

SECURITY ANALYSIS

BASIC CONCEPTS AND FORMULAE

1. Introduction

Security Analysis stands for the proposition that a well-disciplined investor can determine a rough value for a company from all of its financial statements, make purchases when the market inevitably under-prices some of them, earn a satisfactory return, and never be in real danger of permanent loss.

2. Approaches of Security Analysis

There are basically two main approaches of security analysis- Fundamental analysis and Technical analysis.

3. Fundamental Analysis

Fundamental analysis is based on the assumption that the share prices depend upon the future dividends expected by the shareholders. The present value of the future dividends can be calculated by discounting the cash flows at an appropriate discount rate and is known as the '*intrinsic value of the share*'. The intrinsic value of a share, according to a fundamental analyst, depicts the true value of a share. A share that is priced below the intrinsic value must be bought, while a share quoted above the intrinsic value must be sold.

4. Models of Fundamental Analysis

(a) Dividend Growth Model

$$P(0) = \frac{D(0)(1+g)}{(k - g)}$$

Where,

$P(0)$ = Price of Share

$D(0)$ = Current Dividend

g = Growth Rate

k = Cost of Equity

(b) Dividend Growth Model and the PE Multiple

$$P(0) = \frac{bE(0)(1+g)}{(k-g)}$$

Where,

b = Dividend Pay-out fraction or ratio

E(0) = Current EPS

5. Types of Fundamental Analysis

There are three types of fundamental analysis-Economic analysis, Industry analysis and Company analysis.

6. Economic Analysis

Macro- economic factors e. g. historical performance of the economy in the past/ present and expectations in future, growth of different sectors of the economy in future with signs of stagnation/degradation at present to be assessed while analyzing the overall economy. Trends in peoples' income and expenditure reflect the growth of a particular industry/company in future. Consumption affects corporate profits, dividends and share prices in the market.

7. Factors Affecting Economic Analysis

Some of the economy wide factors are as under:

- (a) Growth Rates of National Income and Related Measures
- (b) Growth Rates of Industrial Sector
- (c) Inflation
- (d) Monsoon

8. Techniques Used For Economic Analysis

- (i) Anticipatory Surveys: They help investors to form an opinion about the future state of the economy.
- (ii) Barometer/Indicator Approach: Various indicators are used to find out how the economy shall perform in the future.
- (iii) Economic Model Building Approach: In this approach, a precise and clear relationship between dependent and independent variables is determined.

9. Industry Analysis

An assessment regarding all the conditions and factors relating to demand of the particular product, cost structure of the industry and other economic and

government constraints have to be done.

10. Factors Affecting Industry Analysis

The following factors may particularly be kept in mind while assessing the factors relating to an industry :

- (a) Product Life-Cycle;
- (b) Demand Supply Gap;
- (c) Barriers to Entry;
- (d) Government Attitude;
- (e) State of Competition in the Industry;
- (f) Cost Conditions and Profitability and
- (g) Technology and Research.

11. Techniques Used For Industry Analysis

- (a) *Regression Analysis*: Investor diagnoses the factors determining the demand for output of the industry through product demand analysis.
- (b) *Input – Output Analysis*: It reflects the flow of goods and services through the economy, intermediate steps in production process as goods proceed from raw material stage through final consumption.

12. Company Analysis

Economic and industry framework provides the investor with proper background against which shares of a particular company are purchased. This requires careful examination of the company's quantitative and qualitative fundamentals.

13. Techniques Used in Company Analysis

- (a) *Correlation & Regression Analysis*: Simple regression is used when inter relationship covers two variables. For more than two variables, multiple regression analysis is followed.
- (b) *Trend Analysis*: The relationship of one variable is tested over time using regression analysis. It gives an insight to the historical behavior of the variable.
- (c) *Decision Tree Analysis*: In decision tree analysis, the decision is taken sequentially with probabilities attached to each sequence. To obtain the probability of final outcome, various sequential decisions are given along with probabilities, then probabilities of each sequence is to be multiplied and then summed up.

14. Technical Analysis

Technical analysis is a method of share price movements based on a study of price graphs or charts on the assumption that share price trends are repetitive, that since investor psychology follows a certain pattern, what is seen to have happened before is likely to be repeated.

15. Types of Charts

- (i) **Bar Chart** : In a bar chart, a vertical line (bar) represents the lowest to the highest price, with a short horizontal line protruding from the bar representing the closing price for the period.
- (ii) **Line Chart**: In a line chart, lines are used to connect successive day's prices. The closing price for each period is plotted as a point. These points are joined by a line to form the chart. The period may be a day, a week or a month.
- (iii) **Point and Figure Chart**: Point and Figure charts are more complex than line or bar charts. They are used to detect reversals in a trend.

16. General Principles and Methods of Technical Analysis

Certain principles underlying the technical analysis need to be understood and correlated with the tools and techniques of technical analysis. Interpreting any one method in isolation would not result in depicting the correct picture of the market.

17. The Dow Theory

The Dow Theory is based upon the movements of two indices, constructed by Charles Dow, Dow Jones Industrial Average (DJIA) and Dow Jones Transportation Average (DJTA). These averages reflect the aggregate impact of all kinds of information on the market. The movements of the market are divided into three classifications, all going at the same time; the primary movement, the secondary movement, and the daily fluctuations. The primary movement is the main trend of the market, which lasts from one year to 36 months or longer. This trend is commonly called bear or bull market. The secondary movement of the market is shorter in duration than the primary movement, and is opposite in direction. It lasts from two weeks to a month or more. The daily fluctuations are the narrow movements from day-to-day.

18. Market Indicators

- (i) **Breadth Index**: It is an index that covers all securities traded. It is computed by dividing the net advances or declines in the market by the number of issues traded. The breadth index either supports or contradicts the

movement of the Dow Jones Averages. If it supports the movement of the Dow Jones Averages, this is considered sign of technical strength and if it does not support the averages, it is a sign of technical weakness i.e. a sign that the market will move in a direction opposite to the Dow Jones Averages.

- (ii) *Volume of Transactions:* The volume of shares traded in the market provides useful clues on how the market would behave in the near future. A rising index/price with increasing volume would signal buy behaviour because the situation reflects an unsatisfied demand in the market. Similarly, a falling market with increasing volume signals a bear market and the prices would be expected to fall further. A rising market with decreasing volume indicates a bull market while a falling market with dwindling volume indicates a bear market. Thus, the volume concept is best used with another market indicator, such as the Dow Theory.
- (iii) *Confidence Index:* It is supposed to reveal how willing the investors are to take a chance in the market. It is the ratio of high-grade bond yields to low-grade bond yields. It is used by market analysts as a method of trading or timing the purchase and sale of stock, and also, as a forecasting device to determine the turning points of the market. A rising confidence index is expected to precede a rising stock market, and a fall in the index is expected to precede a drop in stock prices. A fall in the confidence index represents the fact that low-grade bond yields are rising faster or falling more slowly than high grade yields. The confidence index is usually, but not always a leading indicator of the market. Therefore, it should be used in conjunction with other market indicators.
- (iv) *Relative Strength Analysis:* The relative strength concept suggests that the prices of some securities rise relatively faster in a bull market or decline more slowly in a bear market than other securities i.e. some securities exhibit relative strength. Investors will earn higher returns by investing in securities which have demonstrated relative strength in the past because the relative strength of a security tends to remain undiminished over time.

Relative strength can be measured in several ways. Calculating rates of return and classifying those securities with historically high average returns as securities with high relative strength is one of them. Even ratios like security relative to its industry and security relative to the entire market can also be used to detect relative strength in a security or an industry.

- (v) *Odd - Lot Theory:* This theory is a contrary - opinion theory. It assumes that the average person is usually wrong and that a wise course of action is to

pursue strategies contrary to popular opinion. The odd-lot theory is used primarily to predict tops in bull markets, but also to predict reversals in individual securities.

19. Support and Resistance Levels

When the index/price goes down from a peak, the peak becomes the resistance level. When the index/price rebounds after reaching a trough subsequently, the lowest value reached becomes the support level. The price is then expected to move between these two levels. Whenever the price approaches the resistance level, there is a selling pressure because all investors who failed to sell at the high would be keen to liquidate, while whenever the price approaches the support level, there is a buying pressure as all those investors who failed to buy at the lowest price would like to purchase the share. A breach of these levels indicates a distinct departure from status quo, and an attempt to set newer levels.

20. Interpreting Price Patterns

- (a) *Channel*: A series of uniformly changing tops and bottoms gives rise to a channel formation. A downward sloping channel would indicate declining prices and an upward sloping channel would imply rising prices.
- (b) *Wedge*: A wedge is formed when the tops (resistance levels) and bottoms (support levels) change in opposite direction (that is, if the tops are decreasing then the bottoms are increasing and vice versa), or when they are changing in the same direction at different rates over time.
- (c) *Head and Shoulders*: It is a distorted drawing of a human form, with a large lump (for head) in the middle of two smaller humps (for shoulders). This is perhaps the single most important pattern to indicate a reversal of price trend. The neckline of the pattern is formed by joining points where the head and the shoulders meet. The price movement after the formation of the second shoulder is crucial. If the price goes below the neckline, then a drop in price is indicated, with the drop expected to be equal to the distance between the top of the head and the neckline.
- (d) *Triangle or Coil Formation*: This formation represents a pattern of uncertainty and is difficult to predict which way the price will break out.
- (e) *Flags and Pennants Form*: This form signifies a phase after which the previous price trend is likely to continue.
- (f) *Double Top Form*: This form represents a bearish development, signals that price is expected to fall.

- (g) *Double Bottom Form*: This form represents bullish development signaling price is expected to rise.
- (h) *Gap*: A gap is the difference between the opening price on a trading day and the closing price of the previous trading day. Wider the gap, stronger is the signal for a continuation of the observed trend. On a rising market, if the opening price is considerably higher than the previous closing price, it indicates that investors are willing to pay a much higher price to acquire the scrip. Similarly, a gap in a falling market is an indicator of extreme selling pressure.

21. Decision Using Moving Averages

Moving averages are frequently plotted with prices to make buy and sell decisions. The two types of moving averages used by chartists are the Arithmetic Moving Average (AMA) and the Exponential Moving Average (EMA).

Buy and Sell Signals Provided by Moving Average Analysis

Buy Signal	Sell Signal
(a) Stock price line rise through the moving average line when graph of the moving average line is flattening out.	(a) Stock price line falls through moving average line when graph of the moving average line is flattening out.
(b) Stock price line falls below moving average line which is rising.	(b) Stock price line rises above moving average line which is falling.
(c) Stock price line which is above moving average line falls but begins to rise again before reaching the moving average line	(c) Stock price line which is slow moving average line rises but begins to fall again before reaching the moving average line.

22. Bollinger Bands

A band is plotted two standard deviations away from a simple moving average. Because standard deviation is a measure of volatility, Bollinger bands adjust themselves to the market conditions. When the markets become more volatile, the bands widen (move further away from the average), and during less volatile periods, the bands contract (move closer to the average). The tightening of the bands is often used by technical traders as an early indication that the volatility is about to increase sharply.

23. Momentum Analysis

Momentum measures the speed of price change and provides a leading indicator of changes in trend. The momentum line leads price action frequently enough to signal a potential trend reversal in the market.

24. Bond Valuation

A bond or debenture is an instrument of debt issued by a business or government.

- (a) **Par Value:** Value stated on the face of the bond. It is the amount a firm borrows and promises to repay at the time of maturity.
- (b) **Coupon Rate and Interest:** A bond carries a specific interest rate known as the coupon rate. The interest payable to the bond holder is par value of the bond × coupon rate.
- (c) **Maturity Period:** Corporate bonds have a maturity period of 3 to 10 years. While government bonds have maturity periods extending up to 20-25 years. At the time of maturity the par (face) value plus nominal premium is payable to the bondholder.

25. Bond Valuation Model

Value of a bond is:

$$V = \sum_{t=1}^n \frac{I}{(1+k_d)^t} + \frac{F}{(1+k_d)^n}$$

$$V = I(PVIFA_{k_d, n}) + F(PVIF_{k_d, n})$$

Where,

V = Value of the bond

I = Annual interest payable on the bond

F = Principal amount (par value) of the bond repayable at the time of maturity

n = Maturity period of the bond.

Value of a bond with semi-annual interest is:

$$\begin{aligned} V &= \sum_{t=1}^{2n} \left[\frac{I/2}{\{(1+k_d/2)^t\}} \right] + \left[\frac{F}{(1+k_d/2)^{2n}} \right] \\ &= I/2(PVIFA_{k_d/2, 2n}) + F(PVIF_{k_d/2, 2n}) \end{aligned}$$

Where,

V = Value of the bond

I/2 = Semi-annual interest payment

$K_d/2$ = Discount rate applicable to a half-year period

F = Par value of the bond repayable at maturity

$2n$ = Maturity period expressed in terms of half-yearly periods.

26. Price Yield Relationship

As the required yield increases, the present value of the cash flow decreases; hence the price decreases. Conversely, when the required yield decreases, the present value of the cash flow increases, hence the price increases.

27. Relationship between Bond Price and Time

Since the price of a bond must be equal to its par value at maturity (assuming that there is no risk of default), bond price changes with time.

28. Yield Curve

It shows how yield to maturity is related to term to maturity for bonds that are similar in all respects, except maturity.

$$\text{Discount at the yield to maturity : } (R_t) \text{ PV [CF(t)]} = \frac{CF(t)}{(1+R_t)^t}$$

Discount by the product of a spot rate plus the forward rates :

$$\text{PV [CF(t)]} = \frac{CF(t)}{(1 + r_1) (1 + r_2) \dots (1 + r_t)}$$

Question 1

A company is evaluating a new venture that will cost Rs. 10 crores. The venture will have a return on investment of 20 per cent and the firm forecasts a 12 per cent growth in earnings from the project. The treasurer has identified the following sources for financing the project:

- (a) Equity shares to be sold at Rs. 400 per share.
- (b) Convertible debentures with a 6 per cent coupon to net Rs. 980 (face value Rs. 1,000), and convertible at Rs. 500 per share after 2010.
- (c) Debentures with warrants with a 6 per cent coupon to net Rs. 980 (face value Rs. 1,000), and with each bond having one warrant entitling the holder to buy one equity share at Rs. 500 after 2010.

The financing decision is being made in the fourth quarter of 2008. Over the past ten years, a company has been growing at a 10 per cent rate of sales and earnings.

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The treasurer expects the company to continue to grow at 10 per cent even though the firm has traditionally paid 40 per cent of its earnings as dividends. The treasurer expects A's equity shares to continue to rise in price. Using the price trend over the past 5 years, he has projected probable market price ranges for the next three years. The historical data and the projections of the treasurer are given below:

Year	Historical Market price	Year	Forecasted Probability	Market Price
	Rs.			Rs.
2003	220	2009	20%	450
2004	250		60%	500
2005	330		20%	600
2006	270	2010	20%	480
2007	380		60%	550
Current	450		20%	620
		2011	20%	500
			60%	600
			20%	700

The Proforma Balance Sheet and Income Statement prepared by the treasurer for the year 2008 is shown below:

A Company Ltd. Proforma Balance Sheet (December 31, 2008)

				(Rs.'000)	
	2008	2007		2008	2007
Equity Shares (Rs. 10)	10,000	10,000	Plant and Equipment	2,52,000	2,31,000
Share Premium	40,000	40,000	(Less: Accumulated		
Retained Earnings	1,36,000	1,27,000	Depreciation	<u>(62,000)</u>	<u>(59,000)</u>
Bonds (7%)	90,000	52,000		1,90,000	1,72,000
Mortgage (6%)	30,000	55,000	Inventories	64,000	62,000
Accounts Payable	7,000	6,000	Receivables	44,000	45,000
Other Current	11,000	10,000	Cash and Bank	22,000	18,000
Liabilities			Balances		
			Other Current Assets	<u>4,000</u>	<u>3,000</u>
	<u>3,24,000</u>	<u>3,00,000</u>		<u>3,24,000</u>	<u>3,00,000</u>

Proforma Income Statement (Rs.'000)

	Sales	EBIT	Interest*	EBT	NIAT	EPS
2008	4,20,000	71,500	8,000	63,500	31,750	31.75
2007	3,80,000	65,000	7,000	58,000	29,000	29.00

*Rounded off.

The management of A Ltd. was initially impressed by the fact that the new venture will increase sales by Rs. 12 crores. Management is also interested in the expected 12 per cent growth rate of the venture. As per Company's Financial Policy, the firm's debt-asset ratio should not be above 40 per cent.

With the above information and detailed analysis for next 3 years, what will be the long-term sources of financing for the new proposal?

Make suitable assumptions in your answer, wherever necessary figures could be rounded off. Income-tax rate applicable to the company is to be taken at 50%.

Answer

The various steps for detailed analysis of given information for next 3 years for determining the long term sources of financing for the new proposal costing Rs. 10 crore are as follows:

Step 1: Determining the Size of Offering for Various Sources of Financing

- (i) Equity shares to be sold at Rs. 400 per share

Cost of new venture = Rs. 10 crore

No. of equity shares to be offered = $\frac{\text{Rs. 10 crores}}{\text{Rs. 400}}$

= 2,50,000 shares

- (ii) Convertible debentures with a 6% coupon to net Rs. 980 (face value Rs. 1,000), and convertible at Rs. 500 per share after 2010..

No. of debentures to be offered = $\frac{\text{Rs. 10 crores}}{\text{Rs. 980}} = 1,02,000$ (rounded off)

- (iii) Debentures with warrants with a 6 per cent coupon to net Rs. 980 (face value Rs. 1,000) and with each bond having one warrant entitling the holder to buy one equity share at Rs. 500 after 2010.

No. of debentures to be offered = $\frac{\text{Rs. 10 crores}}{\text{Rs. 980}} = 1,02,000$ (rounded off)

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Step 2: Computation of Earnings before Interest and Tax (EBIT) for next year

$$\begin{aligned}\text{EBIT (without new venture)} &= \text{Current EBIT} \times \text{Growth factor} \\ &= \text{Rs. 7.15 crores} \times 1.10 \\ &= \text{Rs. 7.865 crores} \\ \text{EBIT (with new venture)} &= \text{Current EBIT} \times \text{Growth factor} + \text{Investment in} \\ &\quad \text{New venture} \times \text{R.O.I of new venture} \\ &= \text{Rs. 7.15 crores} \times 1.10 + \text{Rs. 10 crores} \times 20\% \\ &= \text{Rs. 7.865 crores} + \text{Rs. 2 crores} \\ &= \text{Rs. 9.865 crores}\end{aligned}$$

Step 3: Computation of Earnings before interest and tax (EBIT) after 3 years (at the end of planning horizon)

$$\begin{aligned}\text{EBIT (without new venture)} &= \text{Current EBIT} \times (\text{Growth factor})^3 \\ &= \text{Rs. 7.15 crores} \times (1.10)^3 \\ &= \text{Rs. 9.517 crores} \\ \text{EBIT (with new venture)} &= \text{Current EBIT} \times (\text{Growth factor})^3 + \text{Investment in} \\ &\quad \text{new venture} \times (\text{R.O.I of new venture})^2 \\ &= \text{Rs. 7.15 crores} \times (1.10)^3 + \text{Rs. 10 crores} \times \\ &\quad (20\%) \times (1.12)^2 \\ &= \text{Rs. 9.5166 crores} + \text{Rs. 2.5088 crores} \\ &= \text{Rs. 12.0254 crores}\end{aligned}$$

Step 4: To determine likelihood of issue of equity shares by conversion of debentures into equity or by exercise of warrants after year 2010

Expected price of equity shares during 3 year planning period.

Year	2009	2010	2011
	Rs.	Rs.	Rs.
	Rs. 450 $\times$ 20% = 90	Rs. 480 $\times$ 20% = 96	Rs. 500 $\times$ 20% = 100
	Rs. 500 $\times$ 60% = 300	Rs. 550 $\times$ 60% = 330	Rs. 600 $\times$ 60% = 360
	Rs. 600 $\times$ 20% = <u>120</u>	Rs. 620 $\times$ 20% = <u>124</u>	Rs. 700 $\times$ 20% = <u>140</u>
Expected price	<u>510</u>	<u>550</u>	<u>600</u>

Since the expected price of equity shares is more than the conversion and option price of Rs. 500 per share, it is likely that some equity will be created by 2011 as a result of conversion or exercise of warrants, if one of these financing methods is used.

Step 5: Calculation of the Effect on EBIT due to Exercise of Warrants

In forecasting future earnings per share, the firm must consider a likely profit on the additional capital provided by the exercise of warrants.

$$\begin{aligned}\text{EBIT (if warrants are exercised)} &= \text{Rs. 5.10 crores} \times 12.54\% \\ &= 0.63954 \text{ crores}\end{aligned}$$

(Refer to working notes 1 & 2)

Step 6: Statement showing computation of Earnings per share for next years' for various alternatives

(Rs. in crores)

	Alternatives			
	No new venture	Equity share	Convertible debt	Warrant debt
Earning before interest and tax	7.865	9.865	9.865	9.865
Less: Interest old debt	0.810	0.810	0.810	0.810
(Refer to working note 3)				
New debt	-	-	<u>0.612</u>	<u>0.612</u>
(Refer to working note 4)				
Earning before tax (EBT)	7.055	9.055	8.443	8.443
Less: Tax @ 50%	3.5275	4.5275	4.2215	4.2215
Earning after tax (EAT)	3.5275	4.5275	4.2215	4.2215
No. of shares (lakhs)	10	12.5	10	10
Earning per share (Rs.)	35.27	36.22	42.215	42.215

Step 7: Statement showing Computation of Earnings per share at the end of planning horizon for various alternatives

	Alternatives			
	No new venture	Equity share	Convertible debt	Warrant debt
Earnings before interest and tax (EBIT)	9.516	12.0254	12.0254	12.0254

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Add: Earnings before interest & tax
by Exercise of warrants

- - - 0.63954

(Refer to step 5)

Less: Interest old debt 0.810 0.810 0.810 0.810

New debt 0.612

Earning before tax (EBT) 8.706 11.2154 11.2154 11.2429

Less: Tax @ 50% 4.353 5.6077 5.6077 5.6214

Earning after tax (EAT) 4.353 5.6077 5.6077 5.6214

No. of shares (lakhs) 10 12.50 12.04 11.2

(Refer to working note 1) (Refer to working note 2)

Earning per share (EPS) (Rs.) 43.53 44.86 46.57 51.00

Step 8: Computation of Increase in Retained Earnings for Various Alternatives can be determined as follows:

$$\frac{1\text{st year earnings after tax} + 3\text{ years Earnings after tax (1 - Dividend payout)}}{2} \text{ No. of years}$$

$$\text{No new venture} = \frac{\text{Rs. 3.52 crores} + \text{Rs. 4.353 crores}}{2} \times 60\% \times 3 \text{ years}$$

$$= \text{Rs. 7.085 crores}$$

$$\text{Issue of equity shares} = \frac{\text{Rs. 4.527 crores} + \text{Rs. 5.608 crores}}{2} \times 60\% \times 3 \text{ years}$$

$$= \text{Rs. 9.121 crores}$$

$$\text{Issue of convertible debetures} = \frac{\text{Rs. 4.2215 crores} + \text{Rs. 5.608 crores}}{2} \times 60\% \times 3 \text{ years}$$

$$= \text{Rs. 8.846 crores}$$

$$\text{Issue of warrant debt} = \frac{\text{Rs. 4.2215 crores} + \text{Rs. 5.621 crores}}{2} \times 60\% \times 3 \text{ years}$$

$$= \text{Rs. 8.858 crores}$$

Step 9: Analysis for Measuring the Degree of Risk in Capital Structure

	(Rs. in crores)			
	No new venture	Equity share	Convertible debt	Warrant debt
<i>End of the year 2008</i>				
Old debt	12.0	12.0	12.0	12.0
New debt	—	—	<u>10.2</u>	<u>10.2</u>
	<u>12.0</u>	<u>12.0</u>	<u>22.2</u>	<u>22.2</u>
Old equity	18.6	18.6	18.6	18.6
New equity	—	<u>10.0</u>	—	—
	<u>18.6</u>	<u>28.6</u>	<u>18.6</u>	<u>18.6</u>
Debt asset ratio	39.2%	29.6%	54.5%	54.5%
<i>End of the year 2011</i>				
Old debt	12.0	12.0	12.0	12.0
New debt	—	—	—	<u>10.2</u>
	<u>12.0</u>	<u>12.0</u>	<u>12.0</u>	<u>22.2</u>
Old equity	18.6	18.6	18.6	18.6
New equity	-	10.0	10.2	5.10
Increase in retained earnings	<u>7.0865</u>	<u>9.121</u>	<u>8.846</u>	<u>8.858</u>
	<u>25.6865</u>	<u>37.721</u>	<u>37.646</u>	<u>32.558%</u>
Debt asset ratio	31.8%	24.1%	24.1%	40.5%

Working Notes:

- Equity shares from conversion of debentures:
 Debentures issued ´ Shares per debenture (on conversion)
 = 1,02,000 debentures ´ 2 share per debenture
 = 2,04,000 shares
 Equity shares from exercise of warrants
 Bonds issued ´ Shares per bond (Exercise of warrants)
 = 1,02,000 bonds ´ 1 share per bond

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= 1,02,000 shares

Value of shares = 1,02,000 shares × Rs. 500 (option price)

= Rs. 5.10 crores

2. Return on new equity shares (on exercise of warrants)

The return on additional capital provided by the exercise of warrants to issue equity shares is the lower figure between average return for the firm and the return on the new proposal if adopted.

Average return on market value of firm

$$\begin{aligned} &= \frac{\text{EBIT}}{\text{Debt} + \text{Market value of equity shares}} \\ &= \frac{\text{Rs. 7.15 crores}}{(\text{Rs. 9 crores} + \text{Rs. 3 crores}) + (10 \text{ lakhs shares} \times \text{Rs. 450})} \\ &= \frac{\text{Rs. 7.15 crores}}{\text{Rs. 12 crores} + \text{Rs. 45 crores}} \\ &= \frac{\text{Rs. 7.15 crores}}{\text{Rs. 57 crores}} \end{aligned}$$

= 12.54%

R.O.I from new proposal = 20%

Since the average return on market value of firm is lower than R.O.I. from new proposal (20%). Hence, return on new equity shares on exercise of warrants is 12.54%.

3. Interest on old debt

	(Rs. in crores)
7% Bonds of Rs. 9 crores	0.630
6% Mortgage of Rs. 3 crores	<u>0.810</u>
	<u>0.810</u>

4. Interest on new debt

6% debentures of Rs. 10.2 crores = Rs. 0.612 crores

Conclusions:

1. Issue of equity shares for financing the project offers high earnings and is within the company's Financial Policy.

2. Issue of convertible debentures for financing the project offers high earnings but the firm's debt asset ratio exceeds 40% now and there is a possibility of it being within the company's Financial Policy by year 2011.
3. Issue of warrants for financing the project offers high earnings but is beyond the company Financial Policy (Debt asset ratio exceeds 40%) both now and in the year 2011.

In conclusion, the firm should consider financing the project to gain the large rise in earnings. The equity shares only or a mixture of equity shares and debt financing, represents the most attractive financing alternative. With mixed financing, the firm can achieve a significant rise in earnings without increasing the risk of exceeding the 40 per cent debt – asset guidelines.

Assumptions:

1. It is assumed that the earnings from new project occur at the end of the year.
2. It is assumed that the debentures will be converted into shares in the year 2011.
3. It is assumed that all the holders of the warrants will buy equity shares in the year 2011.

Question 2

The HLL has Rs. 8.00 crore of 10% mortgage bonds outstanding under an open-end scheme. The scheme allows additional bonds to be issued as long as all of the following conditions are met:

- (1) *Pre - tax interest coverage $\frac{\text{Income before tax} + \text{Bond Interest}}{\text{Bond Interest}}$ remains greater than 4.*
- (2) *Net depreciated value of mortgage assets remains twice the amount of the mortgage debt.*
- (3) *Debt-to-equity ratio remains below 5.*

The HLL has net income after taxes of Rs. 2 crores and a 40% tax-rate, Rs. 40 crores in equity and Rs. 30 crores in depreciated assets, covered by the mortgage.

Assuming that 50% of the proceeds of a new issue would be added to the base of mortgaged assets and that the company has no Sinking Fund payments until next year, how much more 10% debt could be sold under each of the three conditions? Which protective covenant is binding?

Strategic Financial Management

Answer

Let x be the crores of Rupees of new 10% debt which would be sold under each of the three given conditions. Now, the value of x under each of the three conditions is as follows:

1. Pre - tax interest coverage $\frac{\text{Income before tax} + \text{Bond Interest}}{\text{Bond Interest}}$ remains greater than 4.

$$\frac{\text{Rs. 2 crores} / (1 - 0.4) + 8 \text{ crores} \times 0.1 + x \times 0.1}{(8 \text{ crores} \times 0.1) + (x \times 0.1)}$$

$$\text{Or } \frac{\text{Rs. 3.33 crores} + 0.80 \text{ crores} + 0.10x}{(0.80 \text{ crores} + \text{Rs. } 0.10x)}$$

$$\text{Or } \frac{\text{Rs. 4.13 crores} + 0.10x}{\text{Rs. 0.80 crores} + \text{Rs. } 0.10x}$$

$$\text{Or } \text{Rs. 4.13 crores} + 0.10x = 4 (\text{Rs. 0.80 crores} + \text{Rs. } 0.10x)$$

$$\text{Or } \text{Rs. 4.13 crores} + 0.10x = \text{Rs. 3.2 crores} + \text{Rs. } 0.40x$$

$$\text{Or } \text{Rs. } 0.30x = 0.93$$

$$\text{Or } x = \text{Rs. } 0.93 / 0.30$$

$$\text{Or } x = \text{Rs. 3.10 crores}$$

Additional mortgage required shall be a maximum of Rs. 3.10 crores.

2. Net depreciated value of mortgage assets remains twice the amount of mortgage debt

(Assuming that 50% of the proceeds of new issue would be added to the base of mortgaged assets)

$$\text{i.e. } \frac{\text{Rs. 30 crores} + 0.5x}{\text{Rs. 8 crores} + x} = 2$$

$$\text{or } \text{Rs. 30 crores} + 0.5x = 2 (\text{Rs. 8 crores} + x)$$

$$\text{or } \text{Rs. } 1.5x = \text{Rs. 14 crores}$$

$$\text{or } x = \frac{\text{Rs. 14 crores}}{1.5}$$

$$\text{or } x = 9.33 \text{ crores}$$

Additional mortgage required to satisfy condition No. 2 is Rs. 9.33 crores

3. Debt to equity ratio remains below 5

$$\text{i.e. } \frac{\text{Rs. 8 crores} + x}{\text{Rs. 40 crores}} < 5$$

$$\text{or Rs. 8 crores} + x = \text{Rs. 200 crores}$$

$$\text{or } x = \text{Rs. 192 crores}$$

Since all the conditions are to be met, the least i.e. Rs. 3.10 crores (as per condition – 1) can be borrowed by issuing additional bonds.

Note: Since in the question, it is given that Debt to equity ratio remains below 5, the value of debt is computed by using this condition. However, the new additional debt (x) is exorbitant and is not comparable with the value of new additional debt (x) computed under conditions 1 and 2. For getting the comparable value of new additional debt x the debt to equity ratio should be read as 0.5. Accordingly, value of additional debt would be Rs. 12 crores.

Question 3

A company has a book value per share of Rs. 137.80. Its return on equity is 15% and it follows a policy of retaining 60% of its earnings. If the Opportunity Cost of Capital is 18%, what is the price of the share today?

Answer

The company earnings and dividend per share after a year are expected to be:

$$\text{EPS} = \text{Rs. 137.8} \times 0.15 = \text{Rs. 20.67}$$

$$\text{Dividend} = 0.40 \times 20.67 = \text{Rs. 8.27}$$

The growth in dividend would be:

$$g = 0.6 \times 0.15 = 0.09$$

$$\text{Perpetual growth model Formula: } P_0 = \frac{\text{Dividend}}{K_e - g}$$

$$P_0 = \frac{8.27}{0.18 - 0.09}$$

$$P_0 = \text{Rs. 91.89}$$

Alternative Solution:

However, in case a student follows Walter's approach as against continuous growth model given in previous solution the answer of the question works out to be different. This can be shown as follow:

Strategic Financial Management

Given data:

Book value per share	= Rs. 137.80
Return on equity	= 15%
Dividend Payout	= 40%
Cost of capital	= 18%
\ EPS	= Rs. 137.80 × 15%
	= Rs. 20.67
\ Dividend	= Rs. 20.67 × 40%
	= Rs. 8.27

Walter's approach showing relationship between dividend and share price can be expressed by the following formula

$$V_c = \frac{D + \frac{R_a}{R_c}(E - D)}{R_c}$$

Where,

V_c = Market Price of the ordinary share of the company.

R_a = Return on internal retention i.e. the rate company earns on retained profits.

R_c = Capitalisation rate i.e. the rate expected by investors by way of return from particular category of shares.

E = Earnings per share.

D = Dividend per share.

Hence,

$$\begin{aligned} V_c &= \frac{8.27 + \frac{.15}{.18}(20.67 - 8.27)}{.18} \\ &= \frac{18.60}{.18} \\ &= \text{Rs. } 103.35 \end{aligned}$$

Question 4

Pragya Limited has issued 75,000 equity shares of Rs. 10 each. The current market price per share is Rs. 24. The company has a plan to make a rights issue of one new equity

share at a price of Rs. 16 for every four share held.

You are required to:

- (i) Calculate the theoretical post-rights price per share;
- (ii) Calculate the theoretical value of the right alone;
- (iii) Show the effect of the rights issue on the wealth of a shareholder, who has 1,000 shares assuming he sells the entire rights; and
- (iv) Show the effect, if the same shareholder does not take any action and ignores the issue.

Answer

- (i) Calculation of theoretical Post-rights (ex-right) price per share:

$$\text{Ex-right value} = \frac{M \times N + S \times R}{N + R}$$

Where,

M = Market price,

N = Number of old shares for a right share

S = Subscription price

R = Right share offer

$$= \frac{(Rs. 24 \times 4) + (Rs. 16 \times 1)}{4 + 1}$$

$$= Rs. 22.40$$

- (ii) Calculation of theoretical value of the rights alone:
 = Ex-right price – Cost of rights share
 = Rs. 22.40 – Rs. 16 = Rs. 6.40
- (iii) Calculation of effect of the rights issue on the wealth of a shareholder who has 1,000 shares assuming he sells the entire rights:

Rs.

- | | | |
|-----|------------------------------------|--------|
| (a) | Value of shares before right issue | |
| | (1,000 shares × Rs. 24) | 24,000 |
| (b) | Value of shares after right issue | |

Strategic Financial Management

(1,000 shares × Rs. 22.40)	22,400
Add: Sale proceeds of rights renunciation (250 shares × Rs. 6.40)	<u>1,600</u>
	<u>24,000</u>

There is no change in the wealth of the shareholder if he does not take any action and ignores the issue.

- (iv) Calculation of effect if the shareholder does not take any action and ignores the issue:

	Rs.
Value of shares before right issue (1,000 shares × Rs. 24)	24,000
Less: Value of shares after right issue (1,000 shares × Rs. 22.40)	<u>22,400</u>
Loss of wealth to shareholders, if rights ignored	<u>1,600</u>

Question 5

M/s Agfa Industries is planning to issue a debenture series on the following terms:

Face value	Rs. 100
Term of maturity	10 years
Yearly coupon rate	
Years	
1 - 4	9%
5 - 8	10%
9 - 10	14%

The current market rate on similar debentures is 15 per cent per annum. The Company proposes to price the issue in such a manner that it can yield 16 per cent compounded rate of return to the investors. The Company also proposes to redeem the debentures at 5 per cent premium on maturity. Determine the issue price of the debentures.

Answer

The issue price of the debentures will be the sum of present value of interest payments during 10 years of its maturity and present value of redemption value of debenture.

Security Analysis

Years	Cash out flow (Rs.)	PVIF @ 16%	PV
1	9	.862	7.758
2	9	.743	6.687
3	9	.641	5.769
4	9	.552	4.968
5	10	.476	4.76
6	10	.410	4.10
7	10	.354	3.54
8	10	.305	3.05
9	14	.263	3.682
10	14 + 105 = 119	.227	<u>3.178 + 23.835</u>
			71.327

Thus the debentures should be priced at Rs. 71.327

Question 6

There is a 9% 5-year bond issue in the market. The issue price is Rs. 90 and the redemption price Rs. 105. For an investor with marginal income tax rate of 30% and capital gains tax rate of 10% (assuming no indexation), what is the post-tax yield to maturity?

Answer

Calculation of yield to Maturity (YTM)

$$YTM = \frac{\text{Coupon} + \text{Pro-rated disc.}}{(\text{Redemption price} + \text{Purchase Price})/2}$$

$$\text{After tax coupon} = 9 \times (1 - .30) = 6.3\%$$

$$\text{After tax redemption price} = 105 - (15 \times .10) \text{ or Rs. } 103.5$$

$$\text{After tax capital gain} = 103.5 - 90 = \text{Rs. } 13.5$$

$$YTM = \frac{6.3 + (13.5/5)}{(103.5 + 90)/2} \text{ or } \frac{9.00}{96.75} = 9.30\%$$

Question 7

ABC Limited's shares are currently selling at Rs. 13 per share. There are 10,00,000 shares outstanding. The firm is planning to raise Rs. 20 lakhs to Finance a new project.

Strategic Financial Management

Required:

What are the ex-right price of shares and the value of a right, if

- (i) The firm offers one right share for every two shares held.*
- (ii) The firm offers one right share for every four shares held.*
- (iii) How does the shareholders' wealth change from (i) to (ii)? How does right issue increases shareholders' wealth?*

Answer

- (i) Number of shares to be issued : 5,00,000

$$\text{Per - right} = \frac{\text{Rs. } 1,30,00,000 + 20,00,000}{15,00,000} = \text{Rs. } 10$$

$$\text{Subscription price Rs. } 20,00,000 / 5,00,000 = \text{Rs. } 4$$

$$\text{Value of right} = \frac{\text{Rs. } 10 - 4}{2} = 3$$

- (ii) $\text{Per - right} = \frac{\text{Rs. } 1,30,00,000 + 20,00,000}{12,50,000} = \text{Rs. } 12$

$$\text{Subscription price Rs. } 20,00,000 / 2,50,000 = \text{Rs. } 8$$

$$\text{Value of right} = \frac{\text{Rs. } 12 - 8}{4} = \text{Rs. } 1$$

- (iii) Since right issue is constructed in such a way so that shareholders' proportionate share will remain unchanged, shareholders' wealth does not change from (i) to (ii).

Right issue increases shareholders' wealth because the cost of issuing right shares is much lower than the cost of a public issue.

Question 8

The following data are available for a bond

Face value	Rs. 1,000
Coupon Rate	16%
Years to Maturity	6
Redemption value	Rs. 1,000
Yield to maturity	17%

What is the current market price, duration and volatility of this bond? Calculate the expected market price, if increase in required yield is by 75 basis points.

Answer

1. Calculation of Market price:

$$YTM = \frac{\text{Coupon interest} + \frac{\text{Discount or premium}}{\text{Years left}}}{\frac{\text{Face Value} + \text{Market value}}{2}}$$

Discount or premium – YTM is more than coupon rate, market price is less than Face Value i.e. at discount.

Let x be the market price

$$0.17 = \frac{160 + \frac{(1,000 - x)}{6}}{\frac{1,000 + x}{2}}$$

$$x = \text{Rs. } 960.26$$

Alternatively, the candidate may attempt by

$$160 (\text{PVIFA } 17, 6) + 1,000 (\text{PVIFA } 17, 6)$$

$$= 160 (3.589) + 1,000 (.390)$$

$$= 574.24 + 390$$

$$= 964.24$$

2. Duration

Year	Cash flow	P.V. @ 17%	Proportion of bond value	Proportion of bond value x time (years)
1	160	.855	136.8	0.142
2	160	.731	116.96	0.122
3	160	.624	99.94	0.104
4	160	.534	85.44	0.089
5	160	.456	72.96	0.076
6	1160	.390	<u>452.4</u>	<u>0.467</u>
			<u>964.4</u>	<u>4.236</u>

Duration of the Bond is 4.236 years

Strategic Financial Management

3. Volatility

$$\begin{aligned}\text{Volatility of the bonds} &= \frac{\text{Duration}}{(1 + \text{yields})} = \frac{4.236}{1.17} \\ &= 3.62\end{aligned}$$

4. The expected market price if increase in required yield is by 75 basis points.

$$= \text{Rs. } 960.26 \times .75 (3.62/100)$$

$$= \text{Rs. } 26.071$$

$$\text{Hence expected market price is Rs. } 960.26 - \text{Rs. } 26.071 = \text{Rs. } 934.189$$

Hence, the market price will decrease

This portion can also be alternatively done as follows

$$= \text{Rs. } 964.4 \times .75 (3.62/100)$$

$$= \text{Rs. } 26.18$$

then the market price will be

$$= \text{Rs. } 964.4 - 26.18 = \text{Rs. } 938.22$$

Question 9

M/s Transindia Ltd. is contemplating calling Rs. 3 crores of 30 years, Rs. 1,000 bond issued 5 years ago with a coupon interest rate of 14 per cent. The bonds have a call price of Rs. 1,140 and had initially collected proceeds of Rs. 2.91 crores due to a discount of Rs. 30 per bond. The initial floating cost was Rs. 3,60,000. The Company intends to sell Rs. 3 crores of 12 per cent coupon rate, 25 years bonds to raise funds for retiring the old bonds. It proposes to sell the new bonds at their par value of Rs. 1,000. The estimated flotation cost is Rs. 4,00,000. The company is paying 40% tax and its after cost of debt is 8 per cent. As the new bonds must first be sold and their proceeds, then used to retire old bonds, the company expects a two months period of overlapping interest during which interest must be paid on both the old and new bonds. What is the feasibility of refunding bonds?

Answer

NPV for bond refunding

	Rs.
PV of annual cash flow savings (W.N. 2)	
(3,49,600 × PV/FA 8,25) i.e. 10.675	37,31,980

Security Analysis

Less: Initial investment (W.N. 1)	<u>29,20,000</u>
NPV	8,11,980

Recommendation: Refunding of bonds is recommended as NPV is positive.

Working Notes:

(1) Initial investment:

(a)	Call premium	
	Before tax $(1,140 - 1,000) \times 30,000$	42,00,000
	Less tax @ 40%	<u>16,80,000</u>
	After tax cost of call prem.	25,20,000
(b)	Floatation cost	4,00,000
(c)	Overlapping interest	
	Before tax $(.14 \times 2/12 \times 3 \text{ crores})$	7,00,000
	Less tax @ 40%	<u>2,80,000</u>
(d)	Tax saving on unamortised discount on old bond $25/30 \times 9,00,000 \times .4$ (3,00,000)	4,20,000
(e)	Tax savings from unamortised floatation	
	Cost of old bond $25/30 \times 3,60,000 \times .4$	<u>(1,20,000)</u>
		<u>29,20,000</u>

(2) Annual cash flow savings:

(a)	Old bond	
(i)	Interest cost $(.14 \times 3 \text{ crores})$	42,00,000
	Less tax @ 40%	<u>16,80,000</u>
(ii)	Tax savings from amortisation of discount $9,00,000/30 \times .4$	25,20,000
(iii)	Tax savings from amortisation of floatation cost $3,60,000/30 \times .4$	(12,000)
		<u>(4,800)</u>
	Annual after cost payment of Debt (A)	25,03,200

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(b) New bond

(i)	Interest cost before tax (.12 ´ 3 crores)	36,00,000	
	Less tax @ 40%	<u>14,40,000</u>	
	After tax interest	21,60,000	
(ii)	Tax savings from amortisation of floatation cost (.4 ´ 4,00,000/25)	<u>(6,400)</u>	<u>21,53,600</u>
	Annual after tax payment		<u>3,49,600</u>

Question 10

Find the current market price of a bond having face value Rs.1,00,000 redeemable after 6 year maturity with YTM at 16% payable annually and duration 4.3202 years. Given $1.16^6 = 2.4364$.

Answer

$$\text{Duration } 4.3202 = (1.16/0.16) - [1.16 + 6(c-0.16)] / (c[(1.16)^6 - 1] + 0.16)$$

$$4.3202 = \frac{1.16}{0.16} - \frac{1.16 + 6(c - 0.16)}{c[(1.16)^6 - 1] + 0.16}$$

$$\frac{1.16 + 6c - 0.96}{1.4364c + 0.16} = 2.9298$$

$$0.2 + 6c = 4.20836472c + 0.468768$$

$$1.79163528c = 0.268768$$

$$C = 0.150012679$$

$$\therefore c = 0.15$$

Where c = Coupon rate

$$\text{Therefore, current price} = \text{Rs.}(1,00,000/- \times 0.15 \times 3.685 + 1,00,000/- \times 0.410)$$

$$= \text{Rs.}96,275/-$$

Question 11

MP Ltd. issued a new series of bonds on January 1, 2010. The bonds were sold at par (Rs.1,000), having a coupon rate 10% p.a. and mature on 31st December, 2025. Coupon payments are made semiannually on June 30th and December 31st each year. Assume that you purchased an outstanding MP Ltd. bond on 1st March, 2018 when the going interest rate was 12%.

Required:

- (i) What was the YTM of MP Ltd. bonds as on January 1, 2010?
- (ii) What amount you should pay to complete the transaction? Of that amount how much should be accrued interest and how much would represent bonds basic value.

Answer

- (i) Since the bonds were sold at par, the original YTM was 10%.

$$Y + M = \frac{\text{Interest}}{\text{Principal}} = \frac{\text{Rs.100}}{\text{Rs.1,000}} = 10\%$$

- (ii) Price of the bond as on 1st July, 2025 = Rs.50 × 9.712 + 1,000 × 0.417
= Rs.902.60

$$\text{Total value of the bond on the next interest date} = \text{Rs.902.60} + \text{Rs.50}$$

$$= \text{Rs.952.60}$$

$$\begin{aligned} \text{Value of bond at purchase date} &= \text{Rs.952} \times \frac{1}{(1+0.06)^{2/3}} \\ &= \text{Rs.952.60} \times \text{Rs.0.731004} \\ &\quad \text{(by using excel)} \\ &= \text{Rs.696.35} \end{aligned}$$

The amount to be paid to complete the transaction is Rs.696.35. Out of this amount Rs.16.57 represent accrued interest and Rs.679.68 represent the bond basic value.

Alternative solution:

$$Bo = \sum_{t=1}^{2n} \frac{\frac{1}{2}(Int_t)}{(1+\frac{kd}{2})^t} + \frac{B_m}{(1+\frac{kd}{2})^{2n}}$$

$$Bo = \sum_{t=1}^{2 \times 15} \frac{\frac{1}{2}(100)}{(1+\frac{12}{2})^t} + \frac{1000}{(1+\frac{12}{2})^{2 \times 15}}$$

$$Bo = \sum_{t=1}^{30} \frac{50}{(1.06)^t} + \frac{1000}{(1.06)^{2 \times 15}}$$

$$\begin{aligned} Bo &= 50 \times 13.765 + 1000 \times .174 \\ &= 688.25 + 174 = 862.25 \end{aligned}$$

Strategic Financial Management

Therefore Value of Bond at purchase date

$$= \text{Rs } 862.25 \times \text{Rs } 0.731004$$

$$= \text{Rs. } 630.31$$

The amount to be paid to complete the transaction is Rs.630.31. Out of this amount Rs.16.57 represent accrued interest and Rs.613.64 represent the bond basic value.

Question 12

On the basis of the following information:

$$\text{Current dividend (Do)} = \text{Rs. } 2.50$$

$$\text{Discount rate (k)} = 10.5\%$$

$$\text{Growth rate (g)} = 2\%$$

- (i) Calculate the present value of stock of ABC Ltd.
- (ii) Is its stock overvalued if stock price is Rs.35, ROE = 9% and EPS = Rs.2.25? Show detailed calculation.

Answer

- (i) Present Value of the stock of ABC Ltd. Is:-

$$V_0 = \frac{2.50(1.02)}{0.105 - 0.02}$$

$$= \text{Rs. } 30/-.$$

- (ii) Pay out ratio of ABC Ltd. = $\frac{2.5}{2.25}$

$$= 1.111$$

$$\text{Hence, Retention ratio} = 1 - 1.111$$

$$= -0.111$$

$$\text{Or } -11.1\%$$

$$\text{Sustainable growth ratio is} = -0.111 \times 0.09$$

$$= -0.00999$$

$$= -0.999\%$$

Using the constant growth model, the value is

$$\begin{aligned}
 &= \frac{\text{Rs.}2.50(0.99)}{0.105 - (-0.00999)} \\
 &= \frac{2.475}{0.11499} \\
 &= \text{Rs.}21.52
 \end{aligned}$$

This value is less than the stock price of Rs.30/- as calculated above or Rs.35, as given in the question, which indicates that stock of ABC Ltd. is Overvalued.

Alternative answer (ii)

$$\begin{aligned}
 (\text{MV}) \text{ of Stock in Rs.} &= \frac{D_1}{k_e - g} = \frac{D_0(1+g)}{(k_e - g)} \\
 &= \frac{2.5 \times 1.02}{0.105 - 0.02} = 30(\text{BV}) = \frac{\text{Rs.}225}{0.09} = \text{Rs.}25
 \end{aligned}$$

Again $\frac{(\text{MV})}{(\text{BV})} = \frac{k_r - g}{k_e - g}$ where symbols denote their usual notations.

$$\text{So, } \frac{0.09 - 0.02}{0.105 - 0.02} = \frac{(\text{MV})}{25} \text{ or, } \frac{0.07}{0.085} = \frac{(\text{MV})}{25}$$

$$\therefore (\text{MV}) = \frac{\text{Rs.}0.07}{0.085} \times 25 = \text{Rs.}20.59$$

Based on $\frac{(\text{MV})}{(\text{BV})}$ ratio and based on perpetual growth model the price of the share should be Rs.20.59 and Rs.30 respectively which are lower than the present (MV) of Rs.35.

The stock is therefore, Overvalued.

Question 13

ABC Ltd. has been maintaining a growth rate of 10 percent in dividends. The company has paid dividend @ Rs.3 per share. The rate of return on market portfolio is 12 percent and the risk free rate of return in the market has been observed as 8 percent. The Beta co-efficient of company's share is 1.5.

You are required to calculate the expected rate of return on company's shares as per CAPM model and equilibrium price per share by dividend growth model.

Strategic Financial Management

Answer

CAPM formula for calculation of Expected Rate of Return is :

$$\begin{aligned} \text{ER} &= R_f + B (R_m - R_f) \\ &= 8 + 1.5 (12 - 8) \\ &= 8 + 1.5 (4) \\ &= 8 + 6 \\ &+ 14\% \text{ or } 0.14 \end{aligned}$$

Applying Dividend Growth Model for the calculation of per share equilibrium price:

$$\begin{aligned} \text{ER} &= \frac{D_1}{P_0} + g \\ 0.14 &= \frac{3(1.10)}{P_0} + 0.10 \\ 0.14 - 0.10 &= \frac{3.30}{P_0} \\ 0.04 P_0 &= 3.30 \\ P_0 &= \frac{3.30}{0.04} \\ &= \text{Rs.}82.50 \end{aligned}$$

Per share equilibrium price will be Rs.82.50.

Question 14

Based on the credit rating of bonds, Mr. Z has decided to apply the following discount rates for valuing bonds:

<i>Credit Rating</i>	<i>Discount Rate</i>
AAA	364 day T bill rate + 3% spread
AA	AAA + 2% spread
A	AAA + 3% spread

He is considering to invest in AA rated, Rs.1,000 face value bond currently selling at Rs.1,025.86. The bond has five years to maturity and the coupon rate on the bond is 15% p.a. payable annually. The next interest payment is due one year from today and the bond is redeemable at par. (Assume the 364 day T-bill rate to be 9%).

You are required to calculate the intrinsic value of the bond for Mr. Z. Should he invest in the bond? Also calculate the current yield and the Yield to Maturity (YTM) of the bond.

Answer

The appropriate discount rate for valuing the bond for Mr. Z is:

$$R = 9 + 3 + 2 = 14\%$$

Time	CF	PVIF 14%	PV (CF)	PV (CF)
1	150	0.877		131.55
2	150	0.769		115.35
3	150	0.675		101.25
4	150	0.592		88.80
5	1150	0.519		596.85
				∑ PV (CF) i.e.
				$P_0 = 1033.80$

Since, the current market value is less than the intrinsic value; Mr. Z should buy the bond.

$$\text{Current yield} = \text{Annual Interest} / \text{Price} = 150 / 1025.86 = 14.62\%$$

The YTM of the bond is calculated as follows:

@15%

$$P = 150 \times \text{PVIFA}_{15\%, 4} + 1150 \times \text{PVIF}_{15\%, 5}$$

$$= 150 \times 2.855 + 1150 \times 0.0497$$

$$= 428.25 + 571.55 = 999.80$$

@14%

As found in sub part (a) $P_0 = 1033.80$

By interpolation we get, YTM = 14.23%

Question 15

A money market instrument with face value of Rs.100 and discount yield of 6% will mature in 45 days. You are required to calculate:

- (i) Current price of the instrument.
- (ii) Bond equivalent yield
- (iii) Effective annual return.

Strategic Financial Management

Answer

- (i) Current price of the Bond = $100 \times [1 - \{45/360\} \times 0.06]$
= Rs.99.25

Alternatively, the current price of bond may also be calculated as follows:

$$\frac{D}{100 - D} \times \frac{360}{45} = 0.06$$

$$\frac{D}{100 - D} = 0.06 \times \frac{45}{360}$$

$$\frac{D}{100 - D} = 0.06 \times \frac{1}{8}$$

$$8D = 6 - 0.06D$$

$$8.06D = 6$$

$$D = \frac{6}{8.06} = 0.7444$$

Current price of the bond = Face value – D

$$= \text{Rs.}100 - 0.7444 = \text{Rs.}99.2556$$

- (ii) Bond equivalent yield = $\frac{100 - 99.25}{99.25} \times \frac{360}{45} = 6.045\% \text{ P.A.}$

- (iii) Effective annual return = $\left[1 + (0.06045/8)^8\right] - 1$
= 6.045% P.A..

Note: If a year of 365 days is considered the Bond equivalent yield and Effective annual return works out to 6.129% P.A.

EXERCISES

Question 1

Phototech plc has in issue 9% bonds which are redeemable at their par value of £100 in five years' time. Alternatively, each bond may be converted on that date into 20 ordinary shares of the company. The current ordinary share price of Phototech plc is £4.45 and this is expected to grow at a rate of 6.5% per year for the foreseeable future. Phototech plc has a cost of debt of 7% per year. You are required to calculate the following current values for each £ 100 convertible bond:

- (i) Market value;

- (ii) Floor value; and
- (iii) Conversion premium.

(Answer: (i) £ 123·89 (ii) £ 108·20 (iii) £34·89)

Question 2

On 1 June 2003 the financial manager of Gadgets Corporation's Pension Fund Trust is reviewing strategy regarding the fund. Over 60% of the fund is invested in fixed rate long-term bonds. Interest rates are expected to be quite volatile for the next few years.

Among the pension fund's current investments are two AAA rated bonds:

- 1) Zero coupon June 2018
- 2) 12% Gilt June 2018 (interest is payable semi-annually)

The current annual redemption yield (yield to maturity) on both bonds is 6%. The semi-annual yield may be assumed to be 3%. Both bonds have a par value and redemption value of \$100. You are required to estimate the market price of each of the bonds if interest rates (yields):

- (i) increase by 1%;
- (ii) decrease by 1%.

[Given PVF (2.5%, 30) = 0.4767, PVF (3%, 30) = 0.412, PVF (3.5%,30) = 0.3563]

[Answer: (i) Zero Coupon Bond-13·1% (Decrease) & 12% Gilt June 2018- 8·1% (Decrease) (ii) Zero Coupon Bond-15·3% (Increase) & 12% Gilt June 2018- 9·1% (Increase)]

Question 3

It is now January 1, 2009 , and Mr. X is considering the purchase of an outstanding Municipal Corporation bond that was issued on January 1, 2007, the Municipal bond has a 9.5 percent annual coupon and a 30 -year original maturity (it matures on December 31, 2037). Interest rates have declined since the bond was issued, and the bond now is selling at 116.575 % of par, or Rs.1,165.75. Determine the yield to maturity (YTM) of this bond for Mr. X.

(Answer: 8.22%)