company has paid only 75% of its earnings as dividends and hence, it is not following optimum dividend policy.

2-stage dividend valuation model

(PP6)

	Year	CF(₹)	PV@20%	PVCF
g=15%	1	138.00	0.833	114.95
	2	158.70	0.694	110.13
	3	182.51	0.579	105.67
	4	209.88	0.482	101.16
g=5%	4 ⊛	1,469.16	0.482	708.14
				Vs = ₹1,140.05

⊛ $P_4 = \dfrac{D5}{ke - g}$

$= \dfrac{D_4(1+g)}{ke - g}$

$= \dfrac{209.88(1.05)}{0.20 - 0.05}$

$= \dfrac{220.37}{0.15}$

$= ₹1,469.16$

Notes:

1. 2-Stage dividend model focuses on investor's time-horizon.

2. Every person investing in the stocks traded in the market shall have a time horizon. In the given question, it is 4 years.
3. That means, in the given case, the investor invests today, hold it for 4 years and sell the shares at the end of 4th year.
4. Therefore, investor is expecting dividend for next 4 years @ growth of 15% and sell @ perpetual growth of 5% p.a.
5. Since, the investor desires to sell the share at the end of 4th year, he need to expect a value which would occur after 4 years. Hence, we calculated P_4, which considers all cash flows from D_5 to D_∞ at a perpetual growth rate of 5%. That price has come to ₹1,469.16.
6. Using all these data inputs we discounted the future CFs and value is ₹ 1,140.05.

<u>Conclusion:</u>

The real worth of company's share is only ₹1,140.05, whereas it traded in the market @ ₹3122. Hence, it is overpriced to the tune of ₹1,981.95.

(PP7:) **Step 1: Calc of ke (existing)**

Since, the dividend expected is ₹ 20, it shall be considered as D_1. (As against D_0 given in ISM)

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

$$ke = \frac{D_1}{P_0} + g$$

$$= \frac{₹20}{₹1,460} + 0.075 \Rightarrow 8.87\%$$

Step 2: Calc of revised ke.

since, company is changing its retention propn, it is sure that it will change its growth because

growth = retention prop × ROE

$= b \times r$

a. calc of revised growth

$g = b \times r$

$= 0.60 \times 0.10$

$= 0.06$

b. Calc of existing payout & retention propn

$g = b \times r$

$0.075 = b \times 0.10$

$b = 0.75$ (retention prop)

$1 - b = 0.25$ (payout prop)

c. calc of existing EPS

Payout amount expected = ₹20

payout propn = 25%

25% ⟶ ₹20

100 % ⟶ ? = ₹80

∴ It is considered that ₹80 is expected Eps.

d. Calc of revised ke

$$ke = \frac{D_1 (\text{Revised})}{P_0} + g$$

$$= \frac{EPS_1 \times \text{Rev } P_0}{P_0} + g$$

$$= \frac{₹80 \times 40\%}{₹1,460} + 0.06$$

$$= \frac{₹32}{₹1,460} + 0.06$$

$$= 0.0219 + 0.06$$

$$= 8.19\%$$

Summary of Chapter (formulae)

	Particular	Formula
1.	Walter model	$P = \dfrac{D + \frac{r}{k_e}(E - D)}{k_e}$
2.	Gordon model	$P_0 = \dfrac{D_1}{k_e - g}$ (or) $P_0 = \dfrac{E(1-b)}{k_e - br}$
3.	Modigliani & Miller model	1. $P_0 = \dfrac{D_1 + P_1}{1 + k_e}$ 2. $mP_1 = I - (E - nD_1)$ 3. $nP_0 = \dfrac{P_1(n+m) - I + E}{1 + k_e}$
4.	Graham & Dodd model	$P = \left[D + \dfrac{E}{3}\right] \times m$
5.	Linters model	$D_1 = D_0 + [(EPS \times POR) - D_0] \times AF$
6.	Miscellaneous	1. $EPS = BVPS \times ROE$ 2. $PE = MPS / EPS$ 3. $k_e = D_1/P_0 + g$. 4. $MPS = EPS \times PE$ 5. $k_e = 1/PE$ 6. $PE = 1/k_e$.

THE END