



MBF 723

**FINANCE AND
INVESTMENT ANALYSIS**

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MODULE 1

Unit 1	Meaning and Scope of Financial Analysis
Unit 2	Analysis of Financial Statement
Unit 3	Analysis of Financial Statements: (Continued)

UNIT 1 MEANING AND SCOPE OF FINANCIAL ANALYSIS

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1.0 INTRODUCTION

This unit of financial and investment analysis introduces you to the study of financial analysis. It deals with the meaning, scope, objectives, and tools of financial analysis. Opinions abound on this concept, but they all, interestingly point to one fact- its invaluableity in managerial decision making process. There appears to be no hard and fast rule in application of financial analysis technique. What you, therefore, need to understand is the concept and the extent to which financial analysis could influence financial decision in an organization.

2.0 OBJECTIVES

After studying this unit, you should be able to:

- Define and explain the term financial analysis
- Identify and state the scope of financial analysis
- Explain the objectives of financial analysis
- Explain tools of financial analysis

3.0 MAIN CONTENT

3.1 Meaning of Financial Analysis

Management of business organizations, in administering the activities of the firm, engages in transactions that mostly have financial implication. These financial transactions have to be adequately summarized to at least determine the viability of the firm in terms of profit generation. The result is the preparation of financial statements that would span the business life time. This financial statement is used by management, creditors, investors, etc. Examination of these statements will enable management and other users to have insight into the operating performance and financial position of the firm. Management should be particularly interested in knowing financial strength of the firm to make their best use and to be able to spot out financial weakness of the firm to take suitable corrective actions. Plans of the firm are, thus, based on this knowledge.

Financial analysis is then the process of identifying the financial strengths and weakness of the firm by properly establishing relationships between items in the balance sheet and income statement in order to appraise financial worth of the firm (Pandey, 1998 and Kurfi, 2003). Financial analysis should be undertaken before that application of any sophisticated forecasting and planning procedures. This would provide a better focus, as understanding of the past is a prerequisite for anticipatory future (Pandey, 1998).

3.1.1 Scope of Financial Analysis

The nature, content and extent of financial analysis are bonded by type of information required by the stakeholders of the firm. This requirement always differs just as the stakeholders differ. The stakeholders of the firm are numerous and include management, creators, investors, government, employees, etc. As varied as these needs are, it could be categorized under the followings:

- **Liquidity:** - determination of the ability of the firm to settle its short term obligations and survive in the long term
- **Performance:** - determination of the efficiency and effectiveness for decision made and quality of management
- **Planning:** - provision of a guide for future actions

3.3 Objectives of Financial Analysis

Financial analysis is undertaken basically to assess the liquidity of firm (whether weak or strong), performance of a firm (whether efficient and

effective or not) and to provide a guide to future plan of actions. Stakeholders of firm undertake analysis of financial statement for some specific objectives that are determined by their relationship with the firm. We have earlier listed the stakeholders of a firm to include management, investors, creditors, suppliers of long term debt, employees, etc. We should now discuss their likely objective in financial analysis:

- **Trade Creditors:** Trade creditors are interested in the firm's ability to meet their claims within a very short period of time. For this reason, they will be more interested in the liquidity position of the firm. Their analysis, will, thus be concentrated on areas that would provide information on the liquidity position of a firm.
- **Investors:** Investors could be those already having a stake in the firm and those contemplating having a stake. These stakeholders are concerned mostly about the firm's long-term survival and earnings. Firms with steady growth in earnings earn their confidence the most. They therefore, concentrate on the analysis of the firm's present and future profitability. The firm's financial structure and the extent of its influence on earnings ability and risk is also of interest to them.
- **Management:** management of a firm will be interested in every aspect of the financial analysis. Management has the overall responsibility to see that the resources of the firm are used most effectively and efficiently, and that the firm's financial condition is always sound.
- **Suppliers of long term debt:** This category of stakeholder is concerned with the firm's long-term solvency and survival. They are thus, interested in the analysis of firm's profitability over time, its ability to generate cash to pay interests and principal and capital structure relationship (the relationship between various sources of funds). Long term creditors place more emphasis on the firm's projected or pro forma financial statements to make analysis on its future solvency and profitability than the historical financial statements.
- **Employees and Trade Unions:** These stakeholders are more concerned about the long term survival and profitability of the firm and its ability to pay higher wages and salaries. They therefore concentrate their analysis on profitability trends and capital structure relationships.
- **Government:** Government through Inland Revenue services are concerned with the profitability of the firm and its ability to pay appropriate taxes as and when due. Government is also interested in long term survival of the firm and its ability to provide social amenities through social responsibility functions like environmental protections, sponsorships and employment opportunities. Government will therefore, concentrate on the analysis of the

financial statement that would provide information which can satisfy these needs.

3.4 Tools of Financial Analysis

The analysis of financial statement may be undertaken by the use of the following procedures:

- Comparisons of absolute account figures in the financial statements
- Computations of financial ratios and acid test

1. Comparison of Absolute Accounting Figures in the Financial Statements

This is a highly simplified tool of financial analysis. It is a process of merely comparing the figures in the financial statements to determine their changes over time. There are no further calculations made to determine relationships in the figures. Example: comparing the profit figure of previous year in income statement, the fixed assets figures in the balance sheet, etc.

One major limitation of this approach is that the analysis only stops at determination of inter-period variations in the accounting figures and does not involve intra-period comparison.

2. Financial Ratios

Financial ratios are a powerful tool of financial analysis. A ratio is defined as the indicated quotient of two mathematical expressions (Pandey, 1998). It is also a relationship between two or more things. Financial ratio is an index that relates two accounting numbers which is obtained by dividing one number by the other. In financial analysis, a ratio is used as a benchmark for evaluating the financial position of a firm. Ratios indicate a qualitative relationship, which can be, in turn, used to make a qualitative judgment.

In this unit and subsequent ones, we shall concentrate only on the use of financial ratios as a tool of financial analysis. Detailed explanations will be made in unit 2 and computational examples shall be undertaken in unit 3.

SELF ASSESSMENT EXERCISE

- i. Explain the term “Financial Analysis”

- ii. Discuss the need for Financial Analysis

4.0 CONCLUSION

You have learned in this unit that financial analysis is the process of identifying the financial strength and weakness of the firm by properly establishing relationship between items in the income statement and the balance sheet, in order to appraise the financial worth of the firm. Liquidity, performance and planning assessments are identified as the summarized needs for financial analyzing which financial ratios is a powerful tool to adopt. We have also learned that financial analysis should be undertaken before application of any forecasting and planning procedures as it will provide information for understanding past and bases for anticipating future.

5.0 SUMMARY

The unit treats fundamentals of financial analysis by specifically discussing the meaning, scope, objection and the tools of financial analysis. The detailed explanation and computational workings of the use of financial ratio as a tool of financial analysis shall be undertaken in unit 2. With, this we have laid a foundation for proper understanding of the subsequent units.

6.0 TUTOR - MARKED ASSIGNMENTS

“The absolute accounting figures reported in the financial statements do not provide a meaningful understanding of the performance and the financial positions of the firm; hence need to be further analyzed”.

Discuss the need for the analysis, bringing out clearly the specific areas the various stakeholders of the firm would be interested.

7.0 REFERENCES/FURTHER READINGS

Kurfi, A.K (2003). *Principles of Financial Management*, Kano: Benchmark Publishers Limited.

Pandey, I.M. (1998). *Financial Management* 7th ed. New Delhil: Vikas Publishing House PVT Ltd.

UNIT 2 ANALYSIS OF FINANCIAL STATEMENT

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- 2.0 Objectives
- 3.0 Main Content
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1.0 INTRODUCTION

In unit 1, we discussed the meaning, scope, objectives and tools of financial analysis. We also identify financial ratios as a powerful tool of financial analysis, and computational examples deferred to this unit. We shall, in this unit, examine ratio analysis in detail and apply it in the analysis of the income statement and balance sheets, the fundamental financial statements. We shall at the end bring out possible problems/limitations in the use of financial ratios for financial analysis.

2.0 OBJECTIVES

After studying this unit, you should be able to:

- Explain the nature and classification of financial ratios used in financial statement analysis
- Compute ratios from financial statements – the income statement and balance sheet.
- State relationship between the computed ratios and its influence on decision making.

3.0 MAIN CONTENT

3.1 Nature of Financial Ratios

In unit 1, we defined financial ratio as an index that relates two accounting numbers which is obtained by dividing one number by the other. It is a relationship between two accounting figures expressed mathematically. In finance, ratios are used to point out relationships that are not obvious from the raw accounting data. When ratios are

calculated, we can get comparison that may prove more useful than the raw numbers by themselves.

3.2 Standards of Financial Ratios Comparison

When we compute ratio from financial statement, we have to compare them using certain criteria to achieve useful interpretation. A single ratio in itself does not indicate favorable or unfavorable condition. It has to be compared with some standards before comments can be made.

The standards of comparison as suggested by Panday, (1998) and many other experts in finance are:

- **Past ratios;** past ratios are ratios calculated from the past financial statement of the same firm.
- **Projected ratios;** These are ratios computed using projected or proforma, financial statement of the same firm.
- **Competitors Ratios:** These are ratios of some selected firms, especially the most progressive and successful competitors of similar level of operations at the same point in time.
- **Industry ratios;** these are ratios of the industry to which the firm belongs

3.3 Classification of Ratio

Financial ratios have been classified in variety of ways. Many find the following broad bases of many classifications employed in current literatures.

(a) Primacy Criterion:

This base of classification suggests two types

- Primary ratios, which is mainly the ratio on investments ratio and
- Secondary ratios, which is all other ratios may be computed for the purpose of analysis.

This approach to classification will essentially vary among firms, and they will select only such that are relevant for their needs.

(b) Ratios Tagged to Needs of Interest Groups:

Under this approach, ratios are classified based on the needs of the interest groups. The major interest groups identified for this purpose are: management, owners, and lenders.

- **Management View Point:** Management will be interested in the ratios that will enhance management and operational control. These ratios are cost of goods sold and gross margin ratios, profit ratios, operating expenses ratios, contribution ratios and working capital ratios.
- **Owners View Point:** The ratio owners are interested in includes; net profit to network ratio, net profit to equity share capital ratios, economy per share, divided per share etc.
- **Lenders' Evaluation:** Lenders are mostly interest in the liquidity position and going concern of the firms. The ratios that will be interested in includes: Current ratios, quick ratio, solvency, ratios, profitability, ratio etc.

(c) Fundamental Classification Basis:

Ratios under this classification are grouped according to a basic function relevant to financial analysis five (5) such groups have been generally recognized, and are:

- **Liquidity Ratios:** These are ratios that measures firm's ability to meet its maturing short term obligations. Examples include the Current Ratio and Quick Ratio.
- **Leverage Ratios:** These are ratio that measures the extent to which a firm has been financed by debt and its ability to meet interest and other fixed charges obligations. Examples include Debt to Total Asset; Times Interest earned, and fixed charges coverage ratios.
- **Activity Ratios:** These are ratio that the effectiveness with which a firm is using its resources: Examples includes, inventory turnover, average collection period, fixed asset turnover and total asset turnover.
- **Profitability Ratios:** These ratios measure the efficiency of the activities of a firm and its ability to generate profit. Examples includes, profit (net or gross) margin, return on investment, net profit to network, etc.
- **Investment Ratios:** These ratios measured the ability of a firm to create and market values in excess of investment costs. Examples are rice earning ratios, and market/book value ratios.

The fundamental classification is the most extensively used mode of presenting financial statement analysis. We shall adopt fundamental classification in our subsequent discussions of financial analysis.

3.4 The Norms for Evaluation Using Financial Ratios

You may be wondering on how to control activities through ratios. The answer is not difficult to seek. Ratios that have been identified for control of activities measures relationships between key elements at any point in time. Such a measure is then compared with some “norm” and the causes for directors investigated. An action plan is then prepared and implemented to remove the counsels). The following appears to be the ways for evaluating the figures:

- **Time Series Analysis:** The easiest way to evaluate the performance of a firm is to compare its current period ratio with the past ratio. When financial ratios of a firm over a period of time are compared it is known as time series (or trend) analysis. This comparison given an indication of the direction of change and reflects whether the financial performance has improved, degenerated or remained constant overtime. The analyst should not simply determine the change, but more importantly, he should understand why ratios have changed.
- **Pro-forma Analysis:** This is the use of future ratios as standard of comparison. Future ratio can be developed from the projected, or pro-forma, financial statements. The comparison of current or past ratios with the future ratios would reveal the firm’s relative strengths and weaknesses in the past and the future. If the future ratios indicate weak financial positions, correction should be initiated.
- **Cross-sectional Analysis:** Another way of comparison is to compare ratios of one firm with some selected firms in the same industry at the same point in time. This kind of comparison is called cross-sectional analysis. In must cases, it is more useful to compare the firm’s ratio with those of a few carefully selected competitors who have similar operations. This could indicate the relative financial position and performance of the firm.
- **Industry Analysis:** Computed ratio of a firm can be compared with average ratios of the industry of which the firm is a member to determine its financial condition and performance. This kind of analysis is called industry analysis. This types of analysis help to ascertain the financial standing and capability of the firm vis-à-vis other firms in the industry. Industry ratios are important standards in view of the fact that each industry has its characteristics which influence the financial and operation relationships.

3.5 Computation of Ratios and Purpose

We shall under this part, undertake the computation of ratios describe under fundamental clarification in 3.1 (c). We shall state the formulae for computation and their main purposes.

1. Liquidity Ratios

Liquidity is term used to describe the extent to which a business can meet its short-term obligations as at when due. Insolvency is a state of being unable to pay debt as they fall due. This situation could lead to bankruptcy and collapse of a firm. Investors are unwilling to put their monies into, or lend money, to firms that are insolvent; traders are unwilling to sell goods on credit to firms that are always having liquid problems.

Assessment of a firm's liquidity position is done using the following ratios:

- (i) **Current ratio:** This ratio compares all current assets with current liabilities and indicates a firm's ability to meet its short tem obligation with it current assets.

$$\frac{\text{Current Assets}}{\text{Current Liabilities}}$$

As a convention, a current ratio of 2:1 is considered satisfactory. Too high a ratio will suggest too much fund field up a current asset, and low a ratio could be an indication of danger of not being able to pay creditor when they come and price for quick payment.

- (ii) **Quick or Acid Test Ratio:** This ratio is a more conservative measure of liquidity. It excludes inventory (stocks) from the current assets in the determination of liquidity. The ratio emphasizes more on assets that can be easily converted into cash or to a reasonable time without loss of value. Quick ratio is given by:

$$\frac{\text{Current Assets} - \text{Inventory (Stocks)}}{\text{Current liabilities}}$$

Generally, a quick ratio of 1:1 is considered to represent a satisfactory current financial condition of a firm.

- (iii) **Cash Ratio:** This ratio takes more stringent view on liquidity. It examines only cash and its equivalent (i.e. marketable security) in relation to current liabilities. It is a measure of most liquid asset of a firm as it consider only cash and marketable securities in the current assets as the numerators. Cash ratio is given by

$$\frac{\text{Cash} + \text{Marketable securities}}{\text{Current liabilities}}$$

2. Profitability Ratios

Profit is the difference between revenues and expenses over a period of time (usually one year). Profitability ratios are used to measure the operating efficiency of a firm. All stakeholders of a firm are interested in the profitability of the enterprises profitability is measured by the following ratios.

- (i) **Gross Profit Margin:** This ratio shows the profits relative to sales after the direct production costs are deducted. It can be used as an indicator of the efficiency of the production operation and the relationship between selling price and production costs. Gross Profit Margin (GPM) is given by:

$$\frac{\text{Sales} - \text{Cost of Goods sold}}{\text{Sales}} \times 100$$

$$\text{or} \quad \frac{\text{Gross Profit}}{\text{Sales}} \times 100$$

Generally, the higher the ratio the more the efficiency of a firms' operation could be.

- (ii) **Mark Ups on Cost:** This is another ratio used to analyze the trading profitability of a firm. It shows the profits relative to direct costs of production. Mark –ups on cost is given by

$$\frac{\text{Gross Profit}}{\text{Cost of Goods Sold}} \times 100$$

This ratio expresses gross profit in different ways. A fall of the two ratios (i.e. Gross profit and Mark-ups on cost) below expectation may be due to some of the following reduction in selling, poor buying, and poor stock control.

- (iii) **Profit Margin:** This ratio helps in measuring the relationship between sales and operating profits. It measures the profit made on sales after all the running expenses have been deducted from the gross profit. If the percentage of this ratio has fallen, while Gross Profit Margin has remained constant then increase in running costs should be investigated and efforts be made to reduce them. Profit margin is given by:

$$\frac{\text{Operating Income}}{\text{Sales}} \times 100$$

Sales

If the profit margin is inadequate, a firm cannot achieve satisfactory returns to its investors, because it is an indicator of the ability of a firm to withstand adverse conditions such as fall in prices, rise in costs and declines in sales

- (iv) **Net Profit Margin:** This ratio is obtained when operating expenses interest and taxes are subtracted from the gross profit. Net profit Margin is given by

$$\frac{\text{Profit After Tax}}{\text{Sales}} \times 100$$

Net Profits Margin establishes a relationship between net profit and sales, and indicates management's efficiency in manufacturing, administering and selling the products. It is a measure of a firm's ability to turn each Naira sales into net profit.

- (v) **Basic Earnings Power:** This ratio measures the returns achieved by firm in relation to its assets. Basic Earning Power is given by:

$$\frac{\text{Earnings Before Interest and tax}}{\text{Total Assets}} \times 100$$

This ratio links the profits generated to the book value of the assets. If a firm is using its assets efficiently this ratio will be high.

- (vi) **Return on Investment:** This ratio measures the overall effectiveness of a firm in generating profits with available assets. Return On Investment (ROI) is given by:

$$\frac{\text{Net Profit After Taxes}}{\text{Total Assets}} \times 100$$

As this ratio measures the earning power of the invested capital, the higher the ratio the better for the firm.

3. Leverage Ratios

Leverage ratios measure the relationship between the funds provided by the owners (shareholders) of a firm and funds provided by the creditors of the firm. They also measure the ability of the firm to service the

charges accruing from the use of outsiders' funds (creditors). Leverage is measured through the following ratios.

- (i) **Debt – to – Equity:** This ratio assesses the extent to which firm is using borrowed funds, it is computed by dividing the total debt of a firm (including current liabilities) by its shareholders equity. Debt to equity is given by

$$\frac{\text{Total Debt}}{\text{Shareholders equity}} \times 100$$

Generally creditors would like this ratio to be low, because the lower the ratio, the higher the level of the firm's financing that is being provided by shareholders, and the larger cushion (margin of protection) in the event of shrinking asset values or outright losses. Prefers stocks are sometimes included as debt rather than equity when leverage ratios are calculated.

- (ii) **Debt –to-Total Assets:** This ratio measures the amount of the total funds provided by creditors in relation to the total assets of the firm. Debt – to – Total Asset is given by

$$\frac{\text{Total Debt}}{\text{Total Assets}} \times 100$$

Generally creditors would also prefer low ratio for all debt's ratios, because the lower the ratio, the greater the cushion against the creditors' losses in the event of liquidation.

- (iii) **Long Term Debt – to Total Capitalization:** This ratio measures the relative weight of long-term capital to the capital structure (long-term financing) of the firm. Long-term debt – to-total capitalization is given by:

$$\frac{\text{Long-term debt}}{\text{Total capitalization}} \times 100$$

Total capitalization means capital employed (long term debt + equity). This ratio measures the extent to which a firm is financed by long-term loans, the lower the ration the lower the financial risk of the firm. This ratio is also called Gearing Ratio.

- (iv) **Times Interest Earned:** This ratio measurers how satisfactorily a firm will meet its interest payment. Times Interest Earned is given by.

$$\frac{\text{Earnings before Interest and Tax}}{\text{Interest Charges}}$$

As this ratio serves as one measure of the firm's ability to meet its interest payments and thus avoid bankruptcy, the higher the ratio the greater the likelihood that the firm could cover (i.e. settle) its interest payments without difficulty. It also sheds some light on the firm's capacity to take on new debt.

- (v) **Fixed charge coverage:** This ratio is similar to interest earned ratio but it is more inclusive in that it recognizes that many firms lease assets and incur long-term obligations under lease contracts for the payment of lease premium. This ratio is given by.

$$\frac{\text{Earning before interest and tax} + \text{lease obligation}}{\text{Interest charge} + \text{Lease obligation}}$$

As nowadays, leasing is becoming widespread in financing businesses, this ratio is preferable to the time interest earned ratio for making financial analyses.

4. Investment Ratios

The financial statements of public liabilities companies are used by investors and their advisers to make analysis for investment decision like buying more shares or holding on or selling out calculating ratio assists shareholders when analyzing a potential investment in the stock of an enterprise they are employing the following ratios:

- (i) **Earning per share:** this is the ratio that is used to determine the return accruing to each share. It is calculated by dividing the profit after taxes by the total number of common stocks outstanding. Earning per share (EPS) is given by:

$$\text{EPS} = \frac{\text{Profit after taxes}}{\text{Number of common stocks outstanding}}$$

This ratio simply reveals the profitability of a firm on per share basis, it does not reflect how much is paid as dividend and how much is retained in the business. But as a profitability index, it is a valuable and widely used ratio.

- (ii) **Price – Earnings ratio:** this is a measure of confidence a shareholder can place in the profit growth of a firm, because a high price-earnings ratio indicates strong shareholders' confidence in the firm and its future, and a lower ratio indicates lower confidence. Price – Earnings (PE) ratio is given by:

$$\text{PE ratio} = \frac{\text{Market Price Per Share}}{\text{Earnings Per Share}}$$

Price earnings ratio is widely used by security analysis to value the firm's performance as expected by investors. It indicates investors' expectations about the firm's performance. Management is also interested in this market appraisal of the firm's performance and will like to find the cause of P/E ratio declines.

- (iii) **Earning Yield:** This ratio is the reciprocal of P/E ratio: therefore, all the analysis made under P/E ratio could be applied in earning yield. The ratio seeks to find the percentage of EPS in relation to market price per share earnings yield, this is given by:

$$\frac{\text{Earnings per share}}{\text{Market price per share}} \times 100$$

- (iv) **Dividends Per Share:** This ratio indicates earnings given to shareholders per each share as dividend. Even though all net profits after taxes belong to the shareholders, not the whole of it that will be distributed to them as cash dividend. Dividends per share (DPS) is given by:

$$\text{DPS} = \frac{\text{Earning paid to shareholders (dividends)}}{\text{Number of ordinary shares outstanding}}$$

A large number of present and potential investors may be more interested in DPS, rather than EPS, because DPS is what actually accrue to them as cash returns for their investment.

- (v) **Dividend-Payout Ratio:** this ratio reveals the percentage of the dividend in relation to the percentage retained to expand the growth of the firm. Dividend payout ratio (or simply payout ratio) is DPS (or total dividends) divided by the EPS (or profit after tax). Dividend payout ratio is given by:

$$\frac{\text{Dividend per share}}{\text{Earnings per share}} \times 100 \quad -$$

This ratio has strong bearing on what accrues to the shareholders as cash dividend since it contains some information to potential investors. How much emphasis is lay on it but less to retain for the future expansion and growth of the firm internal source of finance.

- (vi) **Dividend Yield:** this ratio shows the percentage of income from shares (dividends) in relation to the market value of the share. Dividend yield is given by:

$$\frac{\text{Dividend per share} \times 100}{\text{Market price per share}}$$

Since dividend yield is used to evaluate the shareholders' return in relation to the market value of the investment (share), the result should be compared with returns from other types of investment for taking the right decision.

- (vii) **Markets Value-to-Book: Value (MV/BV) Ratio:** this is measure of the ratio of market value of the share to the book value of the share. Market value-to-Book value (MV/BV) ratio given by:

$$\frac{\text{Market price per share}}{\text{Book value per share}}$$

Note that book value per share is equity divided by the number of shares outstanding. The higher this ratio is, the healthier is the performance of the share in the market place.

- (viii) **Tobin's q:** this is a measure of the impacts of inflation to replacement costs of the assets of a firm. With rising price (i.e. inflation) book values understates replacement cost. One may want to consider the ratio of the market value of a firm's equity and debt to the current replacement cost of its assets. This ratio is popular known as Tobin's q is given by:

$$q = \frac{\text{Market value of assets (debt + equity)}}{\text{Estimated replacement cost of assets}}$$

Tobin argues that firms have an incentive to invest when q is greater than 1 (i.e., when capital equipment is worth more than its replacement costs), and that they will stop investing only, when q is less than 1 (i.e., when equipment is worth less than its replacement cost). When q is less than 1 it may be cheaper to acquire assets through merger rather than buying new assets.

5. Activity Ratios

Activity ratios are overall performance ratios that are employed to evaluate effectiveness of the form's use of its resources. Over all performance is measured by the following ratios:

- (i) **Return on Capital Employed (ROCE).** This ratio relates the profit earned to the amount of long term capital invested in the business and measures the efficiency of management in the use of the firm's resources. Capital employed is total assets less current liabilities or equity plus long term liabilities. Return on Capital Employed (ROCE) ratio is given by

$$\frac{\text{Earnings before interests and tax}}{\text{Capital Employed}} \times 100$$

- (ii) **Receivables Turn Over Ratio (in number of times).** This ratio measures the quality of the receivables of the firm and the efficiency in its collection. It is usually expressed in number of times and given by

$$\frac{\text{Annual net credit sales}}{\text{Receivables}}$$

- (iii) **Average Collection Period/Debtors Collection Period.** This ratio assesses the speed with which a firm collects amount owing from customers. It is the ratio used to determine average period receivables or collected after sales. The ratio is given by:

$$\frac{\text{Receivables}}{\text{Net sales}} \times 360$$

The lower the collection period the more effective is the control of credit. Very high collection period, thus, is an indication of bad credit control system that needs to be corrected and improved. This could be either be through incentive for prompt payments or effective sanctions for slow payers.

- (iv) **Average Payable Period/Creditors Payment Period:** This ratio assesses the level of insolvency of a firm. It indicates the average number of days taken by a firm in payment of its credits. The ratio is given by:

$$\frac{\text{Account payable}}{\text{Annual credit sales}} \times 360$$

Low credit payment period ratio is an indication that the firm makes credit payments promptly and that the credit system is efficient. High ratios indicate the opposite.

- (v) **Inventory (or stock) Turnover ratio:** this ratio indicates the level of efficiency and effectiveness in the management of firm's inventory and its liquidity. It is usually expressed in number of times. The ratio is given by:

$$\frac{\text{Cost of sales}}{\text{Average inventory}}$$

Average inventory is computed by dividing by two (2) the sum of opening and closing inventories.

Generally, the higher the inventory turnover, the more the efficiency of the management of the firm's inventory and its liquidity. However, high turnover might sometimes be an indication of maintenance of too low a level of inventory and occurrence of frequent stock out. Low inventory turnover is often a sign of excessive, slow moving or obsolete items in inventory.

- (vi) **Current Asset Turnover:** this ratio measures the number of times current assets has been converted into sales. It is given by:

$$\frac{\text{Sales}}{\text{Total current assets}}$$

The higher the ratio, the more effective the revenue generation of a firm

- (vii) **Fixed Asset Turnover:** This ratio reveals the efficiency in the employment of fixed assets in the generation of revenue. The higher the ratio, the better for the firm. It is given as:

$$\frac{\text{Sales}}{\text{Net Fixed assets}}$$

Other variations of activity ratios abound which could extend to ratios as: sales per employee, total asset turn over etc

3.6 Limitations of Financial Ratio Analysis

The followings are some of the limitations of financial ratios.

- Comparison of ratios among firms may be misleading as different firms operate under different social and economic conditions differs in their sizes or the nature of the business carried on and in their accounting methods.
- Inflation has a significant effect on the validity of the historical cost account and tends to render ratio analysis useless unless provision is

made for adjustment to the inflated figure especially in trend analysis.

- Ratios are not a standard formula for judging the performance of a business. Many ratios are in common use and express standard relationships but are only a guide since management can not be reduced to a formula.
- Ratios are not a substitute for judgment. Management is produced with answers to its problems by ratios. In this connection a meaningful figure for comparison may be crucial. Unfortunately in some areas absolute standards have been adopted.
- Difficulties in selection of profit figures, different bases of stock valuation, depreciation charges and in valuating fixed assets, provide a serious threat to the usefulness of ratio.
- External analysis of balance sheet can be misleading because the picture at that particular moment of time may not be representative of the year as a whole.

SELF ASSESSMENT EXERCISES

- i. The ratios measuring management's overall effectiveness as shown by the returns generated on sales and investment are:
 - a. Leverage ratios
 - b. Profitability ratios
 - c. Activity ratio
 - d. Liquidity ratio
- ii. Inventory turnover is defined as ----- divided by inventories
 - a. Cost of goods sold
 - b. Accounts receivable
 - c. Gross profit
 - d. Net operating income
- iii. The primary purpose of the current ratios is to measure a firm's
 - a. Use of debt
 - b. Profitability
 - c. Effectiveness
 - d. Liquidity
 - e. None of these
- iv. Because inventories are less liquid than other current assets, the quick ratio is regarded as being a more stringent test of liquidity than the current ratio. True/false

- v. Other things being constant, (assuming an initial current ratio greater than 1.00) which of the following will not affect the current ratio?
- a. Fixed assets are sold for cash
 - b. Long-term debt is issued to pay off current indebtedness
 - c. Accounts receivables are collected
 - d. Cash is used to pay off accounts payable
 - e. A bank loan is obtained
- vi. The averages collection period is found by dividing ----- with ----- and then dividing average sales per day into accounts ----- The average collection period is the length of time that a firm must wait after making a sale before it receives-----

4.0 CONCLUSION

In this unit, you have learnt, in detail, nature of financial ratios, its classifications and ways they should be computed. Criteria for financial ratio assessment were also discussed. We have tried to explain that financial ratios are used to assess the performance through computation of specific ratios from balance sheet and the income statement of a firm and comparing them with standards to provide further information regarding specific aspect of the firm's operation. We also state that financial ratios should be used with care because of some inherent limitations, as listed in 3.6 above.

5.0 SUMMARY

In this unit we treated financial ratio were treated in details, Classification of ratios, norms for evaluation of computed ratios and illustrative example were given and discussed. This unit provides adequate background on the use of financial ratios, when used within its limitations, in the evaluation and prediction of the performance of an enterprise.

6.0 TUTOR - MARKED ASSIGNMENTS

1. Explain three major classifications of ratios and the significance of each to financial analysis.
2. What are the major limitations of ratio analysis?

7.0 REFERENCES/FURTHER READINGS

- Kurfi, A.K (2003). *Principles of Financial Management*, Kano: Benchmark Publishers Limited.
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UNIT 3 ANALYSIS OF FINANCIAL STATEMENTS: (CONTINUED)

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Computations of financial ratios
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignments
- 7.0 References/Further Readings

1.0 INTRODUCTION

In unit 2, we discussed in details the models (formulas) for the computation of ratios for financial analysis. We shall now attempt to compute these ratios using examples of financial statement. The computed ratios will, therefore, be analyzed and the relationship explained.

2.0 OBJECTIVES

At the end of the studying of this unit, you should be able to:

- Compute financial ratios from financial statement
- Explain and establish relationship between the computed ratios and
- States the importance of ratio in decision making.

3.0 MAIN CONTENT

3.1 Computations of Ratios

To achieve our aim at this point, we shall use the example below to compute identified ratios in unit 2

SELF ASSESSMENT EXERCISE

The Balance sheet, trading/profit and loss account of Nauzo Business Company Ltd as at 31st December 2008 are as follow:

QUICK BUSINESS COMPANY LTD
BALANCE SHEET AS AT 31ST DECEMBER 2008

	2008		2007	
	N'000	N'000	N'000	N'000
Fixed Assets (less Depreciation):				
Land and Building		166		120
Motor vehicles		80		80
Plant and Machinery		<u>480</u>		<u>320</u>
		726		520
Current assets:				
Stock	180		140	
Work in progress	134		92	
Debtors (less doubtful debts)	220		160	
Bank	<u>40</u>		<u>60</u>	
	<u>574</u>		<u>452</u>	
Less: current liabilities:				
Creditors	90		120	
Dividends payable	60		40	
Taxation	36		24	
Bank overdraft	<u>104</u>		<u>52</u>	
	<u>290</u>		<u>236</u>	
Networking capital		<u>248</u>		<u>216</u>
Net asset		<u>1,010</u>		<u>736</u>
Financed by:				
Issued/paid capital	600		400	
Reserves	166		100	
Profit and loss	<u>84</u>		<u>36</u>	
		850		536
10% Debenture		<u>160</u>		<u>200</u>
		<u>1,010</u>		<u>736</u>

QUICK BUSINESS COMPANY LTD
TRADING AND PROFIT ACCOUNT FOR THE YEAR ENDED 31ST DECEMBER, 2008

	2008		2007	
	N'000	N'000	N'000	N'000
Sales		3680		2888
Less cost of sales:				
Opening stock	232		180	
Purchases	2904		2218	
	3136		2398	
Closing stock	<u>314</u>	<u>2822</u>	<u>232</u>	<u>2166</u>
Gross profit		858		722

Less expenses		<u>694</u>		<u>606</u>
Net profit		164		116
Provision for tax	36		24	
Transfer to reserves	20		16	
Proposed dividend	<u>60</u>	116	<u>40</u>	80
		<u>48</u>		<u>36</u>

Additional information:

1. The market price per share is as follows 2008 #1.50; 2007 #1.45
2. Expenses include debenture interest as follows:

2008	N16,000
2007	N20,000

Required:

Define the following accounting ratio, compute and comment on the ratios of quick business company limited

- i. Gross profit and net profit margin
- ii. Return on capital employed (ROCE)
- iii. Return on Equity (ROE)
- iv. Quick Assets ratio (Acid Test)
- v. Capital Gearing.
- vi. Sales to debtors
- vii. Debt ratio
- viii. Total assets turnover
- ix. Earning yield
- x. Stock turnover.

Solution

Gross profit margin

$$2008 = \frac{858000}{3680000} (3,680 - 2,822) = 23.3\%$$

$$2007 = \frac{722000}{2888000} (2,888 - 2166) = 25\%$$

Net profit margin

$$2008 = \frac{164000}{3680000} = 4.5\%$$

$$2007 = \frac{116000}{2888000} = 4.0\%$$

ii) Return on Capital Employed (ROCE)

This ratio relates profit only to long term funds made up of equity shares capital, reserves and profits) preferences capital and debenture or loan stock.

$$\text{ROCE} = \frac{\text{Net profit before interest on long term loan}}{\text{Total long term funds}}$$

$$2008 = \frac{164000+10000}{1010000} = \frac{180000}{1010,000} = 17.8\%$$

$$2007 = \frac{116000+20000}{736000} = \frac{180000}{736000} = 18.5\%$$

This ratio is used in determining rate of returns on capital employed with a view to ensure efficient use of resources.

iii) Return on Equity

This is the ratio of net profit after tax to the total equity funds and it shows the efficiency with which the equity funds are employed.

$$2008 = \frac{164000 - 36000}{850000} = \frac{128000}{850000} = 15.1\%$$

$$2007 = \frac{116000 - 24000}{536000} = \frac{92000}{536000} = 17.2\%$$

iv) Quick Asset Ratio (ACID Test)

This is the ratio of current assets less inventories to current liabilities. The ratio indicates the capacity of the company to generate sufficient cash to discharge its short-term liabilities as they fall due.

$$= \frac{\text{Current Assets} - \text{stock}}{\text{Current liabilities}}$$

$$2008 = \frac{574000 - 180000 - 134000}{290000} = \frac{260,000}{290,000} = 0.9:1$$

$$2007 = \frac{452,000 - 140,000 - 92000}{236,000} = \frac{220000}{236000} = 0.93:1$$

(v) Capital Gearing

This ratio measures total long term loans to equity funds. It gives a measure of the proportion of the long term capital that is funded by loan or debenture.

$$\begin{aligned} 2008 &= 160000:850000 = 0.2:1 \\ 2007 &= 200000:536000 = 0.37:1 \end{aligned}$$

This indicates that a large proportion of the capital is provided by the equity shareholders.

(vi) Sales to Debtors

The ratio measure the effectiveness of debt collection function

$$\begin{aligned} 2008 &= \frac{3650000}{220000} = 16.7 \text{ times} \\ 2007 &= \frac{2888000}{160,000} = 18 \text{ times} \end{aligned}$$

This connotes that the company is effective and efficient in cash collection.

(vii) Debt Ratio

The ratio measures the proportion of the company's total assets which are paid for by both long term and short term debts.

$$\text{Debt ratio} = \frac{\text{Current liabilities} + \text{long term loans}}{\text{Total assets}}$$

$$\begin{aligned} 2008 &= \frac{290,000+160000}{726000 + 574000} = \frac{450000}{1300000} = 34.6\% \\ 2007 &= \frac{236000+ 200000}{520000+452000} = \frac{436000}{972000} = 44\% \end{aligned}$$

viii) Total Assets to Turnover

This is the ratio that relates the assets employed to total sales

$$\text{The computation is} = \frac{\text{Total Assets}}{\text{Sales}}$$

$$\begin{aligned} 2008 &= (726+574): 3680 = 13000:3680 = 1:2.83 \\ 2007 &= (520 +452):2888 = 972:2888 = 1:2.97 \end{aligned}$$

Comment:

The ratio indicates how the company has efficiently used its assets to generate its income.

(ix) Earnings Yields

Earning yield is the ratio of the earnings per share to the market value of shares. Earning per share is arrived at by dividing the net profit after tax by the number of shares.

Computation: earnings yield = $\frac{\text{Earnings per share}}{\text{Market value of share}}$

Earnings per share = $\frac{\text{Net profit after tax}}{\text{No of shares}}$

$$2008 = \frac{(164000-36000)}{600000} \times 1/1.5\%$$

$$= \frac{0.21}{1.5\%} = 14\%$$

$$2007 = \frac{(116000-24000)}{40000} \times 1/1.45\%$$

$$\frac{0.23\%}{1.45} = 15.86\%$$

Comment: - This ratio is used to determine possible returns on investment in the company's share at the existing market.

Stock Turnover

Stock turnover relates the cost of sales to the average stock

Computation

$$2008 = \frac{2822000/2}{(232000+314000)} = \frac{2822000}{273000} = 10.33 \text{ times}$$

$$2007 = \frac{2166000/2}{(180000+232000)} = \frac{2166000}{206000} = 10.51 \text{ times}$$

Comment: The stock turnover ratio gives the number of times the average stock holding of the company could be utilized in meeting the supply of its products for sales

4.0 CONCLUSION

In this unit, Computations of financial ratios has been demonstrated using specimen financial statement. It should be noted that no one single question would provide figures for computation of all identified ratios. Hence only ratios that values for their variables could be determined should be computed for examination and practical purposes. This is because companies vary in characteristics as such content of financial statement/reports differs.

5.0 SUMMARY

Unit 2 discussed the theory and models for computation of ratios. This unit provide illustrative example on the computations and analysis of the ratios. It is expected that with this adequate illustration on the computation of ratios, you should be able to apply it to guide decision making.

6.0 TUTOR - MARKED ASSIGNMENTS

This profit and loss account and balance sheet of Abubakar Nigeria plc as at 31st December, 2007 and 2008 are as follows:

	2008	2007
	N'000	N'000
Turnover	2713285	3089973
Cost of sales	(1907419)	(1954626)
Gross profit	805866	1135347
Operating expenses	(664,738)	(553645)
Trading profit	141128	581702
Exceptional items	176157	(5848)
Other income	72859	37085
Interest charges	(105976)	(80273)
Profit on ordinary activities before tax	284168	532666
Tax on ordinary activities	(69938)	(191265)
Profit on ordinary activities after tax	214230	341491
Debenture redemption	-	(10000)
Dividend proposed	(132875)	(199313)
Retain profit for the year	81355	132088
Reserve at the beginning of the year	464434	332364
Transfer from redemption reserve	40000	-
Transfer to general reserve	585789	464434

Balance Sheet as at 31st December

	2008	2007
	N'000	N'000

Fixed Assets	260,739	248609
Long term investment	<u>160</u>	<u>160</u>
	<u>260899</u>	<u>248769</u>
Current Assets		
Stocks	1456182	138073
Debtors	579876	310322
Bank and cash balances	<u>525574</u>	<u>79059</u>
	2561632	2489454
Creditor: (Due within one year)	1479217	(1557347)
Creditor: (Due after one year)	(10795)	(8700)
Provision for liabilities and charges	<u>(258 701)</u>	<u>(179713)</u>
	<u>1073818</u>	<u>992463</u>
Capital and reserves		
Called up share capital @ 50k each	332188	332188
Reserves	174630	660275
	<u>1973818</u>	<u>992463</u>
Market price of shares	45k/share	60k/share

You met the M.D and financial controller of Abubakar Nigeria plc to discuss the figures, and they explained that the reduction in trading profit was due to various adverse economic, infrastructural and socio-political factors prevalent in 2008

You are required to:

1. Compute the following ratios for 2007 and 2008:
 - i. Gross profit margin
 - ii. Return on capital employed
 - iii. Net profit margin
 - iv. Current ratio
 - v. Liquid ratio
 - vi. Debtors collection period
 - vii. Proprietary ratio
 - viii. Earnings per share
 - ix. Dividend per share
 - x. Price earning ratio
2. Based on the ratios computed in (a) above comment on the company's profitability and liquidity position.
3. Indicate the measures the company should take to improve the collection of debts and cash flow under the central and accounting information you would require for this purpose.

7.0 REFERENCES/FURTHER READINGS

- Okwuosa, I (2005). *Advanced financial Accounting Mannual*, Lagos: Arnold consulting Ltd.
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MODULE 2

Unit 1	Capital Budgeting - Introduction
Unit 2	Capital Budgeting Investment Appraisal I
Unit 3	Capital Budgeting – Investment Appraisal II
Unit 4	Capital Budgeting – Investment Appraisal III
Unit 5	Capital Investment Analysis in the Public Sector

UNIT 1 CAPITAL BUDGETING - INTRODUCTION

CONTENTS

1.0	Introduction
2.0	Objectives
3.0	Main Content
3.1	Meaning of capital budgeting
3.2	Factors to consider in capital budgeting
3.3	steps in capital budgeting decision
3.4	Planning and control of capital expenditure
3.4.1	Planning
3.4.2	Control
4.0	Conclusion
5.0	Summary
6.0	Tutor Marked Assignments
7.0	References/Further Readings

1.0 INTRODUCTION

This is the 4th unit of this course. It will cover a period of one hour. We shall be looking at the definition of capital budgeting, need for capital budgeting, methods of evaluating capital expenditure, theoretically, and limitations of capital budgeting.

2.0 OBJECTIVES

By the end of this unit, you should be able to:

- Explain the concept and need for capital budgeting
- State steps in capital budgeting

3.0 MAIN CONTENT

3.1 Meaning of Capital Budgeting

Capital budgeting is the act of long term planning decision for investment which involves fixed assets and their financing. Hampton (1992) defines capital budgeting as the decision making process by which firms evaluate the purchase of major fixed assets, including buildings, equipment. It also covers decisions to acquire other firms, either through purchase of their common stock or groups of assets that can be used to conduct an on-going business. It is a process used to evaluate capital expenditures. The primary objective in capital budgeting decision is to add to the value of a business by selecting investments that meet the goals of the organization and provide the highest possible rates of returns.

The capital investment decision is one of the most significant decision areas. It might have effect on future profitability either because it might result in an increase in revenue or because it can cause an increase in efficiency and reduction in costs.

3.2 Factors to Consider in Capital Budgeting

The following factors may influence capital budgeting decisions.

- (i) **Economic Change:** The economic condition is highly dynamic, it is never static. As such, it is always important to try and foresee future economic developments. One development that must quickly be detected is the emergence that must be quickly detected, is the emergence of new competitors and new markets.
- (ii) **Technological Change:** Nowadays change in the technological field is very rapid. Faster communication, increasing automation, new forms of materials and the endless products of more and more research and development makes it essential that any plan spanning the years predicts the broad development in technology.
- (iii) **Socio-Political Change:** The societal values, norms and orientations do change even though not as rapid as the economic and technological changes. Changes in the societal norms and values would greatly influence consumers' preferences and tastes, which will affect future demands of goods and services of the firm. Therefore, management should anticipate such changes and incorporate them in the long-term plan (i.e., the capital budgeting).
- (iv) **Future Prospects:** The current decision on capital budget should be taken with provision for future growth or expansion in terms

of future additional equipment that will be needed to meet the future demand, reacting to new challenges and opportunities etc.

- (v) **Financing:** In all capital budgeting decisions one ultimately arrives at the question of how will needs (i.e., projects) be financed? This depends very much on the financing policy of the enterprise, either by using equity or debt capital or a combination of both.

3.3 Steps in Capital Budgeting Decision

The important steps in the decision process are:

- (i) Identify possible investment projects: This is the project ideas can originate from any level within the organization. It can be from the operator in the factory or supervisor or production manager or managing director,
- (ii) Acquiring relevant data on the projects under consideration: This stage involves finding all the relevant data on the projects under consideration. This task should be carried out without bias,
- (iii) Evaluating the projects from the data assembled: This stage involves carrying out a financial evaluation of the projects based on the criteria the firm uses,
- (iv) Identifying possible alternative to the projects being evaluated the project. The board of Directors will usually take the decision on projects to be selected.
- (v) Project selection: This is a stage where a final decision on projects to be selected.
- (vi) Project implementation: this involves implementing the decision taken on the projects selected. Efforts should be made as much as possible to carryout the decision taken.
- (vii) Project monitoring and control this involves monitoring the progress of the project to assess its effectiveness and whether the expected benefits are being realized. Review such as a post audit might need to be carried out.

3.4 Planning and Control of Capital Expenditure

3.4.1 Planning

The following are the steps involved in planning for capital expenditure:

- i. Determination of key investment factors: These factors are the demand, hence sales for product/services and the costs of production to give the cash flow, cash outflow etc.
- ii. Selection of an appropriate techniques of appraisal e.g. NPV, IRR etc

- iii. Source of finance
- iv. Evaluation of risk and uncertainty
- v. Consideration of specific problems such as liquidity, tax implications, and the effect of the proposed investment on the total investment strategy of the firm.

3.4.2 Control

The instruments for controlling capital expenditure are:

- i. **Capital expenditure Committee:** Some large organizations have a committee which is charged with the responsibility of initial screening of capital expenditure requests and recommend to the M.D. for approval.
- ii. **Board of Directors:** With the exception of private companies, it is usual to limit the managing Directors authority to incur capital expenditure to a certain amount and any amount above this referred to the Board for approval.
- iii. **Budgetary control:** Capital expenditure budget should be prepared for all approved projects.
- iv. **Forms:** Two types of forms may be designed to assist in the control. One is the authorization request which should detail the following among others:
 - a) Description of the project
 - b) Purpose of expenditure
 - c) Estimated cash inflows and cost saving's
 - d) Estimated capital cost
 - e) Whether new or replacement of existing assets
 - f) Classification by asset

The other form should be the cost sheet for accumulation of costs and comparison with the approvals.

SELF ASSESSMENT EXERCISE

- i. Define capital budgeting
- ii. Discuss the factors to be considered in capital budgeting
- iii. Explain steps in capital budgeting

4.0 CONCLUSION

Capital budgeting has been explained and attempt made to advance its importance in long term financial planning. The steps involved were discussed. Capital budgeting was discussed to involve huge capital expenditure that need to be adequately planned for and control to

achieve optimality in corporate objective of profit making. Methods of evaluating the capital expenditure and their detail computation and analysis shall be treated in unit 5.

5.0 SUMMARY

In this unit, you have learnt the basis of capital budgeting. Specifically, the need for it, its planning and control mechanism and the introductory aspect of the evaluation methods. This unit attempt to lay foundation for the understanding of unit 5.

6.0 TUTOR - MARKED ASSIGNMENTS

1. Explain steps in capital budgeting
2. Explain the steps involved in planning and control of capital expenditure.

7.0 REFERENCES /FURTHER READINGS

Kurfi, A.K (2003). *Principles of Financial Management*, Kano: Benchmark Publishers Limited.

Olowe, R. A. (1997). *Financial Management: Concepts, Analysis and Capital Investments*, Lagos, Briefly Jones Nig Limited.

UNIT 2 CAPITAL BUDGETING INVESTMENT APPRAISAL 1

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Definition of Investments
 - 3.2 Types of Investment
 - 3.3 Objectives of Investment appraisal
 - 3.4 Investment appraisal techniques
 - 3.5 Traditional Methods of Investment appraisal
 - 3.5.1 Payback Period
 - 3.5.2 Accounting Rate of Return (ARR)
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignments
- 7.0 References/Further Readings

1.0 INTRODUCTION

In unit 4, you have learnt the concept of capital budgeting. In this unit, techniques of investment appraisal shall be discussed. We shall look at the traditional method now and discounted cash flow methods in unit 6.

2.0 OBJECTIVES

By the end of this unit, you should be able to:

- Identify types of projects
- States traditional method of investment appraisal and its computational process.
- Offer advice on the choice of investments based on the analyzed data.

3.0 MAIN CONTENT

3.1 Definition of Investment

Investment is the commitment of capital to project or venture with a view for profit. Examples includes: the purchase of stocks, shares or bond, building, purchase of cars, taking a life insurance, bank deposit, etc. its basic feature is that, its usually involves initial large outflow of cash and streams of income thereafter over the useful life of the project or venture.

3.2 Types of Investment

Investments can be classified variously, but the common criteria are:

- i. Variability of income
 - ii. Relationship of the investments.
- a. **Classification Based on Variability of Income:**
Under this, investment can be classified as fixed income or variable income investments.
- i. **Fixed Income Investment:**
Investments that fall under this category are those whose streams of income are fixed irrespective of performance of the issuing institution. The expected rate of return is constant and is computed on the value of funds committed. Example is investment in corporate debenture stock.
 - ii. **Variable Income Investment:**
Under this classification, the return or income depends on the fortunes of the issuing institutions. Where the performance is high the investor earns higher return and vice versa
- b. **Classification based on relationship of / between the Investments.**

Under this, investments can be classified into:

- i. **Mutually Exclusive Investments**
Mutually exclusive investments are those that serve the same purpose and compete with each other. If a firm accepts one, others have to be ruled out. An example of this kind of project would be the need to transport supplies from a loading dock to the warehouse. The firm may be considering two proposals: a conveyor belt connecting the dock and warehouse, or forklifts to pick up the goods and move them. If the firm accepts one proposal it precludes the acceptance of the other.
- ii. **Independent Projects**
Independent projects are projects that serve different purposes and do not compete with each other. For example; a firm having surplus resources for investment may decide to expand its existing facilities to enlarge its market for the existing products or it may decide to diversify into another line of business entirely different from its current market or products. Depending on the

feasibility profitability and availability of funds, the firm can undertake both projects.

iii. Contingent or Dependent Project

Dependent or contingent projects are projects whose choice of one project necessitates undertaking one or more other projects. For example if a firm decides to buy a new machine like computer it has to buy other peripheral devices that are compatible with that model of computer machine such as the cursor, the printer etc.

3.3 Objectives of Investment Appraisal

Investment appraisal serves three main objectives and there are as follows:

- To present important facts on returns and risk
- To arrive at a conclusion on safety and attractiveness of a given investment
- To determine the extent to which the investments meet the objective of a firm/investors.

3.4 Investment Appraisal Techniques

Once the necessary information has been collected there, is need to evaluate the attractiveness of the various investment proposals under consideration. Several evaluation techniques had been developed or used in assessing economic worth of projects. These techniques can be classified into two categories as follows:

1. Traditional Techniques or Non-discounted cash flow criteria, under which we have two methods:
 - (i) Pay Back Period (PBP), and
 - (ii) Accounting (or Average) Rate of Return (ARR).
2. Modern techniques or Discounted Cash flow criteria, under which we have four methods:
 - (i) Net Present Value (NPV),
 - (ii) Internal Rate of Return (IRR),
 - (iii) Profitability Index (PI), and
 - (iv) Discounted Payback Period (DPBP).

In this unit we shall discuss the first classification – Traditional or non – discounted cash flow techniques, and the second classification - Modern techniques or Discounted Cash flow techniques – in the next unit.

3.5 Traditional Method of Investment Appraisal

Traditional investment appraisal techniques are referred to as such because they do not incorporate the concept of time value of money in their analysis. They assume that the value of money remains constant all the time; as such they treat future and past flows as the same with the present value of cash flows. The traditional methods of investment appraisal are basically two:

- i. The pay back period (PBP) and
- ii. Accounting rate of return (ARR)

3.5.1 Payback Period

The payback period is the length of time required to recover the cost of investment from the net cash flows it generates; thus, it is the period needed for an investment to pay for itself. Payback is commonly used as a screening method for evaluating projects as a rough measure of liquidity and that of profitability.

$$\text{PBP is given by} = \frac{\text{Initial Cost of Investment}}{\text{Annual net cash flows.}}$$

The above formula for PBP is only applicable where the annual net cash flows are uniform.

Example One

Bellan LTD is considering investing in a project that requires an initial outlay of N300,000 with 5 years life span and promises net cash inflows of N 115,000 per annum, and the required rate of return or cost of capital for the firm is 10 percent.

Required

Determine the PBP of the project for the firm.

Suggested Solution

$$\text{PB P} = \frac{300,000}{115,000} = 2.61 \text{ years}$$

But when the annual cash flows are not uniform, we determine the PBP by cumulating the cash inflows until we reach the initial outlay (i.e., the cost of the investment).

Example Two

Consider the following data pertaining to an investment opportunity Niger Com Ltd

- (a) Initial cost of investment N150, 000.
- (b) Expected net cash flows:

<u>Year</u>	<u>Amount</u>
1	N 30,000
2	N 40,000
3.	N 40,000
4.	N 50,000
5.	N60,000

- (c) Corporation's cost of capital: 13 percent.

Required

Determine the PBP of the investment opportunity for the corporation.

Solution

<u>Year</u>	<u>Cash Flows</u>	<u>Cumulative Inflows</u>
0	(N150,000)(a)	
1	30,000	30,000
2	40,000	70,000
3(b)	40,000	110,000 (C)
4	50,000 (d)	160,000
5	60,000	220,000

Note: $PBP = b + \frac{(a-c)}{d} = 3.8 \text{ years}$

Where

a=Initial Cost of investment

b=Common

c=

d=

d

$$= 3 + \frac{(150,000 - 110,000)}{50,000}$$

$$= 3 + \frac{40,000}{50,000}$$

$$= 3 + 0.8 = 3.8$$

$$= 3 + 0.8 = 3.8$$

PBP = 3.8 years or 3 years 10 months approx

Steps:

1. Accumulate the cash flows occurring after the initial outlay in a cumulative inflows' column.
2. Look at the cumulative in flows' column and note the last year (a whole figure) for which the cumulative total does not exceed but is closer to the initial outlay. In our example that would be year 3.
3. Compute the fraction of the following year's cash in flow needed to 'payback' the initial cash outlay as follows: take the initial outlay minus the cumulative total from step 2, and then divide this amount by the following year's cash inflow. For our example, we have (N150,000-N110,000)
- 4 To get the payback period in years, take the whole figure determined in step •2, and add to it the fraction of a year determined in step 3. Thus, our payback period is 3 plus 0.8 or 3.8 years

Decision Rule for PBP

If the calculated payback period is less than an organization's target payback period, the proposal is accepted; if not, it is rejected. For mutually exclusive projects, the project with the shorter payback period will be selected provided the payback period of that project is less than an organization's targeted payback period.

Advantages of PBP

- i. It is simple to operate and easy to understand.
- ii. It shows how soon the cost of purchasing an asset will be delivered.
- iii. Because the method considers only The years in which cost is secured, estimates are not based on very long periods of time and so tend to be relatively more accurate than other methods in which the total life of the asset is considered,
- iv. This short term approach reduces loss through obsolescence,
- v. It is a measure of liquidity and very appropriate when there is shortage of cash.

Disadvantages

- i. It does not measure profitability; rather it measures the break even point.
- ii. It stresses the importance of converting capital into cash, which may be unimportant in assets with a long working life.
- iii. There is no consideration of the time value of money
- iv. It does not consider the return on capital investment

- v. It does not consider the fact that profits from different projects may accrue uneven rate,
- vi. It is subjective in determining the company's target payback period

3.5.2 Accounting Rate of Return (ARR)

ARR is the ratio of average annual profits after depreciation of the capital invested. The profits may be before or after tax. ARR shows the relative profitability in individual projects.

There are several definitions of ARR, but the most widely used definition is:

$$\text{ARR} = \frac{\text{Average Annual Profits}}{\text{Average Investment}} \times 100$$

There are variations as to what constitutes average annual profits in practice. Some firms show average annual profit after deduction of tax, whereas some firms show theirs before deducting tax. For our illustrations in this course material, we will show both ARR before tax and ARR after tax. But in a situation where tax information is not given, we will take average annual profits before tax. Average profits are found by first adding the total profits over the duration of the project and then divide by the number of years of the project's life

With regards to the average investment, the most widely used definition is the average of the opening investment (cost of the project) and closing investment (residual value). Mathematically it can be stated as:

$$\text{Average Investment} = 1/2(\text{Opening Investment} + \text{Closing Investment}).$$

Example Three

Sauki (Nigeria) Limited is considering an investment proposal that has the following data available:

- (a) Initial cost of investment: N140,000
- (b) Life span: 5 years
- (c) Residual value: N15,000
- (d) Estimated future profits before depreciation and tax are as follows:

<u>Amount ₦</u>	
Year 1	30,000
2	35,000
3	40,000
4	50,000
5	60,000

- (e) Assuming a straight line method of depreciation, a tax rate of 40% and the company's required rate of return of 15%.

Required

Determine the ARR of the proposal, and advice the management of the company appropriately.

Suggested solution

$$\text{Annual depreciation} = \frac{\text{N}140,000 - 15,000}{5 \text{ years}} = \text{N}25,000 \text{ p.a.}$$

	Years				
	1	2	3	4	5
	₦	₦	₦	₦	₦
Net profit before deprec. & tax	30,000	35,000	40,000	50,000	60,000
Less depreciation	<u>25,000</u>	<u>25,000</u>	<u>25,000</u>	<u>25,000</u>	<u>25,000</u>
Profit before Tax (PBT)	5,000	10,000	15,000	25,000	35,000
Tax @ 40%	<u>(2,000)</u>	<u>(4,000)</u>	<u>(6,000)</u>	<u>(10,000)</u>	<u>(14,000)</u>
Profit after tax (PAT)	3,000	6,000	7,000	15,000	18,000

Therefore:

$$\text{Average annual profit after tax} = \frac{3,000 + 6,000 + 7,000 + 15,000 + 18,000}{5 \text{ years}} =$$

$$\frac{\text{N}49,000}{5} = \text{N}9,800$$

$$\text{Average investment} = \frac{\text{N}140,000 + 15,000}{2} = \frac{\text{N}155,000}{2} = \text{N}77,500$$

$$\text{ARR} = \frac{\text{N}9,800}{77,500} \times \frac{100\%}{1} = 12.65\%$$

The management of the company is advised to reject the proposal because it will promise them an ARR of 12.65% after tax, which is less than their required rate of return of 15%.

However to determine the ARR before tax, we will take the total profit after depreciation before taxation and divide by the number of years for the project life span to get the average annual profits after depreciation;

then we will divide that by the average investment to get our ARR. This can be illustrated as follows:

Average annual profits after depreciation = $(N90,000/5) = N18,000$

Average investment over 5 years = $(N155,000)/2 = N77,500$

$$\therefore \text{ARR} = (N18,000) / 77,500 \times 100 = 23.2258\%$$

The management of the company should accept the proposal because the ARR before taxation is even greater than the company's required rate of return of 15%.

Decision Rule for ARR

This method will accept all those projects whose ARR is higher than company's required rate of return or cost of capital. And for mutually exclusive projects, the one with the highest ARR would be selected provided the project has an ARR higher than the company's required rate of return.

Advantages of ARR

1. It is simple to use and easy to understand.
2. It is determined using accounting information, which is always available.
3. It considers the total profits of a project throughout its operating life.
4. It is consistent with the return on investment measure used to compare divisional performance in many companies.
5. It provides a conservative measure of profitability.

Disadvantages of ARR

1. It ignores time value of money.
2. It is based on accounting information rather than cash flows.
3. There is no universally accepted method of calculating ARR.
4. It fails to consider the fact that money can further be reinvested.
5. It is in line with the traditional view of maximization of profit as the overall objective of business enterprises thereby forgetting about an important measure, which is that of wealth maximization.
6. It does not consider that projects may have different life span.
7. It does not consider the size of the investment.
8. It ignores the fact that profits from different projects may accrue at an uneven rate.

4.0 CONCLUSION

A traditional method of investment appraisal – The Pay Back Period (PBP) and Accounting rate of return (ARR), was discussed and their computational processes explained. The techniques has been identified as among the tools that could be used to determine the choice of project to undertaken, despite identified limitations

5.0 SUMMARY

In this, unit, attempt have been made to describe how payback period (PBP) and Accounting rate of return (ARR), could be applied to viability of projects proposed to be undertaken. Other techniques shall be discussed in unit 6.

6.0 TUTOR - MARKED ASSIGNMENTS

Sa'achi enterprises are considering investment in projects with the following data.

- (a) Initial cost Project A: N500,000, Project B: N450,000
- (b) Expected net cash flows:

Year	Project A Amount (N)	Project B Amount (N)
1	130,000	120,000
2	140,000	230,000
3	210,000	110,000
4	150,000	100,000
5	100,000	120,000
6	120,000	110,000

- c. Cost of capital of the company is 12% and tax rate of 25%

Required:

Advice the management of Sa'achi Enterprises which Project it should accept using:

1. Pay back period (PBP)
2. Accounting/average rate of return (ARR)

7.0 REFERENCES/FURTHER READINGS

Olowe, R. A. (1997). *Financial Management: Concepts, Analysis and Capital Investments*, Lagos, Briefly jones Nig Limited.

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Weston, J. F. and Brigham, E. F. (1985). *Essentials of Managerial Finance*, New York, Dryden press.

UNIT 3 CAPITAL BUDGETING – INVESTMENT APPRAISAL II

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
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- 3.1 Discounted cash flow techniques of investment appraisal
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1.0 INTRODUCTION

You have learnt how to appraise investment proposals using pay back period (PBP) and Accounting rate of return (ARR) – The traditional techniques in unit 5. This unit is a continuation and in it, we shall demonstrate how investments can be appraised using discounted cash flow (DCF) techniques

2.0 OBJECTIVES

By the end of this Unit, you should be able to understand:

- Explain discounted cash flow techniques of investment appraisal and the computational process.
- Advice on the choice of investment based on the computations made.

3.0 MAIN CONTENT

3.1 Discounted Cash Flow Techniques (DCF) of Investment Appraisal

These are referred to as modern techniques because they do incorporate the modern concept of time value of money. They assume that money does not have the same value all the time. They postulate that cash-flows arising at different time periods differ in value and are comparable only when their equivalents present values are found out.

3.1.1 Net Present Value (NPV)

The NPV method involves calculating the present values of expected cash inflows and outflows (i.e., the process of discounting) and establishing whether in total the present value of cash inflows from a given project is greater than the present value of cash outflows of the project. The NPV is the value obtained by first discounting all future cash-flows from a capital investment project at a chosen discount rate which is normally the cost of capital or required rate of return of a company and then subtracting the initial cost of the project. Mathematically, the Net Present Value (NPV) is given as follows:

$$NPV = \sum_{n=1}^n \frac{A_i}{(1+r)^i} - I_o$$

Where:

A_i	= Annual cash inflow
I_o	= Initial investment
r	= Discount factor

Example One

Kawu Ltd. is considering a capital investment proposal costing N1,500,000. The corporation's cost of capital is 12%. And the estimated cash flows from the Proposal are given as follows:

Years	1	= N400,000
	2	=N600,000
	3	=N900,000
	4	=N800,000
	5	=N200,000

$$\begin{aligned}
 NPV &= \frac{400,000}{1.12} + \frac{600,000}{1.12^2} + \frac{900,000}{1.12^3} + \frac{800,000}{1.12^4} + \frac{200,000}{1.12^5} - 1,500,000 \\
 &= 357142.86 + 478316.33 + 640602.22 + 508414.46 + 113485.37 \\
 &= 2097961.24 - 1500000 \\
 &= \underline{\underline{N597,961.24}}
 \end{aligned}$$

Alternatively the solution could be presented in tabular form, and slight modification can be made to the NPV formula with 't' starting from year 0 to year n. As such cash outflows (e.g. an initial outlay) represent negative cash flows, whereas cash inflows represent positive cash flows. The formula for NPV would now be as follows:

$$NPV = \sum_{n=1}^n \frac{A_i}{(1+r)^i} - I_o$$

Solution in Tabular Form

year	Cash flow	DCF at 12%	Present
------	-----------	------------	---------

0	(1500,000)	1.0000	(N1,500,000)
1	400,000	0.8929	357160
2	600,000	0.7972	478320
3	900,000	0.7118	640620
4	800,000	0.6355	508400
5	200,000	0.5674	<u>113480</u>
		NPV =	<u>597980</u>

The difference of N18.76 compared with the first solution is due to an approximation of the discount factors. But this alternative presentation is best recommended.

The management of Kawu Ltd is advised to accept the proposal because it has a positive NPV.

Decision Rule in NPV

- If the NPV is positive, the project should be accepted.
- If the NPV is negative, the project should be rejected.
- If the NPV is exactly zero the project will be just worth undertaking. Or mutually exclusive projects, we select a project that has the highest NPV.

Advantages of NPV

1. It takes appropriate care of time value of money and timing of cash flows.
2. It is based on the modern business objective namely maximization of shareholders' wealth.
3. It employs the use of cash flows rather than profit, cash flows are much more objective than profits which is very much subjective because of certain elements such as depreciation.
4. It is very crucial in ranking projects.

Disadvantages of NPV

1. Discounting cash flows is not as easy as thought especially to some of our laymen investors who are in majority in our society.
2. It necessarily calls for the calculation of the cost of capital, which is not easy, and so enhancing more uncertainty in the method.
3. It wrongly assumes that all shareholders are much more concerned with cash flows than with high profits which may not be true in all cases.
4. It has problems in ranking projects that have different costs and different benefits.

5. To simplify the calculations involved we incorporate some impractical assumptions such as doing away with inflations and taxation.

3.1.2 Internal Rate of Return (IRR)

The IRR is defined as the discount rate used to make the discounted cash inflows equal to its initial cash outflows (that is, the NPV is equal to zero). IRR can be found using the following formula.

$$\text{IRR} = \text{LR} + (\text{HR} - \text{LR}) \times \frac{\text{NPV LR}}{\text{NPV HR} - \text{NPV LR}}$$

Where: LR = Lower discount rate that gives positive NPV
 HR = Higher discount rate that gives negative NPV
 NPV LR = Net present value at lower discount rate
 NPV HR = NPV at higher discount rate

Example Two

Doko Limited is considering a capital investment project costing N560,000. The project will generate future cash flows as follows.

<u>Year</u>	<u>Cash flow</u>
1	N1 70,000
2	N1 80,000
3	N200,000
4	N250,000
5	N1 60,000

Doko's cost of capital is 15%.

Required

Advice the management of Doko Limited appropriately on whether to undertake the project or not, using IRR techniques.

Solution

Let us first find the NPV of the project by using the company's cost of capital 15%.

Year	Cash flow	DCF At 15%	PV
0	(N560,000)	1.0000	(N560,000)
1	N1 70,000	0.8696	N147,832
2	N1 80,000	0.7561	N136,098
3	N200,000	0.6575	N131,500
4	N250,000	0.5718	N142,950
5	N1 60,000	0.4972	N 79,552
		NPV = N 77.932	

As the NPV is positive at 15%, the IRR must be higher than 15%.

Let us try 24% to get a negative NPV:

Year	Cash flow	DCF At 24%	PV
0	(N560,000)	1.0000	(N560,000)
1	N1 70,000	0.8065	N137,005
2	N1 80,000	0.6504	N117,072
3	N200,000	0.5245	N104,900
4	N250,000	0.4230	N105,750
5	N1 60,000	0.3411	N 54,576
		NPV = (40597)	

With DCF of 24% the NPV is negative. This means that the IRR of the project lies between 15% - 24%. Going by the formula, we can calculate the IRR as follows (we have to follow the rule of BODMAS in our calculations)

$$\begin{aligned} \text{IRR} &= 15 + (24-15) \left(\frac{77,932}{77,932 - (-40,597)} \right) \\ &= 15 + (9) (0.6575) = 20.92\% \end{aligned}$$

The management of Doko Limited is advised to accept the project because it has an IRR of 20.92% which is greater than the company's required rate of return or cost of capital.

Decision Rule for IRR

If the IRR exceeds the firm's cost of capital or required rate of return, the project will be accepted.

If the IRR is less than the cost of capital, the project should be rejected.

If the IRR is equal to the firm's cost of capital, the project will just be worth undertaking.

For mutually exclusive projects, we select a project with a higher IRR provided the IRR of that project is higher the firm's cost of capital.

Advantages of IRR

1. It is easy to be appreciated by a layman.
2. It makes a provision for a margin of error, which is not well taken care of by even NPV.
3. It enjoys almost all the advantages of an NPV method.

Disadvantages of IRR

1. An investment may have more than one IRR.
2. It is by no means easy to be calculated or determined.
3. It is very difficult and sometimes impossible to choose between alternative investments projects using IRR.

3.1.3 Profit Ability Index (PI)

When the NPV method is used to evaluate capital expenditures, all projects with positive NPVs are acceptable. Managers, however, usually face two conditions that complicate the evaluation of NPV results:

1. The various project proposals being considered have different costs and of course different benefits; and
2. The firm does not have sufficient funds to invest in all the projects available

Therefore, an extension of the NPV method, called profitability index (PI) be used to ensure that a firm uses its limited resources for investments with the highest returns possible. That is, it is used to prioritize investment opportunities in terms of their expected profitability. The PI method is not normally used appraising projects because it will yield the same decision with the method. However, PI is more useful in a situation of capital rationing, which will discuss in the next segment of this unit.

Profitability Index (PI), which is also called benefit cost ratio, is determined dividing the net present value of future cash flows by the initial outlay.

Mathematically PI is written as follows:

$$\text{Profitability Index (PI)} = \frac{\text{NPV}}{I_0}$$

Where NPV = Net present value of investment
 I_0 = Initial investment/cash outlay

Example Three

Kpanje Ltd is contemplating investing in a project proposal that requires an initial outlay of N400,000, which promises the following cash flows for the next five years:

Year	Cash flow
1	N100,000
2	N120,000
3	N110,000
4	N110,000
5	N100,000

The corporation's required rate of return or cost of capital is 10%;

Required

Determine the profitability index of the project and advice the management of Maslaha appropriately.

Solution

First we have to calculate the NPV of the project:

Year	Cash flow	DCF at 10%	Present value (P)
0	(N400,000)	1.0000	(N400,000)
1	N100,000	0.9091	N90910
2	N120,000	0.8264	N99168
3	N110,000	0.7513	N 82643
4	N110,000	0.6830	N75130
5	N 100000	0.6209	N62090
			NPV = N 9941

$$\text{Profitability Index (PI)} = \frac{\text{NPV}}{I_0} = \frac{9941}{400,000} = 0.02486$$

The management of Kpanje is advised to accept the proposal because it has a positive PI (0.02486).

Decision Rule for PI

If the PI is positive which means the NPV is positive the project should be accepted, but when the NPV is negative which means the PI is less than zero, the project should be rejected.

In ranking projects and for selection among mutually exclusive projects the project with the highest PI should be ranked first, and it should be the one to be selected.

Advantages of PI

1. Almost all the advantages of NPV method could be ascribed to PI method.
2. It is more useful in ranking projects and for capital rationing.
3. It is easily appreciable by a layman.

Disadvantages of PI

1. Almost all the disadvantages of NPV method could be ascribed to it.
2. It cannot be used for project appraisal without the NPV rule.

3.1.4 Discounted Payback Period

It was pointed out earlier that the traditional payback method is a breakeven concept. But such a breakeven period is not accurate because the cost of capital is ignored. If we borrowed money to invest in a project, then the interest paid on the loan is ignored by the traditional payback method. Another drawback pointed out was the isolation of the time value of money. The discounted payback method overcomes these two shortcomings by incorporating discounting into the payback calculation. It is the discounted into cash flows which is used in calculating the payback period.

Example Four

Rakiya Limited is considering an investment opportunity that requires an initial outlay of N250,000 and it promises the following cash flows:

<u>Cash flow</u>
N 80,000
N100,000
N90,000
N 80,000
N 70,000

The company's cost of capital is 12%.

Required

Calculate the discounted payback period of the project and advice the management of the company accordingly.

Solution

Year	Cashflow N	DCF at 12%	PV	Cumulative PV(N)
0	(250,000) a		-	-
1	80,000	0.8929	71,432	71,432
2	100,000	0.7972	79,720	151,152
3(b)	90,000	0.7118	64,062	215,214(c)
4	80,000	0.6355	50,840	266,054
5	70,000	0.5674	39,718	305,772

$$\begin{aligned}
 \text{Note: DPBP} &= b + \frac{(a-c)}{d} \\
 &= 3 + [(250,000 - 215,214)] / 50,840 \\
 &= 3 + 0.68
 \end{aligned}$$

DPBP = 3.68 years or 3 years 8 months approx

Depending on the targeted payback period of the company, for instance if the target payback period of the company is 4 years, the management should accept the projects that will payback itself in less than 4 years (i.e., 3.68 years).

Note: The decisions rules for DPBP are the same with the non-discounted PBP, and also all the advantages and disadvantages of the non-discounted PBP could be ascribed to the DPBP. But one more advantage of DPBP is the incorporation of the time value of money into the analysis. And generally the DPBP takes longer time to payback than the non-discounted PBP because of the smaller values of the discounted future cash flows compared to the non-discounted future cash flows:

SELF ASSESSMENT EXERCISE

- Discuss the merits and demerits of various discounted cash flow techniques.
- Enock Ltd is considering the selection of one of the pair of mutually exclusive investment projects. Both would involve purchases of machinery with a life of five years.

Project A would generate annual cash flows (receipts less payments) of =N=200,000, the machinery would cost =N=600,000.

Project B would generate annual cash flows of =N=500,000, the machinery would cost =N=1,600,000.

Enock Ltd uses straight-line method for providing depreciation. Its cost of capital is 15% per annum. , Assume that annual cash flows arise on the anniversaries of the initial outlay, that there will be no price changes over the project lives and that acceptance of one of the project will not alter the required amount of working capital.

You are required to:

- (a) Calculate for each project:
 - (i) The payback period in one decimal place.
 - (ii) The accounting rate of return (ARR)
 - (iii) The net present value (NPV)
 - (iv) The internal rate of return (IRR) to the nearest percent.
- b) State which project you would select for acceptance.

4.0 CONCLUSION

Discounted cash flow methods of investments were explained. NPV, DPBP and PI computational process were demonstrated as well as the criteria of their use in the choice of the projects to undertake.

5.0 SUMMARY

This unit is a continuation of unit 5 and discussed the discounted cash flow techniques of investment appraisal. We assumed also in this unit that cash flows are certain and this may not be obtainable in practice. In unit 7 we shall discuss the impact of risk and uncertainty on investment appraisal.

6.0 TUTOR - MARKED ASSIGNMENTS

Mohammed plc, is considering two mutually exclusive project which have the following cash flow profile:

	Project A =N=	Project B =N=
Initial outlay	2,000,000	2,050,000
Estimated future cash flows		
Year 1	800,000	750,000
Year 2	820,000	780,000
Year 3	850,000	900,000
Year 4	860,000	950,000

The company's cost of capital is 15%.

Required: Advise the company on the project to select using:

(1) NPN. (2). IRR. (3). Profitability Index

7.0 REFERENCES/FURTHER READINGS

Olowe, R. A. (1997). *Financial Management: Concepts, Analysis and Capital Investments*, Lagos, Briefly Jones Nig Limited.

Omolehinwa, A. (2001). *Work out Corporate Finance* 2nd ed, Lagos: panaf publishing

UNIT 4 CAPITAL BUDGETING – INVESTMENT APPRAISAL III

CONTENTS

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- 3.0 Main Content
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 - 3.2 Risk analysis in capital budgeting
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignments
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1.0 INTRODUCTION

Units 2 and 3 discussed traditional and discounted cash flow techniques of investment appraisal, which we expect that you have understood. This unit would discuss capital rationing and risk analysis in investment appraisal. Issues discussed in unit 5 and 6 assume consistency in risk in and sufficiency of fund for investments, that in practice is not always applicable.

2.0 OBJECTIVES

By the end of this unit, you should be able to:

- Explain best ways of rationing limited investible fund among viable investments.
- Explain the technique of estimating risk in investments.
- State the implication of risks on investment appraisal.

3.0 MAIN CONTENT

3.1 Capital Rationing

Ordinarily firms take on investments to the point where the marginal returns from the investments are just equal to their estimated marginal cost of capital. However, firms may have to choose among profitable investment opportunities because of their limited financial resources. Capital rationing refers to a situation where a firm is constrained for external or internal reasons to obtain necessary funds to invest in all available investment projects that have positive net present values. It is a situation in which a firm is unable to undertake all projects, which are apparently profitable because of a limited amount of funds, as such

projects have to be prioritized and ranked in order of benefit or maximum returns possible from each.

External capital rationing mainly occurs on accounts of the imperfections in the capital market, such as deficiencies in market information or rigidities of attitude that hamper the free flow of capital. External capital rationing is caused by factors outside the control of management of an enterprise. Such factors include:

- Depression of share price in the stock market making, it impossible to raise money through the stock market.
- Restrictions on bank lending due to government controls.
- High floatation costs in the stock market making it expensive to make issues of capital.
- Attitude of the capital market about providing funds beyond a specific amount because it would lead to increased risks of high bankruptcy costs - so high those feasible interest rates would not be adequate compensation. For instance, a bank might consider a firm too risky to be given any more loan capital even at a very high interest rate (Olowe, 1997).

Internal capital rationing is caused normally by self-imposed restrictions by the management. The management may decide not to obtain additional funds by incurring debt or not issuing additional stocks for the fear of dilution of ownership. Also management may fix a limit to the amount of funds to be invested by divisional managers for control reasons or other reasons. And sometimes management may resort to capital rationing by requiring a minimum rate of return higher than the cost of capital.

Example One

Assume a firm that is having 20% as its required rate of return is faced with the following investment opportunities:

Project	Initial cash outflow	IRR	NPV	PI
A	N1 50,000	23%	N27,000	0.18
B	N300,000	25%	N50,000	0.17
C	N450,000	21%	N1 75,000	0.39
D	N1 50,000	29%	N35,000	0.23
E	N200,000	18%	(N28,000)	(0.14)
F	Nil 0,000	30%	N27,500	0.25
G	N1 00,000	27%	N25,000	0.25
H	N 65,000	24%	N19,300	0.30

I	N3 50,000	19%	(N2 1,000)	(0.06)
J	N 90,000	28%	N18,700	0.21
K	N2 10,000	17%	(N22,250)	(0.11)

The budget ceiling for initial cash outlays during the period is N965,000 and proposals are independent of each other, you would want to select the combination of proposals that provides the greater increase in the firm value that 35,000 (or less) can provide. But automatically excluding proposals E, I and because their IRRs are less than the hurdle rate of the firm, i.e., 20%, which the required rate of return; and that is why they are having negative NPVs and therefore, selecting projects in descending order of profitability according to the various discounted cash flows methods we discussed until N965,000 budget is exhausted reveals the following.

Using IRR Criteria

Project	IRR	NPV	Initial outflow
F	30%	N27,500	N110,000
D	29%	35,000	150,000
J	28%	18,700	90,000
G	27%	25,000	100,000
B	25%	50,000	300,000
H	24%	19,300	65,500
A	23%	27,000	150,000
		N202,500	N965,000

Using NPV criteria

Project	NPV	Initial outflow
C	N175,000	N450,000
B	50,000	300,000
D	35,000	150,000
H	<u>19,300</u>	<u>65,000</u>
	N279,300	N965,000

Using PI criteria

Project	PI	NPV	Initial outflow
C	0.39	N175,000	N450,000
H	0.30	19,300	65,000
F	0.25	27,500	110,000
G	0.25	25,000	100,000
D	0.23	35,000	150,000
J	0.21	<u>18,700</u>	<u>90,000</u>
		N300,500	<u>N965,000</u>

With capital rationing, you would accept projects C,D,F,G,H and J, totaling | N965,000 in initial out flows. No other mix of available projects will provide J greater total net present value than the N300.500 that these projects provide. This has buttressed the superiority of PI in ranking of projects in terms profitability. And because of budget constraint, you cannot necessarily invest • all proposals that increase the net present value of the firm; you invest in acceptable proposal only if the budget constraint allows such an investment.

3.2 Risk Analysis in Capital Budgeting

Uncertainty is a major factor to be considered in all types of decision making. It is of particular important in investment appraisal because of the long time scale and amount of resources involved in a typical investment decision.

Risk is generally defined as the possibility of suffering, damage or loss. Certainty is a situation where one has full knowledge of future occurrence of an event; while uncertainty is the reverse.

Thus, the riskiness of an asset is defined in terms of likely variability of future returns of the asset. The more variable the expected future returns, the more risky the investment

In general, risky or uncertain projects are those whose future cash flows, and hence the returns on the projects, are likely to be variable - the greater the variability, the greater the risk. Unfortunately, elements of uncertainty can exist even if future cash flows are known with certainty. For example, if a lease is being appraised the future cash flows are known and fixed but their value may vary because of changes in the rate inflation.

The greater risk of a proposed project then greater the required rate of return or cost of capital.

There are three stages of the overall appraisal and decision process in which risk and uncertainty merit special attention:

- a. The risk and uncertainty associated with the individual project.
- b. The effect on the overall risk and uncertainty of the firm when the project being considered is combined with the rest of the firm's operation,
- c. The decision maker's attitude to risk and its effect on the final decision.

The following are the most common measures of risk of individual projects.

(1) Standard Deviation:

The traditional approach utilizes the measure of the tightness of the probability distribution of a project returns to determine the risk of the project. This measure of tightness that is used is the standard deviation. The tighter the probability distribution, the smaller the standard deviation and the less risky the project.

(2) Coefficient of Variation:

When we divide the standard deviation by the mean, or the expected value of net cash flow, we obtain the co-efficient of *variation*. Co-efficient of variation is a relative measure of risk. The co-efficient of variation is a useful measure of risk when we are considering projects that I have same standard deviations but different expected values, different standard deviations but same expected values, or different standard deviations and different expected values.

Whether a project should be accepted will depend upon the investor's attitude towards risk. An investor can accept a project, which has higher monetary value if he is ready to assume more risk. If he has a great aversion to risk, he would accept projects with less risk but with low monetary value. This is true because of the popular slogan in business finance, which says the higher the risk, higher the return.

Other techniques of measuring variability, which are also useful, include sensitivity analysis and decision tree.

A. Sensitivity Analysis.

This is a method of analyzing changes in the projects NPV for a given period in one of the variables. It forces the decision maker to identify underlying variables (e.g. factors of production), indicates critical variables and helps in strengthening the project by pointing out its weak links. Its limitations are that it cannot handle a large number of interdependent variables and some times it fails to give unambiguous results.

B. The Decision Tree Analysis.

A decision tree is a graphic display of the relationship between a present decision and future events, future decisions and their consequences. The sequence of events is mapped out over time in a format similar to the branches of a tree. In decision tree, after the investment proposal has been defined each alternative will have different consequences. The decision tree would be graphed indicating the decision points, changes, events, and other data. The relevant data such as the projected cash flows, probability distributions, the expected present values etc should be located on

the decision tree branches. And finally the results would be analysed and the best alternative would be selected. But for now we shall be more concerned with the first two measures of risk, i.e., standard deviation and coefficient of variation as they are the most popular tools of risk analysis.

Example Two

Suppose 2 investment proposals have the following probability distribution of expected cash flows:

Proposal A		Proposal B	
Probability (p)	Cash flow (X) ₦	Probability (P)	Cash flow (X) N
0.10	7,000	0.20	3,000
0.15	6,000	0.30	4,000
0.25	5,000	0.25	5,000
0.30	4,000	0.15	5,500
0.20	3,000	0.10	6,500

Required

- Calculate the expected value of the cash flows of each.
- Find the standard deviation of each.
- Find the coefficient of variation of each.
- Advice a prospective investor on which of the two proposals he should go for and why?

Solution

a) Expected value of cash flow: $\bar{A}_t = \sum_{t=1}^n A_{xt} P_{xt}$

b) Standard deviation: $\delta = \sqrt{\sum_{t=1}^n (A_{xt} - \bar{A}_t)^2 P_{xt}}$

c) Coefficient of variation: $C.V = \frac{\delta}{\bar{A}_t}$

Proposal A

Probability Px (1)	Cash flow A x (2)	E.V 1 x 2 = (3)	(2) – A _t Dev (4)	(4) ² = 5 Sq. Dev	(Ax – A _t) ² Px (5x1) = 6
	₦	₦	₦	₦	₦
0.10	7000	700	2350	5522500	552250
0.15	6000	900	1350	1822500	273375
0.25	5000	1250	350	122500	30625
0.30	4000	1200	(650)	422500	126750
0.20	3000	600	(1650)	2722500	544500
	A _t =	₦ 4650		δ ² =	<u>1527500</u>
				δ	₦ 1235.920

$$\text{Coefficient of variation (CV)} = \frac{\delta}{A_t} = \frac{1235.92}{4650} = 0.27$$

Proposal B

Probability Px (1)	Cash flow A x (2)	E.V 1 x 2 = (3)	(2) – A _t Dev (4)	(4) ² = 5 Sq. Dev	(Ax – A _t) ² Px (5x1) = 6
	₦	₦	₦	₦	₦
0.20	3000	600	(1525)	2325625	465125.00
0.30	4000	1200	(525)	275625	82687.5
0.25	5000	1250	475	225625	56406.25
0.15	5500	825	975	950625	142593.75
0.10	6500	650	1975	3900625	390062.5
	A _t =	₦ 4525		δ ² =	<u>1136875.00</u>
				δ	₦ 1235.920

$$\text{Coefficient of variation (CV)} = \frac{\delta}{A_t} = \frac{1066.247}{4525} = 0.24$$

Thus, if the investor is a risk averse, he should go for proposal B, because of its lower standard deviation and smaller coefficient of variation (i.e., less risky) but promising lower expected value of cash flow (i.e., lower return). On the other hand, if he is a risk lover, he would prefer proposal A, because it has a higher expected value of cash flow (i.e., higher return) but also has higher standard deviation and higher coefficient of variation as such more riskier.

In determining standard deviation of the net annual cash flows for a whole project life span, the standard deviation of the expected net present value has to be calculated. There are two formulae for calculating the standard deviation of the expected net present value; however, this depends on whether cash flows in each year are mutually independent or dependent.

4.0 CONCLUSION

The impact of capital limitation and risk and uncertainties on project appraisal was demonstrated, computed and explained.

5.0 SUMMARY

We have said that a business plan is a document that sets out what a business seeks to achieve and how it wants to do it. The management plan is a key aspect of a business and examines the management aspects of the business. It focuses attention on the staffing of an organization to enable it meet organization needs.

In the next unit, we shall discuss the marketing plan.

6.0 TUTOR - MARKED ASSIGNMENTS

1. What do you understand by the term “Capital rationing” as it relate to capital budgeting.
2. Discuss the common measure of risk in capital budgeting
3. Chechen Inc. that currently has a capital budget of N700,000 is considering the following projects that are independent.

Project	Cost (N'000)	Annual cash flow (N'000)
A	300	100
B	180	80
C	100	48
D	400	150
E	250	85

All project have a 5 year life with nil residual value. The company's cost of capital is 18%

Required:

Advice the company on the project to select assuming:

- i. Projects are divisible
 - ii. Projects are not divisible.
4. XYZ Ltd is considering an investment project costing N350,000.

The company has determined the following discrete probabilities for net cash flows generated by contemplated projects

Year 1		Year 2		Year 3	
Cash flows (N)	Probabilities	Cash flows (N)	Probabilities	Cash flows (N)	Probabilities
80,000	0.3	90,000	0.2	100,000	0.3
160,000	0.5	150,000	0.5	120,000	0.6
140,000	0.2	170,000	0.3	180,000	0.1

Assume a risk free rate of 10%, determine: a) The Expected NPV and b) Standard deviation of the project.

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UNIT 5 CAPITAL INVESTMENT ANALYSIS IN THE PUBLIC SECTOR

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Capital Budgeting Tool in Public Sector
 - 3.2 Cost Benefit Analysis
 - 3.3 Cost Benefit Analysis Process
 - 3.4 Evaluation of Cost Benefit Analysis and Project selection
 - 3.5 The cost of Capital used in Cost Benefit Analysis
 - 3.6 Risk Evaluation in Cost Benefit Analysis
- 4.0 Conclusion
- 5.0 Summary
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1.0 INTRODUCTION

In the previous units we emphasize only on the investing and financing decisions in the private sector. We shall in this unit, attempt to discuss capital investment analysis as it applies to public sector.

Unlike the private sector whose objective is always expressed in financial terms, the principal objective of a public sector enterprise might not necessarily be a financial one. Political and social considerations might take priority over a financial objective in the public sector. The government enterprises might be expected to provide certain standard or service to all customers at a charge well below its cost. The government might be prepared to subsidize the industry and accept losses from the industry, e.g., postal services. Thus, the approach to capital investment analysis, sometimes in the public sector might be different from that of the private sector. Cost-benefit analysis offers a better approach to analyzing projects in the public sector (Central Government, State Government and Local Government).

2.0 OBJECTIVES

At the end of the study of this unit, you should be able to:

- Explain the application of capital budgeting techniques in the public sector
- Describe the process of its application and its impact on governmental decisions.

3.0 MAIN CONTENT

3.1 Capital Budgeting Tool in Public Sector

In addition to other identified techniques in the previous units, Cost – Benefit Analysis (CBA) is the most widely used technique

3.2 Concept of Cost – Benefit Analysis

The analysis of public sector projects might be done using Cost-Benefit Analysis (CBA). Techniques CBA draws on the concept of capital budgeting discussed in previous units. In addition CBA is a sophisticated technique that incorporates a number of other issues such as environmental problems, opportunity costs and transfer prices. Thus, CBA is more subjective than the normal capital budgeting techniques especially as to the forecasting of future outcomes of proposed project. CBA attempts to take into consideration all the consequences that may arise from embarking on a project. For instance, if the government is considering setting up an oil refinery, a normal capital budgeting techniques might show that setting up the refinery is viable. However, CBA examines all consequences including; for instance, the effects the resources discharged may have on the environment (e.g. farming difficulties, health problems etc). The environmental problems constitute social cost and might be a major item in proposed project. Just like capital budgeting, CBA can be used in determining the viability of a project and selecting among alternative projects. In addition, CBA can be used to determine the time cycle that would be beneficial to the project. The costs and benefits of a project can be assessed in terms of cash flow or profit. However, cash flow preferable. Since the costs and benefits would be analyzed over a future period, it might be better to use discounted cash flow techniques.

3.3 Cost – Benefit Analysis Process

The following steps are involved in CBA.

- Establish the objectives and possible advantages of a proposed project
- Ascertain alternative solutions to the problem.
- Estimate and analyze the costs and benefits

The costs and benefits will be considered in a wider-spectrum. It will consider not only costs and benefits specific to the project but costs and benefits that may accrue to anyone outside the project. For instance, if the government builds an airport, in addition to the costs and benefits of building the airport, the ripple effect that will occur might include

reduction in road accidents, increase in commercial activities, tourist attraction, etc.

Cost and benefits include also the following:

- **Opportunity Costs:** Opportunities forgone because of the project.
- **Shadow prices:** this is the cost of obtaining an extra unit of a scarce resource. Shadow prices are used in CBA when resources are being transferred from one area to another. For instance supposing a skilled staff employed by the Ministry of Works is indifferent as to the project on which he is working. If he currently earns N70,000 per annum and he is offered N20,000 to transfer to a new project, the shadow price is N90,000 per annum.
- **Transfer payments:** this includes, for instance, subsidies and grants from a central government fund to a state or local government funds. It should be included in CBA. The costs and benefits will be forecasted over a future period for each alternative solution. Not only will monetary cost and benefits be forecasted but also social costs and benefits. However, the evaluation of social costs or benefits may be difficult or ever impossible. Any quantification of social costs or benefits is subjective, although it may serve as a guide to the decision making. Where it is not possible to quantify social costs or benefits, this fact should be brought to the attention of the decision maker who should be aware of all assumptions made in CBA study.

3.4 Evaluation of Costs and Benefits and Project Selection

This state involves evaluating the costs and benefits using various investment evaluation criteria. The following criteria are the most commonly used criteria.

- a) **Benefits/Costs Comparison:** this involves simply comparing the costs with the benefits. If the benefits exceed the cost, the project will be undertaken. This method does not take into consideration time value of money and as such, is not satisfactory. The method may lead to a wrong decision especially in selecting between mutually exclusive projects.
- b) **Benefits/Costs Ratio:** this is the ratio estimated benefits to estimated costs. If the greater than 1, the project should be accepted, otherwise, it should be rejected. This method does not take into consideration time value of money. However, it produces relative figures that allow for comparison between different projects. Benefits/costs ratios can be adapted to take into consideration time value of money. This involves computing a

profitability index of the project that is the ratio of present value of future cash inflow to the present value of cash outflows.

- c) **Discounted Cash flow techniques:** this includes the net present value and internal rate of return criteria. Both take into consideration time value of money and have been extensively discussed in previous units.

3.5 The Cost of Capital Used In Cost Benefit Analysis

Unlike the private sector, calculating a cost of capital for government organization might be difficult. Government institutions do not have a market value and most of them do not pay interest on much or all of the finance they received. There is no business risk or financial risk in government activities. The following choices can be used as cost of capital.

1. **The Social Time Preference Rate**

This rate expresses the value which one places on consuming or owning an asset now as an alternative to consuming or owning it in the future. This rate is based on the kind of tables used by insurance companies.

2. **Government Borrowing and Lending Rate**

This is roughly the risk free rate of interest. The interest rate on treasury bills can be used.

3. **The Opportunity Cost Rate of Interests**

If a project has been undertaken at the expense of another project, the rate of interest that compensates for the capital being freed for the alternative project is called the opportunity cost rate of interest.

4. **Real Cost of Capital**

This is used where the government set a target real rate of return for projects.

3.6 Risk Evaluation in Cost Benefit Analysis

CBA is a forward planning technique like capital budgeting involving forecasting. The acceptance or rejection of a project depends on the accuracy of the forecast of costs and benefits. The forecasted costs and benefits might be guesses and not the accurate figure. Thus, there is a risk in accurately forecasting cost and benefits in CBA. Risk can be evaluated by using the following techniques.

- i. **Probability based techniques (as discussed in unit 6 and 7)**

ii. Scenarios

We can develop an operation environment scenario in the use of CBA. This is a description in narrative form including physical, social, economic and legal constraints of the environment in which the proposed project will operate. The description should be supported by charts, graphs, and columnar data. In the analysis each of the possible alternative courses of action should be matched against the scenario to see how projected operational factors might favour or hinder a particular course of action (brown and Howard, 1982). The scenarios, which should include the relevant data, should be carefully constructed without bias.

iii. Sensitivity analysis

This involves altering the assumptions involved in the project and evaluating the consequences on the viability of the project using CBA.

SELF ASSESSMENT EXERCISE

Discuss the concept of C-B Analysis as a tool of capital budgeting in the public sector.

4.0 CONCLUSION

The objective of a government institution might not necessarily be financial but it might be based on social and political considerations. Public sector projects are better appraised using cost-benefit analysis. Cost-benefit analysis is a sophisticated technique that draws on concept of capital budgeting and wider issues such as environmental problems, opportunity costs and transfer prices. Cost-benefit analysis enables the decision maker to make decisions based on a rigorous appraisal of all the factors involved in undertaking the project. The steps involved in cost-benefit analysis include: establishing the objective ascertaining alternative solutions to the problem; estimating cost and benefits, and evaluating costs and benefits.

The cost of capital used in CBA can be social time preference rate, government borrowing and lending rate, the opportunity cost rate of interest and real cost of capital.

The accuracy of CBA is limited to the accuracy of costs and benefits forecast. Thus, there is a risk in forecasting CBA. The risk can be handled by using probability – based techniques, scenarios and sensitivity analysis.

5.0 SUMMARY

In this unit you have learnt that capital budgeting technique could be applied in the public sector. The concept of the basic tool – Cost Benefit Analysis was discussed. The process of its usage and ways of its evaluation were discussed as well. You are advised to study this unit in conjunction with other previous units on capital budgeting.

6.0 TUTOR MARKED ASSIGNMENTS

1. Identify and discuss the cost of capitals that could be used for capital budgeting in the public sector.
2. How are costs and benefits evaluated for the purpose of project selection in the public sector?

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MODULE 3

Unit 1	Mathematics of Finance
Unit 2	Valuation of Stocks and Bonds

UNIT 1 MATHEMATICS OF FINANCE

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1.0 INTRODUCTION

In this unit, we shall discuss mathematical concepts applied in accounting for variations, in the timing of cash flow. These variations in timing of inflows and outflows of funds give rise to the concept of time value for money. The mathematical concepts we shall discuss are: Interests, Future values, Present values, Annuities, perpetuities, Amortisation and Sinking fund..

2.0 OBJECTIVES

By the end of this unit, you should be able to:

- Explain the concept of Interests, Future values, Present values, Annuities, perpetuities, Amortisation and Sinking fund.
- Describe the applications of these concepts concerning time value of money

3.0 MAIN CONTENT

3.1 Interest Rate

Rationally an individual would prefer to collect N2,000 today than to be given the same amount five years from today. An individual's preference for possession of a given amount of cash today, rather than the same amount at some future time is called 'time preference for money'.

Some of the reasons for the individual's time preference for money include:

- Uncertainty and risk of future
- Preference for current consumption and
- Availability of investment opportunities.

Interest, which is the money, earned (or paid) for the use of money is generally rationalized on opportunity cost or alternative investment outlets and uncertainty or risk, which goes with time. Therefore, the time preference for money is generally seen to be expressed by an interest rate. Interest rates, as cost of money capital, are charged two forms: simple and compound interest.

3.1.1 Simple Interest

Simple interest is defined as an amount of money paid (or earned) for the use of money borrowed (or lent) on the principal sum. The amount of simple interest is a function of three variables; the original amount lent (or borrowed) or the principal, the interest rate per time period and the number of time periods for which the principal is lent (or borrowed). The formula for calculating simple interest is given as follows:

$$SI = Po (i) (n).$$

Where SI = Simple interest naira
Po = Principal, or original amount lent (or borrowed) at time period zero.
i. = Interest rate per time period.
n = Number of time periods

Example One

Suppose that you deposit N10,000 in a savings account paying 11 percent simple interest and kept for 8 years. Determine the amount of accumulated interest at the end of the 8 – year period.

Solution

$$SI = [N10,000(11)(8)]/100 = N8,800.$$

However, sometimes we may be interested in determining the future value (FV) of the account at the end of the 8 years period. This future value or terminal value could be gotten when we add the interest earned on the principal amount originally invested. This can be shown as follows:

$$FV_8 = N10,000 + [N10,000(11)(8)]/100 = N18,800.$$

For any simple interest rate, the future value of an account (i.e. total amount) at the end of n period is:

$$FV_n = Po + SI = Po + Po(i)(n).$$

$$\text{Or equivalently, } FV_n = Po[1 + (i)(n)]$$

Sometimes we may know the future value of a deposit at i percent for n years, but we do not know the principal originally invested i.e., the account's present value ($PVo = Po$). We can determine that by making Po the subject of the formula as follows:

$$PVo = Po = \frac{FV_n}{[1 + (i)(n)]}$$

To illustrate using the example where $FV_8 = N18,800$, $i = 10\%$ and $n = 6$, if we do not know Po or Vo , that can be determined as follows:

$$PVo = Po = \frac{N18,000}{[1 + (.11)(8)]} = \frac{N18,800}{1.88} = N10,000$$

Therefore, the present value of N18,800 at 11 percent simple interest in an 8 year period is N10,000.

3.1.2 Compound Interest

Compound interest is defined as amount earned (or paid) on any previous interest earned, as well as on the principal lent (or borrowed). Compound interest generally implies that interest earned on a loan is

periodically added to the principal; and interest is earned on the previous interest as well as on the original principal. Generally in dealing with problems of compound interest, we are either interested in future value (FV) or present value (PV) rather than the total amount of the compound interest alone. The formula for calculating future (compound) value at the end of n period at i rate of interest is:

$$FV_n = Po(1 + i)^n$$

Example Two

Supposing you deposit N12000 in a savings account paying percent compound interest and is being kept for 5 years. Determine the future value (V) of the amount at the end of the 5 year period.

Solution

$$\begin{aligned} FV_5 &= N12,000 (1 + 0.9)^5 \\ &= N12,000(1.09)(1.09)(1.09)(1.09)(1.09). \\ &= N12,000 91.5386) \\ \therefore FV_5 &= N18,463.49 \end{aligned}$$

This implies that at the end of five years, the account would be worth N18,463.49.

In general, FV_n , the future (compound) value of a deposit at the end of n periods is:

$$FV_n = Po (1 + i)^n$$

Time preference for money requires that value of future cash flows should be determined in relation to their present value in order to make rational financial decision. Thus, the process of converting future worth of an amount to the present value is referred to as discounting which is the inverse of compounding. For instance, if you are to collect N20,000 at the end of 7 years from today, if your opportunity cost of fund or interest rate compound annually is 12 percent; what is the value of that amount equated to the present? In solving this type of problem, the interest rate is known as the discount rate (or capitalization rate).

Thus to solve the above exercise of finding present value (or discounting) we simply invert the compounding formula; we already know that:

$$FV_n = Po(1 + i)^n$$

To determine the Present Value (PV) or (Po) we make PV the subject of the formula.

$$\begin{aligned}
 PV_0 &= \frac{FV_n}{(1+i)^n} \\
 &= FV_n \left[\frac{1}{(1+i)^n} \right]
 \end{aligned}$$

Note that the term, $\frac{1}{(1+i)^n}$ is simply the reciprocal of future value interest factor at $i\%$ for n periods this reciprocal is referred to as the present value interest factor at $i\%$ for n periods. The use of a calculator can alternatively ease the computation.

$$\therefore PV_0 = P_0 = \frac{N20,000}{(1+12)^7} = N9,046.98$$

This implies that the value of #20000 which will be collected in a 7 year period from today is N9,046.98 in present day value, taking 12 percent discounting factor. Alternatively if we keep N9,046.98 in a fixed deposit account that gives 12 percent compound interest per annum, the amount will accrue to N20,000 in 7 years.

Compounding More Than Once a Year

Sometimes interest may be compounding more than once in a year. Some banks compound interest weekly, monthly, quarterly or semi-annually. There are some incremental benefits to a depositor or non-annual interest compounding. For instance suppose that interest is paid quarterly. If you then deposit N10,000 in a savings account at a nominal 12 percent annual interest rate, the future value at the end of three months would be:

$$FV_{25} = N10,000 \left[1 + \frac{12}{4} \right] = N10,300$$

In other words, at the end of the first quarter of the year you would receive 3 percent in interest, not 12 percent. At the end of a year the future value of the deposit would be:

$$FV_1 = N10,000 \left[1 + \left(\frac{12}{4} \right) \right]^4 = N11,255.09$$

This amount (N11,255.09) compare with N11,200 if interest is paid once a year; the N55.09 different is caused by interest being earned in the second, third and fourth quarters on the interest paid at the end of each quarter. The more times during the year that interest is paid, the greater the future value at the end of a given year.

The general formula for solving the future value at the end of n years where interest is paid m times a year is given by:

$$FV_o = PV_o \left[1 + \left(\frac{i}{m} \right) \right]^{mn}$$

To illustrate, assume that interest is paid monthly and that you wish to know the future value of N10,000 at the end of one year where the nominal annual interest rate is 12percent. The future value would be:

$$FV_1 = N10,000 \left[1 + \left(\frac{12i}{12} \right) \right]^{12(1)} = N11,268.25$$

Which of this course is higher than annual, semi-annual or even quarterly compounding?

The future value at the end of five years for example with monthly compounding is:

$$FV_5 = N10,000 \left[1 + \left(\frac{.12}{12} \right) \right]$$

$$FV_5 = N10,000 [1 + 0.01]^{60} = N18,166.97$$

Compared to a future value with quarterly compounding is

$$FV_5 = N10,000 \left[1 + \left(\frac{.12}{4} \right) \right]^{(4)(5)}$$

$$FV_5 = N10,000 [1 + 0.03]^{20} = N18,061.11$$

Also with seminannual compounding is:

$$FV_5 = N10,000 \left[1 + \left(\frac{.12}{2} \right) \right]^{(2)(5)}$$

$$FV_5 = N10,000 [1 + 0.06]^{10} = N17,908.48$$

Also with annual compounding is:

$$FV_5 = N10,000 \left[1 + \left(\frac{.12}{1} \right) \right]^{(1)(5)}$$

$$FV_5 = N10,000 [1 + 0.012]^5 = N17,623.42$$

Thus, the more frequently interest is paid, the greater the future value.

Present Value of Uneven Sum

In most cases the future sum may not be just one lump sum. The future cash flow may be uneven sums or not uniform Naira values. For instance it is very common when one makes investment the benefits, i.e., the cash flows to be generated over the life of the project will be fluctuating. As such to find the present value of an uneven cash flow stream, we have to find the present value of each of the future receipts and then sum such present values. For example, if future uneven cash receipts are denoted as R_n ($n=1,2,3,4,5,\dots$), then the present value of such cash receipts series can be determined as follows:

$$PV = \frac{R_1}{(1+i)} + \frac{R_2}{(1+i)^2} + \frac{R_3}{(1+i)^3} + \frac{R_4}{(1+i)^4} + \dots + \frac{R_{n-1}}{(1+i)^{n-1}} + \frac{R_n}{(1+i)^n}$$

Where:

- PV = Present value
- R = the periodic/yearly receipts
- i = the annual rate of interest/discounting rate
- n = the number of periods/years

Example Three

Suppose an investment opportunity promises the following cash flows in future years:

Year	Cash Flow (N)
1	250,000
2	230,000
3	200,000
4	240,000
5	275,000
6	300,000
7	220,000

Find the sum of the present values of these cash receipts if the firm's discount rate is 13 percent.

Solution:

Year	Cash Flow (N)	PVIF _{13,n}	PV (N)
1	250,000	0.88496	221,240.00
2	230,000	0.78135	180,124.50
3	200,000	0.69305	138,610.00
4	240,000	0.61332	147,196.80
5	275,000	0.54276	149,259.00
6	300,000	0.48032	144,096.20
7	220,000	0.42506	93,513.20

Present value of the future cash flows (discounted at 13%) = **N1,074,039.50**

This sum of the present value of the future cash flows to be generated by the project (investment opportunity) can be compared with the expected Naira cost of the investment to find Net present value (NPV). If in the above illustration the Naira cost of the investment is N1 million, the Net Present Value (NPV) of the project is given by:

$$\text{NPV} = \text{N1,074,039.50} - \text{N1,000,000} = \text{N74,039.50}$$

This amount (N74,039.50) is the Net Present Value which is the benefit to be generated by the project within its 7-year life span equated to the present value.

3.2 Annuities

An annuity is a series of payments or receipts occurring over a specified number of periods. An annuity can either be classified as an ordinary annuity or an annuity due. In an ordinary annuity receipts or payments are made at the end of each period, whereas in an annuity due the receipts or payments are made at the beginning of each period.

3.2.1 Ordinary Annuity

An ordinary annuity is where the receipts or payment occur at the end of the periods

Example Four

Suppose you deposit N10,000 in a savings account with a bank which pays interest at the rate of 13 per annum on deposit. If you deposit same amount for five consecutive years, what is the future value of the deposits?

Solution

Periodic receipts – $R = \text{N}310,000$; $i = 13\%$ and $n = 5$ years.

Mathematically, the future (compound) value of an annuity can be solved by the formula.

$$FVA_n = R \left[\sum_{t=1}^n (1+i)^{n-t} \right] = R \left[\frac{(1+i)^n - 1}{i} \right]$$

Where:

FVA_n = Future value of an annuity at the end of n years.

R = the period/yearly receipts or payments,

i = annual rate of interest

n = the number of years/periods.

The above illustration can be solved with the formula as follows.

$$\begin{aligned} FVA_5 &= \text{N}10,000 \left[\frac{(1.13)^5 - 1}{.13} \right] = \text{N}10,000 \left[\frac{1.84244 - 1}{.13} \right] \\ &= \text{N}10,000(0.48027061) \\ &= \text{N}64,802.71 \end{aligned}$$

3.2.2 Annuity Due

In an annuity, due the series of equal receipts or payment are made at the beginning of each period, in contrast to an ordinary annuity where receipts or payment are made at the beginning of the periods. Therefore, to determine the future (Compound) value of an annuity due is simply to compound for one more year the future (compound) value of an ordinary annuity. Thus, the future value of annuity due at i percent for n period ($FVAD_n$) is determined as follows:

$$FVAD_n = R(FVIFA_{i,n})(1+i).$$

For instance, we can determine the future value of an annuity due for $\text{N}10,000$ annual deposits at 13 percent for 5 years period as follows:

$$FVAD_5 = \text{N}10,000(6.4803)(1.13) = \text{N}73,227.39.$$

The main distinguishing factor between the future value of an ordinary annuity and an annuity due is the point at which the future value is calculated. For an ordinary annuity, future (compound) value is calculated as of the last cash flow, whereas for an annuity due, future (compound) value is calculated as of one period after the last cash flow.

3.2.3 Present Value of an Annuity

The present value of an ordinary annuity is the amount that would have to be deposited today at a certain compound interest rate to enable the depositor to receive the series of future payment over a specified period.

Example Five

Assume ABC Limited has an obligation of N10,000 that it must repay at the end of each the next five years, including the current one, the corporation wants to know how much it would have to invest today to repay each obligation if the amount invested earns 12 percent interest rate compounded annually.

Solution:

Calculator can be used to determine the $PVIFA_{i,n}$ with the aid of the following formula:

$$PVIFA_{i,n} = \left\{ \frac{I - \left[\frac{1}{(1+i)^n} \right]}{i} \right\}$$

Using our illustration where $i = 12\%$ and $n = 5$ years, we can determine the value of $PVIFA_{12\%, 5 \text{ years}}$ as follows.

$$PVIFA_{12\%, 5 \text{ years}} = \left\{ \frac{I - \left[\frac{1}{(1.12)^5} \right]}{12} \right\} = \left[\frac{1 - 0.56743}{12} \right]$$

$$\therefore PVIFA_{12\%, 5 \text{ years}} = 3.604776202$$

$$PVA_5 = N10,000(3.604776303) = N36,047.76$$

The present value of an annuity due is the amount that would have to be deposited today at a certain compound interest rate to enable the depositor to receive series of future payments from now over a specified period.

Example Six

Suppose in the above exercise ABC Limited obligation of N10,000 is to be repaid at the beginning of each of the next five years, the corporation wants to know how much it has to invest today to repay each obligation if the amount invested earns 12 percent interest rate compounded annually.

Solution:

The present value of a five-year annuity due is equal to the present value of a four-year ordinary annuity one non-discounted period receipt or payment. This can be generalized as follows:

$$\begin{aligned} \text{PVAD}_n &= R(\text{PVIFA}_{i,n-1}) + R \\ &= R (\text{PVIFA}_{i, n-1+1}) \end{aligned}$$

We can use the $\text{PVIFA}_{i,n}$ table to solve the above exercise as follows:

$$\text{PVAD}_5 = \text{N}10,000 (3.0373 + 1) = 40,373.$$

This implies that ABC Ltd needs to invest N40,373 today in an account that pays 12% annual compound interest to enable it repay an obligation of N10,000 at the beginning of each of the next five years.

3.3 Perpetuity

Perpetuity is an ordinary annuity whose periodic payments or receipts continue forever. An example of perpetual payment is dividend on common stock.

The present value of perpetuity (PVP) is simply the periodic payment (or receipt) divided by the interest rate per period:

$$\text{PVP} = R/i$$

Where:

- PVP = the present value of a perpetuity
- R = the periodic/yearly receipts or payments
- i = the annual rate of interest or discounting factor.

Example Seven

Paul needs N30,000 annually to maintain a certain building indefinitely. What is the present of this annuity to support this perpetual maintenance if Musa can invest at the rate of 12 percent per annum?

Solution:

$$\text{PVP} = \frac{\text{N}30,000}{.12} = \text{N}250,000$$

This implies that Paul has to invest N250,000 in an account that would earn 12 percent interest per annum to be withdrawing N30,000 per annum indefinitely to maintain the building.

3.4 Sinking Fund

A sinking fund is an account into which periodic payments are made in order to accumulate a future sum. Generally a sinking fund is established to periodically retire a portion of a security issue before maturity, or to accumulate a future sum in order to acquire some specific equipment or assets.

To determine the periodic amount to be set aside in order to accumulate a future value of sinking fund is given by:

$$FV = A \left[\frac{(1+i)^n - 1}{i} \right]$$

Where:

- FV = Future value of the sinking fund
- A = The periodic amount to be set aside
- n = Number of periods
- t = interest rate.

Example Eight

Balarabe Limited needs to have N15 million to replace its fixed assets in 7 years time. In order to generate this amount, the company can set aside an equal amount out of its profits. The amount to be set aside will be invested at 18% interest rate per annum. Determine the amount the company should set annually out of its profits and show the sinking fund schedule.

Solution

FV = N15 million, $i = 18\%$, $n = 7$ years, $A = ?$

$$= N10,000,000 = \left[\frac{(1.18)^7 - 1}{.18} \right]$$

$$N15,000,000 = A (12.1415)$$

$$\therefore A = \frac{N15,000,000}{12.1415}$$

$$= N1,235,432.20$$

This implies that the amount the company should set aside from its profits annually for seven years in order to accumulate N15,000,000 is N1,235,432.20.

The sinking fund schedule is shown as follows

Sinking Fund Schedule

Year	(a) Balance Brought forward	(b) Interest at 18%	(c) Sinking Fund	(d) = a+b+c Balance carry forward
1	-	-	1,235,432.20	N1,235,432.20
2	N1,235,432.00	222,377.80	1,235,432.20	2,693,242.20
3	2,693,242.20	284,783.60	1,235,432.20	4,413,485.00
4	4,413,457.80	794,422.44	1,235,432.20	6,443,312.44
5	6,443,312.44	1,159,796.24	1,235,432.20	8,838,540.88
6	8,838,540.88	1,590,937.36	1,235,432.20	11,664,910.44
7	11,664,910.44	2,099,683.88	1,235,432.20	15,000,026.52

3.5 Loan Amortization

A loan is said to be amortized if both interest and principal are recovered through an equal (installmental) payments over a period of time. These payments can be made monthly, quarterly, semi-annually, or annually. Installment payments are very common in term loans, consumer loans and certain business loans.

Loan recovery through amortization can be determined by the use of the reciprocal of the present value interest factor of an Annuity (PVIFA_{i,n}) formula.

Example Nine

Suppose Isah needs to repay a N300,000 loan with Akode Bank over the next 7 years, with 15 percents interest per annum and equal installment payments are required at the end of each year. Determine the amount of each installment and show the amortization schedule.

Solution

$$PVAn = R(PVIFA_{i,n})$$

$$R = PVAn \left[\frac{1}{PVIFA_{i,n}} \right]$$

We obtain

$$R = N300,000 \left[\frac{1}{4.1604} \right] = N72,108.45$$

This implies that the annual payments of N72, 108.45 will completely amortize (i.e extinguish) a N300,000 loan in seven years (both the principal and the interest component).

The amortization schedule is hereby shown below:

Amortization schedule

Year	(1) Installment payment	(2) Annual Interest (4)-1x .15	(3) Principal Payment (1) – (2)	(4) Principal amount owing at year end. (4) – 1 – (3)
0	-	-	-	N300,000.00
1	72,108.45	45,000.00	27,108.45	272,892.55
2	72,108.45	40,933.73	31,174.72	241,716.83
3	72,108.45	36,257.52	35,850.93	205,865.90
4	72,108.45	30,879.89	41,228.57	164,637.33
5	72,108.45	24,695.60	47,412.85	117,224.48
6	72,108.45	17,583.67	54,524.78	62,699.70
7	72,108.45	9,404.96	62,703.49	
	N504,759.15	N204,755.37	N300, 000 (Aprox.)	

SELF ASSESSMENT EXERCISE

- i. What is interest rate?
- ii. What is time value of money?
- iii. What is an annuity?
- iv. Distinguish between a sinking fund and loan amortization

4.0 CONCLUSION

Mathematical concept has been applied in the valuation of time value of money. The influence of interests/ cost of money have quantitatively demonstrated by computations of present and future values of the concept.

5.0 SUMMARY

Money is generally considered to have time value, that is to say one Naira today has more value than one Naira tomorrow or any time in the future. Because of time preference of money, so many mathematical concepts are developed to take care of time value of money. Most of these mathematical concepts are imbued in the interest rate expected any given time period. The most common mathematical concepts that are used to determine either future values or present values based on the rate of compounding or discounting include: annuities, perpetuities, sinking

fund and amortization. These were discussed in this unit and illustrative examples provided.

6.0 TUTOR - MARKED ASSIGNMENTS

Mr Danladi deposit N100,000 in a savings account with Babylon bank which pays interest at the rate of 12 per annum on deposit. Same amount is deposited for six consecutive years. Determine the future value of the deposits and the total deposits due?

7.0 REFERENCES/FURTHER READINGS

Olowe, R. A. (1997) *Financial Management: Concepts, Analysis and Capital Investments*, Lagos, Briefly jones Nig Limited.

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UNIT 2 VALUATION OF STOCKS AND BONDS

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Stock and Bonds Valuation Concept
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1.0 INTRODUCTION

Unit 2 Mathematics of finance where concept of value of money was discussed is designed to launch us into understanding the concept of valuation of stock and bonds. We shall in this unit discuss the relationship of risks and returns as they affect the values of stock and bonds.

2.0 OBJECTIVES

By the end of this unit you should be able to explain:

- Basic concepts of stock and bonds valuation
- Various stock and bond valuation techniques and their implications on financial decision.

3.0 MAIN CONTENT

3.1 Stock and Bonds Valuation Concepts

There are many concepts of value stocks and bonds that are used for different purposes. These concepts are:

a. Book Value:

This is the historical accounting value of a given asset or security less its accumulated depreciation over the years. For instance, the value of a corporation is equal to the Naira difference between the corporation's total assets and its liabilities and preferred stock as reflected on its balance sheet. Since book value is based on

historical values, it may bear little relationship to an asset's or corporation's market value.

b. Market Value:

This is the current market price of a given asset or security at which it is being sold or purchased. Generally market value per share is expected to be higher than the book value per share for growing profitable companies.

c. Replacement Value:

This is the amount that a company would be required to spend if it were to replace its existing assets in the current condition.

e. Going Concern Value:

This is the amount that a company could be sold for as a continuing operating business. Generally going concern value is higher than liquidation value. Most of the valuation models we will discuss in this chapter assume going concern values of companies' rather than liquidation value.

f. Intrinsic Value:

This is the price a security ought to be if properly priced based on all factors bearing on valuation such as assets, future prospects, earnings, spread of risk and management. When capital market is highly informed and efficient, the current market price of a security should fluctuate closely around its intrinsic value. The intrinsic value of a security should always be compared with market price of a security for a rational decision to be made. Whenever the intrinsic value of a security is greater than the market price of the security, the security is said to be under valued as such it is worth buying and vice-versa.

g. Liquidation Value:

This is the amount that a company could realize if it sold its asset separately from its operating organization. When a company decides to terminate its business operation, the assets of the company are said to have liquidation value if they are to be sold. Generally, present value, which reveals the intrinsic value, is the real concept of value, which will be discuss in this unit

It should be noted that Equity stock is another name for common stock.

3.2 Common/Equity Stock Valuation

The returns of a common stock consist of cash dividends and capital gains that are highly uncertain. The uncertainty associated with returns

from common stock makes the valuation of common stock difficult. Generally returns on preferred stocks and bonds are fixed and predictable, whereas the returns on common stock are variable depending on the performance of the enterprise. Notwithstanding the variability of returns on common stocks, the expected returns in forms of dividends and capital gains are the major variables employed in common stock valuation.

Since common stocks have no maturity date, unlike bonds, we begin by assuming a one– year holding period. This can be determined by using the following formula.

$$K_e = \frac{E(D_1) + (E(P_1) - P_0)}{P_0}$$

Where K_e = Cost of common/equity stock
 $E(D_1)$ = Expected dividend per share in period 1
 $E(P_1)$ = Expected market price per share in period 1
 P_0 = current market price of share.

Example One

Assuming that Mohammed Plc's common stock has an expected dividend per share, $E(D)$, of N6, the current price of a share (P_0) is N65, and the expected price at the end of the year, $E(P_1)$, is N73, determine the expected return on the share, (K_e), for a one – year holding period.

$$K_e = \frac{E(D_1) + (E(P_1) - P_0)}{P_0}$$

$$K_e = \frac{N6 + (N73 - N65)}{N65} = 0.2154 = 21.54\%$$

This implies that the expected return on the security holding for one – year period, (k_e) is 21.54%. Therefore, depending on the investor's required rate of return (IRR), if $K_e > RRR$, he should go for this investment and vice versa.

Equation above can be used to determine current price of the share if we are given investor's forecast of dividend and price, and the expected return of other equally risky shares. Thus,

$$P_0 = \frac{ED_1 + E(P_1)}{1 + K_e}$$

The above formula is achieved by making current price (P_0) the subject of the fomula.

Example Two

Assuming that Mohammed Plc's shares in the above example one is= E (P_1) = N73 and $E(D_1)$ = N6. If the expected returns for securities in the same risk class, as Mohammed Plc are 21.54 percent, determine current price of the share.

Solution

$$P_o = \frac{N6 + N73}{(1 + .2154)} = \frac{N79}{1.2156} = N65$$

Whenever the estimated value of the share, which is the intrinsic value, is greater than the actual market price, the share is said to be undervalued, investors will want to buy more of the shares. For instance if the market of price of Mohammed Plc share is less than N55, which is calculated value, investors would like to buy more of the shares of Mohammed Plc, and vice versa.

If the holding period is for a longer period more than one year, as it is with most investor, then equation can be expressed as follows:

$$P_o = \frac{E(D_1)}{(1 + Ke)} + \frac{E(D_{12})}{(1 + Ke)^2} + \dots + \frac{E(D_{n3}) + E(P_n)}{(1 + Ke)}$$

$$= \sum_{t=1}^n \frac{E(Dt)}{(1 + Ke)^t} + \frac{E(P_n)}{(1 + Ke)^n}$$

Where

$E(Dt)$ = Expected dividend at the end of period t

Ke = Expected return on a share or cost of equity

$E(Pn)$ = Market price expected to prevail at period n.

P_o = Current market price

$\sum_{t=1}^n$ = Sum of the discounted dividends from period 1 to n

Ke will be assumed constant in a multi period model.

Example Three

Assuming that Mohammed Plc shares in the above example expected dividend after a year, $E(D_1)$, is N6, and it is expected to grow at a rate of 10 percent per annum, the expected dividend after two years, $E(D_2)$, will be $N6 (1.10) = N6.60$; after three years. $N6.0 (1.10)^2 = N7.26$ and so on. Assume that the expected return on the share is 24 percent, whereas the expected price of the share at the end of 5 year is N75, calculate the current market price of the share.

Solution

$$\begin{aligned}
 P_0 &= \left[\frac{N6}{(1.24)} + \frac{N6.60}{(1.24)^2} + \frac{N7.26}{(1.24)^3} + \frac{N7.99}{(1.24)^4} + \frac{N8.78}{(1.24)^5} \right] + \frac{N75}{(1.24)^5} \\
 &= N16.09 + N25.58 = N41.67
 \end{aligned}$$

The value of dividends is N16.09 and value of the price at the end of five years is N25.58.

If the holding is infinite (∞) i.e., n approaches to infinity, the present value of the future price will approach zero. Thus, the price of a share today is the present value of an infinite stream of dividends.

$$\begin{aligned}
 P_0 &= \frac{E(D_1)}{(1 + Ke)} + \frac{E(D_{12})}{(1 + Ke)^2} + \dots + \frac{E(D_{n \rightarrow \infty})}{(1 + Ke)^{n \rightarrow \infty}} \\
 &= \sum_{t=1}^n \frac{E(Dt)}{(1 + Ke)^t}
 \end{aligned}$$

The above equation relies on dividends as its foundation as such it is called Dividend Capitalization Model. If common stock dividends do not grow over time but remain constant, that is $E(D_1) = E(D_2) = \dots = E(D_{\infty})$, then equation will become:

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

Example Four

Zaco Inc. is currently paying N8.0 dividend per share. This level of dividends is expected to be maintained into the future. If the capitalization rate, i.e. cost of equity is 16 percent, determine the current market price per share.

Solution

$$P_0 = \frac{N8.0}{0.16} = N50$$

However, if dividends are expected to grow, but at a constant rate, the equation will become.

$$P_0 = \sum \frac{Do(1+g)^t}{(1+Ke)^t} = \frac{Do(1+g)}{(1+Ke)} + \frac{Do(1+g)^2}{(1+Ke)^2} + \dots + \frac{Do(1+g)^{\infty}}{(1+Ke)^{\infty}}$$

Where:

D_0 = dividend at time zero (that is a current dividend).
 g = constant growth rate of dividend

If K_e is greater than g (a reasonable assumption since a dividend growth rate which is always greater than the capitalization rate would imply an infinite stock value), the equation can be expressed as follow:

$$P_0 = \frac{E(D_1)}{K_e - g}$$

Where: ED_1 = the expected dividend per share at time 1.
 The above equation is the perpetual growth model in which the relationship between K_e and g is assumed to be constant and perpetual.

To obtain the investor's required rate of return, K_e , we can rearrange equation as follows:

$$K_e = \frac{E(D_1)}{P_0} + g$$

Example Five

Assuming the Mohammed Plc has recently paid N7.5 each dividends and it is expected to grow at an 8 percent rate per annum forever, the dividend per share expected at $t = 1$ is N7.5 (1.08). If the market capitalization rate is 20 percent; determine the present value of the share.

Solution:

$$P_0 = \frac{N8.10}{.20 - .08} = N67.50$$

For most companies in the mature stage of their life cycle, the perpetual growth model is often reasonable.

3.3 Preferred Stock Valuation

Generally, preferred stock can be issued with or without maturity period. The holders of preferred stock get dividends at a fixed rate and have a preference over common stockholders.

When preferred stock has maturity period, the market price of the stock, P_0 , can be determined by the following formula:

$$P_0 = \frac{PD_1}{(1 + K_p)} + \frac{PD_2}{(1 + K_p)^2} + \dots + \frac{PD_n + P_n}{(1 + K_p)^n} = \sum_{t=1}^n \frac{PD_t}{(1 + K_p)^t} + \frac{P_n}{(1 + K_p)^n}$$

Where:

PD_t = the preference dividend per share in period t ,

K_p = the required rate of return on preferred stock,

P_n = the value of the preferred stock on annuity.

If the preferred stock has not maturity date i.e. it is irredeemable, the market price of the stock, P_o , can be determined by the following formula.

$$P_o = \frac{PD}{K_p}$$

Rearranging the above equation to determine the yield on an irredeemable preferred stock would be given as follows:

$$P_o = \frac{PD}{P_o}$$

Example Six

Felix Limited has issued 13 percent stocks with a nominal value of N30. This type of preferred stock is currently yield 11 percent. Determine the market price if:

- the preferred stocks have seven years to maturity
- The preferred stocks are irredeemable.

Solution:

$$(i) \quad P_o = \sum_{t=1}^n \frac{PD_t}{(1 + K_p)^t} + \frac{P_n}{(1 + K_p)^n} = PD_t \frac{1 - (1 + K_p)^{-n}}{K_p} + \frac{P_n}{(1 + K_p)^n}$$

$$PD_t = 13\% \times N30 = N3.90$$

$$K_p = 11 \text{ percent}$$

$$P_n = N30$$

$$n = 7 \text{ years}$$

$$\begin{aligned} \therefore P_o &= N3.90 \left[\frac{1 - (1.11)^{-7}}{0.11} \right] + \frac{N30}{(1.11)^7} \\ &= \#18.38 + N14.45 \\ &= \#32.83 \end{aligned}$$

$$(ii). \quad P_o = \frac{PD_t}{K_p} = \frac{N3.90}{0.11} = N35.45$$

Example Seven

Assuming in the above example (ii) we know the dividend preferred stock, PD, is N3.90 and the market price, Po, is N35.45. if we do not know the current yield of the stock, it can be determined as follows:

$$Kp = \frac{PD}{Po} = \frac{N3.90}{N35.45} = 11\%$$

3.4 Valuation of Bonds

A bond is a long term debt instrument that generally earns a fixed amount to the investor, period after period, until it is finally retired by the issuing firm. The claims of bondholders are senior to all other securities holders in terms of earnings and assets distribution in case of liquidation. Because of this seniority in terms of claims by bondholders, usually the return of bonds in the name of interest is lower than the returns on other securities. Generally bonds are redeemable, i.e. they have maturity date, but there are instances where perpetual bonds are issued, as such they are irredeemable.

To determine the market price of a bond, Po, which has a finite maturity we have to discount the values of cash flows expected from the debt instrument i.e., the annual interest payment plus its terminal, or maturity value. The discounted value of the cash flows will be calculated using the present value concept. By comparing the market price with its present value, it can be determined whether the bond is undervalued of the instrument.

The following formula can be used to determine the market value of a bond with finite maturity.

$$Po = \frac{I_1}{(1 + Kd)} + \frac{I_2}{(1 + Kd)^2} + \dots + \frac{I_n + Pn}{(1 + Kd)^n} = \sum_{t=1}^n \frac{I_t}{(1 + Kd)^t} + \frac{Pn}{(1 + Kd)^n}$$

Where:

Po = Market of price of the bond at time zero

I = Annual Coupon or interest payment

Pn = Maturity value of the bond

Kd = Cost of debt or yield to maturity or required rate of return or assumed reinvestment rate or internal rate of return.

n = Number of years to maturity

If the coupon (or interest) payments are paid for more than once a year (like semi annual), then equation (8-14) will become as follows:

$$P_0 = \sum_{t=1}^{mn} \frac{I/m}{\left[1 + \frac{Kd}{m}\right]^t} + \frac{Pn}{\left[1 + \frac{Kd}{m}\right]^{mn}}$$

Example Eight

Find the market value of a bond with a 12 percent annual coupon rate, a seven year maturity and a N10,000 face value., the market yield on bonds in the same risk class is 15 percent.

Solution

$$P_0 = \sum_{t=1}^n \frac{I_t}{(1 + Kd)^t} + \frac{Pn}{(1 + Kd)^n} = nI \left[\frac{1 - (1 + Kd)^{-n}}{Kd} \right] + \frac{Pn}{(1 + Kd)^n}$$

$$I_t = 0.12 \times \text{N}10,000 = \text{N}1,200$$

$$Kd = 15\%$$

$$Pn = \text{N}10,000$$

$$n = 7 \text{ years}$$

$$\therefore P_0 = \text{N}1,200 \left[\frac{1 - (1.15)^{-7}}{0.15} \right] + \frac{\text{N}10,000}{(1.15)^7}$$

$$= \text{N}4992.50 + \text{N}3,759.37$$

$$= \text{N}8,751.87$$

Example Nine

Recalculate the value of the bond in Example above assuming the coupon rate was paid quarterly in a year.

Solution:

$$P_0 = \sum_{t=1}^{mn} \frac{I/m}{\left[1 + \frac{Kd}{m}\right]^t} + \frac{Pn}{\left[1 + \frac{Kd}{m}\right]^{mn}} = \frac{I_t}{4} \frac{1 - \left(1 + \frac{Kd}{4}\right)^{-4n}}{Kd/4} + \frac{Pn}{\left(1 + \frac{Kd}{4}\right)^{4n}}$$

$$\therefore P_0 = \text{N}300 \left[\frac{1 - (1 + 0.0375)^{-4(7)}}{0.0375} \right] + \frac{\text{N}10,000}{(1.0375)^{4(7)}}$$

$$= \text{N}5146.20 + \text{N}3567.25$$

$$= \text{N}8,713.45$$

In rare occasions bonds could be issued without a maturity date, such bonds are referred to as perpetual bonds. The present value of a perpetual bond would simply be the discounted value of an infinite

stream of interest payments. The following formula can be used to determine the market value of a bond that has infinite life:

$$P_o = \frac{I}{Kd}$$

Example Ten

If a bond with an annual coupon rate 12 percent and a face value of N10,000 has an infinite life, calculate its market value of the bond is yield is 15 percent.

Solution

$$P_o = \frac{I}{Kd} = \frac{N1,200}{0.15} \\ = N8,000.$$

Sometimes firms do issue a zero-coupon bond, which is a bond that pays no interest to the holders but sells at a higher discount from its face value; it provides compensation to the investors in the form of price appreciation. The valuation of zero-coupon bond is solely being determined by the present value of principal payment at maturity. The market value of a zero – coupon bond can be determined as follows:

$$P_o = \frac{P_n}{(1 + Kd)^n} \\ = \frac{N10,000}{(1 + 0.15)^{12}} \\ = N1,869.07$$

This implies that if the investor purchases this bond for N1,859.07 and redeems at 12 years later for N10,000, his initial investment would thus provide him with a 15 percent compound annual rate of return.

Sometimes one may be interested in determining the returns on a bond. There are three measures of returns for a bond that are usually considered.

- (i) The coupon rate, which is the return on the normal value, par value, or face value of the bond which is generally a fixed rate throughout the tenure of the instrument, except in some rare occasions.
- (ii) The current yield, which is the rate of actual investment of a bond. It is determined by the ratio of annual interest payment to the bonds market price as follows:

$$CY = I/P_o$$

Where
 CY = the current yield
 I = Annual interest payment
 P_o = the market price of the bond.

- (iii) The yield to maturity, which is the rate of return on the nominal or face value of the bond, adjusted for the amortization of the premium (paid) or the discount saved at the time of purchase of the bond. If the market price of the bond is lower than the nominal value, then the bond is selling at a discount, whereas if the market price is higher than the nominal value, it is selling at a premium. The yield to maturity is also referred to as the interest rate of return of a bond, which equates the present value of the coupon and principal payments with the current market price of the bond.

The yield to maturity can be determined precisely by using equation (8 – 14). The following formula provides an approximation of the yield to maturity (YTM).

$$YTM = K_d = \frac{I + \left[\frac{FCV - P_o}{n} \right]}{\frac{1}{2}(FCV + P_o)}$$

Where:

YTM = K_d = Yield to maturity or internal rate of return
 FCV = Face value or terminal value of the bond
 I = Annual coupon or interest payment
 n = numbers of years to maturity
 P_o = market price of the bond at time zero.

Example Eleven

Fati Enterprise issues a 13 percent bond having a 10 year maturity and a face value of N10,000. If the bond is currently selling at N7,500, determine its:

- (i) Current yield and
- (ii) Approximate yield to maturity

Solution

- (i) CY = I/P_o
 I = 0.13 x #10,000 = N1,300
 P_o = N7,500
 PCV = N10,000
 n = 10 years

$$\therefore CY = \frac{N1,300}{N7,500} = 0.1733 = 17.33\%$$

$$\begin{aligned}
 \text{(ii) } YTM = Kd &= \frac{I + \left[\frac{FCV - P_o}{n} \right]}{\frac{1}{2}(FCV - P_o)} \\
 &= \frac{N1300 + \left[\frac{N10,000 - N7,500}{10} \right]}{\frac{1}{2}(N10,000 - N7,500)} \\
 &= \frac{N1,550}{N8,750} \\
 &= 0.1771 \\
 &= 17.71\%
 \end{aligned}$$

SELF ASSESSMENT EXERCISE

- i. Explain five concepts of value that are used in a firm.
- ii. What are the major determinants of valuation of common stocks?
- iii. What do you want understand by capitalization rate of a stock?
- iv. What is the different between valuation of preferred stocks and bonds?

4.0 CONCLUSION

Concept of valuation of stocks and bonds has been discussed. Their computational methods demonstrated as well as their implication on financial decisions.

5.0 SUMMARY

The value of a long-term security depends on the returns expected from such a security. The main concepts of value include book value, market value, replacement value, going concern value, intrinsic value and liquidation value. The present value concept, which measures the intrinsic value, is the price a security ought to be worth based on hard facts like future prospects and spread of risk. Common stocks, which are the real ownership capital, whose returns are not fixed, are more difficult to value. The expected returns from dividends and capital gains due provide the basis to the valuation of common stock. Preferred stocks and bonds whose returns are generally fixed particularly where the security has a fixed maturity date are simpler to value than common stock. Even where preferred stocks and bonds are issued to perpetuity, their values are simpler to measure than that of common stocks, because non-

maturity of the instruments implies that the redemption value approaches zero. This unit has vividly explained all these.

6.0 TUTOR - MARKED ASSIGNMENTS

1. Isah Inc's stock has an expected dividend per share of N10, the current market price is N100 and the expected end of the year's price is N130. Determine the expected return on shares.
2. Danlami Ltd issued a 10% preferred stock with nominal value of N40, which currently yields 9%. Determine the market price of the stock if:
 - a. The stock has 10 Years to maturity
 - b. the stock is irredeemable.

7.0 REFERENCES/FURTHER READINGS

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MODULE 4

Unit 1	Capital Structure Theories
Unit 2	Dividend Theories

UNIT 1 CAPITAL STRUCTURE THEORIES

CONTENTS

1.0	Introduction
2.0	Objectives
3.0	Main Content
3.1	Concept of Capital Structure Theories
3.1.1	Assumption of Capital Structure Theories
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3.2.1	Net Income Approach
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3.2.4 (a)	Modigliani and Miller (M&M) Model (Without Corporate Tax)
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4.0	Conclusion
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1.0 INTRODUCTION

In the previous units we discussed the performance evaluation, investments appraisal and valuation of stocks and bonds. We shall, in this unit discuss the capital structure and their likely effect on the value of firms.

2.0 OBJECTIVES

By the end of this unit, you should be able to:

- Explain the concept of capital structure theories,
- Relate the theories to valuation of companies.

3.0 MAIN CONTENT

3.1 Concept of Capital Structure Theories

One of the most important duties of a finance manager is the undertaking of combination of different securities in the firm's assets in an attempt to maximize the overall market value of the company. Capital structure is the firm's mix of different sources of finance. A firm's capital has two components: Debt and Equity/Common stock.

In reflecting the relationship between the combination of the types of financial structure (capital structure) and the value of the firm, there are various theories propounded by scholars.

3.1.1 Assumption of Capital Structure Theories

The assumptions of capital structure theories are as follows:

- Firms could make use of only debt and equity in financing its operations.
- There are no corporate or personal income taxes and no bankruptcy costs.
- The ratio of debt to equity of a firm can be changed by issuing debt to purchase equity or issuing equity to pay debt. In other words, a change in the capital structure is effected immediately; there are no transaction costs.
- It is firm's policy to pay out 100% of its earnings as dividend; there are no retained earnings.
- The expected value of the probability distributions of expected future operating earning for each company are the same for all investors in the market
- The operating earnings of the firm are not expected to grow. The expected value of the probability distribution of expected earnings for all future periods are the same as present operating earnings.

Given these assumptions, the following formula and mathematical representation are relevant in capital structure theories.

Cost of debt, $K_d = \frac{\text{Annual interest charges}}{\text{Market value of debt}}$

Cost of equity, $K_e = \frac{\text{earnings available to shareholders}}{\text{Market value of shares outstanding}}$

Total value of the firm = market value of debt + market value of ordinary shares, that is $V = D + E$

Cost of capital, $K_o = \frac{\text{Net operating income}}{\text{Value of the firm}}$

3.2 Capital Structure Models

3.2.1 Net Income Approach

The net income approach suggests that a firm can vary its value by either increasing or decreasing it through the financial mix that is the ratio of debt to equity. This approach is based on the assumption that the cost of debt is less than that of equity and that the cost of both are constant.

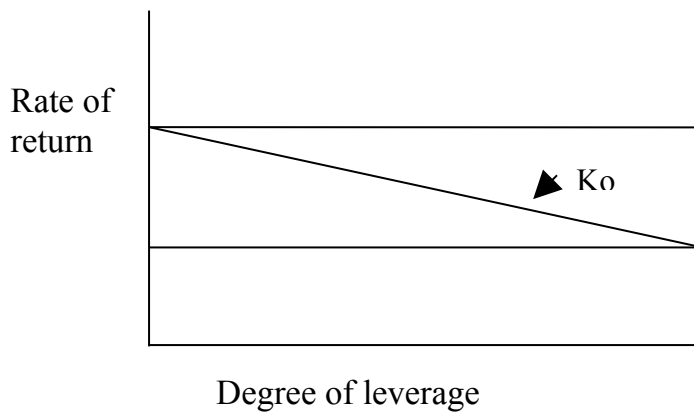


Figure 1: Effect of leverage on cost of capital under Net income approach.

Example One

Bala limited has an expected annual net operating income of ₦500,000 with a cost of equity of 10% and ₦800,000 8% debenture. Calculate the value of the firm and the company's cost of capital. Assuming that debenture is increased to ₦1,000,000 while other items remain, will the value of the firm and cost of capital change?

Solution

Bala Limited:		₦
Net operating income		500,000
Less: Debenture interest:		
8% x ₦800,000		<u>64,000</u>
Earnings available to the shareholders		<u>436,000</u>
Market value of equity:		
<u>₦436,000</u>		₦
0.1		4,360,000
Market value of debt:		
<u>₦64,000</u>		
0.08		<u>800,000</u>
(a) (i) Market value of the firm		<u>5,160,000</u>
(ii) Company's cost of capital =	$\frac{\text{Net operating income}}{\text{Value of the firm}}$	
=	$\frac{\text{₦500,000}}{\text{₦5,160,000}}$	= 0.0969 = 9.69%

Assuming debt is increased to ₦1,000,000:

		₦
Net operating income		500,000
Less: debenture interest (8% of ₦1,000,000)		<u>80,000</u>
Earnings available to the shareholders		<u>420,000</u>
Market value of equity:		₦
	<u>₦ 420,000</u>	4,200,000
	0.1	
Market value of debt:	<u>₦80,000</u>	<u>1,000,000</u>
	0.08	
Market value of the firm:		<u>5,200,000</u>

$$\begin{aligned}
 \text{(b) Company's cost of capital} &= \frac{\text{Net operating income}}{\text{Value of firm}} \\
 &= \frac{\text{₦500,000}}{\text{₦5,200,000}} = 0.0962 \text{ or } 9.62\%
 \end{aligned}$$

It can be seen that the value of the firm increased from ₦5,160,000 to ₦5,200,000 through the use of more debt to finance the operations.

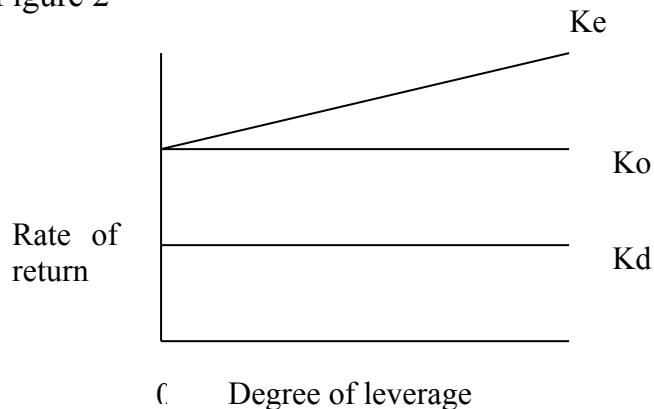
3.2.2 Net Operating Income Approach

Net operating income approach believes that the market value of the firm is not affected by changes in the capital structure. With this approach, net operating income of the firm is capitalized at an overall

rate (the firm's cost of capital) to obtain the total market value of the firm. The market value of debt is then deducted from the total market value of the firm to obtain the market value of the stock.

This approach is based on the assumption that the overall company's cost of capital and cost of debt are constant for all degrees of leverage and the cost of equity increases linearly with that of leverage.

Figure 2



From the figures in example one, it can be seen that an optimum capital structure of a firm under net operating income approach does exist. The effect of increase in the use of more debt is offset by the increase in cost of equity.

Example Two

A firm has ₦500,000 perpetual streams of operating incomes per annum, with the overall capitalization rate of 16%. The firm is partially financed by debt of ₦800,000 at 12%. Calculate the market value of the firm and cost of equity. Suppose the debt is increased to ₦1,000,000 while other items remain constant, will this affect the value of the firm and cost equity?

Solution

	₦
Net operating income	<u>500,000</u>
Market value of the firm	
₦ <u>500,000</u>	3,125,000
0.16	
Market value of the debt	<u>(800,000)</u>
Market value of shares (or equity)	<u>2,325,000</u>

Cost of equity (K_e), = $\frac{\text{Earnings available to the shareholders}}{\text{Market value of shares}}$

$$\begin{aligned}
 &= \frac{\text{Net operating income} - \text{debenture interest}}{\text{Market Value of shares}} \\
 &= \frac{\text{N}500,000 - (12\% \times \text{N}800,000)}{\text{N}2,325,000} \\
 &= \frac{\text{N}500,000 - \text{N}96,000}{\text{N}2,325,000} = \frac{\text{N}404,000}{\text{N}2,325,000}
 \end{aligned}$$

Cost of equity (K_e) = 0.1738 = 17.38%

When debt is increased to N1,000,000		N
Net operating income		500,000
Market value of the firm	<u>500,000</u>	3,125,000
	0.16	
Market value of debt		<u>(1,000,000)</u>
Market value of equity		<u>2,125,000</u>
Cost of equity = $\frac{\text{Earnings available to shareholders}}{\text{Market value of shares}}$		
	$= \frac{\text{N}500,000 - (12\% \times \text{N}1,000,000)}{\text{N}2,125,000}$	
	$= \frac{\text{N}500,000 - \text{N}120,000}{\text{N}2,125,000}$	$= \frac{\text{N}380,000}{\text{N}2,125,000}$
Cost of equity		= 0.1788 = 17.88%

From this Example, the required return of equity, (K_e), rises with the degree of leverage, which implies that the total valuation of the firm is unaffected by its capital structure.

3.2.3 Traditional Approach

The traditional approach to valuation and leverage argues that there is an optimal capital structure and that the total value of the firm can increase through a judicious use of the leverage.

The traditional theory of a company's capital structure suggests that the overall cost of capital depends on the degree of leverage. As the level of leverage increases over a moderate debt level, the overall cost of capital falls, since the cost of debt is lower than the cost of equity. The theory believes that as long as the portion of leverage is below a certain critical level, the risks to the shareholders are negligible and consequently they do not require a risk premium in their return. Beyond this critical leverage level, the cost of equity begins to rise. Moreover, the debenture holder will experience greater risk and the cost of debt will continue to

rise. Consequently, the overall cost of capital of the firm will begin to rise beyond the critical leverage level.

Between the falling and rising parts of the cost of capital curve is a minimum point at which the cost of capital is at its lowest which is also the same point where the value of the firm is at its optimum level.

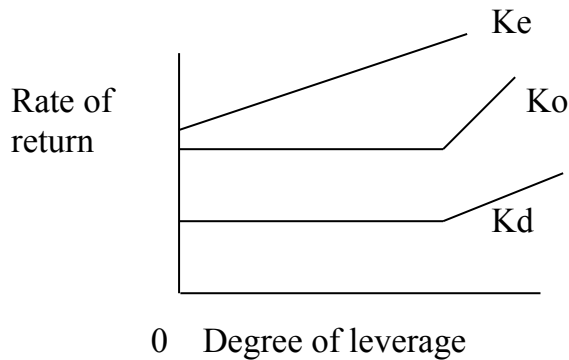


Figure 3: Effect of leverage on cost of capital under the traditional view

3.2.4 (a) Modigliani and Miller (M&M) Model (Without Corporate Tax)

Proposition I (No Taxes)

Modigliani and Miller argued that leverage increases the expected streams of earnings per share but not the share price. The reason is that the change in the expected earnings streams is offset by a change in the rate at which the earnings are capitalized. The essence of the MM argument is an Arbitrage process.

Arbitrage process is a situation whereby shareholders can switch between two firms that are identical in all respects except their degree of leverage. This means that if one of the firms had a higher market value than the other, the shareholders of the higher valued firm would sell their shares and buy those of lower valued company, until the share process of both firms are the same.

MM concluded that the capital structure of a firm does not matter, because whatever the financing mix adopted, the market value of the firm will be the same.

Example Three

Fati Ltd and Zakari Ltd are identical in every respect, except that Fati Ltd is financed entirely by ordinary shares whereas Zakari Ltd has outstanding ₦800,000 5% loan stock valued at par.

You are given the following additional information:

	Fati Ltd ₦	Zakari Ltd ₦
Net operating income	200,000	200,000
Less; debenture interest	<u>-</u>	<u>40,000</u>
Earnings for shareholders	<u>200,000</u>	<u>160,000</u>

Assume the costs of equity to be 8% and 10%, respectively, in Fati Ltd and Zakari Ltd.

Market value of equity (W1)	2,500,000	1,600,000
Market value of debt	<u>-</u>	<u>800,000</u>
Market value of the firm	<u>2,500,000</u>	<u>2,400,000</u>
Overall cost of capital (w2)	8%	8 1/3%

Suppose Isah as investor owns shares in Fati Ltd having a market value of ₦150,000. Highlight the process by which Isah could earn the same return at a lower cost.

Solution

Isah percentage of holding in Fati Ltd

$$\frac{150,000}{2,500,000} \times 100\% = 6\%$$

Isah's present return from Fati Ltd:

$$6\% \times \text{₦} 200,000 = \text{₦} 12,000$$

Alternative Investment Strategy

Without changing the risk level, Isah would purchase 6% of Zakari's equity and debt, from the sales proceed of investment in Fati Ltd, thus;

	₦
Investment in Zakari's equity: 6% x 1,600,000	96,000(Note 1)
Investment in Zakari's debt: 6% x 800,000	<u>48,000(Note 2)</u>
	<u>144,000</u>

Isah's new return from Zakari Ltd.

Equity income 6% (200,000-(5% x ₦800,000))	9,600
Interest income 6% of (5% of ₦800,000)	<u>2,400</u>

	<u>12,000</u>
Savings from the new investment strategy:	
Market value of Isah's investment in Fati ltd shares	150,000
Investment in Zakari Ltd shares	(96,000)
Investment in Zakari Ltd Debt	<u>(48,000)</u>
Remaining cash, being savings	<u>6,000</u>

Notes

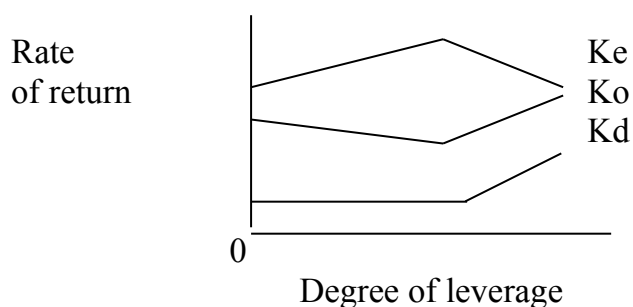
1. a) Market value of equity = Earnings of $\frac{200,000}{8\%} = 2,500,000$
 b) Market value of equity = Earnings of $\frac{160,000}{10\%} = 1,600,000$
2. a) Cost of capital = $\frac{(200,000 \times 100\%)}{2,500,000} = 8\%$
 b) Cost of capital = $\frac{(200,000 \times 100\%)}{2,400,000} = 8 \frac{1}{3}\%$

From the above illustration, it can be deducted that as long as investors can borrow or lend on their own account, on the same terms as the firm ('homemade leverage') they can "undo" the effect of changes in the firm's capital structure.

Proposition II

Modigliani and Miller argued that the expected rate of return of the equity holders of a levered firm increases in proportion to the debt equity ratio, as expressed in their market values. However, the rate of increase depends on the spread between the expected rates of return on a portfolio of all the firm's securities and the expected return on the debt.

Figure 4

**Cost of Equity under MM Theory**

The implication of MM proposition II is that the cost of debt is independent of debt/equity ratio and that the cost of equity increases linearly as debt-equity ratio increases. As the firm borrows more, the risk of default increases and the firm has to pay higher rate of interest.

MM predicted that when this occurs, the rate of increase in the cost of equity slows down. The more debt the firm has, the less sensitive the cost of equity is to further borrowing.

Shortcomings/Weakness of MM Hypothesis

The shortcoming of this theory lies in the assumption that perfect capital market exists, under which the arbitrage process would work. However, the following imperfections will; not allow the arbitrage process in reality.

- **Corporate and Personal Leverage not Being Perfect Substitute.** The perceived risks of personal leverage and corporate leverage may differ. Firms usually have higher credit standing than individual because of the substantial holding of asset thereby making the cost of borrowing for individual higher than that of firms.
- **Institutional Restriction.** Restriction on investment behaviour may retard the arbitrage process. Many institutional investors, such as pension funds and Life Insurance Company are not allowed to engage in the homemade leverage that was described.
- **Existence of Transaction Costs.** The existence of transaction costs impedes the process of arbitrage. Transaction costs are those costs incurred at the time an investor buys or sells securities. In MM hypothesis, this transaction costs to be incurred at the time of switching investments are not taken account of.
- **Existence of Company Tax.** The existence of company tax would not allow the process of arbitrage to work since debenture interest is tax deductible. That means that the real costs debt is lesser than what MM used in their hypothesis.

3.2.4(b) MM Hypothesis Under Corporate Taxes

The advantage of debt in a world of company taxes is that interest payments are tax deductible as an expense unlike dividends or retained earnings associated with stock. With interest tax shield allowed for levered firms, debt financing is more advantageous than equity financing.

Example Three

Considering two firms identical in all respects, one unlevered with ₦50,000 capital and the other levered with ₦25,000 10% debt and ₦25,000 equity financing for its operations. Both firms earn expected

return before interest and taxes of ₦12,500 and will be liable to pay 30% company tax. The policy of both firms is to distribute all earnings available and the present value of interest tax shield for the levered firm.

Solution

	Levered Firm	un-levered Firm
	₦	₦
Earnings before interest and taxes	12,500	12,500
Debenture interest (10% x 25,000)	<u>(2,500)</u>	<u>0</u>
Earnings before taxes	10,000	12,500
Tax @ 30%	<u>(3,000)</u>	<u>(3,750)</u>
	7,000	8,750
Debenture interest	<u>2,500</u>	<u>0</u>
	<u>9,500</u>	<u>8,750</u>

Working

Present value of interest tax shield = $\frac{\text{Debenture interest} \times \text{tax rate}}{\text{Cost of debt}}$

$$\frac{2,500 \times 0.3}{0.1} = \frac{750}{0.1} = \text{₦}7,500$$

Capital structure theories are explained and its influence on the valuation of companies demonstrated quantitatively. This should form the basis of deciding on the mixture of finance (i.e debt and equity) the firm should adopt to maximize its value.

4.0 CONCLUSION

In this unit, we discussed managing manufacturing operations. We discussed the nature of manufacturing and also took a look at manufacturing facilities like land, utilities and factory layout. We also saw a checklist for manufacturing segment. All these helped us to understand the management of manufacturing operations.

5.0 SUMMARY

In this unit, you have learnt the theories of capital structure. Specifically, the Net Income, Net Operating Income, the Traditional and Modigliani and Miller (MM) approaches, were demonstrated quantitatively.

6.0 TUTOR - MARKED ASSIGNMENTS

- 1) Dare at present owns 20,000 shares of Jummy plc, a company financed entirely by equity. Jummy plc carries out a policy of paying out all its earnings in dividend, which are expected to be 24 kobo per share in all future years. The shares have a market price of ₦2 each. Dare's friend, Bola, owns 30,000 shares in Akimbo plc, which pays equal annual dividend of 14kobo per share. A share in Akimbo Plc has a market value of ₦1. Bola advises Dare to sell of his shares and buy some of Akimbo plc's shares, but the latter is unsure since he does not want to increase the riskiness of his income. He therefore considers that Bola would be better off to move to holding shares in Jummy plc. The following information is also available.
 - i The operating earnings before deducting any interest of Akimbo plc are considered to be of identical risk of those of Jummy plc.
 - ii Akimbo plc has a policy of not retaining earnings.
 - iii The summarized balance sheet of Akimbo plc shows:

	₦'000
1,500,000 1 ordinary shares	1,500
500,000 8% irredeemable debentures	<u>500</u>
	<u>2,000</u>
Sundry Assets	<u>2,000</u>

- iv The market rate of interest for debenture similar to that of Akimbo plc, is 8%.

Required to Calculate:

- a) The total annual operating earnings of Akimbo plc.
- b) The average cost of capital of each of the companies
- c) Who out of the two friends should change his holding if he can improve his earnings whilst still maintaining identical level of risk?

Note: Assume that an individual can borrow at the same rate as a corporate organization.

7.0 REFERENCES/FURTHER READINGS

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UNIT 2 DIVIDEND THEORIES

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
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 - 3.2 Dividend Valuation Models
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1.0 INTRODUCTION

In unit 3 we discussed capital structure theory, a central issue in financing decision function of management. We shall in this unit discuss dividend policy and examine its influence on the valuation of firm.

2.0 OBJECTIVES

After studying this unit, you should be able to:

- Explain the concept of dividends and dividend policy
- Describe the extent to which forms of dividend policy may influence the value of firm

3.0 MAIN CONTENT

3.1 Concept of Dividends and Dividend Policy

Dividend decision is one of the three main finance decisions of any firm and it involves the determination of the proportion of a company's earnings to pay out or retain. Dividends are described as current earnings, which are paid or distributed by companies to their shareholders as a return on their investments.

Ordinarily, dividends should convey the impression to the shareholders that the company is profitable and financially strong. As shareholders consider dividend payment desirable as it increases their current return, companies on the other hand consider retained earning as a significant internal management source of financing corporate growth.

There are two schools of thought about whether or not dividend policy affects the value of a firm. The first school of thought argues that dividend policy affects the value of the firm (dividend supremacy) while the second school believes otherwise. (Dividend irrelevance)

Dividend policy is, therefore, defined as the 'trade off' between retaining earnings, on the one hand, and paying out cash as dividend on the other.

3.2 Dividend Valuation Model

Dividend models are classified under two groups: Those that suggests its effect on the value of firms (The relevancy theory) and those that suggests otherwise (The irrelevancy theory).

3.2.1 Dividend Relevancy Theories

Under this school of thought, we consider two major studies carried out by Professors James Walter and Myron Gordon, thus;

a. Walter's Model

Walter in his studies asserts that dividend policies usually affect the value of the firm stating that the rate of return and the cost of capital are important in determining the dividend policy which maximizes the value of the firm.

Professor James Walter based his argument, on the following assumptions:

- Internal financing. The firm finances all investment opportunities through retained earnings. This means that debt or new equity is not issued.
- Constant rate of return and cost of capital
- 100% 'payout' or retention. All earnings of the firm are either distributed as dividend or re-invested internally, immediately
- constant earnings per share (EPS) and dividend per share (DPS)
- Infinite time. The firm has a very long or infinite life.

In determining the market price per share, he gave the valuation model as:

$$P = \frac{\text{DIV}}{K} + \frac{r/k (\text{EPS} - \text{DIV})}{k}$$

Where, $p =$ Market price per share
 $\text{DIV} =$ Dividend per share
 $\text{EPS} =$ Earnings per share
 $r =$ firm's rate of return

$k =$ firm's cost of capital

This valuation model consists of two present values, viz;
 'DIV is the dividend per share; 'k' is the present value of the infinite stream of constant dividend payments; 'r/k (EPS-DIV)'

k is the present value of the infinite streams of capital gains. In demonstrating how dividend policies affect value of the firm, Walter classified all firms into three categories: 'growth firms' (where $r > k$) 'normal firms' (where $r = k$) and declining firms' (where $r < k$). In the growth firms', he concluded that the market price per share will increase as dividend pay-out ratio declines. Walter says that the firm has enough investment opportunities which will yield returns higher than the opportunity cost of capital. Consequently, the optimum payout ratio is zero.

For the 'normal firms', dividend policy does not affect the value of share price. And for the declining firms', as payout ratio increases, the market price per share also increases. For 'declining firms' the optimum payout ratio is 100% since the companies do not have investment opportunities that will yield earnings up to the opportunity cost of capital.

Example One

Walter's Model:

The earnings per share of a company are ₦8. it has an internal rate of return of 15% and the capitalization rate of its risk class is $12\frac{1}{2}\%$. If Walter's model is used:

- What should be the optimum payout ratio of the firm?
- What would be the price of the share at this payout ratio?
- How would the price of the share be affected if 40% of the earnings were paid out?

Solution

Using Walter's model, the optimum payout ratio for any firm whose rate of return is greater than the cost of capital (ie $r > k$) is zero. This means that the firm should not pay any dividend.

- Price of share when payout ratio is zero;

$$K = \frac{DIV}{k} + \frac{r}{k} (EPS - DIV)$$

$$P = \frac{0}{0.125} + \frac{0.15}{0.125} (8 - 0)$$

$$\begin{aligned}
 &= \frac{0.125}{0.125} + \frac{0.125}{0.125} \\
 &= \frac{0+9.6}{0.125} = \text{N}76.80
 \end{aligned}$$

- c. If the payout ratio of the firm is 40%

$$\begin{aligned}
 P &= \frac{\text{DIV}}{K} + \frac{r/k (\text{EPS}-\text{DIV})}{k} \\
 &= \frac{0.4 \times 8}{0.125} + \frac{0.15/0.125 (8-0.4 \times 8)}{0.125} \\
 &= \frac{3.2}{0.125} + \frac{1.2 (\text{N}8 - \text{N}3.2)}{0.125} \\
 &= 25.6 + \frac{5.76}{0.125} \\
 &= 25.6 + 46.08 = \text{N}71.68
 \end{aligned}$$

B. Gordon's Model

Myron Gordon's model is based on the following assumptions;

- Internal financing
- The firm is entirely financed by equity; there is no debt
- There is constant rate of return and cost of capital.
- Cost of capital is greater than the growth rate.
- The firm's stream of earnings is perpetual.
- There is constant rate of retention, 'b', thus the growth rate ($g=br$) is also constant forever.

His valuation model is given as:

$$P_0 = \frac{\text{DIV} (1+g)}{1+k} + \frac{\text{DIV} (1+g)^2}{(1+k)^2} + \dots + \frac{\text{DIV} (1+g)^n}{(1+k)^n}$$

This can be further written as:

$$P_0 = \frac{\text{DIV}_0 (1+g)}{k-g}$$

Since, $\text{DIV}_1 = \text{DIV}_0 (1+g)$ and $g = rb$

$$\begin{aligned}
 \text{DIV}_1 &= \text{EPS} (1-b) \\
 P_0 &= K - rb = k - rb.
 \end{aligned}$$

Gordon's conclusion on the relationship between dividend policy and value of the firm is similar to that of Walter's model. Under the growth

firm's assumption, the market price of share increases as retention ratio increases and for declining firms, market price reduces as retention ratio increases, but for 'normal firms', dividend policy does not matter. However, the dividend supremacy school of thought suffers from such limitations as constant rate of return, constant cost of capital and no external financing.

Example Two

Gordon's Model

A company has a total investment of ₦1,000,000 in assets and 100,000 outstanding ordinary shares at ₦10 per share. It earns a rate of 15% on its investment, and has a policy of retraining 30% of the earnings. If the appropriate discount rate of the firm is 10%, determine the price of its share using Gordon's model. What will happen to the price of the share if the company has a payout ratio of 80%?

Solution

Using Gordon's model

$$P_0 = \frac{DIV_1}{k-g} = \frac{EPS(1-b)}{k-rb}$$

$$EPS = \frac{15\% \times 1,000,000}{100,000} = \frac{150,000}{100,000} = ₦1.5$$

$$\text{Growth rate} = rb = 15\% \times 30\% = 0.045$$

$$P_0 = \frac{1.5(1-0.3)}{0.1-0.045} = \frac{1.5(0.7)}{0.055} = \frac{1.05}{0.055} = ₦19.09$$

When the payout ratio increases to 80%;

$$\text{Growth rate} = rb = 15\% \times 20\% = 0.03$$

$$P_0 = \frac{1.5(1-0.2)}{0.1-0.03} = \frac{1.5(0.8)}{0.07} = \frac{1.2}{0.07} = ₦17.14$$

3.2.2 Dividend Irrelevance MM Hypothesis

Scholars of the dividend irrelevance school of thought believe that the dividend policy of a company does not make any difference to the value of that firm, once the investment decision has been made for the present and all future periods.

They also argue that once an ideal pattern of company investments has been established, the dividend policy follows as a by-product.

Modigliani and Miller hypothesis is based on the following assumptions:

- a. Perfect capital market. The firm operates in a perfect capital market which is characterized by the following:
 - Investors behave rationally
 - There is free flow of information
 - Transaction and floatation costs do not exist
 - No single investor is big enough to affect the market price of a share.
- b. No taxes. Taxes are assumed not to exist. Even if they exist, the same tax rate is charged on both dividends and capital gains.
- c. Homogenous Expectations. All individuals have the same beliefs concerning future investments, profits and dividends.
- d. The investment policy of the firm is set ahead of time, and is not altered by changes in dividend policy.
- e. No risk. Uncertainty does not exist. Investors are able to forecast future prices and dividends with certainty and one discount rate is appropriate for all securities and all time period.

M & M valuation model is given as:

$$V = nP_0 = \frac{nDIV_1 + (n+m)P_1 - mP_1}{1+k}$$

Where n = number of shares outstanding in period 0
 m = number of new shares at time 1

Since the firm's investment programme in a given period of time can be financed by either retained earnings, issue of new shares or both, the amount of new shares issued will be:

$$\begin{aligned} mP_1 &= I_1 - (X_1 - nDIV_1) \\ &= I_1 - X_1 + nDIV_1 \end{aligned}$$

Where I_1 = total amount of investment during first period
 X_1 = total net profit of the firm during the first period

Substituting the value of mP_1 into the first formula; the valuation model becomes:

$$V = nP_0 = \frac{(n+m)P_1 - I_1 + X_1}{1+k}$$

Modigliani and Miller assert that it does not matter to the shareholder in which pattern he receives the dividends, for with perfect market and condition of certainty, he can distribute the time pattern of the dividends to suit his wishes. He can decide to lend dividends if he wants to defer consumption, or he can borrow against future dividends if he wishes to consume at an earlier date than the receipt of the dividends.

They conclude that since DIV, completely cancel out of the equation, dividends do not matter in the determination of the firm's value.

Example Three

ABC plc has 5,000,000 shares of ₦1 nominal value. These are currently quoted at ₦5 each ex div. the dividend proposed for the current year is 50 kobo per share. No increase in this dividend is anticipated unless new project are accepted. There is no long-term debt.

The company can invest cash surpluses at 10% per annum at the same level of risk as current operations.

Required

Compute the effect on the shareholders' wealth (cash and capital) for the following options being considered by the company, namely:

- Continuing with the current dividend and investment policy
- Retaining an extra:
 - i. 1 million
 - ii. 2.5 million. In both cases investing at 10% and paying out the returns as additional dividends.
- Paying out the normal dividend and raising an additional 1 million for investment at 10% by rights issue.

Note: ignore taxation and issuing cost.

Solution

As any new investment is not expected to change the risk, it should have the same required return as prevails at the moment:

$$K_e = \frac{DIV}{P_0} = \frac{0.5}{5} = 10\% \text{ or } 0.1$$

a.	Continuing current policies:	₦
	Market value 5,000,000 shares @ ₦5 each	25,000,000
	Dividend 5,000,000 shares @ 0.50 each	<u>2,500,000</u>
	Computation of the shareholders' wealth	<u>27,500,000</u>

b. i) Retaining 1 million and investing @ 10%:

$$\begin{aligned}\text{New (future) dividend} &= \text{current dividend} + \text{investment return} \\ &= \text{₦}2,500,000 + 10\% \times \text{₦}1,000,000 \\ &= \text{₦}2,600,000\end{aligned}$$

New market value: ₦

$$\frac{\text{New dividend}}{K_e} = \frac{2,600,000}{0.1} = 26,000,000$$

$$\begin{aligned}\text{Dividend: normal dividend} - \text{retention} \\ \text{₦}(2,500,000 - 1,000,000) \quad \underline{1,500,000}\end{aligned}$$

$$\text{Computation of the shareholders' wealth} \quad \underline{27,500,000}$$

ii. Retaining ₦2.5 million and invest @ 10%:

$$\begin{aligned}\text{New (future) dividend} &= \text{current dividend} + \text{investment return} \\ &= \text{₦}2,500,000 + (10\% \times \text{₦}2,500,000) \\ &= \text{₦}2,750,000\end{aligned}$$

$$\text{New market value} = \frac{\text{new dividend}}{K_e} = \frac{2,750,000}{0.1} = 27,500,000$$

$$\begin{aligned}\text{Dividend} &= \text{normal dividend} - \text{retention} \\ &= 2,500,000 - 2,500,000 \quad \underline{-}\end{aligned}$$

$$\text{Shareholders' wealth} \quad \underline{27,500,000}$$

c. Raising additional 1 million for investment:

$$\begin{aligned}\text{New future Dividend} \\ &= \text{₦}2,500,000 + 10\% \times \text{₦}1,000,000 \\ &= \text{₦}2,600,000 \quad \text{₦}\end{aligned}$$

$$\text{Market value} = \frac{\text{₦}2,600,000}{0.1} = 26,000,000$$

$$\begin{aligned}\text{Dividend} &2,500,000 \\ \text{Subscribed for shares} &\underline{(1,000,000)} \\ \text{Shareholders' wealth} &\text{₦}\underline{27,500,000}\end{aligned}$$

3.3 Determinants of Dividend Policy

Determinants of dividend policy are those factors that need to be considered to ensure appropriate formulation of dividend policy.

Determinants of dividend policy, strictly speaking, cannot be universally prescribed for adoption by every firm in an industry or for industries. Dividend policy can and should be formulated by management in terms of individual corporate circumstances; characteristics and objectives and on the basis on other relevant conditions. Some of these factors are:

a) Legal Constraints

Governments of most countries enact legislation to regulate the payment of cash dividends, consequently dividend policy of a firm in the jurisdiction of the law of a country have to be evolved within that legal frame work and restriction.

(b) Contractual Constraints

Demand payment by a firm may be constrained by covenant, or terms of loan agreement, a bond adventure, a lease contract, etc. These covenants, generally, either restrict the payment of dividend until a certain level of earnings have been attained or limit the amount to be paid to certain level or percentage of earning. This is done with the view of protecting the interests of the lenders in term or repayment of interests and principal sum and avoidance of losses in the cent of insolvency. A firm in this factor as it violation could be a ground for an immediate request for repayment of loaned fund by creditors, an event that could force a firm into bankruptcy and eventual liquidation.

(c) Internal Constraints

This fact comes in form of availability of liquid cash, in other words, liquidity position of a firm. Firms with low liquidity, other things being equal, may settle for low dividend payout and vise versa. It is possible that a firm with low liquidity level will go for loan to pay for dividend. Despite this, it is most likely that dividend to be paid will be at minimum. Attempt by firm to finance dividend payment from borrowed funds could be a difficult task. Lenders will necessarily not be interested in extending credit facilities for that purpose, since it will produce not tangible nor operating benefit that could enhance repayment of the loan. It is even irrational decision to borrow money and distribute to share holders as dividends. Therefore, firms' level of liquidity could influence its dividend policy.

(d) Growth Prospect

Growth prospect of a firm needs to be considered by management when formulating dividend policy. The firm must plan its needed finance in terms of its reasonable anticipated growth prospect. The availability of external finance, the ease of access and its exact timing will determine the need for retention of earnings for growth financing, which in consequences; will dictate the amount to be distributed as dividends to owners.

(e) Shareholders/ Owners Consideration

Primarily, dividend policy should be formulated while maximizing firm owner's wealth in the long run. Ownership of a firm is diverse, usually with different interest. Though it may be practically impossible to establish those policies, which satisfy the owners individually, it is necessary that the policy to be formulated be the one that will consider the interest of majority of the owners. Specifically, three factors need to be noted, owner tax status, their investment opportunities and the dilution of owners.

(f) Market Consideration:

It is important, in the formulation of dividend policy, that behavioural aspect of the security market be considered. Since the wealth of the owners of firm is reflected by the prices of its shares in the market recognition of possible response of share prices to certain types of dividend policies is an important consideration in dividend policy formulation.

(g) Dividend Policy of Similar Companies:

When deciding on dividend policy, companies will tend to allow similar policy to that of similar companies in the same industry or similar industries.

SELF ASSESSMENT EXERCISE

- i. Which one of the following theories of dividend policy asserts that it does not make any difference to the value of a firm once the investment decision has been made for the present and all future periods?
 - a. James Walter's model
 - b. Myron Gordon's Model
 - c. Modigliani – Miller's model
 - d. Graham- Dodd's Model
 - e. Modiglian's model
- ii. Which one of the following scholars in the field of finance first advanced the 'bird-in-hand' argument?

- a. John Kirshman
 - b. Myron-Gordon
 - c. Mordillian Miller
 - d. Graham-Dodd
 - e. James-Walter
- iii. The following are features of a perfect capital market, except
- a. Investors are free to buy or sell securities
 - b. finance assets are divisible
 - c. sense of transaction cost
 - d. only those who have the required amount of money can participate
 - e. absence of floating cost
- iv. The following scholars worked on dividend theory, except:
- a. James –Walter
 - b. Myron –Gordon
 - c. Modiglian-Miller
 - d. Graham Dodd
 - e. Gordion-shapiro
- v. Which one of the following is not an argument of James Walter’s Model?
- a. No external financing
 - b. constant rate of return
 - c. Constant opportunity cost of capital
 - d. The firm has definite lifespan
 - e. Constant earnings per share.
- vi. A process of switching investment from a levered to an unlevered firm, with a view to obtaining the same level income at a smaller investment outlay is known as ----- process.
- vii. The mix of a firm’s financial sources is known as its -----
- viii. ----- is the ‘trade-off’ between retaining earnings and paying out cash to the investors.
- ix. Using Walter’s model, what is the formula for determining market price of shares -----
- x. Using Gordon’s model, determine the price of shares when payout ratio of a company is 30%, earning on its investment 15% and the par value of equity is ₦10. assume discount rate of 12%

4.0 CONCLUSION

Dividend policy theories are explained and their influences on the value of companies were quantitatively demonstrated. Factors that could influence the choice of the policy were also discussed. Adequate mix of the theories and the factors discussed by management should aid the making of optimal dividend decisions that would maximize the shareholders fund.

5.0 SUMMARY

In this unit, you learnt the theories of dividends and factors that could practically influence its decisions.

6.0 TUTOR - MARKED ASSIGNMENTS

1. Discuss the factors that could influence dividend policy of a firm.
2. What is the postulate of dividend irrelevance? List assumptions on which dividend irrelevance is based.
3. Bandala Plc has a total investment of N1,000,000 in assets and 200,000 outstanding ordinary shares of N15 per share. It earns a rate of 20% on its investments, has a policy of retaining 40% of its earnings. If appropriate discount rate of the firm is 10%, determine the share price of the company using Gordons model. Also determine the effect on the share prices if the company has a retention policy of 30%.

7.0 REFERENCES/FURTHER READINGS

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MODULE 5

Unit 1	Portfolio Theory
Unit 2	Capital Asset Pricing Model
Unit 3	Capital Market Efficiency

UNIT 1 PORTFOLIO THEORY

CONTENTS

1.0	Introduction
2.0	Objectives
3.0	Main Content
3.1	Definition of Portfolio Theory
3.2	Assumptions of Portfolio Theory
3.3	Risk and return of a Single Security
3.4	Expected Return of Portfolio
3.5	Portfolio Risk
3.6	Correlation
4.0	Conclusion
5.0	Summary
6.0	Tutor Marked Assignments
7.0	References/Further Readings

1.0 INTRODUCTION

In the previous units, particularly, unit 5 – 7 discussions were centered on determination of viable investments option. We shall, in this unit refer to these options as securities. Combination of investments in those securities is termed as portfolio. We shall explain the concept of return and risk of securities in conjunction with explanations in unit 9 in valuation of stocks and bonds. The relationship between risk and return of security and portfolio of securities shall also be discussed. The use of capital Asset Pricing Model (CAPM) and Arbitrage Price Model (APM) shall be discussed in the subsequent units.

2.0 OBJECTIVES

After studying this unit, you should be able to:

- Explain the concepts of portfolio
- State the relationship between risk and return of securities and portfolio of securities
- State the implications of the relationship of financial decisions.

3.0 MAIN CONTENT

3.1 Definition of Portfolio Theory

A portfolio is a group of investments. It describes the collections of various investments that make up an investor's total investment. These might be in securities or capital projects. Investors are generally assumed to be risk averse, as such they try as much as possible to have well-diversified portfolio in order to optimize returns and minimize risks.

3.2 Assumption of Portfolio Theory

The basic assumption of portfolio theory are that investor acts in accordance with the following rules:

- If two securities have the same risk and different expected return, the one with higher return is preferred.
- If two securities have the same expected returns and difference degree of risks, the one with a lower risk is preferred.
- If one security has a larger expected return and a lower risk than another, it will be preferred
- The investor is making one period decision and will stick by it until he next reviews his assets.
- He will maximize one period expected utility
- the investor exhibits diminishing marginal utility to wealth
- the investor will make decisions solely in terms of expected returns and risk
- the investor is risk averse
- The investor visualizes investments in terms of a profitability distribution of expected returns.
- Returns are normally distributed

Investment risk estimates are proportional to the variability of returns. When an investor has a portfolio of securities, he will expect the portfolio to obtain a certain return.

For proper understanding of portfolio theory, we shall start by discussing those that relate to risk and return of a single security.

3.3 Risk and Return of a Single Security

To recall, in chapter eight, we saw that the rate of return on a security (especially common stock is given by):

Return = Dividend Yield + Capital gain.

$$R_1 = \frac{DiVi}{P_o} + \frac{(P_1 - P_o)}{P_o} = \frac{Divi + (P_1 - P_o)}{P_o}$$

Where:

R_1 = Return on a common stock security at the end of period I

P_1 = Market price of the security at the end of Period I.

P_o = Market price of the security at the beginning of period (ie., Current price)

$DiVi$ = Dividend paid during period I.

Example One

Edwin the common stock of Edewo Plc when the market price is #2.60. He expects the stock will appreciate to N3.50 n one year's time when he will later sell it.

Required

Calculated the expected return on the stock if:

- No dividend will be paid during the period
- A dividend of 50k will paid during the period

Solution

$$\begin{aligned} \text{i) Expected return, } R_1 &= \frac{P_1 - P_o + D_1}{P_o} \\ &= \frac{N3.50 - N2.60 + 0}{260} = 0.346\% \end{aligned}$$

$$\begin{aligned} \text{ii) Expected return, } R_1 &= \frac{P_1 - P_o + D_1}{P_o} \\ &= \frac{N3.50 - N2.60 + 0.5}{260} = 0.5385\% \end{aligned}$$

In world of uncertainty the above returns may not be achieve realized. There is a possibility that the actual return form holding the security will be different from expectations, if the actual return of a security deviates from expectations, there is a risk associated with the return of that security. The probability distribution in the assessment of risk can be summarized in terms of two parameters: the expected value and standard deviation. The expected return is given by.

$$E(Ri) = \sum_{i=1}^n RiPi$$

Where (R_i) = is the expected value of returns in security j,
 R_i = is the return associated with as event
 P_i = is the probability associated with event I
 n = is the total number of events

The standard deviation is given by

$$\sigma = \sqrt{n \sum_{i=1} (R_i - \sum (R)^2 P)}$$

The square of the standard deviation is known as the variance of the distribution.

Example Two

The return on security P for a one year holding period is not certain. However, the probability distribution of possible returns of security p is given as follows.

EVENT (i)	POSSIBLE RETURN%	PROBABILITY OF EVENT
2	18	0.3
2	20	0.2
4	24	0.5

Solution

Return R_i	Probability P	$R_i P_i$	$R_i - E(R)$	$(R_i - E(R))^2 P$
a	b	a x b	D	e
0.18	0.3	0.0054	-0.034	0.000347
0.20	0.2	0.04	-0.014	0.000039
0.24	0.5	0.12	0.026	0.000338
	E(R)	0.214		0.000724

Expected return = 21.4%

Standard Deviation: $\sqrt{\sigma^2} = \sqrt{0.000724} = 0.0269 = 2.69\%$

3.4 Expected Return of Portfolio

The expected return on a portfolio is the weighted average of the expected return of each investment in the portfolio where the weight represent the portion of total funds of each investment in the in the portfolio, the expected return on a portfolio is given by.

$$R_p = \sum_{i=1}^n W_j R_j$$

Where R_j = Expected return on security
 W_j = Proportion of portfolio funds invested in securities J.
 R_p = Expected return on portfolio P.

Example Three

Danladi is considering investing in two securities, which have the following probability distributions of returns.

Security X		Security Y	
Probability	Return	Probability	Return
.25	0.19	.35	0.21
.45	0.23	.25	0.18
.30	0.17	.40	0.20

Determine the expected return on a portfolio, $E(R_p)$, consisting of 45 percent of security X and 55 percent security Y.

Solution

$$E(R_x) = (0.25)(0.19) + (0.45)(0.23) + (0.30)(0.17) = 0.202 = 20.20\%$$

$$E(R_y) = (0.35)(0.21) + (0.25)(0.18) + (0.40)(0.20) = 0.1985 = 19.85\%$$

$$E(R_p) = (0.45)E(R_x) + (0.55)E(R_y)$$

$$= (0.45)(0.202) + (0.55)(0.1985) = 0.0909 + 0.109175 = 0.200075$$

$$E(R_p) = 20.01\%$$

3.5 Portfolio Risk

Risk of a portfolio is the dispersion or variability of the returns of the portfolio around its expected return. And it is measured by the expected variance (or standard deviation) of the distribution. Unlike the expected return on a portfolio, which is determined by weighted average of returns on the individual securities, the risk of a portfolio depends not only on the riskiness (i.e., standard deviation) of the securities making up the portfolio but also on the relationship among those securities (i.e. covariance of the securities).

Covariance is the product of the standard deviations of two securities and their correlation coefficient. It is a statistical measure of the degree to which two variables (i.e. securities returns) move together. A negative covariance suggests that, on the average, the two securities move in opposite directions. A zero covariance suggests that the two securities show no tendency to vary together in either a negative or positive linear fashion, as such they are indifferent. Positive covariance means that, on the average, the two securities move together which increases the riskiness of the portfolio.

The standard deviation of a possible portfolio returns is given by:

$$\delta_P = \sqrt{\sum_{K=1}^n \sum_{L=1}^n W_K W_L \delta_{KL}}$$

Where:

δ_P = Standard deviation of a portfolio

W_K = The proportion of total funds invested in security K

W_L = The proportion of total funds invested in security L

δ_{KL} = the covariance between possible returns for securities K and L.

n = the total number of different securities in the portfolio

The two sigma denote that the covariance for all possible pair wise combinations of securities in the portfolio will be considered.

For illustration a two-security portfolio is hereby considered. The standard deviation of two-security portfolio is given by:

$$\delta_P = \sqrt{W_x^2 \delta_x^2 + W_y^2 \delta_y^2 + 2W_x W_y COV_{xy}}$$

Where:

W_x = the proportion of total funds invested in security X.

δ_x = the standard variation of returns on security X

W_y = the proportion of total funds invested in security Y

δ_y = the standard deviation of returns on security Y

COV_{xy} = the covariance between returns on security X and Y

Determining covariance is not straightforward. Thus, if the returns between securities X and Y are subjected to the same event, then

$$COV_{xy} = \sum_{i=1}^n P_i [R_x - E(R_x)] [R_y - E(R_y)]$$

Where

COV_{xy} = the covariance between returns on security X and Y

R_x and R_y = returns of securities X and Y respectively.

$E(R_x)$ and $E(R_y)$ = the expected returns of X and Y respectively.

P_i = the probability associated with event i.

n = total number of events.

Example Two

Random returns of two securities are given as follow:

Probability	Return on Security A	Return on Security B
0.3	23%	14%
0.5	18%	15%
0.2	15%	16%

Required:

Calculate the standard deviation of the return on A portfolio consisting of 50% of security A and 50% of security B.

Solution

P_i	$R_A P_i$	$R_A - \bar{R}_A$	$(R_A - \bar{R}_A)^2 P_i$
0.3	0.069	0.041	0.000504
0.5	0.09	-0.009	0.000041
0.2	0.03	-0.039	0.000304
\bar{R}_A	0.189		d_A^2 0.000849

P_i	$R_B P_i$	$R_B - \bar{R}_B$	$(R_B - \bar{R}_B)^2 P_i$
0.3	0.42	0.041	0.000504
0.5	0.075	-0.009	0.000041
0.2	0.032	-0.039	0.000304
\bar{R}_B	0.140		d_B^2 0.000849

P_i	$R_A - \bar{R}_A$	$R_B - \bar{R}_B$	$P_i(R_A - \bar{R}_A)(R_B - \bar{R}_B)$
0.3	0.041	0.009	-0.000111
0.5	-0.009	0.001	-0.000005
0.2	-0.039	0.011	-0.000086
			-0.000202

$$\sigma_P = \sqrt{W_A^2 \sigma_A^2 + W_B^2 \sigma_B^2 + 2W_A W_B \text{COV}(A, B)}$$

$$\begin{aligned} \sigma_P &= \sqrt{(0.5)^2 (0.000849) + (0.5)^2 (0.000849) + 2(0.5)(0.5)(-0.000202)} \\ &= 0.011113 \\ &= 1.11\% \\ \text{Cov}(A, B) &= \gamma_{AB} \sigma_A \sigma_B \end{aligned}$$

Where

γ_{AB} - is the correlation between possible returns for security A and B.

σ_A = is the standard deviation of security A

σ_B = is the standard deviation of security B

3.6 Correlation

This is the relationship between two or more security correlation coefficient can be positive, negative or zero. The value of a correlation always lies between -1 and +1.

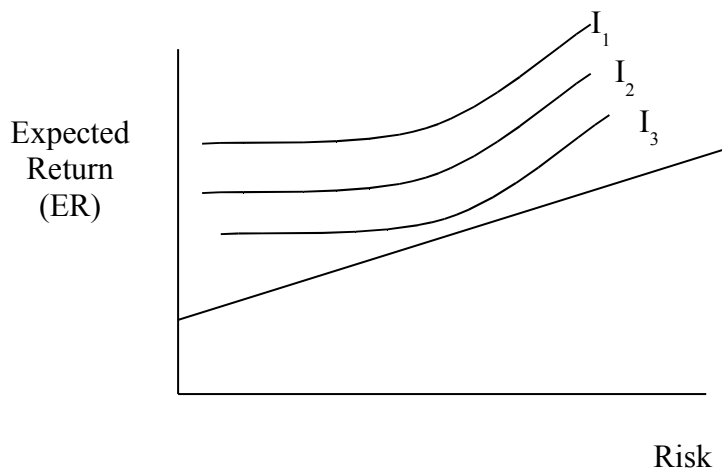
Positive Correlation coefficient: the returns on two securities vary along the same direction.

Negative Correlation coefficient: the returns vary along different direction.

Zero correlation coefficient: there is no relationship between returns on two securities.

If the values of correlation coefficient are strictly 1, it is perfect positive correlation while it is called perfect negative correlation of the value is strictly

The lower of the correlation coefficient of securities in a portfolio, the more effective will be diversification in reducing overall risk of the portfolio. Diversification will be more effective in reducing overall risk of a portfolio if securities in the portfolio are perfect negatively correlated.



According to Markowitz (1952, 1959) an efficient frontier is a portfolio of a securities in which for a given risk has the highest expected return and for a given expected return has the lowest risk. A portfolio is not efficient if there is another portfolio with a higher expected return and a lower risk, a higher expected return but a lower risk.

An investor can invest in a risk-free security that yield a certain future return – an example of a risk free security is government securities e.g. Treasury securities. The expected return on a risk free security is low

compared with other securities; however, there is complete certainty of return.

4.0 CONCLUSION

In this unit, the concept of portfolio theory and its assumptions were explained. Its usefulness in financial decisions was also highlighted.

5.0 SUMMARY

In this unit, attempts have been made to establish the relationship between the risk and return of individual security and a portfolio security.

6.0 TUTOR - MARKED ASSIGNMENTS

1. Dakada bought the common stock of Saachi Limited when the market price is N85, he expects to receive a dividend of N5.50 and sell the stock for N96 after one year. Determine the expected return on the stock. What would be his return if the market price of Saachi Limited Stock were N76 after a year?
2. The common stock of Momoh Limited for one year holding period has the following probability distribution of possible returns:.

Probability of occurrence P_i	Possible Return R_i
.15	-0.03
.20	0.05
.30	0.10
.25	0.13
.10	0.19

Determine the expected return and standard deviation of the stock

3. Determine the standard deviation of the returns on a portfolio consisting of 60 percent of security X and 40 percent of security Y. the probability distribution of returns of the two securities are given as follows:

Probability P_i	Return on Security X R_x	Return on Security Y R_y
.35	21%	17%
.25	19%	22%
.40	23%	18%

7.0 REFERENCES/FURTHER READINGS

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UNIT 2 CAPITAL ASSET PRICING MODEL

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Capital Asset Pricing Model (CAPM)
 - 3.2 Assumptions of Capital Asset Pricing Model
 - 3.3 Classification of Security Risk
 - 3.4 Problems of Applying CAPM in Capital Budgeting
 - 3.5 Implications of Capital Market Efficiency
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignments
- 7.0 References/Further Readings

1.0 INTRODUCTION

In this unit we shall discuss capital asset pricing {CAPM) and their implications on security evaluation.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain the concept of Capital Asset Pricing Model
- State the use of CAPM in security pricing.

3.0 MAIN CONTENT

3.1 Capital Assets Pricing Model (CAPM)

Capital assets pricing model shows the relationship between expected return on a security and its avoidable risk. It provides a framework for the evaluation of securities. It can also be used to determine the cost of company's equity. The CAPM was developed by Sherpe (1954). Lintner (1965) and Mossin (1986).

3.2 Assumptions of the Model

The followings are the assumptions of CAPM

- Investors are risk averse individual who maximize the expected utility of their end of period wealth i.e. one period model

- Investors are risk takers and have homogeneous expectations about securities or assets returns
- There exists a risk free security or asset such that investors may borrow or lend unlimited amounts at the risk free rate.
- The quantities of securities (or assets) are fixed. All securities (or assets) are marketable and perfectly divisible.
- Securities (or asset) markets are frictionless. Information are costless and simultaneously available to all investors.
- There are not market imperfections such as taxes, regulations or transaction costs.

CAPM is an extension of portfolio theory. It is based on the concept that the expected return from investing in security is made up of two parts.

- The risk free rate interest and
- A premium to compensation for the particular risk of the security.

The security market line equation is given by

$$E(R_i) = R_f + (E(R_m) - R_f)B_i$$

$$\text{Where } B_i = \frac{\text{COV}(R_i, R_m)}{\sigma^2_m} = \frac{\text{COV}(A, B)}{\sigma_A \sigma_B} = \gamma_{AB}$$

$$\gamma_{AB} = \frac{\text{COV}(A, B)}{\sigma_A \sigma_B}$$

Where $E(R_i)$ = Expected return on security

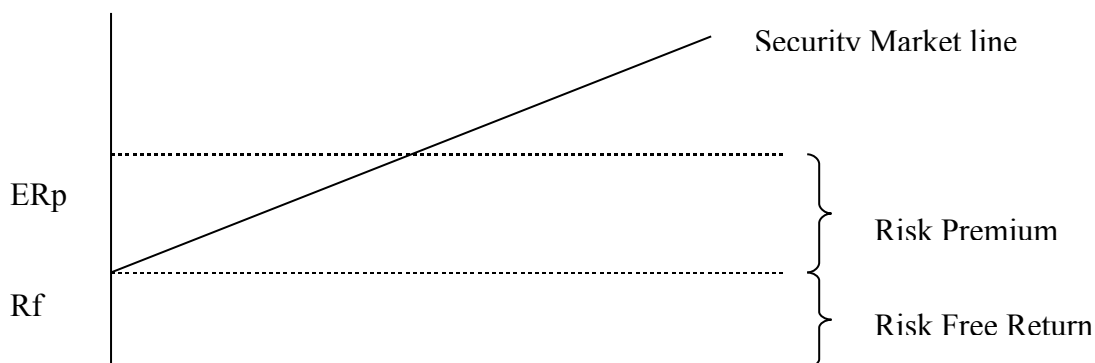
R_f = Risk free rate

R_m = Expected return on a market portfolio

$\text{COV}(R_i, R_m)$ = Covariance of return on security with the returns of market portfolio.

B_i = Beta of security

σ^2_m = Variance of returns on the market portfolio



3.3 Classification of Security Risk

Risk of any security can be divided into:

1. Systematic risk: Undiversifiable risk: this is the market risk which is the risk of the economy as a whole. It is due to overall market risk such as changes in economy tax reform, exchange rate fluctuations, interest rate fluctuations, etc. these risks affect all securities and consequently cannot be diversified away by any investor.
2. Unsystematic Risks:- Diversifiable risks. They are caused by factors that are unique to a particular company e.g. strike in company, changes in management, competition, shortage of raw materials, changes in technology et. Since these risk do not affect all securities, by diversification they can be reduced or even eliminated.

Example

Manila plc currently has a bet of .6, is currently priced to yield and expected return of 20%. The issued free rate is 12% and the expected return on market portfolio is 18%. Is Madela plc stock currently priced?

Solution

Using CAPM

$$\begin{aligned}
 E(R_i) &= R_f + [E(R_m) - R_f]B_i \\
 &= 0.12 + [0.18 - 0.12] 1.6 \\
 &= 0.216 \\
 &= 21.6\%
 \end{aligned}$$

Since 21.6% > 20%, Mandela plc stock is under priced

3.4 Problems of Applying CAPM to Capital Budgeting

Greatest practical problems with the use of CAPM lie in difficulty of estimating accurately not only information and results internal to the company but also those expected by the company that are very much outside its control.

CAPM is a single period model: capital budgeting involves multi-period investments

SELF ASSESSMENT EXERCISE

- i. List the assumptions of CAPM
- ii. Discuss the problems of applying CAPM in capital budgeting

4.0 CONCLUSION

CAPM have been demonstrated as valuable tools in pricing of securities. Their usefulness in financial decisions was also discussed. Difficulty in their applications, notwithstanding, the two models could provide basis for financial decisions.

5.0 SUMMARY

In this unit, you learnt about the concept of CAPM, its computational process and way it could influence financial decision.

6.0 TUTOR - MARKED ASSIGNMENTS

The following relates to Kawu inc show whether the following portfolio are currently priced if the risk-free rate is 12%, expected return in market is 18% and the standard deviation of the ratio on the market portfolio is 13%

Portfolio	Return	Standard Deviation
p	35%	24%
k	25%	15%

7.0 REFERENCES/FURTHER READINGS

Omolehinwa A (2001). *Work-out Corporate Finance*,. Lagos. Panet publishing, Inc

ICAN (2006). *Strategic financial management, - ICAN study Pack*, Lagos: Vi Publishing ltd

UNIT 3 CAPITAL MARKET EFFICIENCY

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Meaning of Capital Market Efficiency
 - 3.2 Assumptions of an Efficient Capital Market
 - 3.3 Role of Capital Market Efficiency
 - 3.4 Forms of Capital Efficiency
 - 3.5 Implications of Capital Market Efficiency
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignments
- 7.0 References/Further Readings

1.0 INTRODUCTION

Discussions in the preceding units are based on the fact that capital market is assumed to be efficient. We shall in this unit explain the concept of efficient capital market, its various forms and its implication on financial managers and investors.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain the meaning of capital market efficiency
- Describe the various forms of capital market efficiency
- State the implication of capital market efficiency on financial managers and the investors.

3.0 MAIN CONTENT

3.1 Meaning of Capital Market Efficiency

Capital market efficiency can be defined as a market where by prices quickly and fully reflect all available information if a market will be rendered useless. In an efficient market, the same rate of return for a given level of risk should realized by all investors. Behaviour of any participant or group should not influence a price of a security in the market.

3.2 Assumptions for an Efficient Market

These are the assumptions of efficient market:

- No transaction cost of trading in securities. Information is freely available to all market participants
- All investors have homogeneous expectations especially as to the implication of current information for the current price and distribution of future prices of each security.
- All investors have the same time horizon.

3.3 Role of Capital Market Efficiency

Capital market efficiency, from the roles the capital markets is expected to perform in the economy, can be classified into three: Viz

1. **Allocation efficiency:** the role of a capital market there is to optimally allocate scarce savings to productive investments in a way that benefits everyone.
2. **Operation Efficiency:** A market is said to be operational, efficient if it serves as intermediates that provide the service of channeling funds from savers to investors at the minimum cost that provides them a fair return for their services.
3. **Pricing Efficiency:** this is market where prices are used as signal of capital allocation. The prices are set by forces of demand and supply. A market that is pricing efficient implies that capital asset anytime is based on the correct evaluation of all information available then.

3.4 Forms Market Efficiency

Market efficiency can be categorized into three forms:

1. **Weak Form:** this is concerned with the adjustment of security prices to historical price or return information. If the market is weak from efficient, not investor can earn any excess or abnormal return based on historical price or return. The technical analysis believe that market prices exhibit identifiably patterns believe that are bound to be repeated. The art lies in devising the proper technique to identify trends, interpret them and interpret any deviating from them. In a weak efficient market, past price and volume of data are already impounded in security prices and no amount of chart reading or any other trading device is likely to outperform the buy and hold strategy.

2. **Semi-Strong for Efficiency:** This is concerned with whether security price fully reflect all information whether available to the public or not. In a strongly efficient, no investor can earn abnormal returns from publicly available information.
3. **Strong Form Efficiency:-** this is concerned with whether security price fully reflect all information whether available to the public or not. In a strongly efficient, market no individual can earn abnormal profit from any information even if he has monopolistic access to such information.

3.5 Implications of Capital Market Efficiency

If the capital market is efficient, it will have the following implications for financial managers and investors

A. For Financial Managers

- The real financial position of a company will always be reflected in a company's share price. If management makes a positive investment decision, provided the information is made public, security prices will always reflect the manager's actions. Thus, managers can pursue the objective of maximizing shareholders' wealth by making public information on positive investment decision.
- Since, strong form of efficient market hypotheses does not hold, management with unfavorable information about their companies might not release such information to the public. If it is a very adverse information, the extent in which the company can withhold such information to the public is doubtful. Sooner or later the information might leak to the public. In a country where there is no stiff action on insider trading, management with withheld unfavorable information about their firm can defraud investors.

B. For Investors

- Investors can rarely beat the market and spot securities at a bargain price that will soon increase in value. All new information will have been built in security prices. The key element to investors' choice in an efficient market is passive portfolio strategy. Passive portfolio strategy as described by Black (1971) involves investors choosing a well-diversified portfolio that fits his objectives including his tax status and his ability to tolerate fluctuations in the value of his portfolio. Nevertheless, once the investor has a portfolio, he should make change only to keep it diversified to fit it to changing objectives, to generate cash or to release losses (Black, 1971, p22)

Passive portfolio strategy also involves emphasis on low turnover and risk control (foster. 1978)

- An efficient capital market tends to imply that the value of security analysis is zero. However, investors still need security analyst to enable them build a well-diversified portfolio and control risk.
- In a situation where the market is near efficient, the key element to investors' choice is active portfolio management. This is an investment approach that attempts to detect and exploit perceived departures from efficiency

SELF ASSESSMENT EXERCISE

- i. What is capital market efficiency?
- ii. List the assumptions of an efficient capital market.
- iii. Distinguish between various forms of capital market efficiency.

4.0 CONCLUSION

Concept of capital market efficiency and its various forms were discussed. We were also able to demonstrate that capital market efficiency has impact on investment decisions.

5.0 SUMMARY

From this unit, you learnt about the concept of capital market efficiency, its roles, various forms and its relevance in financial decisions.

6.0 TUTOR - MARKED ASSIGNMENTS

1. Distinguish between operational and allocational efficiency of capital market
2. Discuss the implications of capital market efficiency for corporate financial management.

7.0 REFERENCES/FURTHER READINGS

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MODULE 6

Unit 1 Financial Planning

UNIT 1 FINANCIAL PLANNING

CONTENTS

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
 - 3.1 Meaning of Financial Planning
 - 3.2 Objectives of Financial Planning
 - 3.3 Basis of Financial Planning
 - 3.4 Methods of Forecasting Financial Requirements
 - 3.5 Limitations of Financial Planning3e
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignments
- 7.0 References/Further Readings

1.0 INTRODUCTION

In the previous units we have discussed financial analysis and investment appraisals as centered on the achievement of financial objective of maximization of returns and minimization of costs. Financial objectives will not be achieved, except by luck, unless management knows what they are trying to achieve and plan hard to achieve the objectives. Qualified targets for the achievement of financial objectives should be set out in financial plan, which should be part of overall strategic plan of the organization.

In the unit, we shall discuss the notion and procedures of financial planning.

2.0 OBJECTIVES

At the end of this unit, you should be able to:

- Explain the objectives of financial planning
- State procedures for financial planning.

3.0 MAIN CONTENT

3.1 Meaning of Financial Planning

Financial planning involves primarily anticipating the impact of operating and financial policies as the future financial position of the twice instituting the right measures that may required. Financial forecast helps to quantify future financial requirements.

3.2 Objectives of Financial Planning

This includes:

- To determine the size of fund needed for long-term investment and short-term cash flow.
- To determine whether surplus cash is likely to occur, for how long and the best use of the surplus cash if it occurs.
- To determine how any required fiancé should be raised
- To determine whether the form is likely to be profitable and achieve it main and subsidiary objectives.

3.3 Basis of Financial Plan

Financial Plan will be based on the following forecast.

(a) Environmental Forecast

These are needed to assess future economic and political events which will influence an organization's prospects. Examples are: interest rates, inflation rates, etc.

(b) Market of Industry Forecast

These are formulated within the framework of environmental forecasts it is an attempt to assess the conditions in the markets and industry and plan for them accordingly. These conditions include changes in growth rate in the industry, market or technological changes etc.

(c) Organizational Forecast

This is prepared within the framework of market and industry forecast. It involves forecast for sales, costs and profits, work fore need, finance need etc.

On the completion of above, an organization needs to establish the financial requirement of business plan and arrange to secure necessary funding from the most appropriate source. The plan also needs to be monitored and renewed against the actual event.

3.4 Methods of Forecasting Financial Requirements

This includes the followings:

a. Percentage of Sales Method

In using this method, various items in the balance sheet are expressed as percentages of firm's annual sales. Increase in assets approach financing requirement, and increase in liabilities period source of funds. The difference between the required growth in assets and the generated funds from liabilities increase represents in normally, first met by internal generated increases in refund retained earnings and those in excess are obtained from external source.

b. Cash Budget

Cash budget involves the projection of future cash receipts and disbursement of firms over various intervals of time. A positive net cash flows indicate that the firm has ample finance, it can invest elsewhere, and a negative cash flow suggest that finance would be required which may be outsourced cash budget is one of the financial planning tools for forecasting cash requirements.

c. Profit Planning

This is one of the basic tasks of a financial manager. It involves assessment of the various levels of operations of the firm that encourages the costs and revenues accruing at each level.

Profit planning can be achieved through the use of the following tools.

(i) Cost Volume Pupil Analysis (CVP – Analysis).

This is an analytical technique for studying the relationship between volume, costs, prices and profits. CVP analysis helps to determine the minimum sales volumetric avoid losses and the sales value of which profit goal of the firm will be achieved.

ii. Operating Leverage Analysis

This is the assessment of the extent to which fixed costs are used in the operation. Leverage is referred to the use of assets and liabilities that bears fixed cost element. High fixed costs arise from employing larger amounts of capital which could permit the firm to operate with less labour and lower variable costs. Operating leverage analysis also involves assessments of the degree of percentage change in profit as result of a percentage change in sales. Financial manager must consider general economic condition, price level changes, labour costs and such

levels over along planning horizon in deciding on the optimal level of operating leverages.

iii. Financial Leverage Analysis

This is the ability of the firm to magnify the sensitivity of net income to changes in net operating income. It involves the assessment of the impact of the mix of debt and equity used in financing firm's activities.

The financial leverage can be positive or negative. It is positive when the firm earns much more than its financial fixed costs, and negative when the reverse is the case.

iv. Combined Leverage Analysis

This is the analysis of operating and financial leverage combinedly. To measure overall sensitivity of net income to changes in sales. This will influence profit planning by financial manager.

3.5 Limiting Financial Planning

Limitations in financial planning are mostly:

- A Uncertainty:** Planning and forecasting involves long term considerations for which factors considered in the estimation are mostly not capable of being done with high degree of certainty.
- B Inaccuracies:** this is another limitation forecast about economic events, changes in the markets, etc are very difficult to make hence forecast will not be wholly accurate.

Above limitation could be hedged against through the following:

- (a) Preparation of probability distributions of the possible outcomes
- (b) Prepare pessimistic, optimistic, and most likely forecast
- (c) Prepare contingency plans
- (d) Engage in risk management.

SELF ASSESSMENT EXERCISE

- i. Define Financial Planning and discuss its objective
- ii. Identify and explain methods of forecasting financial requirements.

4.0 CONCLUSION

In this unit, we have been able to demonstrate that effective performance of a firm depends on proper financial plan for operations. Financial forecasting should precede financial planning. Objectives and limitation of financial planning were discussed. Ways of overcoming these limitations were also highlighted.

5.0 SUMMARY

From this unit, you should have been able to describe financial planning, its objectives, its basis, its method of forecasting and limitations. This, you have been provided with the basic ingredient of understanding the implications of proper financial planning and forecasting.

6.0 TUTOR - MARKED ASSIGNMENTS

1. Identify and discuss the basis of financial planning
2. What are the limitations of financial planning and how do you think the impact of identified limitations could be ameliorated?

7.0 REFERENCES/FURTHER READINGS

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