EQUITY VALUATION

How to Find Your Bearings

BALANCE SHEET

VALUATION

- BOOK VALUE
- LIQUIDATION VALUE
- REPLACEMENT COST

DIVIDEND DISCOUNT MODEL

- **SINGLE PERIOD VALUATION MODEL**

$$P_0 = \frac{D_1}{(1+r)} + \frac{P_1}{(1+r)}$$

- **MULTI - PERIOD VALUATION MODEL**

$$P_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+r)^t}$$

- **ZERO GROWTH MODEL**

$$P_0 = \frac{D}{r}$$

- **CONSTANT GROWTH MODEL**

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

TWO - STAGE GROWTH MODEL

$$P_0 = D_1 \left(\frac{1 - \left(\frac{1+g_1}{1+r} \right)^n}{r - g_1} \right) + \frac{P_n}{(1+r)^n}$$

WHERE

$$\frac{P_n}{(1+r)^n} = \left(\frac{D_1 \ (1+g_1)^{n-1} \ (1+g_2)}{r - g_2} \right) \left(\frac{1}{(1+r)^n} \right)$$

TWO - STAGE GROWTH MODEL : EXAMPLE

EXAMPLE THE CURRENT DIVIDEND ON AN EQUITY SHARE OF VERTIGO LIMITED IS RS.2.00. VERTIGO IS EXPECTED TO ENJOY AN ABOVE-NORMAL GROWTH RATE OF 20 PERCENT FOR A PERIOD OF 6 YEARS. THEREAFTER THE GROWTH RATE WILL FALL AND STABILISE AT 10 PERCENT. EQUITY INVESTORS REQUIRE A RETURN OF 15 PERCENT. WHAT IS THE INTRINSIC VALUE OF THE EQUITY SHARE OF VERTIGO ?

THE INPUTS REQUIRED FOR APPLYING THE TWO-STAGE MODEL ARE :

g_1 = 20 PERCENT
g_2 = 10 PERCENT
n = 6 YEARS
r = 15 YEARS
$D_1 = D_0 (1+g_1)$ = RS.2(1.20) = 2.40

PLUGGING THESE INPUTS IN THE TWO-STAGE MODEL, WE GET THE INTRINSIC VALUE ESTIMATE AS FOLLOWS :

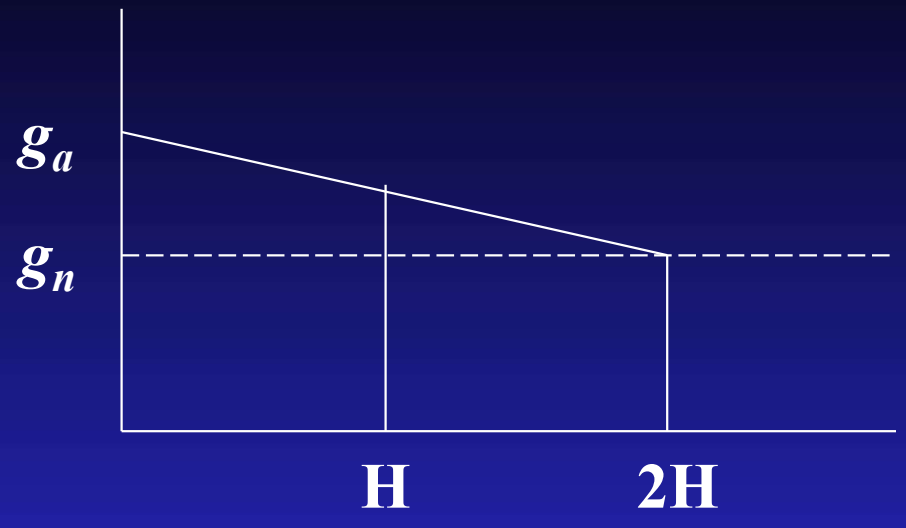
$$P_0 = 2.40 \left[\frac{1 - \left[\frac{1.20}{1.15}\right]^6}{.15 - .20} \right] + \left[\frac{2.40\,(1.20)^5\,(1.10)}{.15 - .10} \right] \left[\frac{1}{(1.15)^6} \right]$$

$$= 2.40 \left[\frac{1 - 1.291}{-0.05} \right] + \left[\frac{2.40\,(2.488)(1.10)}{.05} \right] [0.497]$$

$$= 13.968 + 65.289$$

$$= \text{RS.}79.597$$

H MODEL



$$P_O = \frac{D_0}{r - g_n}\left[(1+g_n) + H(g_a + g_n)\right]$$

$$= \underbrace{\frac{D_0(1+g_n)}{r - g_n}}_{\text{VALUE BASED ON NORMAL GROWTH RATE}} + \underbrace{\frac{D_0 H(g_a + g_n)}{r - g_n}}_{\text{PREMIUM DUE TO ABNORMAL GROWH RATE}}$$

ILLUSTRATION: H LTD

$D_0 = 1$ $\quad g_a = 25\%$ $\quad H = 5$

$g_n = 15\%$ $\quad r = 18\%$

$$P_0 = \frac{1\,(1.15)}{0.18 - 0.15} + \frac{1 \text{ x } 5(.25 - .15)}{0.18 - 0.15}$$

$$= 38.33 + 16.67 = 55.00$$

IF $E = 2$ $\quad P/E = 27.5$

IMPACT OF GROWTH ON PRICE, RETURNS, AND P/E RATIO

	PRICE $P_0 = \frac{D_1}{r - g}$	DIVIDEND YIELD (D_1 / P_0)	CAPITAL GAINS YIELD $(P_1 - P_0) / P_0$	PRICE EARNINGS RATIO (P / E)
LOW GROWTH FIRM	$P_0 = \frac{\text{RS. } 2.00}{0.20 - 0.05} = \text{RS.}13.33$	15.0%	5.0%	4.44
NORMALGROWTH FIRM	$P_0 = \frac{\text{RS. } 2.00}{0.20 - 0.10} = \text{RS.}20.00$	10.0%	10.0%	6.67
SUPERNORMAL GROWTH FIRM	$P_0 = \frac{\text{RS. } 2.00}{0.20 - 0.15} = \text{RS.}40.00$	5.0%	15.0%	13.33

EARNINGS MULTIPLIER APPROACH

$$P_0 = m\,E_1$$

DETERMINANTS OF m (P / E)

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

$$= \frac{E_1(1 - b)}{r - \text{ROE} \times b}$$

$$P_0 / E_1 = \frac{(1 - b)}{r - \text{ROE} \times b}$$

CROSS -SECTION REGRESSION ANALYSIS

$P / E = 8.2 + 1.5g + 6.7b - .2\delta$

g = GROWTH RATE FOR 'NORMALIZED' EPS

b = PAYOUT RATIO

δ = STD. DEV .. OF % EPS CHANGE

- EVERY CONCEIVABLE VARIABLE & COMBINATION OF VAIRABLES .. TRIED..
- ALMOST .. ALL … THESE MODELS .. HIGHLY SUCCESSFUL .. EXPLAINING STOCK PRICES .. AT A POINT .. TIME, BUT LESS SUCCESSFUL … IN SELECTING APPROPRIATE .. STOCKS .. BUY .. SELL.
- WHY

1. MARKET TASTES CHANGE
   - WEIGHTS CHANGE
2. INPUT VALUES CHANGE OVER TIME
   - DIV … & GROWTH IN EARNINGS
3. THERE ARE FIRM EFFECTS NOT CAPTURED BY THE MODEL

P / E BENCHMARK
RULES OF THUMB

- **GROWTH RATE IN EARNINGS**

10% 15% 20% 25% 35%

- $\frac{1}{\text{NOMINAL INTEREST RATE}}$ $\frac{1}{.12} = 8.33$

$\frac{1}{.20} = 5.00$

- $\frac{1}{\text{REAL RETURN}}$ $\frac{1}{.04} = 25$

$\frac{1}{.06} = 16.67$

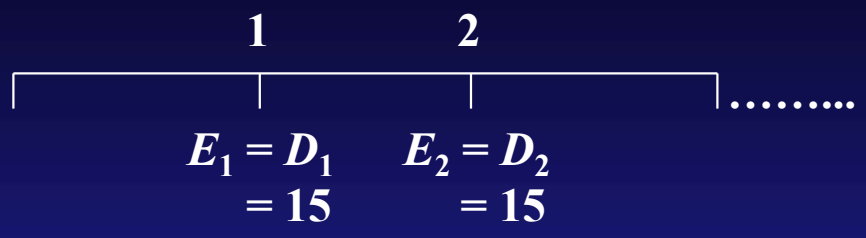
- $\frac{0.5}{.18 - .15} = 16.67$ $\frac{\text{PAYOUT RATIO}}{\text{REQ. RET - GR. RATE}}$

GROWTH AND P / E MULTIPLE

	CASE A : NO GROWTH		CASE B : 10 PERCENT GROWTH	
	YEAR 0	YEAR 1	YEAR 0	YEAR 1
TOTAL ASSETS	100	100	100	110
NET WORTH	100	100	100	110
SALES	100	100	100	110
PROFIT AFTER TAX	20	20	20	22
DIVIDENDS	20	20	10	11
RETAINED EARNINGS	-	-	10	11

	CASE A NO GROWTH			CASE B GROWTH		
	DISCOUNT RATE: 15%	DISCOUNT RATE: 20%	DISCOUNT RATE: 25%	DISCOUNT RATE: 15%	DISCOUNT RATE: 20%	DISCOUNT RATE: 25%
VALUE	20 / 0.15 = 133.3	20 / 0.20 = 100	20 / 0.25 = 80	10 / (0.15 - 0.10) = 200	10 / (0.20 - 0.10) = 100	10 / (0.25 - 0.10) = 66.7
PRICE-EARNINGS MULTIPLE	133.3 / 20 = 6.67	100 / 20 = 5.0	80 / 20 = 4.0	200 /20 = 10.0	100 / 20 = 5.0	66.7 / 20 = 3.33

E / P, EXPECTED RETURN, AND GROWTH



$r = 15\%$ $\qquad P_0 = \dfrac{15}{0.15} = 100$

INVESTMENT .. RS. 15 PER SHARE IN YEAR 1 … EARNS 15%

$$\text{NPV PER SHARE} = -15 + \frac{2.25}{0.15} = 0$$

RATE OF RETURN	INCREMENTAL CASH FLOW	PROJECT'S NPV IN YEAR 1	IMPACT ON SHARE PRICE IN YEAR 0	SHARE PRICE IN YEAR 0, P_0	E_1/P_0	r
0.05	0.75	-10	-8.70	91.30	0.164	0.15
0.10	1.50	-5	-4.35	95.65	0.157	0.15
0.15	2.25	0	0	0	0.15	0.15
0.20	3.00	5	4.35	104.35	0.144	0.15
0.25	3.75	10	8.70	108.70	0.138	0.15

IN GENERAL, WE CAN THINK OF THE STOCK PRICE AS THE CAPITALISED VALUE OF THE EARNINGS UNDER THE ASSUMPTION OF NO GROWTH PLUS THE PRESENT VALUE OF GROWTH OPPORTUNITIES (PVGO).

$$P_0 = \frac{E_1}{r} + \text{PVGO}$$

MANIPULATING THIS A BIT, WE GET

$$\frac{E_1}{P_0} = r\left[1 - \frac{\text{PVGO}}{P_0}\right]$$

FROM THIS EQUATION, IT IS CLEAR THAT :

- **EARNINGS-PRICE RATIO IS EQUAL TO *r* WHEN PVGO IS ZERO.**
- **EARNINGS-PRICE RATIO IS LESS THAN *r* WHEN PVGO IS POSITIVE.**
- **EARNINGS-PRICE RATIO IS MORE THAN *r* WHEN PVGO IS NEGATIVE.**

PRICE TO BOOK VALUE RATIO (PBV RATIO)

$$\text{PBV ratio} = \frac{\text{Market price per share at time } t}{\text{Book value per share at time } t}$$

The PBV ratio has always drawn the attention of investors. During the 1990s Fama and others suggested that the PBV ratio explained to a significant extent the returns from stocks.

DETERMINANTS OF THE PBV RATIO

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

$$D_1 = E_1 (1 - b) = E_0 (1 + g) (1 - b)$$

$$P_0 = \frac{E_0 (1 + g) (1 - b)}{r - g}$$

$$E_0 = BV_0 \text{ x } ROE$$

$$P_0 = \frac{BV_0 (ROE) (1 + g) (1 - b)}{r - g}$$

$$\text{PBV ratio} = \frac{P_0}{BV_0} = \frac{ROE (1 + g) (1 - b)}{r - g}$$

PRICE TO SALES RATIO (PSR RATIOS)

- In recent years PSR has received a lot of attention as a valuation tool. The PSR is calculated by dividing the current market value of equity capital by annual sales of the firm.
- Portfolios of low PSR stocks tend to outperform portfolios of high PSR stocks.
- It makes more sense to look at PSR/Net profit margin as net profit margin is a key driver of PSR.

EQUITY PORTFOLIO MANAGEMENT

PASSIVE STRATEGY

- BUY AND HOLD STRATEGY
- INDEXING STRATEGY

ACTIVE STRATEGY

- MARKET TIMING
- SECTOR ROTATION
- SECURITY SELECTION
- USE OF A SPECIALISED CONCEPT

FORECASTING THE AGGREGATE STOCK MARKET RETURN

- Stock market returns are determined by an interaction of two factors : investment returns and speculative returns.
- In formal terms :

$$SMR_n = \underbrace{[DY_n + EG_n]}_{\text{Investment return}} + \underbrace{[(PE_n / PE_0)^{1/n} - 1]}_{\text{Speculative return}}$$

where : SMR_n = annual stock market return over a period of *n* years

DY_n = annual dividend yield over a period of *n* years

EG_n = annual earnings growth over a period of *n* years

PE_n = price-earnings ratio at the end of *n* years

PE_0 = price-earnings ratio at the beginning of *n* years.

ILLUSTRATION

Suppose you want to forecast the annual return from the stock market over the next five years (*n* is equal to 5). You come up with the following estimates. $DY_5 = 0.025$ (2.5 percent), $EG_5 = 0.125$ (12.5 percent), and $PE_5 = 18$. The current PE ratio, PE_o, is 15. The forecast of the annual return from the stock market is determined as follows:

$$SMR_5 = [0.025 + 0.125] + [(18/15)^{1/5} - 1]$$

$$= [0.15] + [0.037]$$

$$= 15 \text{ percent} + 3.7 \text{ percent} = 18.7 \text{ percent}$$

15 percent represents the investment return and 3.7 percent represents the speculative return.

SUMMING UP

- While the basic principles of valuation are the same for fixed income securities as well as equity shares, the factors of growth and risk create greater complexity in the case of equity shares.
- Three valuation measures derived from the balance sheet are: book value, liquidation value, and replacement cost.
- According to the dividend discount model, the value of an equity share is equal to the present value of dividends expected from its ownership.
- If the dividend per share grows at a constant rate, the value of the share is : $P_0 = D_1 / (r - g)$
- A widely practised approach to valuation is the P/E ratio or earnings multiplier approach. The value of a stock, under this approach, is estimated as follows:

$$P_0 = E_1 \text{ x } P_0/E_1$$

- In general, we can think of the stock price as the capitalised value of the earnings under the assumption of no growth plus the present value of growth opportunities (PVGo)

$$P_0 = \frac{E_1}{r} + \text{PVGO}$$

- Apart from the price-earnings ratio, price to book value (PBV) ratio and price to sales (PSR) ratio are two other widely used comparative valuation ratios
- Two broad approaches are followed in managing an equity portfolio : passive strategy and active strategy.
- Stock market returns are determined by an interaction of two factors : investement returns and speculative returns.