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	k_d/YTM	k_p	k_e
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.

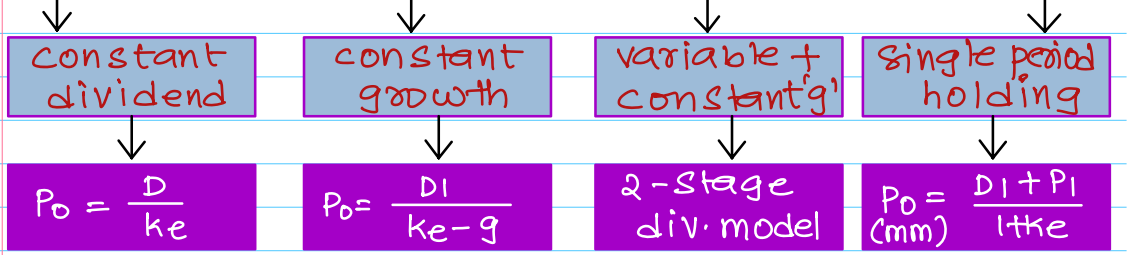
* Shares life is perpetual. Hence, CF given by that share will also recur till perpetuity.
* TO value the asset called 'share' we require, PV of Perpetual CFs which are discounted @ ke. ke is already analysed in the previous chapter. In this chapter, the analysis will be on CFs.
* Formula for PV of PCF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

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

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

$$\frac{D}{ke}.$$

3. Types of dividends



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

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

↓

PV of perpetual dividends

↓

$= \frac{D}{ke}$

II

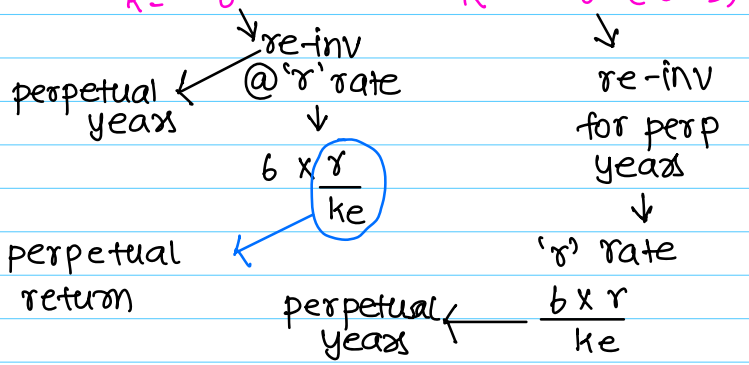
PV of perpetual retention

↓

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

Numerical analysis

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



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.

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

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

$D \rightarrow 1 \times D$

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 $r = ke$**

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

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

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

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

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

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

$$\downarrow$$

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

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

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

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

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

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

$$\downarrow$$

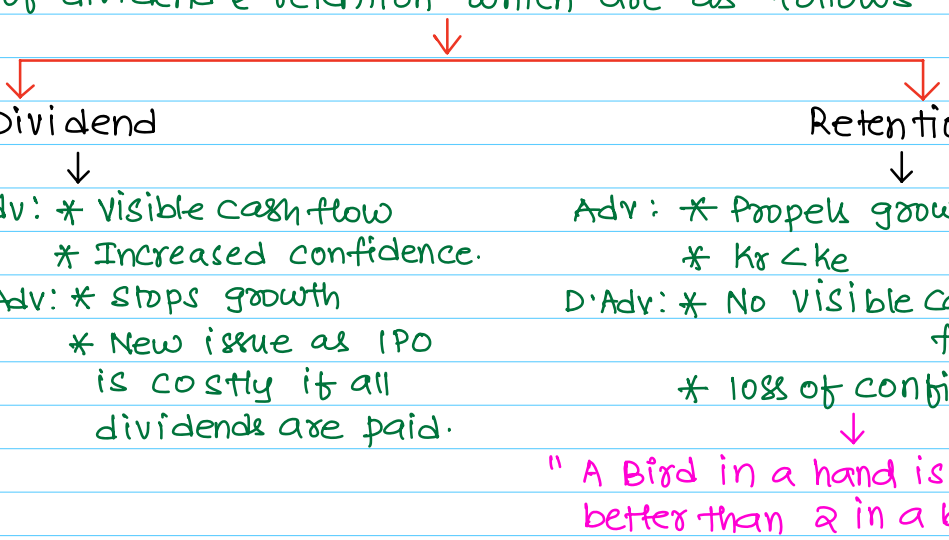
$$P_0 = \frac{D_1}{k_e - g}$$

IV. Understanding growth

* Growth is a product of b x 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 ——



VI. Assumptions of the model

* Earnings are growing at a constant rate.
* Company follow stable pay out.
* Markets are perfect.
* ke ≠ 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 × 12%)	=	(₹12,00,000)
EAESH	=	₹18,00,000
EPS	=	₹6 (₹18L/3L)

Step 2: Calculation of payout.

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

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

$$\Rightarrow ₹6.72 = D + 1.25(₹6 - D)$$
$$\Rightarrow ₹6.72 = D + ₹7.5 - 1.25D$$
$$\Rightarrow ₹6.72 = -0.25D + 7.5$$
$$\Rightarrow 0.25D = ₹7.5 - ₹6.72$$
$$\Rightarrow 0.25D = ₹0.78$$
$$\Rightarrow D = ₹3.12$$

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 (₹1,00,00,000 x 12%)	=	(₹12,00,000)
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%)	Case-2 (g = 8%)	Case-3 (g = 3%)
$P_0 = \frac{₹2(1.05)}{0.15-0.05}$	$P_0 = \frac{₹2(1.08)}{0.15-0.08}$	$P_0 = \frac{₹2(1.03)}{0.15-0.03}$
$= \frac{₹2.10}{0.10}$	$= \frac{₹2.16}{0.07}$	$= \frac{₹2.06}{0.12}$
$= ₹21$	$= ₹30.86$	$= ₹17.17.$

12. Step 1: Calculation of EPS and DPS

a) EPS

$= \frac{₹5,00,000}{1,00,000}$

$= ₹5$

b) DPS

$=$ EPS $\times$ POR

$= ₹5 \times 60\%$

$= ₹3$

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

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

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

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

$$P = ₹ 52.08$$

13. Calculation of price per share for various firms

Particulars	Growth firm	Normal firm	Declining firm
$P_0 = \frac{E(1-b)}{ke-(b \times r)}$	₹ 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

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

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

$$= \frac{₹18 + ₹70}{0.15}$$

$$= \frac{₹88}{0.15}$$

$$= ₹ 586.67.$$

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 > ke, 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.

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

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

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

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

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

(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**

Particulars	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%
$P_0 = \frac{E(1-b)}{k_e - br}$	$P_0 = \frac{E(1-b)}{k_e - br}$	$P_0 = \frac{E(1-b)}{k_e - br}$
$= \frac{₹7(1-0.75)}{0.16-(0.75\times0.20)}$	$= \frac{₹7(1-0.50)}{0.16-(0.50\times0.20)}$	$= \frac{₹7(1-0)}{0.16-0}$
$= \frac{₹1.75}{0.01}$	$= \frac{₹3.50}{0.06}$	$= \frac{₹7}{0.16}$
$= ₹175.$	$= ₹58.33$	$= ₹43.75.$

(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

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

$$= 10\%$$

b. Calc of ke

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

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

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

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

c. comments

In the given case, $r > k_e$. 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 do not affect the price.

∴ ke = r ⇒ 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

(PPG)

	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

⊛ $P_4 = \frac{D_5}{ke - g}$

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

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

$= \frac{220.37}{0.15}$

= ₹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 cashflows 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.

Conclusion:
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 Is m)

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

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

$$= \frac{₹20}{₹1460} + 0.075 \Rightarrow 8.87\%$$

Step2: Calc of revised ke.

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

growth = retention prop X ROE

= b x 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

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

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

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

$$= \frac{₹32}{₹1,460} + 0.06$$

$$= 0.0219 + 0.06$$

$$= 8.19\%$$

Summary of chapter (formulae)

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

THE END

MODIGLIANI AND MILLER MODEL

1. Introduction:

* All the previous models like walter & Gordon has emphasised that, dividend declaration/non-declaration will necessarily affect the share price.

↓

Both these models has dividend in its formula.

* But, MM model, to the contrary, states that the dividend policy of the company will not affect the shareholders wealth / company's wealth.
* As per MM model, it is the investment decision that decides the wealth of a company.

↓

This can be understood through an example as under:

2. The example

The balance sheet of a company is as under ——

Liabilities	Amount (₹)	Assets	Amount (₹)
Equity	10,000	Fixed assets	9,000
Debt	0	Cash	1,000
	10,000		10,000

No. of shares = 1,000, Investment opportunity = ₹1,000

↓

If this company want to takeup an investment project, it has 2 options namely ——

↓

Option-1

↓

Invest the cash ₹1,000 For the invst → cash of ₹1,000 will become the investment in fixed assets

↓

P.T.O

Option-2

↓

Declare div with cash & raise equity → cash will paid as dividend & co will issue new shares in IPO at ex-dividend price.

↓

P.T.O

As per option–1, the share price is as under

↓

SP before dividend = ₹10
[₹10,000/1,000]

SP after investment will remain unchanged because cash becomes an asset and balance sheet & wealth will remain unchanged.

As per option–2, the share price is as under

↓

SP before dividend = ₹10
[₹10,000/1,000]

SP after dividend

Cum–div SP = ₹10
DPS = (₹1)
(₹1,000/1000)
Ex–div. SP = ₹9

↓

This SP is shared by 1,000 SH and wealth become ₹9,000 (1,000 Sh x ₹9/Sh)

↓

once dividend is declared, ₹10,000 worth company will become ₹9,000 worth company. Now the SP of company is ₹9 and at this price, the company will make public issue to make investment of ₹1,000.

↓

No. of shares to be issued = 111 shares.
(₹1000/₹9)

Summary of wealth

↓

If div is not declared

↓

say, holding 10 Sh

Impact on Cos wealth

↓

1,000 Sh x ₹10
= ₹10,000

Impact on SH wealth

↓

10 Sh x ₹10
= ₹100

If div is declared

↓

say, holding 10 Sh

Impact on Cos wealth

↓

1,111 Sh x ₹9
= ₹10,000

Impact on SHs wealth

↓

Sh = 10 Sh x ₹9 = ₹90
Div. = 10 Sh x ₹1 = ₹10
Cash wealth = ₹100

* Therefore, model tries to explain that if a company has an investment opportunity, it will surely takes it whether/not the dividend is declared.
* If the company distributes dividend it raises the required funds through new issue.
* This will not affect the cos wealth as ₹1000 goes out as dividend and come back as capital. The same wealth which is shared by 1000 shares will now be shared by 1,111 shares @ ₹9 SP.
* In this case (div decl), the SH experiences both joy & sorrow. Joy because he receives dividend and sorrow because, SP drops. The dividend benefit is offset by the capital loss leaving SH wealth unchanged.

Super Summary

1. MM-model concentrates on dividends irrelavance on the wealth of CO & SH.

2. MM-model says that wealth of CO/SH will remain unchanged if CO has Good investment opportunity.

3. B/s interpretation

Liabilities	Amount(₹)	Assets	Amount (₹)
Equity	10,000	Fixed assets	9,000
Debt	0	Cash	1,000
	10,000		10,000

The balance sheet shown above is not the accountancy balance sheet rather it is "Market value" balance sheet.

A. meaning of fixed asset

* The term fixed asset used here doesnot mean any individual fixed asset like Land & Building (or) P&M. It is compilation of all projects of a company which generates revenue.
* Value of asset here represents its fairvalue not the historic cost (or) its book value / WDV.
* Fairvalue of any asset is present value of its future CFs discounted at required rate of return.
* Fixed asset in this example represents investments in all the projects of the company at its fair value.

Let us understand difference between accounting Bls and fair value Bls on assets side.

↓

Accounting Bls

↓

purchase of FA worth ₹1,000

↓

Fixed assets a/c (Dr) ₹1,000
To Cash a/c ₹1,000

Fair value Bls

↓

Let us assume that the project of FAs is a perpetual project. PV of perpetual CFs is $\frac{CF\,p.a}{RR}$.

↓

r > ke (r = 10%, ke = 8%)

↓

$\frac{CF\,p.a}{ke} = \frac{₹1,000 \times 10\%}{8\%}$ (₹1,000 ← cost of FA (purch price))

= ₹1,250.

Bls

Fixed assets ₹1,250

r = ke (r = 10%, ke = 10%)

↓

$\frac{CF\,p.a}{ke} = \frac{₹1,000 \times 10\%}{10\%}$

= ₹1,000.

Bls

Fixed assets ₹1,000

r < ke (r = 8%, ke = 10%)

↓

$\frac{CF\,p.a}{ke} = \frac{₹1,000 \times 8\%}{10\%}$

= ₹800.

Bls

FA ₹800

From this one can understand that accounting focuses on costs and FM focuses on fair values.

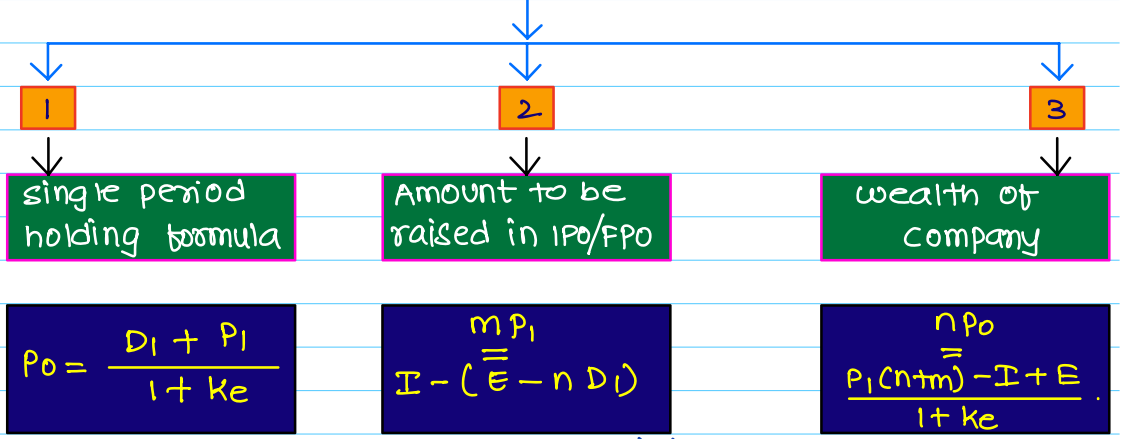
* As per MM model, when r = Ke, ie. when company gives a return exactly as what the SH expects, asset will be fairly valued at cost. This situation is called as "Good" investment opportunity.
* If r > Ke, then it is called as best investment opportunity and if r < Ke, then it is called as "sub-standard" investment opportunity.
* one should understand that the fair value of all the assets is called as projects and value of all projects is value of the business.
* Therefore, value of any business is the present value of all future cashflows project is expected to generate discounted at Ke.

B. Meaning of Equity.

* Here, in this model, the term equity is not ESC/ RES/ both. It is fair value of equity.
* Though people call share capital as an item of liability, in reality share capital is also an asset. The reason is, share value increases if business perform and share value fall if business doesn't perform. we have already learnt that value of business is nothing but value of projects and value of projects is nothing but value of all assets and value of asset is nothing but PV of all FEF. so, if company could not generate proper CF (@ r / > r), then value of assets fall, eventually value of project fall and thereby value of business fall which will then impact the SP. Therefore, it is clear that, Vs is affected by value of business and share doesn't have any seperate value on its own.
* Hence, share is an asset of a kind which derives its value from value of its underlying asset called "Business".

* So, in finance world, unlike accountancy, there is no concept of Liability. Liability is just a connotation used to settle obligations. Hence, SP is just a balancing figure.

4. MM theory of irrelavance using formula.



- P_0 = Current share price
- D_1 = Dividend after 1 year
- P_1 = price after 1 year
- Ke = cost of equity
- I = Investment value
- E = Earnings
- nD_1 = Expected dividend amount
- $n+m$ = total shares after new issue
- n = No. of shares before new issue
- m = No. of shares to be issued.

5. Derivation / interpretation of formulae.

a. $P_0 = \frac{D_1 + P_1}{1 + Ke}$ → value of share is PV of FCF

disc @ Ke

- Ke → 1+Ke
- P_0

FCF: $D_1 + P_1$

- D_1 → Div after 1 year
- P_1 → price after 1 year.

Derivation

$$Ke = \frac{D_1}{P_0} + g \quad ; \quad g = \frac{P_1 - P_0}{P_0}$$

$$Ke - g = \frac{D_1}{P_0}, \qquad Ke - \left[\frac{P_1 - P_0}{P_0}\right]$$

$$\frac{D_1}{P_0} = \frac{Ke}{1} - \frac{P_1 - P_0}{P_0}$$

$$\frac{D_1}{P_0} = \frac{P_0 Ke - P_1 + P_0}{P_0}$$

$$\frac{D_1}{P_0} = \frac{P_0 Ke + P_0 - P_1}{P_0}$$

$$D_1 = P_0 Ke + P_0 - P_1$$

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

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

$$P_0 = \frac{D_1 + P_1}{1 + Ke}.$$

b. Amount to be raised from public issue

$mP_1 = I - (E - nD)$

m = no. of new shares to be issued

P_1 = Price of public issue.

That means, the amount to be raised should be equal to investment value reduced by net earnings. Net earnings means earnings available after declaring dividend.

c. Current value of company

$$P_0 = \frac{D_1 + P_1}{1 + Ke} \quad \& \quad mP_1 = I - (E - nD_1)$$

multiply LHS and RHS by n

$$nP_0 = \frac{nD_1 + nP_1}{1 + Ke}$$

Add and deduct mP_1

$$nP_0 = \frac{nD_1 + nP_1 - mP_1 + mP_1}{1 + Ke}.$$

$$nP_0 = \frac{nD_1 + nP_1 - [I - (E - nD)] + mP_1}{1 + Ke}.$$

$$nP_0 = \frac{nD_1 + nP_1 - I + E - nD_1 + mP_1}{1 + Ke}$$

$$nP_0 = \frac{nP_1 + mP_1 - I + E}{1+ke}$$

$$nP_0 = \frac{P_1(n+m) - I + E}{1+ke}.$$

6. Illustrations from ISM.

Example-2

- No. of shares = 2,00,000
- MPS = ₹10
- DPS = ₹3
- ke = 10%.

Situational analysis

Dividend is declared

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

$$₹10 = \frac{₹3 + P_1}{1+0.10}$$

P_1 = ₹8 (ex-dividend)

No. of shares to be issued to make investment of ₹6L

$$\frac{₹2,00,000 \times 3}{8} = 75,000 \text{ sh.}$$

Market value = 2,75,000 sh × ₹8
= ₹ 22,00,000

Dividend not declared

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

$$₹10 = \frac{0 + P_1}{1+0.10}$$

P_1 = ₹11 (cum-div)

Since there is no pyt of dividend, question of issuing new shares doesn't arise.

Market value = 2,00,000 × ₹11
= ₹22,00,000.

1. Given information

Ke = 10%, No. of shares = 10,000, Mps = ₹100, D_1 = ₹5/Sh.
Earnings available = ₹1,00,000, Investment = ₹2,00,000.

Step 1. Calculation of Mps (with & without dividend)

Dividend is declared	Dividend not declared
$P_0 = \frac{D_1 + P_1}{1 + ke}$	$P_0 = \frac{D_1 + P_1}{1 + ke}$
$₹100 = \frac{₹5 + P_1}{1 + 0.10}$	$₹100 = \frac{0 + P_1}{1 + 0.10}$
P_1 = ₹105.	P_1 = ₹110.

Step 2 Calculation of no. of. shares to be raised

Dividend is declared	Dividend not declared
$mP_1 = I - (E - nD_1)$	$mP_1 = I - (E - nD_1)$
$(m \times ₹105) = ₹2,00,000 - (₹1,00,000 - 10,000 \times ₹5)$	$(m \times ₹110) = ₹2,00,000 - (₹1,00,000)$
$₹105m = ₹2,00,000 - ₹50,000$	$₹110m = ₹1,00,000$
$₹105m = ₹1,50,000$	m = 909.09 Shares
m = 1,428.57 shares.	

Step 3 Calculation of current market value.

Dividend is declared	Dividend not declared
$nP_0 = \frac{P_1 (n+m) - I + E}{1 + ke}$	$nP_0 = \frac{P_1 (n+m) - I + E}{1 + ke}$

$= \frac{₹105(10,000+1428.57) - 2,00,000 + 1,00,000}{1.10}$

$= ₹10,00,000$

$= \frac{₹110(10,000+909.09) - 2,00,000 + 1,00,000}{1.10}$

$= ₹10,00,000$

∴ Value of firm remains the same across any situation.

11. **Addl illustration 1:** Given information

Ke = 12%, No. of shares = 10,000, Mps = ₹100, D_1 = ₹10/sh.

Earnings available = ₹5,00,000, Investment = ₹10,00,000.

Step 1. Calculation of Mps (with & without dividend)

Dividend is declared

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

$₹100 = \frac{₹10 + P_1}{1 + 0.12}$

$P_1 = ₹102$

Dividend not declared

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

$₹100 = \frac{0 + P_1}{1 + 0.12}$

$P_1 = ₹112.$

Step 2 Calculation of no. of shares to be raised

Dividend is declared

$mP_1 = I - (E - nD_1)$

$₹102 \times m = ₹10,00,000 - (₹5,00,000 - 10,000 \times 10)$

$₹102m = ₹6,00,000$

$m = 5882.35$ shares

Dividend not declared

$mP_1 = I - (E - nD_1)$

$₹112m = ₹10,00,000 - (₹5,00,000 - 0)$

$₹112m = ₹5,00,000$

$m = 4464.29$ shares

Step3 Calculation of current market value.

↓

Dividend is declared

$nP_0 = \frac{P_1(n+m) - I + E}{1+ke}$

$= ₹102(10,000 + 5882.35) - ₹10,00,000 + ₹5,00,000 \over 1.12$

$= ₹10,00,000.$

Dividend not declared

$nP_0 = \frac{P_1(n+m) - I + E}{1+ke}$

$= ₹112(10,000 + 4464.29) - ₹10,00,000 + ₹5,00,000 \over 1.12$

$= ₹10,00,000$

Practical Problems (ISM)

(PP2) **Step 1.** Calculation of MPS (with & without dividend)

↓

Dividend is declared

↓

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

$₹100 = \frac{₹5 + P_1}{1.10}$

$P_1 = ₹105$

Dividend not declared

↓

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

$₹100 = \frac{0 + P_1}{1.10}$

$P_1 = ₹110.$

Step2. Calculation of no. of. shares to be issued

I. When dividend is declared

$mp_1 = I - (E - ND_1)$

$₹105m = ₹5,00,000 - (₹2,50,000 - ₹1,25,000)$

$₹105m = ₹5,00,000 - ₹1,25,000$

$₹105m = ₹3,75,000$

$m = 3,571.43$ shares.

II. When dividend is not declared

$$mP_1 = I - (E - nD_1)$$

$$₹110m = ₹5,00,000 - ₹2,50,000$$

$$₹110m = ₹2,50,000$$

$$m = 2,272.73$$

Step 3 **Calculation of current MV of the firm.**

I. When dividend is declared

$$nP_0 = \frac{P_1(n+m) - I + E}{1+ke}$$

$$= \frac{105(28,571.43) - 5,00,000 + 2,50,000}{1.10}$$

$$= \frac{₹30,00,000 - ₹2,50,000}{1.10}$$

$$= ₹25,00,000.$$

II. When dividend is not declared

$$nP_0 = \frac{P_1(n+m) - I + E}{1+ke}$$

$$= \frac{110(27,272.73) - 5,00,000 + 2,50,000}{1.10}$$

$$= \frac{₹ \quad - ₹2,50,000}{1.10}$$

$$= ₹25,00,000.$$

(PP 8.)

Step 1. Calculation of MPS (with & without dividend)

Dividend is declared	Dividend not declared
$P_0 = \frac{D_1 + P_1}{1 + ke}$	$P_0 = \frac{D_1 + P_1}{1 + ke}$
$150 = \frac{8 + P_1}{1.10}$	$150 = \frac{0 + P_1}{1.10}$
$P_1 = ₹157$	$P_1 = ₹165$

Step 2. Calculation of no. of shares to be issued

I. When dividend is declared

$mP_1 = I - (E - nD_1)$

$157m = ₹6,00,00,000 - (3,00,00,000 - 80,00,000)$

$157m = ₹6,00,00,000 - 2,20,00,000$

$157m = ₹3,80,00,000$

$m = 2,42,038.22$ shares.

II. When dividend is not declared

$mP_1 = I - (E - nD_1)$

$165m = ₹6,00,00,000 - ₹3,00,00,000$

$m = 1,81,818.18$ shares.

Step 3. Calculation of MV of company.

In this question, we are required to prove that MV of company is same across any situation at the END of year.

If dividend is paid	If dividend is not paid
$MV = 12,42,038.22 \times 157$	$MV = 11,81,818.18 \times 165$
$= ₹19.50$ Cr	$= ₹19.50$ Cr.