BHM771
CORPORATE FINANCIAL MANAGEMENT

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CONTENTS PAGE

Introduction

The course- BHM771: Corporate Financial Management is a one-semester course work of two credit units. It is required to be taken by all students pursuing a BSc. degree programme in Management Science or Banking and Finance.

Course Aims

The aims of this course are to:

(i) expose you to the concept of Financial Management in Business organisations
(ii) enable you to appreciate the role of financial management in an organisation.
(iii) enable you to have an overview of the finance function and how to have a clear understanding of the financial implications of business decisions.

These aims will be achieved in the following ways.

- Exposition of the general overview of finance function
- Relating managerial decisions to their financial implications
- Identifying investment opportunities
- Evaluating investment projects in accordance with their risk return characteristics
- Selection of investment projects according to their profitability indices
- Identifying sources of capital and their relevant costs
- Explaining capital structure and attendant cost implications
- Discussing dividend decisions, dividend determinants and forms of dividend.

Course Objectives

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

- explain the finance function
- determine present value
- determine future value
- identify short-term and intermediate sources of capital
- evaluate costs of capital
- describe capital structure
- determine factors that influence dividend decisions
- demonstrate the various forms of dividend policies.

Working through This course

The course consists of 17 units covering the financial function-an overview of the financial management function, various tools for financial management functions, and various tools for financial management, investment, financing and dividend decisions. The course will expose you to the specialised functions of the financial manager in a business organisation.

This course guide provides you with an overview of the course and its contents. It provides information on how to use the prescribed texts and review questions for maximum benefits. Information on time management and other useful details are also contained in this course guide. You will find all the components of the course listed below. You need to allocate your time to each unit in order to complete the course successfully and on time.

Course Contents

The course content covers the three basic decision areas confronting financial managers, namely: investment decisions, financing decisions and dividend decisions. These are detailed under the study units.

Course Materials

The course materials consist of:

- course guide
- study units
- recommended textbooks
- assignment file
- presentation schedule

Study Units

This course contains thirteen study units, divided into three modules as follows.

Module 1 Financial Function and Analytical Tools

Unit 1 Nature and Scope of Financial Management
Unit 2 Tools of Financial Management I – The Concept of Value
Unit 3 Tools of Financial Management II – Annuity
Unit 4 Asset Valuation Techniques
Unit 5 Risk and Return – Assets and Portfolio

Assessment

There are two aspects of the assessment of this course; the tutor-marked assignments and a written examination. In doing these assignments, you are expected to apply knowledge acquired during the course. The assignments must be submitted to your Tutor for formal assessment in accordance with the deadlines stated in the presentation schedule and the assignment file.

Tutor-Marked Assignments (TMAs)

These assignments should be submitted to the tutor. In attempting the assignments, you are expected to follow the illustrative examples and apply what you have learnt in the contents of the study units. There are four sets of such assignments which should be submitted to the course tutor for grading. The assignments constitute 40% of the total score for the course.

Final Written Examination

At the end of this course, the student is required to write a final examination based on the course contents. The final examination will contain eight questions, out of which you will be required to answer six, which will attract the remaining 60%. That will bring the total marks for the course to 100%.

Summary

BHM771: Corporate Financial Management is structured around the objectives or goals of a firm, namely maximising the value of the firm for its shareholders, with emphasis on the key elements, generally referred to as “the finance function”.At the end of the course, you would have grasped the concept of financial management, and be armed with the basic tools for financial analysis and corporate financial management.

Course Code BHM771
Course Guide Corporate Financial Management

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CONTENTS PAGE

MODULE 1 FINANCIAL FUNCTION AND ANALYTICAL TOOLS

UNIT 1 NATURE AND SCOPE OF FINANCIAL MANAGEMENT

CONTENTS

1.0 INTRODUCTION

Corporate Financial Management relates to the management of a firm's financial resources. The subject matter of corporate financial management has witnessed significant changes since the 1970s. This is because the global market for capital is being compressed and unified, under the process referred to as globalisation, such that the specific

factors of a country are gradually being eliminated. Inflation has caused firms' cost of capital to increase, rather steeply, and this in turn has forced firms to be more cautious in the allocation of their financial resources.

Also with the developments in information communication technology, corporate managers and financial analysts are now modernising by applying newer financial management techniques to decision-making process. This is further facilitated by modern theoretical innovations in financial management developed by academicians and financial researchers.

The study of financial management is of particular interest to business managers because one of the most important decisions in a firm is that which relates to finance; and a proper understanding of the theory of financial management will provide them with adequate, conceptual and analytical knowledge necessary to make proper financial decisions.

Therefore, this unit is about the nature of Corporate Financial Management. We shall look at the finance function or the function of the financial manager and the relationship between financial management and other related disciplines, the objectives of financial management and the problems of decision making in financial management.

2.0 OBJECTIVES

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

- explain the nature and scope of financial management
- describe the finance function
- discuss the relationship between corporate financial management and other disciplines
- distinguish between the various objectives of financial management
- list the problems that corporate financial management seeks to address.

3.0 MAIN CONTENT

3.1 Scope of Finance

What is finance? What are a firm's financial activities? How are they related to its other activities? Firms create manufacturing capacities for production of goods; some provide services to customers. They sell their goods or services to earn profits. They raise funds to acquire equipment

and other facilities. Thus, the three most important activities of a business enterprise are:

- production
- marketing
- finance

A firm secures whatever capital it needs, and invests this into the business (finance activity), which is expected to generate commesurate returns (production and marketing activities).

3.2 Finance Function

The responsibility of the finance manager in relation to the company's finances is referred to as finance function.

It may be difficult to separate the finance functions from production, marketing and other functions, but the functions themselves can be readily identified.

The finance function is geared towards the attainment of the corporate objective of profit maximisation and shareholder's wealth maximisation.

The finance functions include:

- long-term asset-mix or investment decision
- capital-mix or finance decision
- profit allocation or dividend decision
- short-term asset-mix or liquidity decision

A firm performs finance functions simultaneously and continuously in the normal course of the business. They do not necessarily occur in a sequence. Finance functions require skillful planning and control.

Let us note, at this point, that shareholders are made better off by financial decisions that increase the value of their shares. Thus, while performing finance functions, the financial manager should strive to maximise the market value of shares.

3.2.1 Investment Decision

A firm's investment decisions involve capital expenditures. They are, therefore, referred to as capital budgeting decisions. A capital budgeting decision involves the allocation of capital or commitment of funds to long term assets, which will yield benefits (cash flows) in the future. Two important aspects of investment decisions are as follows.

(a) The evaluation of the prospective profitability of new investment and

(b) The measurement of a cut-off rate against which the prospective return of new investments can be compared. Future benefits of investments are difficult to measure and cannot be predicted with certainty. Risk in investment arises because of uncertain returns. Investment proposals should, therefore, be evaluated in terms of both expected return and risk. Besides, the decision to commit funds into new investment proposals, also involves 'replacement decisions', that is, the decision of recommitting funds when an asset becomes less productive or non-profitable.

There is a broad agreement that the correct cut-off rate or the required rate of return on investments is the opportunity cost of capital. The opportunity cost of capital is the expected rate of return that an investor can earn by investing his or her money in financial assets of equivalent risk. However, there are problems of computing the opportunity cost of capital, in practice, from the available data and information. A decision maker should be aware of these problems.

3.2.2 Financing Decision

Financing decision is the second, most important function to be performed by the financial manager. Broadly, he or she must decide when, where, and how to acquire funds to meet the firm's investment needs. The central issue before him or her is to determine the appropriate proportion of equity and debt. The mix of debt and equity is known as the firm's capital structure. The financial manager must strive to obtain the best financing mix or the optimum capital structure for his or her firm. The firm's capital structure is considered optimum when the market value of shares is maximised.

In the absence of debt, shareholders' return is equal to the firm's return. The use of debt affects the return and risk of shareholders; it may increase the return on equity funds, but it always increases risk as well. The change in the shareholders' return, caused by change in profits is called financial leverage. A proper balance will have to be struck between return and risk. When shareholders' return is maximised with given risk, the market value per share will be maximised and the firm's capital structure will be considered optimum. Once the financial manager is able to determine the best combination of debt and equity, he or she must raise the appropriate amount through the best available sources. In practice, a firm considers many other factors such as control, flexibility, loan covenants, legal aspects etc., in deciding its capital structure.

3.2.3 Dividend Decision

Dividend decision is the third major financial decision. The financial manager must decide whether the firm should distribute all profits, or retain them, or distribute a portion and retain the balance. The proportion of profits distributed as dividends is called the dividend-payout ratio. And the retained portion of profits is known as the retention ratio. Like the debt policy, the dividend policy should be determined in terms of its impact on the shareholders' value. The optimum dividend policy is one that maximises the market value of the firm's shares. Thus, if shareholders are not indifferent to the firm's dividend policy, the financial manager must determine the optimum dividend-payout ratio. Dividends are generally paid in cash. But a firm may issue bonus shares. Bonus shares are shares issued to the existing shareholders without any charge. The financial manager should consider dividend stability, bonus shares and cash dividends in practice.

3.2.4 Liquidity Decision

Investment in current assets affects the firm's profitability and liquidity. Current assets management that affects a firm's liquidity is yet another important finance function. Current assets should be managed, efficiently, to safeguard the firm against the risk of illiquidity. Lack of liquidity (illiquidity) in extreme situations can lead to insolvency. A conflict exists between profitability and liquidity, while managing current assets. He or she should estimate the firm's needs for current assets and make sure that funds are made available when needed.

On the whole, financial decisions directly concern the firm's decision to acquire or dispose off assets, and this requires commitment or recommitment of funds on a continuous basis. It is in this context that finance functions are said to influence production, marketing and other functions of the firm. Hence, finance functions may affect the size, growth, profitability, risk, and ultimately, the value of the firm. To quote Ezra Solomon:

> 'The function of financial management is to review and control decisions to commit or recommit funds to new or ongoing uses. Thus, in addition to raising funds, financial management is directly concerned with production, marketing and other functions, within an enterprise whenever decisions are made about the acquisition or distribution of assets".
>
> We can thus conclude that the function of the financial manager (the finance function) is to take all relevant decisions -

investments, financing and dividend, so as to maximise the value of the firm to its shareholders.

SELF-ASSESSMENT EXERCISE 1

What do you understand by the term finance function? Define the roles of a financial manager.

3.3 The Relationship between Financial Management and other Disciplines

Financial management is not totally an independent area of study in business administration. On the contrary, it draws, most particularly, from accounting and economics. Other disciplines that have made contributions to the development of financial management theory are marketing, production and quantitative methods. A brief discussion of these relationships will be necessary at this point.

(a) Accounting and Financial Management

Financial managers refer to accounting data to assist them in making decisions. Generally, a firm's accountants are responsible for developing financial reports and measures that assist its managers in assessing the past performance and future direction of the firm. Also, the reports of accountants enhance the meeting of certain legal obligations such as the payment of taxes. The role of the accountant includes the preparation of financial statements like the balance sheet, and income statement.

In contrast, the financial manager is primarily concerned with a firm's cash flows, since they often determine the feasibility of certain investment and financing decisions. The financial manager refers to accounting data in making decisions on allocation of resources concerning long term investments. This is done, particularly, when managing current investments in working capital and when making a number of other financial decisions, for example, determining the most appropriate capital structure and identifying the best and most timely sources of funds needed to support the firm's investment programme.

In many small and medium-sized firms, however, the accounting function and the financial management function may be handled in one department or even by one person or group of persons, thus, blurring the functional distinctions presented above.

(b) Economics and Financial Management

The financial manager must, of necessity, be familiar with two basic areas of economics, namely, Micro-economics and Macro-economics. While microeconomics deals principally with the economic decision of individuals, households and firms, macroeconomics takes holistic view of the economy. The typical firm is heavily influenced by the overall performance of the economy and is dependent upon the money and capital markets for investment funds. Therefore, the financial manager should recognise how monetary policies affect the cost of funds and the availability of credit. Financial managers should also be versed in fiscal policy and how it affects the economy. The future direction of the economy is a crucial factor in generating sales forecasts, as well as other type of forecasts.

The financial manager uses microeconomics when developing decision models that are likely to lead to the most efficient and successful models of operation within the firm. Specifically, the financial manager may utilise the basic economic notion from microeconomic theory of setting marginal cost equal to marginal revenue, when making long term investment decision **(capital budgeting)** and when managing cash, inventories and accounts receivable **(working capital management).**

(c) Financial Management and other Related Disciplines

There are other supportive disciplines that are indirectly related to the day-to-day decision-making of the financial manager. These are - marketing, production and quantitative methods. For example, financial managers do consider the impact of new product development and promotion plans made in the area of marketing, since these plans often require capital outlays and impact upon the firm's projected cash flow. Similarly, changes in the production process may necessitate capital expenditure which the firm's financial manager must evaluate and take care of. Finally, the tools of analysis developed in the quantitative methods area are frequently helpful and are adopted in analysing financial management problems.

SELF-ASSESSMENT EXERCISE 2

"Financial management is not an independent area of study but draws from other related disciplines". What are the disciplines?

3.4 Goals of Financial Management: Profit Maximisation versus Wealth Maximisation

3.4.1 Profit Maximisation

In economic theory, the behaviour of the firm is analysed in terms of profit maximisation. Profit maximisation implies that a firm either produces maximum output for a given amount of input, or uses minimum input for producing a given output. The underlying factor of profit maximisation is "Efficiency". It is assumed that profit maximisation enhances efficient allocation of resources under competitive market conditions and profit is considered as the most appropriate measure of a firm's performance.

3.4.2 Limitations of Profit Maximisation Objectives

Profit maximisation objectives have been criticised for the following reasons.

(i) It assumes perfect competition, but modern markets are basically imperfect
(ii) It is premised on the needs of sole-proprietor business ownership, whereas modern business structures are limited liability in nature, with various stakeholders.
(iii) It thus ignores the needs of other stakeholders (such as - shareholders, customers and managers) in a business organisation.
(iv) It is vague. The precise meaning of profit maximisation objective is unclear - is it short term or long term, before-tax or after tax?
(v) It ignores the timing of returns - time value of money,
(vi) It ignores risk - varying degrees of uncertainties in the stream of benefits influence of projects.

3.4.3 Shareholders' Wealth Maximisation

The shareholders' wealth maximisation objective stresses the maximisation of the present value of all future benefits which the owners (i.e. share-holders) of a firm can expect to receive. Present value is defined as the value today, of some future benefits or stream of payments. It takes into account the returns that are available from alternative investment opportunities during a specific time period. The shareholders' wealth is measured by the market value of the shareholders' ordinary shareholdings; market value is defined as the price at which the share trades in the market place, for instance, the Nigerian Stock Exchange. Thus, total shareholders'wealth equals the number of shares outstanding multiplied by the market price per share.

The shareholders' wealth maximisation objective has a number of distinct advantages namely:

a. it is conceptually possible to determine whether a particular financial decision is consistent with this objective or not. If the decision made by a firm has the effect of increasing the long term market price of the firm's share, it is a good decision. If it appears that a certain action will not achieve this result, then the action should not be taken (voluntarily);
b. secondly, shareholders' wealth maximisation is an impersonal objective. Shareholders who may be offended by a firm's policies are free to sell their shares under more favourable terms (i.e. at a higher price) than any other strategy and invest their funds elsewhere;
c. thirdly, this objective allows the financial manager to consider the elements of both timing and risk when making various decisions.

For the above reasons, the shareholders' wealth maximisation objective has become the preferred objective in financial management. However, in order to derive, operationally, meaningful rules that are consistent with the objective, two cases must be considered, the certainty case and the uncertainty case. The first assumes that all future cash flows of the firm are known exactly.

3.4.4 Social Objectives of the Firm

In modern times, firms are often required to exercise a sense of social responsibility in dealing with a number of constituent groups, such as employees, suppliers, customers, and the host community. In most cases, these social responsibilities take on as much importance as laws and other formal obligations. The shareholder's wealth maximisation objective does not deny the existence of these obligations and financial managers should therefore make proper provisions and allocate resources, efficiently, for these purposes.

3.4.5 Problems of Decision Making in Financial Management

Every business firm, irrespective of size is a financial concern and as such its success or failure depends largely on the quality of its financial decisions. This is because most of the key decisions made by a firm's management have important financial implications. These problems of decision making in financial management involve seeking answers to the following questions.

- Will a particular investment project be profitable?

- Where will the funds needed for the investment project come from?
- Does the firm have adequate financial resources to meet its daily operating needs?
- How much inventory should be held by the firm?
- How much debt should the firm have in its capital structure?
- What is the firm's cost of capital?

In trying to arrive at the best financial management decisions, the management has to work out a trade-off between risk and return.

4.0 CONCLUSION

In the course of this study, we have been able to:

- explore the nature of finance and its interaction with other management functions
- review the finance function and the responsibility of the financial manager
- distinguish between profit maximisation and shareholder's wealth maximisation objectives.
- discuss the problems of decision making in financial management
- illustrate, graphically, the finance function.

It is hoped that all of these will boost your understanding of other issues that we shall be looking at in subsequent units.

5.0 SUMMARY

In this first unit, we have discussed the nature and scope of financial management. We have shown that the finance function can be divided into three broad decision areas, namely - (1) investment decision, (2) financing decisions and (3) dividend decision. We found that in making financial decisions, the financial manager should aim at increasing the wealth of shareholders. Financial management uses information and analytical methods from other related fields of study such as accounting, economics, management sciences and qualitative techniques. The financial manager is faced with a number of challenges (everyday), ranging from inflation, exchange rate fluctuations, to globalisation and their effects on the realisation of the firm's objectives.

ANSWER TO SELF-ASSESSMENT EXERCISE 1

The scope of financial management can be divided into three broad categories (1) Investment decisions (2) Financing decisions and (3)

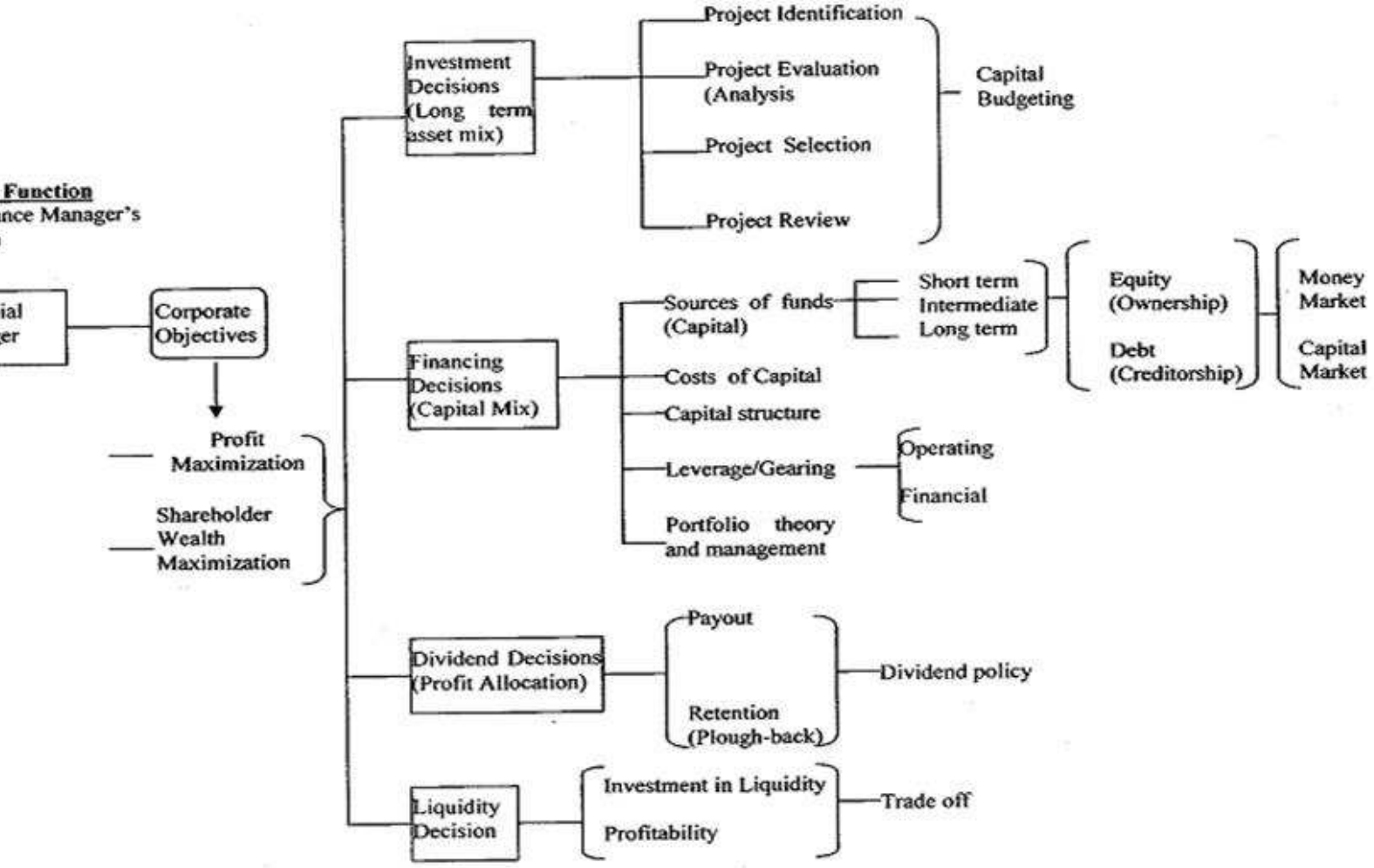
Dividend decisions. The financial manager's role in a modern enterprise include- raising funds, fund allocation and profit planning. The financial manager should aim at increasing the value of shareholders' stake in the firm i.e. Shareholders' wealth maximisation.

ANSWER TO SELF-ASSESSMENT EXERCISE 2

Financial management draws from other disciplines – namely economics, accounting and quantitative studies.

See the fig.1 below

Fig. 1 The finance Function: An Overview



6.0 TUTOR- MARKED ASSIGNMENT

Distinguish between profit maximisation and shareholders' wealth maximisation as objectives of financial management.

7.0 REFERENCES/FURTHER READING

Ezike, J.E. (2000). Essentials *of Corporate Financial Management*. Lagos: Jaylycent Communications.

Pandy, I.M. (2005). *Financial Management* (9th ed.). New Delhi: Vika Publishing House PVT Ltd.

Ezra Solomon (cited on page 9)

UNIT 2 TOOLS OF FINANCIAL MANAGEMENT 1

CONTENTS

1.0 INTRODUCTION

In this unit, we shall be considering some tools of financial management, with special focus on the concept of value. Based on the objectives of firms, as we discussed in unit 1, it follows that a firm will choose that combination of investment, financing and dividend decision that will maximise its value to its shareholders. These decisions affect the firm's value through their impact on its expected return-risk characteristics.

In this unit, emphasis will be on the tools of financial management. Concepts like the time value of money, time preference for money, required rate of return, future value, present value, simple interest and compound interest will be examined.

2.0 OBJECTIVES

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

- explain the concept of time value of money
- discuss factors that influence time preference
- explain the concept of internal rate of return
- calculate future value and present value
- explain the techniques of compounding and discounting.

3.0 MAIN CONTENT

3.1 Time Value of Money

In all market economies, where time preferences result in positive rates of interest, the time value of money is an important concept. For example, shareholder will place a higher value on an investment that promises returns over the next five years, than on an investment that promises identical returns for a period of six years or more. Consequently, the timing of expected future cash flows is extremely important in the investment of funds.

Most financial decisions, such as the purchase of assets or procurement of funds affect a firm's cash flow in different ways, over a period of time. For example, the purchase of a fixed asset will require a huge current capital outlay, and will generate cash inflows over a long period of time. In like manner, if a firm borrows funds from a bank or raises funds by issuing equity, the firm's cash balance will increase as at the time of receiving the loan or equity issue funds. However, as it fulfills its interest obligations over time, or pays dividend, outflow of funds will occur. Sound decision-making requires that the cash flow, which a firm is expected to receive or give up over a period of time, should be made to be logically comparable. The recognition of the time value of money and risk is extremely vital in financial decision making.

Money may be thought of as having a Time Value. In other words, an amount of money received today, is worth more (in terms of value) than it will be, one year from now. Most people value the opportunity to receive more money now, rather than waiting till a later time before receiving the same amount. Time preference for money is an individual's preference for possession of a given amount of money now, rather than waiting to receive the same amount at some time in the future.

3.1.1 Factors that Influence Time Preference for Money

There are three reasons that may be adduced for an individual's time preference for money, namely:

- utility
- risk and
- opportunity Cost

Now, let us, briefly, look at these one after the other.

(i) Utility

The first reason for desiring early receipt of money concerns what it will be used for and this is often called its utility. Utility refers to the "want - satisfying power" of a given item or sum of money. For example, it is possible to state that £4,100 today usually have more want satisfying power than the same amount received in another one year. Thus, a plan to spend funds on entertainment, for instance, will cause most individuals to prefer entertainment today rather than having the fun in another one year. However, there is a kind of entertainment proposed for another one year that will be preferred to a small(not too elaborate) one now (compare a small house get-together to a party at Muson Centre, Lagos).

(ii) Risk

The second reason for the time value of money is risk. (Risk, in this case, is synonymous with uncertainty). We thus define risk as the possibility that an individual will not receive expected funds at some future time. The planned party at Muson Centre may not hold for various reasons. So, that desire for entertainment will not be satisfied. Whatever the reason, the risk of not receiving expected funds at a later date, implies a preference for early receipts of the funds. As with utility, there is some quantity of money, to be received in future, that will be preferred whatever the risk. If an offer of N 10,000 today or N 100,000 in one year is given, and the option of a future payment is accepted, the individual is giving up an immediate N l0, 000 for the possibility of receiving N100,000 in future. The N 100,000 may never materialise, but the individual prefers that possibility to a N 10, 000 that is certain. Of course, any individual preference risk causes the promise of a naira to be paid in the future to be worth less than a naira to be received now.

(iii) Opportunity Cost

The third reason for the time value of money centres on the concept of opportunity cost. Individuals have many "spending" opportunities available to them. Funds can be used in variety of ways - including various investment opportunities. In our example, one may deposit the N10, 000, if received today, in a savings account at a commercial bank. At present, interest rate on N 10,000 deposit will yield, approximately, N50 in one year, which implies that an individual will require more than N 10,050.00 one year from now, in order to prefer the future payment.

The investor is said to be indifferent between N 10, 000 now and N10,050 in one year. The N 50 is called opportunity cost, and defined as

"the yield on the best available investment opportunity of equal risk; exclusive of opportunity under consideration".

In summary therefore, any investment decision requires the decision-maker to consider, at least, three elements:

- the investor's time utility preference
- the risk involved in the investment
- the investor's opportunity cost, relative to the potential returns available from comparable risk investments.

3.2 Interest on Return

A bank that loans money to a firm foregoes the opportunity to earn a return on some alternative investment. Interest is the return earned or the amount paid to someone who has foregone current consumption or alternative investment opportunities and "rented" money in a creditor relationship. The principal is the amount of money borrowed or invested. The term of a loan is the length of time or period during which the borrower can use the principal or the lender can forego the use of the principal. The rate of interest is the percentage of the principal that the borrower pays the lender, over a period of time, as compensation for foregoing other investment or consumption opportunities.

3.3 Required Rate of Return

The time preference for money is generally expressed by an interest rate, this rate will be positive even in the absence of any risk. It may be therefore called the risk-free rate. For instance, if time preference rate is five percent, it implies that an investor can forego the opportunity of receiving N100, if he is offered N105 after one year (i.e. N100 which he would have received now, plus the interest which he can earn in a year by investing N100 and N105 a year from now, as he considers these two amounts equivalent in value. In reality, an investor will be exposed to some degree of risk. Therefore, he will require a rate of return, called risk premium, from the investment, which compensates him for both time and risk. Thus, the required rate of return is as depicted below.

Required rate of return = Risk-free rate + Risk premium

The risk-free rate compensates for time, while risk premium compensates for risk. The required rate of return may also be called the opportunity cost of capital of comparable risk. This is because the investor can invest his money in assets or securities of equivalent risk. Like individuals, firms also have required rates of return, and they use them in evaluating the desirability of alternative financial decisions. The

interest rates account for the time value of money, irrespective of an individual's preference and attitudes.

3.4 Simple Interest

Simple interest is the interest paid (in the case of borrowed money) or earned (in the case of invested money), on the principal sum only. The amount of simple interest is equal to the product of the principal multiplied by the rate per time period, and multiplied by the number of time periods. This is represented, mathematically, below-

$$I - PVo \times i \times n$$

In the above, I represents the simple interest in naira, while PVo represents the principal amount at time O or the present value, i - the interest rate per time period, and n represents the number of time periods. The following mathematical problems illustrate the use of equation 4.1

(a) What is the simple interest on Nl00 at 10% per annum for 6 months?

Solution: Substituting N100 for Pvo 10% (or 0.10) for i and 6/12 (or 0.5) for n, yields:
1=^100x0.10x0.5
= 145.0

(b) Ngozi Monodu receives N 30 every 3 months from a bank account which pays a 6% annual interest rate. How much is invested in the account?

$$PVo = \frac{I}{\cdot} \quad I \quad n$$

Solution: Substituting N30 for I, 0.06 and i and % (0.25) for n yields

$$PVo \quad \frac{1430}{0.06 \quad 0.25} = \cdot \quad = \quad N\ 42.000$$

It is also useful to calculate the amount of funds one can expect to receive at some point in the future. In financial mathematics, the *TEPJVIINAL* or future value of an investment is termed *FVn* and denotes the principal plus interest accumulated at the end of n years. It is written as this:

$$FVn = PVo + I$$

(c) Mr. Eze Okon borrows ₦1, 000 for 9 months at a rate of 8% per annum. How much will he have to repay at the end of 9 month period?

Solution: Combining equations 1 and 2 to solve for *FVn*, results in the following new equation:

$$FVn = Pvo + (PVo \times ixn)$$
$$\text{or} \quad FVn = Pvo\,(1+(ixn)$$

Substituting £41,000 for Pvo, 0.08 for i and $^{3}/_{4}$ (9 months = $^{3}/_{4}$ of 1 year) for n yields

$$FV^{3}/_{4} = ₦1,000(1 + 0.08x^{3}/_{4})$$
$$= ₦1,000\,(1 + 0.06)$$
$$= ₦1,060$$

3.5 Compound Interest

Compound interest is the interest which is paid, not only on the principal, but also on any interest earned but not withdrawn during earlier periods. For example, if Jeff Zuma receives $41,000 on his graduation day from his father and he deposits it in a savings account at 6% interest, compounded annually; the future (compound) value of his account at the end of 1 year (FV1) is calculated as follows:

Future Value = Principal + Interest on Principal

$FV_1 = 1,000 + (1,000 \text{ x. } 06)$..... (2.1)

1,000 + 60 = 141,060

The above expression can be presented in formal terms as:

$$FV_1 = Pv_0(l+i)$$

Where FVi represents future value at the end of one year;

FV_0 = Principal in year zero

I = Stands for the Principal (ie. 1,000 x 1 = 1,000)

i = Interest rate.

If Mr. Zuma leaves the $41,000 plus the accumulated interest in the account for another year, the value of his account at the end of two years is calculated as follows:

$$FV_2 = FV,(l+i) \qquad \text{…….(2.2)}$$

$= 1060 (1 + .06)$
$= 1123.60$

Note that in the case of compound interest, interest in each period is earned, not only on the principal, but also on any interest earned during the previous period, but not withdrawn. Thus, the above example can also be expressed as follows.

$FV^2 = \{1000 + (1000 \times .06)\} + .06 \{1000 + (1000 \times .06)\} = PV_o (1+i)^2$

$= 1000 \times 1.06 \times 1.06 = 1123.60$

If Mr. Zuma makes no withdrawals from the account for another year, the value of his account at the end of the third year will amount to-

$FV_3 = FV_2 (1+i)$ ……..... (2.3)
$= 1123.60 (1 + .06)$
$= 1191.02$

We can summarise the above illustrations into a general formula for computing future (compound) values in formal term, by combining equations 2; 2.2 and 2.3. Substituting equations 2.3 and 2.2 into 2.1 we will have-

$FV_3 = PV_O (1 + i)^3$ ……..(2.4)

This equation can be further generalised to calculate the future value at the end of year n, for any sum compounded at interest rate i:

$FV_n = PVo(l+i)^n.$

Where FVn = the future value at end of year n

PVo = Principal deposited (or invested)
i = the annual rate of interest

n = the number of years.

SELF-ASSESSMENT EXERCISE 1

If you deposit N500 in a savings account paying compound annual interest of 10 percent, what will be the value of your account at the end of:

(i) 2 years
(ii) 5 years
(iii) 10 years

3.6 Present Value

Whereas compound value (or future value) calculation tries to answer the question -"What will be the future (compound) value of X naira invested today, compounded at i rate of interest? Financial decision makers are often confronted with another type of question, which is: - given some future value Fvn, what will be its equivalent value today?

In other words, what is the Present Value (PVo)? The solution requires present value calculations which are used to determine the naira amount today (PVo), that is equivalent to some promised future naira amount - FVn

The relationship between compound and present value can be shown by re-writing equation 2.4 above to solve for PVo, as shown below.

$$FVn - PVo(1+i)^n$$

$$PVo = \frac{I}{(1 + i)} FVn$$

Where is the reciprocal of the compound value factor? The process of finding future value is referred to as compounding, while that of present value is termed discounting. Equation 2.5 above is the basic discounting formula. To illustrate this, suppose that your banker promises to pay you N255, 200 in five years time if you deposit X naira today, at an annual interest rate of 5 percent.

How much do you have to deposit today to make the transaction worthwhile for you?

The solution is as follows:

$$PVo = \frac{I}{FVn^{(1} + i)}$$

$$= 255200 \frac{I}{(1 + 0.5)}$$

$$= 255200 (0.784)$$

$$= N200$$

SELF-ASSESSMENT EXERCISE 2

Find the present value of the following stream of cash flows discounted at 15% rate of return.

Year end	Cash flows
0	-N2000
1	+N1000
2	+N2000
3	+N500

4.0 CONCLUSION

The mathematic foundation of finance is a necessary pre-requisite for arriving at many business decisions. The mathematics of finance is built around key concepts, namely, time value of money, risk return, risk-premium and risk-free rate. Interest rate or time preference rate gives money its value and facilitates the comparison of cash flow occurring at different periods of time. In this second unit, we explored the principal tools of financial analysis.

You are to take note of the fact that the basic knowledge of the rate of interest is crucial to financial management. Interest is calculated as either simple interest or compound interest.

5.0 SUMMARY

In this unit, we have mentioned that two concepts can be used to find the value of cash flows: compounding and discounting. In compounding, focus is on finding the Future Values of cash flows at a given interest rate, at the end of a given period of time. Future or compound value calculation multiplies future cash flows from initial sum (principal and earned interests) by the compound interest factor, this is expressed thus:

$$FVn = PVo(l+i)^n$$

Present Value of the sum of money received at some future time is the reciprocal of Future Value and is determined by discounting the income stream over the holding period (n) with the interest factor thus:

$$PV_O = \frac{FV_n}{(1+i)^n}$$

Thus, rule of thumb can be formulated thus:

(i) for Future (Compound) Value - multiply
(ii) for Present Value - divide by the rate of Compounding of Discounting $(1+i)^n$

ANSWER TO SELF ASSESSMENT EXERCISE 1

FVn = PVo $(1+i)^n$

(i) FVn = 500 $(1+.10)^2$ = 500 (1.21) = N605
(ii) FVn = 500 $(1+.10)^5$ = 500 (1.611) = N805.50
(iii) FVn = 500 $(1+.10)^{10}$ = 500 (2.594) = N1,297.0

ANSWER TO SELF ASSESSMENT EXERCISE 2

$$PVo = \frac{2000}{(1+.15)^0} + \frac{1000}{(1+.15)^1} + \frac{2000}{(1+.15)^2} + \frac{500}{(1+.15)^3}$$

= -2000(1.000)+1000(0.870)+2000(0.756)+500(0.658)
= -2000 + 870 + 1512 + 329 + N711

6.0 TUTOR- MARKED ASSIGNMENT

Fill in the missing information

	PV	FV	I	n
(i)	1000	…..	10%	5
(ii)	……	2500	5%	6

7.0 REFERENCES/FURTHER READING

Ezike, J. E. (2000). *Essentials of Corporate Financial Management*. Lagos: Jaylycent Communications.

Pandy, I. M. (2005). *Financial Management (*Ninth ed.). New Delhi: Vika Publishing House PVT Ltd.

UNIT 3 TOOLS OF FINANCIAL MANAGEMENT II: ANNUITY

CONTENTS

1.0 INTRODUCTION

In the previous unit, we discussed the concept of value, highlighting time value of money, interest or return, simple and compound interest. In this unit, we shall continue with the discussion of tools of financial management. Here, the topic of focus is annuity; we shall discuss the concept of annuity, future and present values of annuity, then, ordinary annuity and annuity due.

2.0 OBJECTIVES

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

- define annuity
- compute the future value of an annuity
- compute the present value of an annuity
- distinguish between ordinary annuity and annuity due.

3.0 MAIN CONTENT

3.1 Annuity Defined

An annuity is a fixed payment (or receipt), each year, for a specified number of years. If you rent a flat and promise to make a series of payments over an agreed period, you have created an annuity. Also, the equal installments of loans from banks, or salary payments by employers are common examples of annuities.

An ordinary annuity is one in which payment or receipt occurs at the end of each year. An annuity due is one in which payments or receipts occur at the beginning of each year - like most insurance premium and house rents. Under a 4 year ordinary annuity, the last payment is made at the end of the fourth year, while in a 4 Year Annuity Due, the last payment is made at the end of the third year (i.e. at the beginning of the Fourth Year).

Illustration A:

Time Line of an Ordinary Annuity Due of N100 per year for 4 years

END OF YEAR				
0	1	2	3	4
-	N100	N100	N100	N100
	RECEIPTS			

Time Line of an Annuity N100 per year for 4 years

END OF YEAR				
0	1	2	3	4
N100	N100	N100	N100	N100
RECEIPTS				

Fig.3.1:

3.2 Compound Sum of an Ordinary Annuity

The compound sum of an ordinary annuity problem calls the following question to mind:

> suppose a consultant sum of ₦41 is deposited in a savings account at the end of each year for four years at 6 percent interest. How much will the account be worth at the end of 4 a year period?

Solution:

The above case implies that N1 deposited at the end of the first year will grow for 3 years, N1 at the end of a second year for 2 years, N 1 at the end of the third year for 1 year, and N1 at the end of the fourth year, will not yield any interest. We can compute the compound value of the annuity thus:-

The compound value of ₦1 deposited in the first year will be: 1×1.06^3 - ₦1.91, which of ₦1 deposited in the second year will be: ₦1 x 1.06^2 = ₦1.124 and ₦1 deposited at the end of third year will grow to N 41 x 1.06^1 = ₦1.06 and 1 deposited at the end of the fourth year will remain ₦1.00. The aggregate compound value of N 41 deposited at the end of

each year, for four years, will be- N 1.191 + 1.124 + 1.060 + 1.00

N4.375.

This is the compound sum of an annuity of N1 for four years, at 6 percent rate of interest. The graphic illustration is shown below.

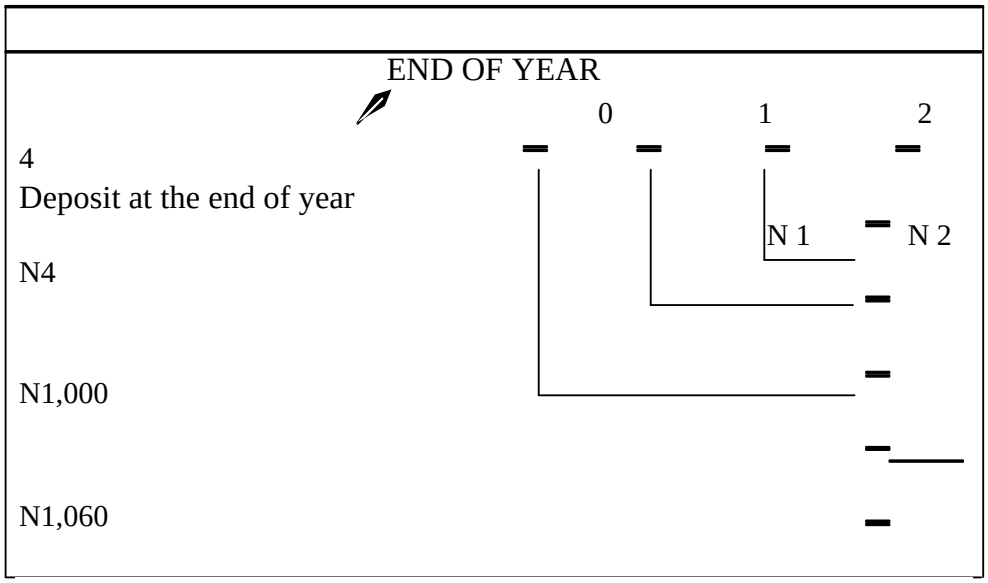


Fig.3.2:

The above computation can be expressed, mathematically, thus-

$CSAN^4 = A\ (1+i)^2 + A(1+i) + A$ Equation 2

$CSAN^4 = A\ [(1+i)^3 + (I+i) + 1]$ Equation 3

In equation (2) is the Annuity. We can extend equation 3 for n periods and rewrite it as follows: (equation 2&3 not clearly specified)

$$CSAN = A\ \frac{(1+i)^n - 1}{i}$$

The term in the bracket is the Compound Value Factor for an annuity of N 1, which we shall refer to as *CSAN*.

Example:

Suppose that N100 is deposited at the end of each of the next three years, at 10 percent interest. We can compute the compound sum of the annuity, based on equation 3, as follows-

$$CSAN = 100 \frac{(1+i)^{n} \updownarrow 1_{100}}{i} \times 3.31 = \underline{N}\ 331.00$$

The compound sum of an annuity interest factor *(CV1FA)* is the sum of compound value interest factors in the Standard table. In the above example, the compound sum of an annuity interest factor is calculated as:

$$CVIFA_{0.10,3} = CVIF_{0.10,2} + CVIF_{0.10,1} + CVIF_{0.10,0}$$
$$= 1.210 + 1.100 + 1.000 = 3.31$$

Table of the compound sum of an ordinary annuity interest factors are available to simplify such computations, (see example, table 3.1 below). The table is constructed with the assumption that the funds are deposited at the end of a period. *CV1FA* can be ascertained from the table to find out the future value (compound sum) of the annuity. The Compound Sum of an ordinary annuity *(CSAN)* may be expressed as follows-

$$CSAN = A(CVlFA_{in})$$

Where CVlFA;, n is the compound value interest factor of an annuity of Nl, at i, rate of interest for n years.

Table 3.1 Compound Sum of an Annuity Interest Factors (CV1FA) For Nl per Year Interest Rate/

End of Year	1%	5%	6%	10%
1	1.00	1.00	1.00	1.00
2	2.010	2.050	2.060	2.100
3	3.030	3.152	3.184	3.310
4	4.060	4.310	4.375	4.641
5	5.101	5.526	5.637	6.105

Illustration B:

Suppose a firm deposit N5, 000 at the end of each year at 6 percent interest rate. What will be the total sum of the annuity at the end of the fifth year? From table 3.1 above, looking at the fifth year row and the six percent column, we have a *CV1FA* of 5.637.

If we multiply 5.637 by N500, we obtain a compound value of N28185.00. *CSAN* = 5000 (*CVIFA*.06,5) = 5000 x 5.637 = N281185

SELF-ASSESSMENT EXERCISE 1

If a businessman deposits N80, 000 in a savings account, at the end of each year, for 5 years at an interest rate of 6 percent per annum. How much will be in the account at the end of the fifth year?

3.3 Present Value of an Annuity

The present value of an annuity (PVAN) is the sum of the present value of a series of equal periodic payments. To compute the present value of an annuity, we will have to find out the present value of the annual amount every year, and then get the aggregate of all the present values to get to the total present value of the annuity.

Example:

An investor has an opportunity to receive an annuity of N1 for four years, and his required interest rate is 10 percent; per year. The present value of N1 received after one year is:

PVAN = 17(1.10) = N0.909; after two years = PVAN $17(1.10)^2$ = N0.826, after three years, PVAN = $17(1.10)^3$ = N0.751 and after four years, PVAN = $17(1.10)^4$ = N0.683.

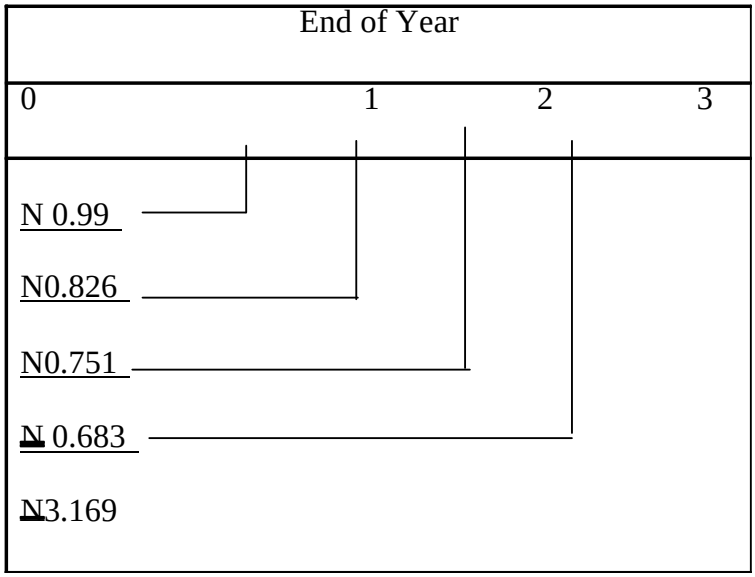
Thus, the total present value of an annuity of N1 for four years is N3.169, as shown below.

$$\text{PVAN} = \frac{1}{(1.10)^1} + \frac{1}{(1.10)^2} + \frac{1}{(1.10)^3} + \frac{1}{(1.10)^4}$$

$$= 0.909 + 0.826 + 0.751 + 0.683 = \text{N3,169}$$

The present value of annuity of £41 for four years, at 10 percent interest rate, is shown in Table 3.2 below. It can be noticed that the present value declines, over a period of time, for a given discount rate.

Table 3.2: Graphic Representation of Present Value of Annuity of N1 at 10%



The present value of an annuity can be expressed, mathematically, as follows:

$$PVAN = \frac{A}{(1+i)^1} + \frac{A}{(1+i)^2} + \frac{A}{(1+i)^3} + \ldots\ldots + \frac{A}{(1+i)^n}$$

$$= \frac{A}{(1+i)^1} + \frac{A}{(1+i)^2} + \frac{A}{(1+i)^3} + \ldots\ldots + \frac{A}{(1+i)^n}$$

'A' is a constant cash flow each year. The above equation can be solved and re-written thus:

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

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

The term within the parenthesis of equation (7) is the Present Value Factor of an annuity of N1 which we will call *PV1FA*, and it is a sum of single - payment present value factors.

Illustration C:

Assuming that a person receives an annuity of N5, 000 for four years, if the rate of interest is 10 percent, the present value of N5, 000 annuity will be computed as:

$$PVAN = 5000 \left[\frac{1}{1.10} - \frac{1}{0.10(1.10)^4} \right]$$

$$= 5000 \times (10 - 6.830) = 5000 \times 3.170 = N15,850$$

To simplify the computations, tables of present value of an ordinary annuity interest factors (PV1FA) have been readily calculated - as in table 3.3 below

Table 3.3: Presents the Value of an Annuity Interest Factor (PV1FA) for 141 per year at an interest rate 1%, for *n* years.

End of Year	1%	5%	6%	10%
1	0.990	0.952	0.943	0.909
2	1.970	1.859	1.833	1.736
3	2.941	2.723	2.673	2.487
4	3.902	3.546	3.465	3.170
5	4.853	4.329	4.212	3.791

We can use the table of pre-calculated, present value interest factors of an annuity of N1, as shown above (Table 3.3) to compute the present value of an annuity.

The present value of an annuity can be determined by simply multiplying the amount of the annuity (A) by the appropriate interest factor from the table.
Thus, equation 7 can also be written as-

PVAN = annuity x present value interest factor of N1

= A (PVlFAi,n)

..... 8??

Here, *PVlFAi,n* is the present value factor of an annuity of N1, at 'i' rate of interest, for n.

Referring to Table 3.3 above, to determine the interest factor for i = 10% and n = 4 years, the PVAN, using equation 8, is:

PVAN = A(PV1FA0.10,4)

= N 5000 (3.170) N15,850

SELF-ASSESSMENT EXERCISE 2

Mr. Kadiri will receive a pension of N3, 000 annually for fifteen years. How much is his pension worth now, if Mr. Kaditi's interest rate is 10 percent per annum.

4.0 CONCLUSION

In this unit, we have discussed the concept of annuity as part of the tools of financial management. An annuity is defined as the payment or receipt of equal amounts of money, per period, for a specified period of time, usually one year. Annuities may require payments or receipts at the beginning of the period - annuity due, or at the end of the period - ordinary annuity. Key concepts to take note of in this unit are annuity; ordinary annuity, annuity due; compound (or future value); present value, interest factor.

5.0 SUMMARY

Two alternative procedures can be used to compute the value of cash flows, compounding (future value) and discounting (present value).

The future value of an annuity for n periods at i rate of interest is expressed, mathematically, as follows.

$$CSAN = A\frac{(1+i)^{1}}{i}$$
$$= A\,(CVIFA_{i.n})$$

The Compound (future) value interest factor *(CVlFAi,n)* and the present value interest factor *(PVlFAi,n),* for various rates of interest and 'n' periods have been pre-calculated and can be found in interest factor tables in most finance text books. This is necessary because it has been realised that the compound or present value calculations of an annuity, for a long period, will be extremely cumbersome without a scientific calculator,

ANSWER TO SELF ASSESSMENT-EXERCISE 1

CSAN = $A(CVIFA_{0.06.5})$
= 80,000 (5.637)
= N450,960

ANSWER TO SELF ASSESSMENT-EXERCISE 2

2. PVAN = A ($PVIFA_{i,n}$)

= A ($PVIFA_{0.10,15}$)

= 3000 (7.60

= ₦22,818

6.0 TUTOR- MARKED ASSIGNMENT

Determine the present value of N 7, 000 each, paid at the end of the
year, for six years. Assume an 8 percent rate of interest, per annum.

7.0 REFERENCES/FURTHER READING

Ezike, J. E. (2000). *Essentials of Corporate Financial Management*. Lagos: Jaylycent Communications.

Pandy, I.M. (2005). *Financial Management* (Ninth ed.).New Delhi: Vika Publishing House PVT Ltd.

UNIT 4 ASSET VALUATION TECHNIQUES

CONTENTS

1.0 INTRODUCTION

In the previous units which were on tools of financial management, we discussed how a firm makes a combination of investment, financing and dividend decisions to maximise its value to its shareholders. We found that in all market economies where time preference results in positive rates of interest, the time value of money is an important concept.

In this course, we shall explore the concept of time, value of money and how they affect asset values.

2.0 OBJECTIVES

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

- distinguish between real and financial assets
- explain the concepts of Valuation of Financial Assets
- explain the fundamental characteristics of ordinary shares, preference shares and bonds (debenture)
- apply the capitalisation of income method of valuation
- use present value concepts in the valuation of shares and bonds.

3.0 MAIN CONTENT

3.1 Concepts of Value

It should be noted that 'present value' is the most valid concept of value.
There are many other concepts of value that are used for different purposes.
These are discussed below.

1. Book Value

Book value is an accounting concept. Assets are recorded at historical cost and are depreciated over the years. The book value, therefore, is the historical cost of an asset amortisation (or depreciated value). The difference between the book values of assets and liabilities is equal to shareholder's funds or net worth.

2. Replacement Value

Replacement value is the amount that a company will be required to spend if it were to replace its existing assets at current cost.

3. Liquidation Value

Liquidation value is the amount that a company can realise if it sells its assets, after terminating its business. Liquidation value is, generally, a minimum value which a company may accept if it sells its assets. It does not include intangibles, since the company is assumed to have ceased to exist.

4. Going Concern Value

Going concern value is the amount that a company can realise from its assets if it sells its business as an operating business. Going concern value is often expected to be higher than the liquidation value, since it reflects the future value of assets and value of intangibles.

5. Market Value

Market value is the value of an asset or security being bought or sold in the market. Market value per share is expected to be higher than the book value per share for a profitable growing firm. In an efficient capital market, and at equilibrium, market value is expected to be equal to the present value (or intrinsic value) of share.

3.2 Types of Assets

There are, basically, two types of assets, namely, real assets and financial assets.

1. Real Assets

These are tangible assets, such as:

(a) real estate – flats, duplexes, offices space, shopping centres and housing estates .
(b) collectibles such as – art masterpieces, coins, stamps, gems and commodities.

2. Financial Assets

Examples are:

Equity- ordinary shares and preferences shares
Debt- bonds (debentures), notes
Leveraged Assets:- warrants, options, unit trusts

3.3 Asset Valuation

The value of an asset is based on the expected future benefits its owner will receive over the life of the assets. The value of a financial asset is based on the expected returns it will generate.

The capitalisation-of-income method of valuation determines the value of an asset as the present value of the stream of future benefits, discounted at an appropriate discount rate.

Algebraically, this approach is expressed thus:

$$VO = \frac{R_1}{(1+K)^1} + \frac{R_1}{(1+K)^2} + \ldots\ldots\ldots + \frac{R_n}{(1+K)^n}$$

Here, *Rt* is the expected cash return at time t, *K* is the required rate of return or discount rate, n is the length of the holding period, and *Vo* is the value of the asset.

Using summation notation, the value is given as-

$$Vo = \sum_{n}$$

$$\sum_{t=1} \frac{Rt}{(1+K)^t}$$

The required rate of return *K*, on an assets is a function certainty, (there is no risk), and the investors required rate of return is the risk-free rate.

3.3.1 Valuation of Bonds

The value of a bond is the present value of its flows from bond investment – namely, interest, income during the holding period, and the principal maturity. Using the capitalisation of income method, the value of a bond is expressed as:

$$Po = \frac{I_1}{(1+Kd)^1} + \frac{I_2}{(1+Kd)^2} + \cdots\cdots + \frac{R_n}{(1+Kd)^n} + \frac{In\ M_n}{(1+Kd)^n}$$

Here, *Po* is the present value of the bond. It is the interest paid at time *t*, *n* is the time for maturity, *M* is the principal repayment at maturity, and *Kd* is the investors required rate of return for the bond.

Since the interest payments are equal, the value of a bond can be expressed using summation notation as follows-

$$\sum_{t=1}^{n} \frac{I}{(1+Kd)^1} + \frac{I}{(1+Kd)^n}, \text{ and}$$

Using present value interest factors *(PV1F).* The value of a bond is given as-

$$Po = (PVIF_{kd,}n) + M(PVIF_{kd},n)$$

Bonds may be classified into three categories:

(i) bonds with finite maturity
(ii) perpetual bonds and
(iii) pure discount bonds (yields to maturity)

Illustration A - (Bonds with finite maturity)

Assuming that an investor is considering the purchase of a Delta Oil bond which will mature in 5 years' time. The bond is in N1,000 denominations, with annual interest rate of 7%. The investor's required rate of return is 8%,

Solution

By implication, the investor will receive N70, as interest each year, for 5 years, and N1,000 at maturity, at the end of year 5. We can thus determine the present value of the bond- Po as follows.

$$Po = \frac{70}{(1+.08)} + \frac{70}{(1+.08)^2} + \frac{70}{(1+.08)^3} + \frac{70}{(1+.08)^4} + \frac{70}{(1+.08)^5} + \frac{70}{(1+.08)}$$

It can be seen that N70 is an annuity for 5 years, and N1,000 is received as a single lump sum, at the end of the 5th year. Therefore, using the Present value interest factor table for annuity and single sum, we can find the bond value as indicated below-

$$Po = I(PVIFA.08,5) + M(PVIF.08,5)$$
$$= 70(3.9930) + 1000\ (0.681)$$
$$= 279.51 + 681 = N960.50$$

3.3.1.1 Perpetual Bonds

Perpetual bonds, also called Consols, have an indefinite life span, and therefore, with no maturity value. As there is no maturity or terminal value, the general formula for a perpetual bond, that pays interest I, per period forever, and has a required rate of return *Kd* , is the discounted value of the infinite stream of interest flow. This is expressed thus:

$$Po = I/Kd$$

Illustration B

Suppose that a 10% N1, 000 bond will pay N100 annual interest in perpetuity, what will be its value to an investor whose required rate of return is 15% per annum? The value of the bond will be given as follows-

$$Po = \frac{I}{Kd} = \frac{100}{0.15} = N667$$

3.3.1.2 Pure Interest Bond (Yield-To-Maturity)

Pure interest bond does not carry an explicit rate of interest. It provides for the payment of a lump sum at a future date, in exchange for the current price of the bond.

The difference between the face value of the bond and its purchase price gives the return or *YTM* (Yield-to-Maturity) to the investor. Also, we can calculate a bond's yield or the rate of return when its current price and cash flows are known.

Illustration C

A company issues a pure discount bond of N1, 000 face values for N520, today, maturing in 5 years. Thus, the bond has (a) purchase price of N520, (b) maturity value (equal to face value) of N1, 000 and (c) maturity period of 5 years. The yield to maturity (or the rate of interest can be calculated as follows:

$$520 = \frac{1000}{(1+YTM)^5}$$

$$(1+YTM)^5 = \frac{1000}{520} = 1.9231$$

$$i = 1.9231^{1/5} - 1 = 0.14 \text{ or } 14\%$$

You can also use the trial and error method to obtain YTM, which is 14%.

YTM is the bonds internal rate of return. Thus, the yield to maturity of 5-year bond, paying 6% annual interest on a face value of N1, 000 and currently selling for N4883.40 is calculated as follows

$$883.40 = \frac{60}{(1+YTM)^1} + \frac{60}{(1+YTM)^2} + \frac{60}{(1+YTM)^3} + \frac{60}{(1+YTM)^4} + \frac{60}{(1+YTM)^5}$$

$$= 10\% \text{ (obtained by trial and error).}$$

It is simpler to calculate yield to maturity of perpetual bond, which is equal to interest- income divided by the bond price. Thus, if the rate of interest on N1, 000 per value perpetual bond is 8%, and its price is N800, then, its *YTM* will be- ___

$$Po = Kd / Kd = \frac{I}{P_o} \quad \frac{I}{+100} \quad \frac{80}{} = 10\%$$

SELF-ASSESSMENT EXERCISE 1

If a perpetual bond pays a fixed interest of N80 at the end of each year, what is the value of the bond if the investors required rate of return is 6%, 8% and 10%?

3.4 Valuation of Preference Shares

A company may issue two types of shares, namely-

(a) Ordinary shares and (b) Preference shares.

Preference shareholders have preference over ordinary shareholders, in terms of payment of dividends and repayment of capital, if the company is to wind-up. They may be issued with or without a maturity, while Irredeemable preference shareholders have shares with no maturity.

With regards to dividends, preference shares may be issued with or without cumulative features. In the case of cumulative preference shares, unpaid dividends accumulate and are payable in the future. Dividends in arrears do not accumulate in the case of non-cumulative preference shares.
In addition, to redeemable and cumulative features of preference shares, there is also the convertible feature. Preference shares may be issued with a conversion option. In case of convertible preference shares, such shares can be converted into ordinary shares after a stated period.

Value of Preference Shares

Most preference shares resemble perpetualities, promising fixed dividends forever. The value of a preference share then is-

$$\sum_{t=1}^{v} \frac{DP}{(1+ Kp)^{t}}$$

Where Dp is the fixed dividend per period, Kp is the required rate of return on preference shares. This valuation formula is reduced to Po - Dp/Kp. ..... ,in the case of an irredeemable preference share.

Illustration D

A company pays annual dividend of N8.25 on a cumulative preference share issue. What will be the value of the preference share, to an investor who requires 15% rate of return on investment?

$$Po = \frac{N8.25}{0.15} = N55.00$$

3.5 Valuation of Ordinary Shares

The valuation of ordinary shares is based on the same principles underlying the valuation of bonds and preference share. The value of ordinary shares is the capitalised (discounted) value of the share's expected stream of returns.

The valuation of ordinary shares is, however, more difficult than other securities, for the following reasons.

a) The returns from owning ordinary shares are a mixture of dividends and capital gains (or losses)
b) Dividends are not constant, and typically, are expected to grow over time.
c) Future returns from ordinary shares are, more, uncertain than the returns from bonds and preference shares.

Dividend Capitalisation models

The present value of an ordinary share is based on the expected dividends received, during the investor's holding period and the expected selling price at the end of the holding period.

(a) The One-Period Model is:

$$Po = \frac{D_1}{(1+Ke)^1} + \frac{P_1}{(1+Ke)^1}$$

Here, *Ke* is the required rate of return. D_1 is the expected dividend at
time 1, and $P_1$is the expected selling price at time 1

Illustration E

If an investor buys a share and intends to hold it for one year, the share pays a dividend of N2 at the end of one Year, and the investor plans to sell the share for N21 at the end of the year; if the investor's opportunity

cost of capital (required rate of return – *Ke*) is 15 percent, how much should he pay for the share?

Solution

The present value of the share will be determined as follows.

$$Po = \frac{D1}{(1+Ke)} + \frac{P1}{(1+Ke)} = \frac{2}{(1+.15)} + \frac{21}{(1+.15)}$$

$$= N20$$

(b) Multi-Period (n Period) Valuation Model

The 'n' period dividend valuation model can be expressed as:

$$Po = \frac{D_1}{(1+Ke)^1} + \frac{D_2}{(1+Ke)^2} \quad \ldots\ldots\ldots\ldots \quad \frac{Dn}{(1+Ke)^n} + \frac{Pn}{(1+Ke)^n}$$

(where, the investor receives dividends for n periods, and the selling price after *n* period -Pn).

The value of the share at the end of the holding period (Pn), depends on the value of the future dividends after time n. The value of ordinary shares at time zero (Po), depends, directly, on dividends received during the holding period ,and indirectly, on dividends after the holding period (through their effect on Pn). The general dividend model, simply establishes the value of a firm's ordinary shares to the investor, to be equal to the present value of the expected future dividend stream.

$$Po = \sum_{t=1}^{\infty} \frac{Dt}{(1+Kp)^t}$$

3.6 Dividend Growth Models

Dividends do not remain constant always. Earnings and dividends of most companies grow over time, at least, because of their relation policies. These policies will increase the ordinary shareholders' equity as well as the firmsfuture earnings. If the number of shares does not change, this policy shouldtend to increase earnings per share, and consequently, it should produce an expanding stream of dividends per share.

The general dividend valuation model can be simplified if the dividends follow a regular growth pattern. Three patterns considered are - constant growth, zero growth, and above normal growth.

(i) Constant Growth Model

The constant growth dividend valuation model assumes that dividends grow at a constant rate 'g' per period forever.

- The future dividend at end of year *t* is Dt = Do (l+g)t
- When dividends grow constantly, the formula for share valuation can be written as follows.

$$Po = \frac{Do\,1+g}{1+Ke} + \frac{Do\,1+g_2}{(1+Ke)^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots \frac{Do\,1+g}{(1+Ke)^{n=\infty}}$$

$$\text{Or } Po = \sum_{t=1}^{\infty} \frac{Do\,1+g}{(1+Ke)^t}$$

Where D_1 is the next periods dividends: $D_1 = Do\,(1+g)$

This constant growth dividend model is usually referred to as the Gordon Model and is based on the following assumptions.

- The capitalisation rate or the opportunity cost of capital must be greater than the growth rate (Ke>g).
- The initial dividend per share *D* must be greater than zero (D_1>0).
- The relationship between *Ke* and *g* is assumed to remain constant and perpetual.
- If *Po, g,* and *DI* are given, the Gordon model can be used to find the investors required rate of return on equity Ke = (Di/Po) + g. The investor's required rate of return is equal to the expected dividend yield (Di/Po), plus the capital gains yield (g), i.e., Equity Capitalisation rate $Ke = \frac{D_1}{Po} + g$

Illustrations F

(a) A company pays a dividend of 37kobo in the previous year, future dividend is expected to grow, perpetually, at a constant rate of 8 percent; what is the value (price) of the share today, to an investor whose required rate of return is 12 percent?

First, determine D_1, i.e. next period's dividend

$D_1 = Do\ (1+g) = 0.37\ (1.08).$

$$\frac{D_1}{(Ke - g)} = \frac{0.3}{7(1.08)} = \frac{0.39}{9} \text{ or } \frac{4}{}$$

Then, find Po -Po = 12 .08 0.04 .04

(b) A Company's share is currently selling at N50 per share, it is expected that a dividend of N3 per share, after one year, will grow at 8 percent indefinitely. What is the equity capitalisation rate?

$$Ke = \frac{D_1}{Po} + g$$

$$Ke = \frac{3}{50} + 0.08 = 0.14 \text{ or } 14\%$$

(ii) Zero Growth Dividend Valuation Model

Where the future dividends (per share) of a firm are not expected to grow over time, that is, where they are expected to remain stagnant forever, then, D^1 in equation above can be replaced by a steady value of D to yield.

$$Po = \sum_{t=1}^{\infty} \frac{D}{(1 + Ke)^1}$$

The Constant dividend model is the simplest dividend valuation model and is identical to the present value of a perpetual bond, and a preferred stock, which can further be simplified as:

$$Po = \frac{D}{Ke}$$

Illustration G

Assuming a company pays an annual dividend of N141.50 per share on its ordinary shares, which is expected to remain unchanged for a long period of time; what will be the appropriate price of the share to an investor whose required rate of return is 6percent?

Solution: Substitution -N1 .50 for D and 6% for Ke,

$$Po = \frac{D}{Ke} = \frac{N1.50}{0.06} = N25.00$$

(iii) Above-normal Dividend Valuation Model

The dividends of a company may not grow at the same constant rate, indefinitely. It may face a two-stage growth situation. In the first stage, dividends may grow at an above-normal growth rate- (g^1), when the company is experiencing very high demand for its products and is able to extract premium from customers. Afterwards, the demand for the company's products may normalise, hence, earnings and dividends may grow at a normal growth rate (g^2).

Assume that dividends grow at rate g^1 over the first M years, and that dividends grow at rate g^2 after that. The value of the share can be expressed as follows:

$$Po = \sum_{t=1}^{m} \frac{Do\,1 + g^{1}_{t}}{(1+Ke)^{t}} + \frac{Pm}{(1+Ke)^{m}}$$

This gives the present value of the first *m*, dividends plus the present value of the price of the stock, at end of year m, (Pm); but because dividends will grow at constant rate g^2, beginning in year *m+1*, the Gordon model may be used to find the share value in year *m*: Pm = Dm+l/(Ke-g^2). By substituting this into the equation for *Pm* above, the above-normal growth dividend valuation model becomes-

$$Po = \sum_{t=1}^{m} \frac{Do(1+g^{1})^{t}}{(1+Ke)^{t}} + \frac{1}{(1+Ke)^{m}}\left(\frac{Dm+1}{Ke-g^{2}}\right)$$

Illustration H

A company expects the earnings and dividends on its ordinary shares to grow at a rate of 12 percent per annum, for the first 3 years. Thereafter, dividends are expected to grow at a normal rate of 6 percent perpetually. The firm currently pays dividend of N2 per share. What will be the value of the company's shares to an investor whose required rate of return is 20%?

Solution:

The current value of the ordinary shares will be given as the present value of the first three dividends, plus the present value of the share in three years (which is found with the Gordon Model).

Present value of the first three years dividends is as follows:

Table 4.1

Year	Dividend	PVlF20.n	Present Value of Dt
1	2.00(1+0.12) = N2.24	0.833	1.866
		0.694	1.771
2	2.00 (1+0. = N2.51 12)^2	0.579	1.627
			5.235
3	2.00 (1+0. = N2.81 12)^3		

Value of share at end of Year three: $P_3 = D^4/(Ke-g^2)$

$D^4 - D^3 (1+g^2) = 2.81 (1+0.6) = 2.979$

$P^3 = 2.979/(.20-.06) = 2.979/0.14 = 21.28$

Present Value of $P^3 = P_3/(1 +Ke)^3$

Pv (P3) = $21.28/(1+.20)^3$ = 21.28 (PVIF.20,3)

= 21.28(0.579)- 12.321

Value of Ordinary Share - Po = Pv (first three dividends) + Pv (P_3)

Po = 5.235 + 12.321 = N17.556

N17.56

SELF-ASSESSMENT EXERCISE 2

Fred Okoh can buy shares of Ashanti Oil Company for N25.00. Fred expects dividends to be N2.00 in one year and N4.00 in two years; and he expects to sell the share at the rate N28.00 in two years. Should Fred buy any share in Ashanti Oil if this required rate of return is 20 percent?

4.0 CONCLUSION

In this unit, we discussed the general concept of valuation, and developed valuation models for bonds, preference shares and ordinary shares. We also mentioned that asset valuation is based on the application of present value concept or capitalisation of income method.

Like any other asset, the present value of a bond or share is equal to the discounted value of the stream cash flows- the discount rate being rate of return that investors expect from the comparable risk of securities .

Thus, the capitalisation-of-income method of valuation determines the value of an asset as the present value of the stream of future earnings, discounted at an appropriate discount rate.

5.0 SUMMARY

In this unit, we have mentioned that the value of an asset or security is determined by a variety of factors, particularly, the expected returns from holding that asset (security) and the degree of risk involved.

The value of a financial asset (security), such as, ordinary share or bond, is based on the expected cash returns the asset will generate for the owner during the holding period.

We also noted that, in the case of bonds, the stream of cash flow consists of annual interest payments (T) and repayment of principal. The basic formula for bond valuation is as follows.

$$Po = \sum_{t=1}^{n} \frac{1}{(1+kd)^t} + \frac{M}{(1+Kd)^n}$$

Cash flow of an ordinary share consists of the system of dividends and terminal price of the share. Unlike the case of bonds, cash flows of a share are not known. The general formula for the share valuation is as follows:

$$Po = \frac{D_1}{(1+Ke)^t} + \frac{D_2}{(1+Ke)^2} \quad \ldots\ldots\ldots \quad \frac{D_n}{(1+Ke)} + \frac{P_n}{(1+Ke)^n}$$

In practice, dividends do grow over the years. If we assume dividends to grow at a constant rate 'g', then the share price formula can be written as follows.

$$Po = \frac{D1}{Ke-g}$$

ANSWER TO SELF-ASSESSMENT EXERCISE 1

Po= I/Kd

(i) At 6% = Po = 807.06 = ^1,333
(ii) At 8% = Po ='807.08 = 141,000
(iii) At 10% = Po = 807.10 = £4800

ANSWER TO SELF-ASSESSMENT EXERCISE 2

$$Po = \frac{D_1}{(1+Ke)} + \frac{D_2}{(1+Ke)^2} + \frac{P_2}{(1+Ke)^2}$$

Po = 2.00 (PVIF.20, 1) + 4.00 (PVIF .20, 2) + 28.00 (PVIF. 20, 2)
Po = 2.00 (0.833) + 4.00 (0.694) + 28.00 (0.694)
= 1.666 + 2.776 + 19.432 = N23.87

Fred should not invest in Ashanti Oil Company shares, because its estimated value of N23.87, per share is less than the N25.00 he would have to pay for it.

6.0 TUTOR-MARKED ASSIGNMENT

Union Aquatic Company has a current share price of N11.00 and an expected dividend of N0.66 in one year;

- if the dividend growth rate is 7%, what is the required rate of return for Union Aquatic shares?
- if the required rate of return is 11.5%, what will be the growth rate of dividend if the Gordon Model fits this share?

7.0 REFERENCES/FURTHER READING

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UNIT 5 RISK AND RETURN: ASSETS AND PORTFOLIO

CONTENTS

1.0 INTRODUCTION

In this unit, we shall be considering the ownership and holding of assets, from the perspective of the investor. In doing so, we shall be asking such questions like - What is Return? How is it measured? What is risk? How is risk measured? Risk and return are very important concepts in Corporate Financial Management. Other related questions in this unit are- How are assets valued in capital markets? How are assets combined in a portfolio?

2.0 OBJECTIVES

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

- discuss the concepts of average and expected rates of return
- define and measure risk for individual assets.
- show the steps in the calculation of standard deviation and variance, as measures of risk
- determine the relationship between risk and return
- discuss the concepts of portfolio risk and return.

3.0 MAIN CONTENT

3.1 Return on a Single Asset

Oluwa Cements is a large company with several thousand shareholders. Suppose you bought 100 shares of the company at the beginning of the year, at a market price of N225. The cost of per value of each share is N10. Your total investment is cash that you paid out. That is-

Investment N225 x 100 = N25, 500 returns

Suppose during the year, Oluwa Cements, paid dividends at 25 percent. As the dividend rate applies to the value per share, your dividend per share will be: N10 x 25% = N2.50, and total dividend will be:

dividend = (dividend rate x par value) x number of shares
dividend = dividend per share x number of shares
dividend = N2.50 x 100 = N250.

Furthermore, if the price of the share, at the end of the year, turns out to be N267.50, with the increase in the price of the share, you have made a capital gain:

capital gain (loss) = (selling price - buying price) x number of shares
capital gain (loss) = N267.50 - N225 x 100 = N4,250.

Your total return is:

total return = dividend + capital gain
total return = N250 + Rs 4,250 = N4,500

If you sold your shares at the end of the year, your cash inflows would be the dividend income plus the proceeds from the sale of shares:

cash flow at the end of the year

= dividends + value of sold shares
= N250 + (N267.50 x 100) - N27,000

This amount equal to your initial investment of N22,500, plus the total return of N4,500: Rs 22,500 + N4,500 = N27,000.

Percentage returns

It is common and convenient to express returns in percentage terms. You earned a total return of N4,500 on an investment of N22,500. You can express your return in percentage term as given below-

$$\text{Return in percentage} = \frac{\text{N4,500}}{\text{N22,500}} = 0.20 \text{ or } 20\%$$

Percentage returns are frequently calculated on per share basis. We have seen in the example above that returns from each share have two components- the dividend income and the capital gain. Hence, the rate of return on a share will consist of the dividend yield and the capital gain yield. The rate of return of a share held for one year is as follows:

$$\text{Rate of return} = \text{Dividend yield} + \text{Capital gain yield}$$

$$R_1 = \frac{DIV_1}{P_0} + \frac{P_1 - P_0}{P_0} = \frac{DIV_1 + (P_1 - P_0)}{P_0}$$

R1 is the rate of return in year 1, DIV_1 is dividend per share received in year 1, P_0 is the price of the share in the beginning of the year and P| is the price of the share at the end of the year.

Dividend yield is the percentage of dividend income, and it is given by dividing the dividend per share at the end of the year by the share price at the beginning of the year, that is, DIV_1/ P_0. Capital gain is the difference of the share price, at the end, and the share price in the beginning, divided by the share price in the beginning: that is *(PI - P0)/P0*. If the ending price is less than the beginning price, there will be a negative capital gain or capital loss.

In the example of Oluwa Cements, your rate of return will be as follows:

$$R = \frac{2.5}{225} + \frac{(267.50 - 225)}{225} = 0.011 + 0.189 = 0.20 \text{ or } 20\%$$

You will earn a negative rate of return (-l0percent) because of the capital loss (negative capital gain). The return of a share, significantly, depends on the change in its share price. The market price of a share shows wide fluctuations. Hence, investment in shares is risky. The risk of a security depends on the volatility of its returns.

***Table 5.1*:** Annual Rates of Return, 1992-2001

Year	Share Price (Rs)	Capital Gain (%)	Dividend Per Share	Dividend Yield (%)	Rate of Return
	P_1	P_1/P_t-$_1$-1	(Rs), DIV_1	$D1V_t./P_{t-1}$	(%)
1991	24.75	-	-	-	-
1992	55.50	124.24	6.30	25.46	149.70
1993	86.25	55.41	8.40	15.14	70.54
1994	88.50	2.61	12.00	13.91	16.52
1995	93.60	5.76	15.00	16.95	22.71
1996	121.20	29.49	18.75	20.03	49.52
1997	207.60	71.29	25.50	21.04	92.33
1998	249.60	20.23	33.00	15.90	36.13
1999	337.50	35.22	43.50	17.42	52.64
2000	309.60	-8.27	52.50	15.56	7.29
2001	322.20	4.07	27.50	8.88	12.95
Average	187.16	34.00	24.25	17.03	51.03

*In July 1991 the company issued bonus shares in the ratio of 1:2. Data is adjusted for bonus issues.

3.2 Rates of Return and Holding Periods

Investors may hold their investment in shares for longer periods, even for more than one year. How do we calculate holding-period returns? Suppose you invest N1 today in a company's share for five years, the rates of return are 18 percent, 9 percent, and 0 percent, 10 percent and 14 percent. What is the worth of your shares? You hold the share for five years; hence, you can calculate the worth of your investment assuming that, each year, dividends from the previous year are reinvested in shares. The worth of your investment after five years is-
(Worth of investment after five years)

= (1 + 0.18) x (1 + 0.09) x (1+0.0) x (1-0.10) x (1 + 0.14)
= 1.18xl.09x 1.00x0.90x 1.14
= N1.32

Your one naira investment has grown to N1.32 at the end of five years. Thus, your total return is: 1.32 - 1 = 0.30 pr 32 percent. Your total return is a five-year holding-period return. How much is the annual compound rate of return? We can calculate the compound annual rate of return as follows:

Compound annual rate of return

$$= \sqrt{1.18x1.09x1.00x0.09x1.14} - 1$$

$$= 1.057 - 1 = 0.057 \text{ or } 5.7\%$$

This compound rate of return is the geometric mean return. You can verify that one naira invested today, at 5.7 percent compound rate, will grow to, approximately, N1.32 after five years- (1.057)5 = N1.32.

Let us take another example. Suppose you invest £41, at the beginning of 1993, in one share of BCC and hold it for two years. The worth of your investment at the end of two years is:

Worth of investment after two years = (1+0.1652) x (1+0.2271)

1.1652 x 1.2271 =N1.43

Your total return is 43 percent. This is a two-year holding period return. If you hold your one naira investment in *BXCC* share at the end of 1991, for 10 years until the end of 2001, it will grow to N41.7 by the end of 2001. Your 10-year holding return is a whopping 407 percent! You can calculate holding period returns for any number of years.

3.3 Risk of Rates of Return: Variance and Standard Deviation

We can observe that the annual rates of return of company shares, sometimes, show wide fluctuations. These fluctuations in returns may be caused by the volatility of the share prices. The changes in dividends also contribute to the variability of rates of return. We can think of risk of returns as the variability in rates of return.

How can one measure the variability of rates of return of a share (or an asset)? The variability of rates of return may be defined as the extent of the deviations (or dispersion) of individual rates of return from the average rate of return. There are two measures of dispersion, these are- variance and standard deviation. Standard deviation is the square root of variance.

The following steps are involved in calculating variance or standard deviation of rates of return of assets or securities, using historical returns.

- Calculate the average rate of return using equation (2), i.e.-

$$R = \frac{1}{n} \sum_{t=1}^{n} R$$

- Calculate the deviation of individual rates of return from the average rate of return and square it, i.e.-

$$\left(R1 - \bar{R}\right)^2$$

- Calculate, the sum of the squares of the deviations, as determined in the preceding step, and divide it by the number of periods (or observations) less one ,to obtain variance, i.e.-

$$\text{var} = s^2 = \frac{1}{n-1}\sum_{t=1}^{n}(R_t - \bar{R})^2$$

In the case of sample of observations, we divide the sum of squares of the deviations by n-1 to account for the degree of freedom. If you were using population data, then the divider will be n.

- Calculate the square root of the variance to determine the standard deviation, i.e.-

$$\text{Standard deviation} = \sqrt{\text{Variance}}$$

$$s = \sqrt{s^2}$$

We can summarise the formulae calculating variance and standard deviation of historical rates of return of a share as follows:

$$s^2 = \frac{1}{n-1}\sum_{t=1}^{n}(R_t - \bar{R})^2$$

$$s = \sqrt{s^2} = \sqrt{\frac{1}{n-1}\sum_{t=1}^{n}(R_t - \bar{R})^2}$$

BCC rates, if return sample is 10 years, you can calculate the variance and the standard deviation using equations (3) and (4) as follows:

Variance (a^2)

$$= \frac{1}{10-1}[(149.70 - 51.03)^2 + (70.54 - 51.03)^2 + (16.52 - 51.03)^2 + (22.71 - 51.03)^2 + (49.52 - 51.03)^2 + (92.33 - 51.03)^2 + (36.13 - 51.03)^2 + (52.64 - 51.03)^2 + (7.29 - 51.03)^2 + (12.95 - 51.03)^2]$$

$$= \frac{1}{9}[1740.18] = 1{,}933.80$$

$$\text{Standard deviation } (s) + = \sqrt{1{,}933.80} = 43.97\%$$

The annual rates of return of BCC share show a high degree of variability; they deviate, on an average, by about 44 percent from the average rate of return of 51.03 percent. Can we use BCC's past returns as a guide for the future returns? It is difficult to say that past returns

will help in assessing the future returns since BCCs returns are quite volatile.

The actual rate of return in any given period may, significantly, vary from the historical average rate of return.

3.4 Expected Return and Risk: Incorporating Probabilities in Estimates

Instead of using historical data for calculating return and risk, we may use forecasted data. Suppose you are considering buying one share of India Cements, which has a market price of N261.25 today. The company pays a dividend of N2.50 per share. You want to hold the share for one year. What is your expected rate of return? This will depend on the dividend per share you would actually receive and the market price at which you could sell the share. The outcomes are quite obvious. These may depend on economic conditions, the performance of the company and other factors.

You will have to think of the outcomes of dividend and the share price under possible economic scenarios to arrive at a judgment about the expected return. You may, for example, assume for (equally likely) possible states of economic conditions and performance: high growth, expansion, stagnation and decline. You also expect the market price of share to be N305.50, N285.50, N261.25 and N243.50 and the dividend per share N4, N3.25, N2.50 and N2 respectively under four different states of economic conditions. Thus, the possible outcomes of return can be calculated as follows in Table 5.2

Table 5.2: Rates of Returns under Various Economic Conditions

Economic Conditions (1)	Share Price (2)	Dividend (3)	Dividend Yield (4)	Capital Gain	Return (6) = (4) + (5)
High growth	305.50	4.00	0.015	0.169	0.185
Expansion	285.50	3.25	0.012	0.093	0.105
Stagnation	261.25	2.50	0.010	0.000	0.010
Decline	243.50	2.00	0.008	-0.068	-0.060

Note that the current share price is N261.25, and depending on the economic conditions, there are four possibilities. The rates of return calculations can be shown as follows:

$$R_1 = \frac{4 + (305.50 - 261.25)}{261.25} = 0.185 \text{ or } 18.5\%$$

$$R_2 = \frac{3.25 + (285.50 - 261.25)}{261.25} = 0.105 \text{ or } 10.5\%$$

$$R_3 = \frac{2.50 + (261.25 - 261.25)}{261.25} = 0.01 \text{ or } 1\%$$

$$R_4 = \frac{2.00 + (243.50 - 261.25)}{261.25} = -0.060 \text{ or } -6.0\%$$

Your total return is anticipated to vary between - 6percent, under unfavourable condition, to + 18.5 percent under the most favourable condition. What is the chance or likelihood for each outcome anticipated by you to occur? Probability is the percentage of the chance or likelihood of an outcome. On the basis of your judgment, you may, for example, say that each outcome is, equally, likely to occur, i.e., each outcome has a chance of 0.25 or 25 percent. This is your subjective assessment. The subjective probability is based on the judgment of the investor, rather than on an objective assessment of events to occur. The objective probability is based on the appraisal of the occurrence of an event for a very large number of times. The sum of probabilities of the occurrence of outcomes is always equal to 1.

Expected Rate of Return

Table 5.3 below, summarises the range of returns under various possible economic conditions, along with probabilities. You can put this information together to calculate the expected rate of return. The expected rate of return [E (R)] is the sum of the product of each outcome (return) and its associated probability:

Expected rate of return

= rate of return under scenario 1 x probability of scenario 1 + rate of return under scenario 2 x probability of scenario *2* + ... + rate of return under scenario n x probability of scenario n

Table 5.3: Returns and Probabilities.

Economic Conditions (1)	Rate of Return (%) (2)	Probability (3)	Expected Rate of Return (6) = (4) + (5)
High growth	18.5	0.25	4.63
Expansion	10.5	0.25	2.62
Stagnation	1.0	0.25	0.25
Decline	-6.0	0.25	-1.50
		1.00	6.00

Thus, the expected rate of return is as given below:

$$E(R) = (18.5 \times 0.25) + (10.5 \times 0.25) + (1.00 \times 0.25) + (-6.0 \times 0.25)$$
$$= 0.06 \text{ or } 6\%$$

You can convert this simple procedure of calculation as follows:

$$E(R) = R_1 \times P_1 + R_2 \times P_2 + \ldots + R_n P_n$$

$$E(R) = \sum_{i=1}^{n} R_i P_i$$

Note that E(R) is the expected rate of return, *Ri* the outcome i, *Pj* is the probability of the occurrence of i and n is the total number of outcomes.

The expected rate of return is the average return. It is 6 percent in our example. We know that the possible outcomes range between - 6 percent to + 18.5 percent. How much is the average dispersion? As stated earlier, this is explained by the variance or the standard deviation. The steps involved in the calculation of the variance and the standard deviation are the same as already discussed in the preceding section, except that the square of the difference of an outcome (return) from the expected return should be multiplied by its probability. The following formula can be used to calculate the variance of returns:

$$s = [R_1 - E(R)]^2 P_1 + [R_2 + E(R)]^2 P_2 + \ldots + [R_n - E(R)]^2 P_n$$

$$= \sum_{i=1}^{n} [R_n - E(R)]^2 P_n$$

In the above example, the variance of return is:

$$s = [18.5 - 6 \times 0.25]^2 + [10.5 - 6 \times 0.25]^2 + [1\ 6 \times 0.25)]^2 +$$
$$[-6 - 6 \times 0.25]^2 = 86.375$$

And the standard deviation is:

$$s = \sqrt{s^2} = \sqrt{86.375} = 9.29\%$$

Should you invest in the share of Oluwa Cement, the returns are expected to fluctuate widely. The expected rate of return is low- (6 percent), and the standard deviation is high (9.29 percent). You may like to search for an investment with higher expected return and lower

standard deviation.

Illustration: Variance and Standard Deviation

The shares of Hypothetical Company Limited have the following anticipated returns with associated probabilities:

Return (%)	-20	-10	10	15	20	25
Probability	0.05	0.10	0.20	0.25	0.20	0.15

The expected rate of return is-

E(R) = -20x0.05+-10x0.10+10x0.20+15x0.25
+ 20 x 0.20 + 25 x 0.15 + 30 x 0.05 - 13%

The risk, measured in terms of variance and standard deviation, is:

$s^2 = (- 13)^2 \times 0.05 + (-10 -1\ 3)^2 \text{ X } 0.10$
$+ (10-13)^2 \times 0.20 + (15-13)^2 \times 0.25$
$+ (20-13)^2 \times 0.20 + (25-13)^2 \times 0.15$
$+ (30-13)^2 \times 0.05 = 156$
$s = \sqrt{156} = 12.49\%$

SELF-ASSESSMENT EXERCISE 1

The following table gives the dividend and share price data for Hind Manufacturing Company.

Year	Dividend Per Share	Closing Share Price
1994	2.50	12.25
1995	2.50	14.20
1996	2.50	17.50
1997	3.00	16.75
1998	3.00	18.45
1999	3.25	22.25
2000	3.50	23.50
2001	3.50	27.75
2002	3.50	25.50
2003	3.75	27.95
2004	3.75	31.30

You are required to calculate:

(i) the annual rates of return,
(ii) the expected (average) rate of return,
(iii) the variance, and
(iv) the standard deviation of returns.

3.5 Portfolio Risk: Two-Asset Case

The return of a portfolio is equal to the weighted average of the returns of individual assets (or securities) in the portfolio, with weights being equal to the proportion of investment value in each asset. Suppose you have an opportunity of investing your wealth, either in asset *X* or asset *Y*, the possible outcomes of two assets in different states of economy are given in Table 5.4 below

Table 5.4: Possible Outcomes of Two Assets, X and Y

State of Economy	Probability	Return (%)	
		X	Y
A	0.10	-8	14
B	0.20	10	-4
C	0.40	8	6
D	0.20	5	15
E	0.10	-4	20

The expected rate of return of *X* is the sum of the product of outcomes and their respective probability. That is:

$$E(R_x) = (-8x1.1) + (10x0.2) + (8x0.4) + (15x0.2) + (-4x0.1) = 5\%$$

Similarly, the expected rate of return of *Y* is:

$$E(R_y) = (14 \text{ x } 0.1) + (-4x0.2) + (6x0.4) + (15x0.2) + (20x0.1) = 8\%$$

We can use the following equation to calculate the expected rate of return of individual asset:

$$E(R_x) = (R,xP,) + (R_2xP_2) + R_3xP_3) + ... + (R_nxP_n)$$

$$E(R_x) = \sum_{i=1}^{n} R_i P_i$$

Note that $E(R_x)$ is the expected return on asset *X*, *Rj* is ith return and *PI* is the probability of ith return. Let us consider an example.

Suppose you decide to invest 50 percent of your wealth in *X*, and 50 percent in *Y*; what is your expected rate of return on a portfolio consisting of both *X* and *Y*? This can be done in two ways. First, calculate the combined outcome under each state of economic condition; then, multiply each combined outcome by its probability (table 5.2 shows calculations).

There is a direct and simple method of calculating the expected rate of return on a portfolio, if we know the expected rates of return on individual assets and their weights. The expected rate of return on a portfolio (or simply the portfolio return) is the weighted average of the expected rates of return on assets in the portfolio. In our example, the expected portfolio return is as follows:

$$E(Rp) - (0.5x5) + (0.5x8) = 6.5\%$$

In the case of two-asset portfolio, the expected rate of return is given by the following formula:

Expected return on portfolio

= weight of security X x expected return on security X
+ weight of security Y x expected return on security Y

$$E(R_p) = w \times E(R_x) + (1 - w) \times E(R_y) \qquad (2)$$

Note what w is the proportion of investment in asset X, and (1-w) is the remaining investment in asset Y.

Given the expected return of individual assets, the portfolio return depends on the weights (investment proportions) of assets. You may be able to change your expected rate of return on the portfolio by changing your proportionate investment in each asset. How much will you earn, if you invest 20 percent of your wealth in *X* and the remaining wealth in *Y*? The portfolio rate of return under this change mix of wealth in *X* and *Y* will be:

$$E(R_p) -\bullet= 0.2 \times 5 + (1-0.2) \times 8 - 7.4\%$$

You may notice that this return is higher than what you will earn if you invest equal amounts in *X* and *Y*. The expected return will be 5 percent if you invest the entire wealth in X (i.e. w = 1.0). On the other hand, the expected return will be 8 percent if the entire wealth is invested in *Y*

(i.e., l-w=l, since w = 0). Your expected return will increase as you shift your wealth from *X* to *Y*. Thus, the expected return on portfolio will depend on the percentage of wealth invested in each asset in the portfolio.

What is the advantage in investing your wealth in both assets *X* and *Y* when you could expect highest return of 8 percent by investing your entire wealth in *Y*? When you invested your wealth equally in assets *X* and *Y*, your expected return is 6.5 percent. The expected return of *Y* (Spercent) is higher than the portfolio return (6.5 percent); but investing your entire wealth in Y is more risky. Under unfavourable economic condition, *Y* may yield a negative return of 4 percent. The probability of negative return is eliminated when you combine *X* and *Y*. Furthermore, the portfolio returns are expected to fluctuate within a narrow range of 3 to 10 percent (see column 3 of Table 5.2). You may also note that the expected return of *X* (S percent) is not only less than the portfolio return (6.5 percent), but it also shows greater fluctuations. We discuss the concept of risk in greater detail in the following section.

3.6 Portfolio Risk: Two-Asset Case

We have seen in the previous section that returns on individual assets fluctuate more than the portfolio return. Thus, individual assets are more risky than the portfolio. How is the risk of a portfolio measured? As discussed in the previous chapter, risk of individual assets is measured by their variance or standard deviation. We can use variance or standard deviation to measure the risk of the portfolio of assets as well. Why is a portfolio less risky than individual assets? Let us consider an example.

In table 5.6 below, it is assumed that there are two investment opportunities- A and B.

Table 5.5: Expected Portfolio Rate of Return

State of Economy (1)	Probability (2)	Combine Returns (%) X (50%) & Y (50%) (3)	Expected Return (%) (4) = (2)x(3)
A	0.10	(-8x0.5) + (14x0.5) = 3.0	0.10x3.0 = 0.3
B	0.20	(10x0.5) + (-4x0. 5) = 3.0	0.20x3.0 = 0.6
C	0.40	(8x0.5) + (6x0.5) = 7.0	0.40x7.8 = 2.8
D	0.20	(5 x0.5) + (15x0.5)= 10.0	0.20 x 10.0 = 2.0
E	0.10	(-4x0. 5) + (20x0. 5) = 6.5	0.10x8.0 = 0.8

Table 5.6: Investments in A and B

Economic Condition	Probability	Return (%) A	Return (%) B
Good	0.5	40	0
Bad	0.5	0	40

The expected rate of return, variance and standard deviation of *A* are:

$$E(R_A) = 0.5 \times 40 + 0.5 \times 0 - 20\%$$

$$s_A^2 - 0.5(40-20)^2 + 0.5(0-20)2 = 400$$

$$s_A \sqrt{400} = 20\%$$

Similarly, the expected rate of return, variance and standard deviation of B are:

$$E(R_B) = 0.5 \times 0 + 0.5 \times 40 = 20\%$$

$$s_B^2 = 0.5(0-20)^2 + 0.5(40-20)2 = 400$$

$$s_B \sqrt{400} = 20\%$$

Both investments *A* and *B* have the same expected rate of return (20percent), and same variance (400) and standard deviation (20 percent). Thus, they are equally profitable and equally risky. How does combining investments *A* and *B* help investors? If a portfolio consisting of equal amount of *A* and *B* is constructed, the portfolio will be:

$$E(R_P) = 0.5 \times 20 + 0.5 \times 20 = 20\%$$

This return is the same as the expected return from individual securities, but without any risk. Why? If the economic conditions are good, then *A* will yield 40 percent return and *B* zero, and the portfolio return will be:

$$E(R_P) = 0.5 \times 40 + 0.5 \times 0 = 20\%$$

When economic conditions are bad, *A* will yield zero percent, and *B*- 40 percent and the portfolio return will still remain the same-

$$E(R,») = 0.5 \times 0 + 0.5 \times 40 = 20\%$$

Thus, by investing equal amounts in *A* and *B*, rather than the entire amount only in *A* or *B*, the investor is able to eliminate the risk altogether. She is assured of a return of 20 percent, with a zero standard deviation.

It is not always possible to entirely reduce the risk. It may be difficult in practice to find two assets whose return moves completely in opposite

directions, as in the above example of securities *A* and *B.* It should be
emphasised that the risk of portfolio will be less than the risk of individual securities, and that the risk of a security should be judged by its contribution to the portfolio risk. We are going to further look at some concepts below.

(a) Measuring Portfolio Risk for Two Assets

Like in the case of individual assets, the risk of a portfolio could be measured in terms of its variance or standard deviation. As stated earlier, portfolio return is the weighted average pf returns on individual assets. Is portfolio variance or standard deviation a weighted average of the individual asset's variances or standard deviations? It is not. Portfolio variance or standard deviation depends on the co-movements of returns on two assets.

Covariance: When we consider two assets, we are concerned with the co-movement of the assets. Covariance of returns on two assets measures their co-movement. How is covariance calculated? Three steps are involved in the calculation of covariance between two assets:

- determine the expected returns on assets
- determine the deviation of possible returns from the expected return for each asset
- determine the sum of the product of each deviation of returns of two assets and respective probability.

Let us consider the data of securities of *X* and *Y* given in table 5.4. The expected return on security *X* is-

$$E(R_x) = (0.1 \text{ x } -8) + (0.2\text{x}10) + (0.4\text{x}8) + (0.2\text{x}5) + (\text{O.lx}-4) = 5\%$$

Security *Y*'s expected return is:

$$E(Ry) = (0.1 \text{ x!}4) + (0.2\text{x}-4) + (0.4\text{x}6) + (0.2\text{x}15) + (0.1\text{x}20) = 8\%$$

If equal amount is invested in *X* and *Y,* the expected return on the portfolio is:

$$E\ (Rp) = 5\text{x}0.5+8\text{x}0.5 = 6.5\%$$

Table 5.7 below shows the calculations of variations from the expected return and covariance, which is the product of deviations of returns of securities *X* and *Y,* and their associated probabilities.

Table 5.7: Covariance of Returns of Securities *X* and *Y*

State of Economy	Probability	Returns		Deviation from Expected Returns		Product of Deviation & Probability
		X	Y	X	Y	
A	0.1	-8	14	-13	6	-7.8
B	0.2	10	-4	5	-12	-12.0
C	0.4	8	6	3	-2	-2.4
D	0.2	5	15	0	7	0.0
E	0.1	-4	20	-9	12	-10.8
		$E(R_x)=5$	$E(R_Y)=8$			Cover=33.0

The covariance of returns of securities *X* and *Y* is 33.0. The formula for calculating covariance of returns of the two securities X and Y is as follows:

$$Cov_{xy} = \sum_{i=1}^{n} I\,[R_x - E(R_x)][R_y - E(R_y)]\,xP_i$$

Note that Cov_{xy} is the covariance of returns on securities *X* and *Y*, R_x and R_y represent returns on securities *X* and *Y* respectively, while $E(R_x)$ and $E(R_y)$ represent expected returns of *X* and *Y* respectively. P_i is the probability of occurrence of the state of economy *i*. Using equation (3), the covariance between the returns of securities *X* and *Y* can be calculated as shown below:

$$\begin{aligned} Cov_{xv} &= 0.1(-8-5)(-14-8) + 0.2(10-5)(-4-8) \\ &\quad + 0.4(8-5)(6-8) + 0.2(5-5)(15-8) \\ &\quad + 0.1(-4-5)(20-8) \\ &= 7.8 - 12 - 2.4 + 0 - 10.8 = -33.0 \end{aligned}$$

What is the relationship between the returns of securities *X* and *Y*? There are the following possibilities:

- **positive covariance-** *X's* and *Y's* returns could be above their average returns at the same time. Alternatively, *X's* and *Y's* returns could be below their average returns at the same time. In either situation, this implies positive relation between two returns. The covariance will be positive.
- **negative covariance-** *X's* returns could be above its average return while *Y's* return could be below its average return and vice

versa. This denotes a negative relationship between returns of *X* and *Y*. The covariance will be negative.

- **zero covariance-** returns on *X* and *Y* could show no pattern; that is, there is no relationship. In this situation, covariance will be zero. In reality, covariance may be non-zero, due to randomness and negative and positive terms may not cancel out each other.

In our example, covariance between returns on *X* and *Y* is negative, that is, *-33.0*. This is akin to the second situation above; that is, two returns are negatively related. What does the number - *33.0* imply? As in the case of variance, covariance also uses squared deviations and therefore, the number cannot be explained. We can, however, compute the correlation to measure the relationship between two returns.

How can we find relationship between two variables? Correlation is a measure of the linear relationship between two variables (for instance, returns of two securities, *X* and *Y* in our case). It may be observed, from equation (3), that covariance of returns of securities *X* and *Y* is a measure of both variability of returns of securities and their association. Thus, the formula for covariance of returns on *X* and *Y* can also be expressed as follows:

Covariance *XY* = Standard deviation *X x* Standard deviation *Y x* Correlation *XY*

$$Cov_{xy} = s_x s_y Cor_{xy}$$

Note that *ax* and *oy* are standard deviations of returns or securities *X* and *Y* is the correlation between returns of *X* and *Y*. From equation (4), we can determine the correlation by dividing covariance by the standard deviations of returns on securities *X* and *Y*:

$$\text{Correlation X,Y} = \frac{\text{Co var ianceXY}}{\text{S tan darddeviationX x S tan darddeviationY}}$$

$$Cor_{xy} = \frac{Cov_{xy}}{s_x s_y}$$

The value of correlation, called the correlation coefficient, could be positive, negative or zero. It depends on the sign of covariance. The correlation coefficient always ranges between *-1.0* and *+1.0*. A correlation coefficient of*+1.0* implies a perfectly positive correlation while a correlation coefficient of *-1.0* indicates a perfectly negative

correlation. The correlation between the two variables will be zero (or not different from zero) if they are not at all related to each other. In a number of situations, returns of any two securities maybe weakly correlated (negatively or positively).

Let us calculate correlation by using data given in Table 5.4. The covariance is 33.0. We need standard deviations of *X* and *Y* to compute the correlation. The standard deviation of securities X and Y are as follows:

$$s_x^2 = 0.1(-8 - 5)^2 + 0.2(10-5)^2 + 0.4(8-5)^2 + 0.2(5-5)^2 + 0.1(-4 - 5)^2$$
$$= 16.9 + 3.6 + 0 + 8.1 = 33.6$$
$$s = \sqrt{33.6} = 5.8\%$$

$$s_y^2 = 0.1 (14 - 8)^2 + 0.2(-4 - 8)^2 + 0.4(6 - 8)^2 + 0.2 (15 - 8)^2 + 0.1 (20-8)^2$$
$$-3.6 + 28.8 + 1.6 + 9.8 + 14.4 - 58.2$$
$$s_y = \sqrt{58.2} = 7.63\%$$

The correlation of the two securities *X* and *Y* is as follows:

$$Cor_{xy} = \frac{-33.0}{5.80 \times 7.63} = \frac{-33.0}{44.25} = 0.746$$

Securities *X* and *Y* are negatively correlated. The correlation coefficient of -0.746 indicates a high negative relationship. If an investor invests her wealth in both, instead of any one of them, she can reduce the risk. How?

(b) Variance and Standard Deviation of a Two-Asset Portfolio

We know now that the variance of a two-asset portfolio is not the weighted average of the variance of assets since they co-vary as well. The variance of two-security portfolio is given by the following equation

$$s_p^2 = s_x^2 w_{2x} + s_y^2 w_{2y} + 2w_x w_y Covar_{xy}$$
$$= s_x^2 w_{2x} + s_y^2 w_{2y} + 2w_x w_y s_x s_y Cor_{xy}$$

It may be noticed from equation (6) that the variance of a portfolio includes the proportionate variance of the individual securities and the covariance of the securities.

The covariance depends on the correlation between the securities in the portfolio. The risk of the portfolio will be less than the weighted average risk of the securities, for low or negative correlation. It is a common

practice to use a tabular approach, as given in Table 5.5, to calculate the variance of a portfolio.

Table 5.8: Covariance Calculation Matrix

I		II		III	
s_x^2	Cov_{xy}	w^2x	w_xw_y	s_xw^2x	$w_xw_yCov_{xy}$
Cov_{xy}	s^2_y	w_xw_y	w^2_y	$w_xw_yCov_{xy}$	$s^2_y w^2_y$

The first two parts of Table 5.5 contain the variance, covariance and weights of two securities, X and Y. in the portfolio. The third part gives the cell-by-cell products of the values in the two parts. We can obtain Equation (6) when we add all values in the third part.

Using the sequences of Table 5.6, the variance of the portfolio of securities *X* and *Y* is given below:

the total of values in the third table: 8.40 - 8.25 - 8.25 + 14.55 = 6.45 is the variance of the portfolio of securities *X* and *Y*.

Applying Equation (6), the variance of portfolio of *X* and *Y* will be as follows-

$$s_p^2 = 33.6(0.5)^2 + 58.2(0.5)^2 + 2(0.5)(0.5)(5.80)(7.63)(-0.746)$$
$$= 8.44\ 14.55 - 16.51 = 6.45$$

The standard deviation of two-asset portfolio is the square root of variance:

$$s_p = \sqrt{s_x^2 w^2_x + s_y^2 + 2w_x w_y s_x s_y Cor_{xy}}$$
$$s_p = 6.45 = 2.54\%$$

What does the portfolio standard deviation of 2.54 percent mean? The implication is the same as in the case of the standard deviation of an individual asset (security). The expected return on the portfolio is 6.5 percent, and it could vary between 3.96 percent (i.e., 6.5 - 2.54) and 9.04 percent [i.e., 6.5 + 2.54] within one standard deviation from the mean. There is about 68 percent probability that the portfolio return will range between 3.96 percent and 9.04 percent, if we assume that the portfolio return is normally distributed.

It can thus be observed that portfolio risk consists of the risk of individual securities plus the covariance between securities. Covariance depends on the standard deviation of individual securities and their correlation.

4.0 CONCLUSION

Risk and return are two most important concepts in corporate finance. They constitute the foundation of modern financial theory. In fact, risk and return are basic concepts to the understanding of the valuation of assets or securities. On the other hand, a portfolio is a combination of individual assets or securities. The portfolio theory provides a normative approach to investors to make decisions to invest their wealth in assets or securities. There is the assumption that investors are averse to risk, and therefore hold a well-diversified portfolio of assets, and then their concern should be the expected rate of return and risk of the portfolio rather than individual assets as well as the contribution of individual assets to portfolio risk. The other assumption of portfolio theory is that the returns of assets are normally distributed. This implies that the means and variance (or standard deviation) analysis is the foundation of portfolio decisions.

5.0 SUMMARY

The basic concepts considered in this unit are Return and Risk, both for individual securities and for portfolio.

ANSWER TO SELF-ASSESSMENT EXERCISE

(i) Annual Rate of Returns

Year	Dividend Per Share	Closing Share Price	Annual Rates of Return (%)
1994	2.50	12.25	
1995	2.50	14.20	2.50 + (14.20 - 12.25)712.25 = 36.33
1996	2.50	17.50	2.50 + (17.50- 14.20)714.20 = 40.85
1997	3.00	16.75	3.00 + (16.75- 17.50)717.50= 12.86
1998	3.00	18.45	3.00 + (18.45 - 16.75)716.75 = 28.06
1999	3.25	22.25	3.25 + (22.25 - 18.45)718.45 = 38.21
2000	3.50	23.50	3.50 + (23.50 - 22.25)722.25 = .35
2001	3.50	27.75	3.50 + (27.75 - 23.50)723.50 = 32.98
2002	3.50	25.50	3.50 + (25.50 - 27.75)727.75 = 4.50
2003	3.75	27.95	3.75 + (27.95 - 25.50)725.50 = 24.31
2004	3.75	31.30 = 25.40	3.75 + (3 1 .30 - 27.95)727.95

(ii) Average Rate of return

Arithmetic average = 36.33+40.85+12.86+28.06+38.21+21.35
+32.98+4.50+24.31+25.40)710 = 26.48%

(iii) Variance and Standard derivation are calculated as shown below:

Year	Annual Rates of Returns	Annual Minus Average Rates	Square of Annual Minus Average Rates of Returns
1	36.33	9.84	96.86
2	40.85	14.36	206.22
3	12.86	-13.63	185.71
4	28.06	1.57	2.48
5	38.21	11.73	137.51
6	21.35	-5.14	26.38
7	32.98	6.49	42.17
8	4.50	-21.98	483.13
9	24.31	-2.17	4.71
10	25.45	-1.08	1.17
Sum(S)	246.85		1186.36
Average	26.48		

Variance $= \frac{1}{n-1} \sum_{i=1}^{n} (R_1 - \bar{R}) = 1186.36/(10-1) = 131.82$

Standard deviation $= \sqrt{131.81} = 11.48$

- Generally investors, in practice, hold multiple securities. Combination of multiple securities in one holding are called portfolio.
- The expected return on a portfolio is the sum of the returns on individual securities multiplied by their respective weights. In other words, it is a weighted average rate of return.
- In the case of a two-security portfolio, the portfolio return is given by the following equation.

  $E(R_p) = wR_x + (1-w)R_y$
- In the case of *n*-security portfolio, the portfolio return will be given as follows:

$$E(R_p) = w,R, + w_2R_2 + ...+ w_nR_n = \sum_{1}^{n} w_1R_1$$

- The portfolio risk on the other hand is not a weighted average risk. Securities included in a portfolio are associated with each other. Hence the portfolio risk also takes into consideration the covariance between returns of securities. Covariance is the product of the standard deviations of individual securities times, their correlation coefficient.
- Therefore the portfolio risk is in the case of a two-security portfolio can be express as follows:

$$q_P = w^2 \; q_2 \; x + (1-w)^2 \; q_2 \; 2 \; q_{2V} + 2(w)(l-w) \; Covxy$$

$$= \sqrt{w^2 \; q_2 \; x + (l-w)^2 \; q_2 \; v + 2(w)(l-w) \; q_x q_y \; Corxy}$$

Return on a security consists of two parts: the dividend and capital gain. The rate of return for one period is given in the following equation-

Return = dividend yield + capital gain rate

$$R = \frac{D_1}{P_0} + \frac{(P_1 - P_o)}{P_o}$$

- The expected rate of return on a security is the sum of the products of possible rates of return and their probabilities.

$$E(R) = R_1P_1 + R_2P_2\text{……..}R_nR_n = \sum_{1}^{n} R_1P_1$$

Dispersion can be measured by variance and standard deviation of return from mean

$$b^2 = \sqrt{\sum_{i=1}^{n} \left[R_i - E(R)\right]^2 P_i} = \sqrt{\left[R_1 - E(R)\right]^2 P_1 + \left[R_2 - E(R)\right]^2 P_2 ... + \left[R_n - E(R)\right]^2 P_n}$$

$$= \frac{\sigma_1 \sigma_2}{\sum_{i=1}^{n} \left[R_i - E(R)\right]^2 P_i}$$

Variance (q^2) or standard deviation (q) is a measure of risk of returns on a security.

6.0 TUTOR- MARKED ASSIGNMENT

1. Show the steps in the calculation of standard deviation and variance as measures of risk.
2. Discuss the concepts of average and expected rates of return.

7.0 REFERENCES/FURTHER READING

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MODULE 2 INVESTMENT AND DIVIDEND DECISIONS

UNIT 1 ELEMENTS OF INVESTMENT DECISIONS

CONTENTS

1.0 INTRODUCTION

In the previous module, we discussed topics such as finance function and analytical tools for financial decisions. In this unit, we are going to be looking at investment decisions. To provide the background for this, we will, first, discuss the basic elements of investment decision. The main issues bother on the nature of, and the significance of investment decisions, identification of investment alternatives, the setting of investment objectives and the steps involved in making investment decisions.

2.0 OBJECTIVES

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

- identify the significance of financial investment management
- distinguish investment alternatives
- determine factors that influence investment objectives
- discuss the four-stage process of investment decisions.

3.0 MAIN CONTENT

3.1 Nature of Investment Decisions

Under the present economic realities, there has developed a need for careful scrutiny of individual investment and financial management decisions. In order to make successful and sound asset management decision, there is the need for the investor to acquire the knowledge and essential skills to make prudent and financially rewarding investment. It is necessary to have a good knowledge of the many investment alternatives and opportunities available in the economic environment. Skills are needed to evaluate the relevant risks and returns associated with each investment decision. In addition, it is important for the investor to know what results have been achieved by past investment decision.

Concern over the management of financial resources is centered on a number of factors resulting from the dynamism of the economic environment. Among such factors are:

- **improvements in life expectancy-** this means that people now live longer than before and are earning more at a very youthful age.
- **increased rate of taxation-** high level of taxation at the federal, state and local government levels, has made careful management of financial resources necessary
- **levels of interest rate-** we have, in the recent past, experienced series of regulation, de-regulation and 're-regulation' of interest rates. To avoid loss of income, investment funds must be channeled in the most efficient manner, giving due consideration to the interest rate regime operating at any point in time.
- **inflation rate-** as commodity prices rise, as it has been the case over the past decade, the value (i.e. purchasing power) of income (money) depreciates. There is need therefore to recognise and plan for the effect of inflation on investment decision.
- **income levels-** fluctuations in income levels are important for the determination of investment capabilities. For example, one concept of income is per capita disposable income. If the disposable income increases, it means that individuals now have more income to manage than before, and vice versa.

3.2 Investment Alternatives

Investment represents claims on assets. Asset claims can be classified into two components, namely - Financial and Real assets.

Financial assets represent a financial claim on an asset, and such claims are represented by pieces of paper such as ordinary share certificates. The financial claim held by an individual varies according to the rights and powers of the various parties creating the claim. We can distinguish two types of financial asset claims - i.e. as an owner or a creditor. The financial claim of an owner is known as equity, while the financial claim of a creditor is known as debt. Ordinary shares and preference shares are examples of equity claim, while bonds and debentures are example of debt or creditor claim.

Real assets on the other hand are physical items that can be touched and are tangible. Examples of real assets are - real estate (land, buildings etc), collectibles (like artworks, coins, antiques, stamps etc.).

Basically, real assets serve as the basis for the creation of financial assets. For example, ordinary shares represent ownership in the real assets owned by the company of interest. Also, bonds are often secured by pledging a real asset, such as equipment, as collateral against the repayment of the financial claim (debt) created by the issuance of the bond.

SELF-ASSESSMENT EXERCISE 1

A number of factors, resulting from changing economic conditions, have made investment management decisions of paramount importance. Identify and discuss these changing economic conditions.

3.3 The Setting of Investment Objectives

The setting of investment objectives may be as important as the selection of the investment; in most cases they should be undertaken simultaneously. The major factors to consider in setting investment objectives include the following.

a) Risk and Safety of Principal- the first factor an investor must consider is the amount of risk he is prepared to assume. In a relatively efficient and informed capital market environment, risk tends to be closely correlated with return.
b) Current Income versus Capital Appreciation- this factor is closely related to the first (risk) referred to above. In buying ordinary shares, an investor in need of current income may opt for high -

yielding mature firms in such industries as utilities. On the other hand, an investor desiring capital appreciation may prefer, relatively new, and emerging firms in the hitech, energy sectors etc. While the former pay high and regular dividends, the latter may pay no dividends, but the profit is re-invested with increased value and capital gain.

c) Liquidity Consideration- liquidity is measured by the ability of the investor to convert an investment into cash, within a relatively short period of time, with little or no capital loss on the transaction. Liquidity can also be measured, indirectly, by the transaction costs or commission involved in the transfer of ownership. The investor must, carefully, assess his/her own situation to determine the need for liquidity of his/her investment.

d) Short term versus Long term orientation- in setting investment objective, we must decide whether we will assume a short term or long term orientation in managing the funds and evaluating performance. For how long is the investor ready to part with his funds? Those who manage funds for others may be put under serious pressure to show a given level of performance in the short-run.

e) Tax Consideration- investor at different tax brackets have varying investment objectives. For instance, investors in high tax brackets will have different investment objectives, more than those in lower brackets or tax-exempted charity foundations etc. These factors should be taken into consideration in making investment decision.

f) Ease of Management- the investor must determine the amount of time and effort that he can conveniently devote to an investment portfolio and act accordingly for an investment in the Stock Market for example, this may determine whether you become a daily trader, or assume a long term perspective, whether you manage your own portfolio or you invest in unit trusts and use the services of professional portfolio managers.

g) Retirement and Estate Planning Consideration- the investment decisions made as a youth will determine an individual's well being at old age. Hence we must consider the effect of our investment decisions on our retirement and the estates we will pass along to the potential family someday. Such considerations inform the recent pension reform.

3.4 The Four-Stage Investment Process

The investment decision for an individual can be viewed as a four-stage process.

Stage One involves determining the present financial health of the individual. Here we ask the relevant question. What do we have? The investor takes a financial inventory by ensuring that his financial affairs are in order prior to considering other investment.

Stage Two: In stage two the individual examines the future in order to determine the best investment. The relevant question at this stage is: - What could we have? Here the investor forms beliefs regarding the future behaviour of the prices of and returns from individual financial alternatives.

Stage Three is concerned with looking at the individual investments as a group. The relevant questions of concern here is: What should we have? This is the stage of evaluation or investment analysis. It considers the risks and returns on individual securities, takes out beliefs about the future and attempts to determine the combinations of assets that will best satisfy the investor's objectives.

Stage Four deals with how the investment performed. Having selected a particular asset or a combination of asset we now at the end of the exercise try to find out – how our choice investment has performed. Have we made a successful investment decision or did we make financial planning mistakes? It is a kind of feed-back mechanism in which the investor attempts to measure result against expectation and make necessary corrections.

It must be observed however, that whatever the stage of the investment process, we must recognise that investment decisions are made in an environment of uncertainty.

SELF-ASSESSMENT EXERCISE 2

What factor should an investor consider in setting investment decisions? Give reasons for your answer.

4.0 CONCLUSION

In this unit, which is centered on the investment decision function of the financial manager, we examined the importance of financial management decisions, the growth of asset holding by various investor groups (individuals, companies and governments) as well as an

overview of the various investment alternatives available in the economy; we finally discussed the basic approaches to the investment process.

5.0 SUMMARY

The main factors that necessitate proper planning of investment and efficient financial management are:

- recent improvements in life expectancy
- increased and varying rates in taxation
- increases and changes in the rates of interest rates over the time
- high rate of inflation and implied decline in purchasing power of money
- fluctuations in income levels due to the economic dynamics

ANSWER TO SELF-ASSESSMENT EXERCISE 1

The economic conditions that necessitate proper investment planning are:

- improvements in life-expectancy
- changing levels of taxation
- changing levels of interest rate
- rising inflation and depreciation of monetary value
- fluctuations in income levels

ANSWER TO SELF-ASSESSMENT EXERCISE 2

Factors to consider in setting investment objectives are:

- risk and safety of principal
- current income versus capital appreciation
- liquidity factors
- short term versus long term orientation
- tax brackets of investors
- ease of management
- retirement and estate planning issues

6.0 TUTOR-MARKED ASSIGNMENT

By means of (4) relevant examples each, discuss the major investment objectives.

7.0 REFERENCES/FURTHER READING

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UNIT 2 CAPITAL BUDGETING

CONTENTS

1.0 INTRODUCTION

In this unit, we shall be discussing capital budgeting, which is at the core of investment decision. We have laid the foundation for the understanding of capital budgeting in previous units.

A capital expenditure is a cash outlay that is expected to generate a flow of future benefits, lasting longer than one year. It is distinguished from a normal operating expenditure, which is expected to result in cash benefits during the coming one year period.

There are several different types of cash outlays that may be classified as capital expenditures, and evaluated using the framework of capital budgeting models. These include:

- the purchase of new equipment, real estate, or a building in order to expand existing product or service line or enter a new line of business.
- the replacement of an existing development programme
- investments in permanent increases of target inventory levels or levels of account receivable.
- the refunding of an old bond issue with a new, lower interest issue.
- lease versus buy analysis.

Capital expenditures are important to a firm because they require sizeable cash outlay, and also because they have long lasting impact on

the firm's performance. A firm's capital expenditure affects future profitability; it maps out the company's future direction by determining which products will be produced, which markets will be entered into, where production facilities will be located and what type of technology will be used.

Decision-making in relation to capital expenditure is important also because it is often difficult to reverse a major capital expenditure without incurring considerable cost. It is in view of these reasons that a firm's management should establish a number of definite procedures to follow when analysing capital expenditure projects. This is undertaken through the capital budgeting process.

2.0 OBJECTIVES

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

- establish capital expenditure as a key decision of a firm's management
- illustrate the role of cash outlay in an investment project.

3.0 MAIN CONTENT

3.1 Key Terms and Concepts in Capital Budgeting

Before proceeding with the analysis of capital budgeting process, it is necessary to introduce a number of terms and concepts which we will be coming across in the course of this study.

i. Cost of Capital

A firm's cost of capital is defined as the cost of the funds supplied to it. It is also termed the required rate of return, since it specifies the minimum rate of return expected by the firm's investors. In this context, the cost of capital provides the firm with a basis for choosing among various capital investment projects.

ii. Capital Rationing

This refers to the process of limiting the number of capital expenditure projects because of insufficient funds.

iii. Net Cash flow

This is cash inflow minus cash outflow. It is often measured as income after tax, plus non-cash expenses associated with a particular investment project.

iv. Net Investment

This is the net cash outlay required at the beginning of an investment project.

v. Normal Project

A project with a cash flow stream, requiring an initial outlay of funds followed by a series of positive, net cash inflows. This is also sometimes called a conventional project.

3.2 Project Classification

Different types of projects which come into focus when a firm is making capital expenditure decisions may be classified as - independent, mutually exclusive or contingent projects.

a) **Independent Project-** an independent project is one which its acceptance or rejection does not directly eliminate other projects from consideration. For example, a firm may want to install a new telephone communication system in its head office and replace a printing press at, approximately, the same time. In the absence of a financial constraint, both projects could be adopted, if they meet minimum investment criteria.

b) **Mutually Exclusive Project-** a mutually exclusive project is one whose acceptance precludes the acceptance of one or more alternative proposals. Since two mutually exclusive projects have the capacity to perform the same function for a firm, only one should be chosen. For example, Volkswagen was recently faced with deciding whether it should locate its new assembly plant in Lagos or Abuja. It, ultimately, chose Lagos, and this precluded the Abuja alternative.

c) **Contingent Project-** contingent project is one which acceptance *is* dependent on the adoption of one or more other projects. For example, the installation of pollution control equipment in a new factory is contingent upon the acceptance of the new factory plant as a desirable investment. When a firm is considering contingent projects, it is best to consider all projects that are dependent on one another, and treat them as a single project for purposes of evaluation.

SELF-ASSESSMENT EXERCISE 1

Identify and distinguish between various classifications of capital projects

3.3 Capital Budgeting Techniques

There are four commonly used techniques for appraising and selecting investment projects, namely-

a. Payback Period (PB)
b. Net Present Value (NPV)
c. Internal Rate of Return (IRR)
d. Profitability Index (PI)

3.3.1 The Payback Period (PB)

The payback period of a project refers to the length of time (period) within which the project will generate enough cash inflows to payback its original cost (i.e. when net cash flows equal net investment).

Illustration A: Assume that a firm is considering two projects A and B, having costs and cash flows as shown below in table 2.1.

	PROJECT A		PROJECT B	
Year	Net Cash flow after tax	Cumulative Net cash flow	Net Cash flow after-tax	Cumulative net cash flow
1.	N12,500	N12,500	N5,000	N5,000
2.	12,500	25,500	10,000	15,000
3	12,500	37,500	15,000	30,000
4	12,500	50,000	15,000	45,000
5	12,500	62,500	25,000	70,000
6	12,500	75,000	30,000	100,000
	Net Investment A = N50, 000		Net Investment A = N50,000	

If, as in project A, the net cash inflows are equal in each year, then the payback period is the ratio of the net investment to the annual net cash inflows.

$$\text{i.e.} \quad PB = \frac{\text{Net Investment}}{\text{Annual net cash inflow}}$$

The payback period (PB) for project A is computed as-

$$PB = \frac{N50,000}{N12,500} = 4 \text{ years}$$

When annual net cash inflows are unequal, as in project B, the payback period is calculated by defining the point in time when cumulative net cash inflow is just equal to the net investment.

As can be seen in table 9.3 this occurs between years *4* and 5. This is because the cumulative net cash inflow for Project B is N45,000 after 4 years, (which is less than the net Investment) and N70,000 after 5 years (which is more than the initial investment).

To determine the actual payback period, we use an interpolation formula as follows:

$$PB = t + \frac{c - c}{d - c}$$

where *PB* is the payback period, *t* is the last, full year in which cumulative net cash flows are less than the investment; *b* is the net investment, *c* is the cumulative cash inflows in year *t* and *d* is the cumulative cash inflows in year *t+1*. In this example, the *PB* for project *B* is given as:

$$PB = \frac{4 + N50{,}000 - 45{,}000}{N70{,}000 - 45{,}000}$$

$$= 4 + \frac{5{,}000}{25{,}000}$$

$$= 4.2 \text{ years}$$

Decision Rule: The payback period method is often used when deciding whether to accept or reject an investment project. Specifically, the PB figure is compared with a maximum- acceptable- payback figure. The project is accepted if the calculated *PB* is less than this standard figure, or rejected if it is greater.

In this case if the firm has a 5 year payback standard, both projects will be acceptable. However, If projects A and B are mutually exclusive, A will be chosen over B, because of its short payback period.

3.3.2 Net Present Value (NPV) Method

The net present value of an investment project is defined as the present value of the stream of net cash flows from the project minus the project's net investment. The cash flows are discounted using the firm's required rate of return i.e. its cost capital. A firm's cost of capital is defined as its minimum acceptable, rate of return for investment project of average risk.

The *NPV* is expressed mathematically as-

NPV - PVNCF – NINV

Where *NPV* is the net present value, *PVNCF* is the present value of net cash flows, and *NINV* is the investment. Assuming a cost of capital *'k'*, the *NPV* for a project with a 5-year expected life would be determined thus-

$$NPV = \frac{NCF_1}{(1+k)^1} + \frac{NCF_2}{(1+k)^2} + \frac{NCF_3}{(1+k)^3} + \frac{NCF_4}{(1+k)_4} + \frac{NCF}{(1+k)^5} - NINV$$

Where *NCF1 – NCF5* are the net cash flows occurring in years 1-5. In general, the *NPV* of a project is defined as-

$$NPV = \sum_{t=1}^{n} \frac{NCFt}{(1+k)t} - NINV$$

$$= \left(\sum_{t=1}^{n} NCFt \times PV1Fkt \right) - NIVN$$

$$= \sum_{t=1}^{n} t$$

Where *'n'* is the expected project t is the like arithmetic sum of the discounted net cash flows, for each year *'t'*, over the project life *'n'* years.

Illustration B – using 15% cost of capital for n=6 years for projects A and B above.

Project A			**Project B**	
Present values an annuity of	Year	NCF	PVIFA.	PVOF
N12,500 for 6 years at			(14,6)	NCF
14%				
PV = N12,500 (PVIFA)	1	N5,000	0.877	N4,385
= 12,500 (3,889	2	10,000	0.769	7,690
= N48,612.50	3	15,000	0.675	10,125
Less NINV N50,000.00	4	15,000	0.592	8.880
NPV = N1,387.50	5	25,000	0.519	12,975
= N1,387.50	6	30,000	0.456	13,680
				57,680

		Less NINV	50,000
		NPV	N7,735

Decision Rule: In general, a project should be accepted if its present value is greater than or equal to zero. In the above example, project A will be rejected because it has negative *NPV* and project B will be accepted because it has positive the *NPV.*

If two mutually exclusive projects have positive *NPV,* the one with the higher *NPV* would be accepted.

3.3.3 Internal Rate of Return (IRR) Method

The internal rate of return is defined as the discount rate that equates the present value of the net cash flows from a project with the present value of the net investment. It is the discount rate that causes a project's net present value to equal zero.

A project's internal rate of return can be determined by using the following equation-

$$IRR = \sum_{t\ 1}^{n} \frac{NCF}{(1+r)t}$$

where $NCFt/(1+r)^t$ is the present value of net cash flows in period *'t'* discounted at the rate *'r'* .*NINV* is the net investment in the project, and *'r'* is the internal rate of return.

For a project having a 5-year life, this basic formula can be re-written as-

$$\frac{NCF_1}{(1+r)^1} + \frac{NCF_2}{(1+r)^2} \frac{NCF_3}{(1+r)^3} + \frac{NCF_4}{(1+r)^4} + \frac{NCF - NINV}{(1+r)^5}$$

This is essentially the same equation as the one used in the net present value method. The only difference is that in the *NPV* approach, a discount rate *k* is specified and the *NPV* is computed; while in the internal rate of return method, the discount rate *'r'*, which causes the project *NPV* to equal zero, is the unknown to be solved.

Illustration C: The *IRR* for project *A* and *B* can now be calculated. Since project A is an amenity of ^12,500 or 6 years, requiring a net investment of N50,000 its *IRR* may be computed directly with the aid of *PVIFA* table.

In this case, the *PVAN* is N50.000 and the annuity, *R*, is N12,500, for n=6. The equation for the present value of an annuity -*PVAN = R (PVIFAi.n)*- may be re-written to solve for the *PVIFA* as follows:

$$PVIFA = \frac{PVAN}{R} = \frac{50,000}{12,500} = 4,000$$

Referring to the *PVIFA* table, and reading across the table for n=6; we find that the interest factor of 4,000 falls at around 13% where it is 3,998. Thus, the internal rate of return for project A is about 13%.

The *IRR* for project *B* is more difficult to calculate since the project is expected to yield uneven cash flows. In this case, the *IRR* is computed by trial and error following these steps.

Step 1: Make and approximate estimate of the *IRR*
Step 2: Use this rate to compute the projects net present value
Step 3: Try a higher rate if the *NPV* is positive or a lower rate if the *NPV* is negative
Step 4: Repeat the process (attempting to "bracket" the *IRR*) until a rate is found where the *NPV* is equal a zero.

Illustration D: Project B- IRR by Trial and Error

Yea	NCF	PVlFO.15	PV Cash Flow	PVIF0.1	PV Flow	PV1F0.1	PV Cash Flow
(1)	(2)	(3)	(4)=(3x2)	(5)	(6)=5x2)	(7)	(8)=(7x2)
1	N5000	0.869	N4,345	0.840	344,200	0.847	N4,235
		0.756	7,560	0.706	7,060	0.718	7,180
2	10,000	0.657	9,855	0.593	8,895	0.609	9,135
3	15,000	0.572	8,580	0.499	7,485	0.516	7,740
4	15,000	0.497	12,425	0.419	10,475	0.437	10,925
5	25,000	0.432	12,960	0.352	10,560	0.370	11,100
6	30,000						
			55,725		48,675		50,315
		Less NINV	50,000		50,000		50.000
			N5,.725	NPV-	J41,325	NPV	N315

First an V of 15% is tried, resulting in a positive *NPV* of N5.725. Next a higher discount rate, 19% is used and the *NPV* here was negative at N1,325. This indicates that the *IRR* is between 15 and 19%.

Trying 18% results in an *NPV* of N315, this narrows the range between 18% and 19%. A more exact internal rate of return can be found by means of interpolation thus-

$$IRR = r_1 + \left(\frac{NPV_1}{NPV_1 + NPV_2}\right)(R_2 - R_1)$$

Where r_1 is the trial *IRR*, at which *NPV* is negative or least positive.

NPV_1 is positive NPV, NPV_2 is the positive NPV and as the summation of the two NPV, ignoring NPV_1 + NPV_2, ignoring signs and R_2 – $R_1$is the difference between the IRR for positive and negative NPVS or Positive NPV Positive NPV

Sum of NPVS

Sum of NPVS tune difference below positive and negative NPVS.

Substituting with our above example we have:

R = 18+0.19 (1%) 18%

= 18... æ N315 ö (19-18%

19% ç ÷

ç ÷÷

(315 + 1,325÷ø

Decision Rule: The *IRR* approach indicates that a project whose internal rate of return is greater than or equal to the firm's cost of capital should be accepted and vice versa. Thus, for project A & B, if the firm's cost of capital is 14%, B will be accepted, and A will be rejected. When two mutually exclusive projects are being considered, the project with the higher *IRR* is preferred, provided it is greater than, or equal to the firm's cost of capital.

3.3.4 Profitability Index (P)

The profitability index (also called benefit-cost ratio) is the ratio of the present value of future net cash flows over the project life, to the net investment. This is expressed thus-

$$P_1 = \frac{\sum_{t=1}^{n} NCFt\ 1(+k)^{1}}{NINV}$$

Assuming a 14% cost of capital *'k'*, using the data for projects A and B, *PT* can be expressed as follows:

$$P1_A = \frac{N48,612.50}{50,000} = 0.97$$

$$P1_B = \frac{N57,735}{50,000} = 1.15$$

Decision Rule: A project with *P1* greater than or equal to '1' is considered acceptable. Hence, B is preferred over project A. Generally, for independent projects, the *PI*, *NPV* and *IRR* method yield identical, 'accept/reject' signals. But for mutually exclusive projects, conflicts may arise. When conflicts occur, financial decisions- with capital rationing, should be based on the *PNV* approach.

SELF-ASSESSMENT EXERCISE 2

An outlay of 50,000 is expected to yield the following cash flows:

Year	Net Cash Flow
1	5,000
2	10,000
3	20,000
4	15,000
5	5,000
6	5,000

The depreciation tax benefits and salvage value are already included in the cash flows, and the cost of capital is 14 percent.

- What is the payback period?
- What is the project's NPN?
- Should the project be adopted?

4.0 CONCLUSION

In this unit, we have discussed the concept of capital expenditure and the techniques of capital budgeting. There are four basic steps in the investment appraisal process, namely- the generation of proposals, the estimation of cash flows, the evaluation and selection of alternatives and the project post-audit and review. These are all parts of the capital-budgeting decision making process.

5.0 SUMMARY

In this unit, we have considered the following that:

- capital expenditure has been established as one of the key issues a firm's management will have to address .

- capital expenditure is a cash outlay in an investment project, that is expected to generate future cash flows which can last longer than one year.
- a key term in capital budgeting is cost of capital budgeting, which is primarily concerned with the incremental, after-tax net cash flows of a particular project.

The four basic techniques of capital budgeting are:

- the Payback Period (PB)
- the Net Present Value (NPV)
- the Internal Rate of Return (IRR) and
- the Profitability Index (PI)

Each of these techniques has some merits and demerits

ANSWER TO SELF-ASSESSMENT EXERCISE 1

The different classes of investment projects are-

- Independent projects
- Mutually exclusive projects
- Contingent projects.

ANSWER TO SELF-ASSESSMENT EXERCISE 2

These will be fully discussed and illustrated with appropriate examples-

(Solution)

a. Payback = 4.0 years (cumulative cash inflow = 50,000 after 4 years).

Year	NCF_t	PVIF @ 14%	PV Cash Flows
1	5.000	.877	4,385
2	10,000	.769	7,690
3	20,000	.675	13,500
4	15,000	.592	8,880
5	5,000	.519	2,595
6	5,000	.456	2,280
			39,330
		Less:	Net (50,000)
			NPV -$-10.670

c. The project should be rejected because of its negative NPV.

6.0 TUTOR- MARKED ASSIGNMENT

Discuss the three project classifications fully.

7.0 REFERENCES/FURTHER READING

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UNIT 3 DIVIDEND POLICY THEORY

CONTENTS

1.0 INTRODUCTION

The value of a firm is influenced by three types of financial decisions:

- Investment decisions
- Financing decision
- Dividend decision

While each is presented as a separate topic in most financial text-books, it is important to realise that the three are interdependent in terms of future earnings and future potential dividends. Capital structures influence the cost of capital, which in turn determines, partly, the number of acceptable investment opportunities. Also, dividend policy influences the amount of equity capital in a firm's capital structure (via retained earnings accounts), and by extension, it influences the cost of capital.

In this unit, focus is on the factors that influence a firm's dividend policy, and the strategies adopted by firms in the execution of their dividend policy.

2.0 OBJECTIVES

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

- state the relevance of dividend decisions in financial management
- discuss, extensively, the determinants of dividend policy
- describe the strategies for dividend decision
- explain the forms of dividend policy.

3.0 MAIN CONTENT

3.1 Determinants of Dividend Policy

Dividend policy determines how the earnings of firms are distributed. Earnings are either retained/reinvested in the firm, or they are paid out to shareholders. Retained earnings can be used to stimulate growth in future earnings, and as a result, can influence future share values. On the other hand, dividends provide stockholders with tangible current returns. Many factors are considered in determining the dividend policy of a firm, these are discussed below.

(a) Legal Constraints

Some legal provisions in Federal or State laws regulate the dividend payments that a firm can make. Such laws, basically, state that:

- a firm's capital cannot be used to make dividend payments.
- dividends must be paid out of a firm's present and past net earnings.
- dividends cannot be paid when the firm is insolvent.

a. The first restriction is termed capital impairment restriction. In some countries/states, capital is seen as including only the per value of common stock. While elsewhere, capital is, broadly, defined to also include the contributed capital in excess of per account (sometimes called capital surplus). For example, The Universal Tool Company has the following capital account on its balance sheet:

Common Stock (N5 per; 100,000 shares)	N500,000
Contributed Capital in excess of per	400,000
Retained earnings	200,000
Total Common Stockholders' equity	N1,100.00

If the company is operating in a country where capital is defined as only per value of common stock, then it can pay out a total of N600,000 (1,100,000 - 500,000) in dividends. If however, the company is operating in a country/state where dividends are restricted to retained earnings alone, then Universal Tool can only pay out N200, 000 as dividends. However, regardless of dividend laws, it should be realised that dividends are payable from a firm's cash account, with an offsetting entry to the retained earnings account.

b. The second restriction, called the net earnings restriction, requires that a firm should generate earnings, BEFORE it is permitted to pay any cash dividends. This prevents the equity owners from withdrawing their initial investment in the firm, which can impair the security position of any of the firm's creditors.

c. The third restriction, termed insolvency restriction, states that an insolvent company may not pay cash dividends. When a company is insolvent, its liabilities exceed its assets. Payment of dividends will interfere with the creditor's prior claims on the firm's assets, hence the prohibition. These three restrictions affect different types of firms in different ways. New firms or small firms with a minimum of retained earnings are more likely to feel the weight of these legal constraints when determining their dividend policies. On the other hand, well-established companies with histories of profitable operations and large retained earnings are less likely to be influenced by them.

(b) Tax Constraints

In some cases, tax code (laws) prohibits companies from retaining an excessive amount of profits for the purpose of protecting stockholders from paying taxes on dividends received. This is because dividend payments are considered taxable income. If a firm decides to retain its earnings in anticipation of growth and future capital appreciation for its investors, the investors are not taxed until their shares are sold. In addition, taxes levied on long term capital gains are generally lower than the taxes on equivalent amount of dividend income.

(c) Restrictive Covenants

Restrictive covenants, generally, have more impact on dividend policy than do legalised tax constraints. These covenants are contained in bonds, dentures, loans, short term borrowing agreements, lease contracts or preferred stock agreements.

Such restrictions, basically limit the total amount of dividends a firm can pay. Sometimes, they may state that dividends cannot be paid, at all, untill a firm's earnings have reached a specified level. In addition, sinking fund requirements, which state that a certain portion of a firm's cash flow must be set aside for the retirement of debt, sometimes limit dividend payments. Dividends may be prohibited if a firm's net working capital or its current ratio does not exceed a certain predetermined level.

(d) Liquidity Considerations

Dividend payments are cash out flows, therefore, the more liquid a firm is, the more able it is to pay dividends. Liquidity is likely to be a problem during a business downturn, when both profits and cash flows often decline. Rapidly growing firms with many profitable investment opportunities often find it difficult to maintain adequate liquidity and pay dividends at the same time. Liquidity is desirable for a number of reasons. Specifically, it affords protection in the event of a financial crisis. It also provides the flexibility needed to take advantage of unusual financial and investment opportunities.

(e) Borrowing Capacity and Access to the Capital Markets

The more access a firm has to external sources of fund, the better able it will be for it to make dividend payments. A small firm, whose stock is closely held and infrequent, often finds it difficult (or undesirable) to sell new equity shares in the capital market. As a result, retained earnings are the only sources of new equity. When a firm of this type is faced with desirable investment opportunities, the payment of dividends is often inconsistent with the objective of maximising the value of the firm.

(f) Stability of Earnings

Most large, widely held firms are reluctant to lower their dividend payments even in times of financial stress. Thus, a firm with a history of stable earnings is usually more willing to pay a higher dividend than a firm with erratic earnings. A firm whose cash flows have been more or less constant over the years can be fairly confident about its future; this confidence is reflected, frequently, in regular and/or higher dividend payments.

(g) Growth Prospects

A rapidly growing firm usually has a substantial need for funds to finance its abundant investment opportunities. Therefore, instead of paying large dividends and having to either sell new equity or borrow to meet capital requirement, such a firm usually retains large proportion of its earnings, avoiding the cost and inconvenience of public stock offerings.

(h) Inflation

Inflation can force a firm to retain more earnings, rather than paying dividends, in an attempt to maintain its, relative, pre-inflation operating

level. This is because, under an inflationary condition, funds generated by depreciation are often insufficient to replace a firm's assets as they become obsolete. Also, inflation has an impact on a firm's working capital needs. It causes the actual monetary investment in inventories and accounts receivable to rise in order to support the same physical volume of business.

(i) Shareholder Preference

In a closely held company with, relatively, few stockholders, management may be able to set dividends according to the preferences of its stockholders. For example, such investors in high, marginal tax brackets may favour a policy of retention of high earnings, rather than a high pay out dividend policy, resulting in eventual capital gains. It is nearly impossible for a financial manager to take individual shareholder's preferences into account when setting dividend policy. In such cases, management should consider investment opportunities, cash flow needs, access to the financial market etc, when setting dividend policy.

It has been argued that firms tend to develop their own "clientele" of investors (this is known in finance as the "clientele effect"). Some companies, such as public utilities, have traditionally attracted investors who desire a high dividend yield, while growth firms, like Microsoft, have tended to attract investors who prefer retention and possible capital gains.

(j) Protection against Dilution

If a firm adopts a policy of paying out a large percentage of its annual earnings as dividends, it may need to sell new shares of stock from time to time, in order to raise equity capital needed to invest in potentially profitable project. If existing stock holders are not able to acquire a proportionate share of the new issues, their controlling interest in the firm is diluted. Some firms choose to retain more of their earnings and pay out lower dividends, rather than risk dilution.

An alternative to retention of earnings is the raising of external capital by way of debt. However, this will increase the financial risk of the firm, ultimately, raising the firm's cost of capital and lowering the price of its shares.

SELF-ASSESSMENT EXERCISE 1

1. List and discuss five determinants of dividend policy.
2. ITU Machine Tool Company has the following equity account on its balance sheet-

Ordinary shares (N5 par, 1 million shares)	N5,000,000	
Share Premium	7,000,000	
Retained Earnings		
15.000.000		
Total Shareholders' Funds		27.000.000

If capital impairment laws of the country define capital as-

(a) par value of Ordinary shares or
(b) par value of ordinary shares and share premium

What is the maximum dividend the company can pay?

3.2 Dividend Strategies

Experience has shown that there are a number of practical considerations which a firm's board of directors takes into account in determining an "optimal" dividend policy. The following alternative dividend strategies have been identified:

- **Passive Residual** Policy- the passive residual policy suggests that a firm should retain its earnings as long as it has investment opportunities that promise higher rates of return than the required rate. For example, assume that a firm's shareholders can invest their dividends in stocks of similar risk with an expected rate of return (dividends plus capital gains) of 12%, this 12% figure then constitutes the required rate of return on the firm's retained earnings. That is the rate of return that must be earned on the equity financed portion of new investments.

In order to earn this return on equity, new investments must earn an overall rate of return, equal to the weighted cost of capital - reflecting the fact that all investments are made with a mix of debt and equity funds in the proportions of the target capitals structures. As long as the firm can invest these earnings to earn more than this required rate, it should not pay dividends according to the passive residual policy. Since such payments will require either that the firm foregoes some acceptable investment opportunities or raise necessary equity capital in the more expensive external capital market. Interpreted literally, the residual policy implies that dividend payments will vary from year to year, depending on available investment opportunities. It suggests that if a

firm has many good investment opportunities, available to it, in a particular year, then it can borrow the funds it needs, temporarily raise its debt-to-equity ratio and avoid a dividend cut.

However, where a firm has many good investment opportunities for a number of years, it may eventually be forced to cut its dividend and/or sell new equity shares in order to meet financing needs and maintain an optimal capital structure. The residual theory also suggests that "growth" firms will normally have lower dividend payout ratios than firms in mature non-growth industries. For example, organisations providing utility services, such as NEPA, NITEL, NRC should have rather high dividend payout ratios. In contrast, growth firms like Computer and Information Technology firms like ZINNOX Computer tend to have rather low payout ratios.

- **Stable Naira Dividend Policy-** there is widespread statistical evidence to suggest that most firms and shareholders prefer reasonably stable dividend policies. This stability is characterised by a rather strong reluctance to reduce the naira amount of dividends from one period to the next. Alternatively, increases in the dividend rate are normally not made until the firm's management is satisfied that future earnings will be high enough to justify the larger dividend. Thus, while dividend rates tend to follow increases in earnings, they also tend to lag behind, to a certain degree.

There are many reasons why investors prefer stable dividends. For instance, investors feel that dividend changes possess informational content - they equate changes in a firm's dividend levels with profitability. A cut in dividends may be interpreted to indicate that the firm's long-run profit potential has declined. Similarly, a dividend increase is seen as a verification of the expectation that future profits will increase.

In addition, many shareholders need and depend on a constant stream of dividends for their cash income requirements. And some managers feel that a stable and growing dividend policy tends to reduce investor uncertainty concerning future dividend streams. They therefore believe that investors will pay a higher price for the share of a firm that pays stable dividends, thereby reducing the firm's cost of equity.

- Other Dividend Payment Policies- some firm's have adopted a constant payout ratio dividend policy. A firm which uses this approach pays out a certain percentage of each year’s earnings - 40% (for instance), as dividends. If the firm’s earnings vary, substantially, from year to year, dividends also fluctuate in

proportion. Other firms may choose to pay a small, regular, quarterly dividend plus year-end extras. This policy is especially ideal for firms with volatile earnings and/or volatile year-to year cash needs.

Forms of Dividend Payments

In most companies, the board of directors holds quarterly or semi-annual meetings to evaluate the firm's past performance and decide the level of dividends to be paid during the next period. The proposed dividend is then tabled for approval at the annual general meeting (AGM) of the company.

Most firms follow a dividend declaration and payment procedure which usually revolves around - a declaration date, an ex-dividend date, a record date, and a payment date.

Table 3.1: Key Dates in Oluwa Gold Company's Payment Procedure

April 15	**May 12**	**May 16**	**May 29**
Declaration Date	Ex-Dividend Date	Record Date	Payment Date

Table 3.1 above illustrates the Oluwa Gold Company's dividend payment procedure. The firm's Board of directors meets on the declaration date - April 15, to consider annual dividends. They declare a dividend on that date, which will be payable to shareholders on the record date - May 16. On that date, the firm makes a list of eligible shareholders from its stock transfer books, through the Company Registrar.

Major Stock Exchanges require four- business (working) days, prior to the record date, for recording ownership changes. The day which begins this 4-days' period is called the ex-dividend date - in this example, May 12, - assuming May 16 falls on a Friday. Investors, who purchase Oluwa Gold shares, prior to May 12, are eligible for the dividend payment; investors who purchase on or after May 12 are not eligible to receive the dividend. The physical payment is usually two to four weeks after the record data, in this example, May 29. On this date, Oluwa Gold, will mail dividend warrants to eligible shareholders.

Stock Dividends: A stock dividend is the payment of additional shares of stock to common stock holders (i.e. bonus shares). It involves making a transfer from the retained earnings account to other stockholders account.

Illustration A: We can illustrate the concept of stock dividends with the following example. It is assumed that Abico Nigeria Limited has the following capital account before issuing a stock dividend – as shown in table 3.2 below.

Table 3.2: Abico Nigeria Limited Pre-stock Dividend Shareholders' Equity

Common stock (N5 par - 100,000 shares)	N500,000
Contributed capital in excess of par (share surplus)	1,000,000
Retained Earnings	
5,000,000	
Total Shareholders' Equity Capital	
6,500,000	

Assuming Abico declares a 10% stock dividend or bonus issue, so that existing shareholders receive 10,000 (10% of 100,000) new shares. If we assume a market price of N20 per share, a total of N200,000 (10,000 x N20) will be transferred from the firm's retained earnings account to the other stockholders equity account. Out of this N200,000, N50,000- N5 par x 10,000) will be added to the common stock account, while the remaining N150,000 is added to the contributed capital or share premium (surplus), in excess of par account to yield the following post-stock dividend position.

Table 3.3: Abico Nigeria Limited: Post-Stock Dividend, Shareholders' Equity

Common stock (N45 par, 110,000 shares)	N550,000
Contributed capital in excess of par (premium)	N1,150,000
Retained earnings	4,800,000
Total shareholders' equity	6,500,00

The net effect of this transaction is to increase the number of outstanding shares and to re-distribute funds among the firm's capital accounts. The firm's total stock holders' equity remains unchanged.

Since each shareholder's proportionate claim on a firm's net worth and earnings remains unchanged, in a stock dividend, the market price of each share of stock declines in proportion to the number of new shares created by the (bonus) stock dividend. In our example above, a N20 pre-stock dividend price will result in a post-stock dividend decline to N18.18

$$\text{Post-stock dividend price} = \frac{\text{Original price}}{1 + \text{percent stock}} = \frac{\text{N20}}{1.10}$$

$$\text{Dividend price} = \text{N18.18}$$

We can see that this keeps the shareholders' wealth pre-post stock-dividend unchanged thus-

N200,000 (10,000 xN20 per share) = N200,000 (110,000 x N18.18)

The reasons why firms issue stock dividends are that:

(a) stock dividends help to broaden the ownership of a firm's shares, since existing shareholders often sell their bonus issues.
(b) a stock dividend results in an effective increase of cash dividend.
(c) the declaration of stock dividends, effectively lowers the per share price of a stock thereby making the stock broadly appealing to investors, who prefer round lots of moderately priced stocks.

Share Repurchases as Dividend Decision- according to the residual theory of dividend policy, a firm which has more funds than it needs for investment should pay a cash dividend to its shareholders. However, some firms prefer to repurchase outstanding shares, rather than pay cash dividends.

Companies undertake share repurchase activities in a number of ways. For example, a company may buy directly from its shareholders, in what is termed a tender offer, or it may purchase the stock in the open market, or it may privately negotiate purchases from large holders such as institutional investors. Repurchased shares are known as treasury stock. Treasury stock is often used to facilitate mergers and acquisitions, to satisfy the conversion provisions of some preferred stock and debentures. It is also used for the exercise of warrants, employee stock purchase plans and executive stock options.

From the shareholders' perspective, share repurchases increase earnings per share for the remaining outstanding shares and also increases stock prices, assuming that investors continue to apply the same price to earnings (P/E) multiple to earnings per share before and after repurchase. For example, if a stock sells for N40 per share and earns N8 per share, its P/E multiple is 5 times (N40/8). The P/E multiple indicates the value placed by investors on a naira of a firm's earnings. It is influenced by a number of factors, including earnings prospects and investors' perceptions regarding risk of the firm.

For example, JKN Company has earnings of N5 million and 1 million shares currently outstanding. The company plans to distribute N2 million, in either the form of cash dividends or share repurchases. The market price of the stock is N30 per share (after accounting for the impact of the expected N2 per share dividend distribution).

Assuming that the firm decides to repurchase some of its shares by making a tender offer to acquire 62,500 shares at N32 per share (N32 x 62,500 = N2 million). How will this affect the remaining shareholders?
If the P/E multiple remains the same, before and after the repurchase (P/E) = N30/N5 (or 6 times), the value of the shares before and after repurchase will be as follows:

	before Repurchase	after Repurchase
Net Earning	N5, 000,000	N5,000,000
Shares outstanding	1,000,000	937,500
Earnings per share	N5.00	N5.33
Price Earning (P/E) ratio	6x	6x
Market price (Ex-dividend)	N30	N32
Expected Dividend	N2	
	N0	

If the firm had chosen to declare a cash dividend instead, shareholders, wealth would have been N32, per share (N30 ex-dividend + N2 dividend). The repurchase of N2 million worth of shares still results in shareholder wealth of N32, but N2 of this total represent capital gains which are taxed at a lower rate. Thus, shareholders who prefer current income will favour cash dividends, while those who prefer capital gains will favour share repurchase.

SELF-ASSESSMENT EXERCISE 2

A Timber Processing Company has the following equity accounts on its balance sheet-

Ordinary share (B2 par, 100,000 shares)	N200,000
Share Premium	N100,000
Retained Earnings	N700,000

The current price of the share is N10 per share. If the Timber Company declares a 5% stock dividend, what is the effect on the firm’s capital account?

4.0 CONCLUSION

The subject-matter of this unit is dividend policy. There are a number of factors that influence a firm's choice of dividend policy. Ideally, a firm chooses a dividend policy that is most likely to maximise Shareholder's wealth. Such a dividend policy affects low investors perceived - and value - a firm. Dividend policy decision is also influenced by some legal and internal constraints.

5.0 SUMMARY

- Dividend policy is concerned with determining how a firm's income is distributed, either retained in the firm or paid out to shareholders. Ideally, a firm should choose a dividend policy that will most likely lead to the maximisation of shareholders' wealth.
- Dividend decisions are affected by legal concerns, taxation, bond- debenture provisions, liquidity, and prospect of earnings, economic factors and shareholder preferences. These are called the determinants of dividend policy.
- A variety of dividend strategies are used by firms as the basis for their dividend policy. The choice of policy, largely, depends on practical considerations; but evidence shows that most firms and shareholders exhibit preference for stability in dividend policies.
- The dividend process follows a pattern of declaration, and payment procedures provide adequate time sequence for the exchange, to record changes in ownership.
- Dividend payments are made either in cash or in lieu of cash. Sometimes, instead of cash, firms declare stock dividends (bonus issues) which result in payment of additional shares to the shareholders.
- Stock dividends result in adjustments in the composition of the firm's net worth, but since each shareholder's proportionate claim on the firm net worth and earnings do not change, the market price, per share, declines in proportion to the number of new shares issued.

ANSWER TO SELF-ASSESSMENT EXERCISE 1

a. If Capital is defined as the par value of ordinary share then dividends can be paid out of retained earnings and share premium. That is N7,000,000 + N15,000,000 = N22,000,000.00

b. If Capital is defined as the par value of ordinary shares and share premium, then only N15,000,000 can be paid as dividends.

ANSWER TO SELF-ASSESSMENT EXERCISE 2

A 5% stock dividend involves creation of an additional 5000 shares. The market value of these to the ordinary shares account and the share premium account. Market value of the dividend is 5,000 shares x N10.00 = N50,000, N2 per share, the par value is transferred to the ordinary shares account and the remaining N40,000 to the share premium account. The resulting capital accounts appear as follows:

Ordinary Shares (N2 par, 105,000 shares)	N210,000	
Share premium	140,000	
Retained Earnings		650,000

6.0 TUTOR- MARKED ASSIGNMENT

Idah Cement Company has the following equity accounts in its balance sheet.

	N
Ordinary shares (N4.0 per 1000, shares	4000,000
Share premium	2000,000
Retained Earnings	6,000,000
Net worth	120,000,000

The current market price per share is N20. If Idah declares a 10% Stock dividend, what will be the effect on the firm's capital account?

7.0 REFERENCES/FURTHER READING

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MODULE 3 FINANCING DECISIONS

UNIT 1 SOURCES OF CAPITAL: SHORT-TERM AND INTERMEDIATE

CONTENTS

1.0 INTRODUCTION

The second major finance function is Financing Decision. Having identified, evaluated and selected an appropriate investment project to undertake, the financial manager has a responsibility to identify a least-cost method of financing the investment project in order to attain the corporate objective. In this unit, and subsequent four units, we shall be discussing the various aspects of the financing decision. The first issue in financing decision is the identification of the various sources of capital supply to the firm.

Also, we shall examine the alternative source of capital funds available to the financial manager- the potential supply of capital funds.

2.0 OBJECTIVES

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

- explain the different sources of capital and their impact on the firm
- distinguish between- maturity, control and monetary costs of various capital sources.
- identify the various factors affecting the supply of capital, which are within or outside the control of the financial manager.
- discuss, effectively, the short term sources of capital
- discuss, effectively, intermediate sources of capital.

3.0 MAIN CONTENT

3.1 Characteristics of Capital Supply Sources

There are different sources of capital for business firms. Any given source can be characterised along different dimensions. We can classify these dimensions into three categories.

(a) Sources which differ in terms of maturity

Some have an in finance life (such as common stock and retained earnings), while others have a rather short life (such as accounts payable). Short term sources may have to be replaced frequently; long terms sources are typically difficult to alter because of their duration. Sources with too short duration are, unduly, expensive because they must be refinanced frequently. This is usually in the form of replacement costs, or sometimes, cost of unfavourable refinancing. If the maturity is long, the degree of flexibility in adjusting the sources of financing is less, and considerable cost may be associated therewith.

Consequently, we can say the cost of renewal decreases as the maturity of the capital supply is increased, and the cost of inflexibility increases as the maturity is lengthened. Total maturity cost is the sum of renewal and flexibility costs.

(b) Sources will differ as to the control they exert over the firm

The sale of an issue of common stock may carry the threat of complete or partial loss of control of the firm when enough of the firm's stock can be bought by a collective interest group. The sale of preferred stock may involve the possibility of losing control which, usually, is contingent on the future ability of the firm to meet preferred dividend requirements. The sale of a bond issue may involve immediate loss of some control as a result of indenture provisions, restricting the range of a firm's behaviour with respect to, for instance, dividend policies, and working capital. It also involves the threat of losing some degree of control, if not all, should the firm be unable to meet interest and principal payment requirement.

(c) Sources will also differ as to monetary cost to the firm

Whereas the costs arising from maturity and control are essentially implicit costs, this is an explicit cost of capital. Customarily, it is expressed as a percentage. This cost depends on the risk of the investment as assessed by investors in the markets. In an efficient market, the coordinates of the point reflecting risk and return of investment in the firm will lie on the *CML*. The return is interpreted in two ways- first, it is a return to investors, and on the other hand, it is also a cost to the firm - the explicit cost of capital.

3.2 Factors Affecting the Supply of Capital

In this section, we shall discuss those variables that are thought to be associated with changes in the supply of capital to the firm. We shall classify them into two broad categories, namely- those variables over which the firm has some control and those variables over which the firm has no significant control.

Variables that affect capital supply are the same variables that affect the cost of capital. Variables that affect capital supply, in other words, affect the amount of capital available at a given cost. The other side of the coin is that, variables that affect capital supply affect the cost of capital for a given amount of capital. Capital costs and capital supply are simply opposite sides of the same coin.

3.2.1 Variables Subject to the Influence of the Financial Manager

Sources of supply making up part of the supply function are the flow of revenue, covering depreciation charges and the earnings retained in the business. It is fairly obvious that the firm can influence both to some degree. The firm's choice of paying cash dividends or not, directly, affects the earnings retained. However, the decision to reduce dividends, naturally, may affect the price of common stock. The ability to choose a depreciation policy for tax purposes will also affect the supply function.

The firm can also indirectly enhance the available supply of investible funds by reducing existing, non-cash assets. In other words, temporary asset reduction may also be used as a source of capital. A financial manager can, for instance, delay additional purchases of inventory; if sales out of inventory continue, cash will flow in without corresponding outflow. The same results can be accomplished by a direct sale of inventory.

The capital market's view of the risk of the firm can be altered by the firm so that the firm is not penalised for an uninformed view of risk inherent in it. The capital market's view of risk may be measured by a number of factors which suppliers, traditionally, use to gauge the risk level of the firm. These factors include, among others, a host of ratios, such as - current ratio, times interest earned, inventory - turnover, receivable turnover, quick-asset, debt-to-net worth, as well as industry descriptions and evaluations, credit rating, the age of the firm and previous credit experience.

Another factor that seems to have significant bearing on the capital market's appraisal of the firm's risk is the historical dividend record of the firm. It is important to note that past dividend patterns influence future uncertainty. Stable dividends tend to reduce the uncertainty surrounding the cash benefit to be received by capital suppliers, and hence, they should be willing to pay more for the shares of companies that pursue this policy.

Financial risk may also affect the cost of a particular source of capital. For example, heavy fixed charges on bonds and/or preferred stock tend to increase the variability in returns to common stockholders.

Efficient investment selection process influences the level of return on a firm's total investment, and likewise its variability and trend of earnings. Thus, realised and expected high rates of growth in earnings and dividends resulting from efficient selection of investment projects may also have marked effects on the overall supply of capital.

The nature of a business organisation also affects capital supply. If a firm is a limited liability company for example, the permanence, the limited liability and transferability of securities are critical to the nature of the supply function.

Marketability is another factor which may affect both the amount of capital supplied and the cost of capital. Marketability is defined as the ability to sell securities or buy assets, quickly, without an appreciable concession over current market price. Marketability is influenced by the efficiency of the market for a firm's securities, as well as the absolute price level of the securities.

Eligibility for institutional investment is another major factor; and this refers to the eligibility of securities for investment by regulated financial institutions (e.g. insurance companies and pension funds). Eligibility applies to common stocks as well as to bonds.

3.2.2 Variables Not Subject to the Influence of the Financial Manager

Many other variable external to the firm, affect the supply function. The variables affecting interest rate in the economy are variables affecting the supply of capital to the firm. On the supply side, factors that affect interest rates are the savings of business, government, individuals, and the activities of the banking system. The demand side of the interest equation is affected by consumers, governments, and businesses. Variations in the demand and supply of capital in various segments of capital tend to alter costs of capital in these different segments, often at different times. Thus, variables not subject to the direct influence of the financial manager are, typically, exogenous economic and non-economic ones. They are changing interest rates, political considerations and acts of God.

3.3 Short Term Sources of Capital

The most important sources of capital available for short periods are loans from commercial banks, inter-business open accounts, sales of commercial paper in the open market, and "loans" from finance companies, as well as, local purchase orders (LPOs). These loans are frequently self liquidating, in that the source of payment of the loan is the collection on sales, financed by the loan. A listing of most short-term capital sources is provided below.

Short Term Sources

Inter-business credit (trade credit)

(a) Open Account
(b) Notes and trade acceptances.

Commercial Banks

a) Unsecured promissory notes
b) Loans secured by endorsement (cosigner)
c) Loans secured by receivable or installment paper.
d) Loans secured by inventory
e) Loans secured by collateral such as cash value of life insurance, stocks and bonds
f) Bankers' acceptances.
g) Discounted notes and trade acceptances of client's customers.

Commercial paper

Finance companies and factors

a) Loans secured by receivables or instalment paper.
b) Loans secured by inventory
c) Sale of receivables

Temporary asset liquidations

Advances from customers
Small loan companies, industrial banks, credit unions and pawn shops.
Loans from friends, relatives, stockholders, officers and directors.

Short term sources, by our definition, provide capital for periods up to one year.

SELF-ASSESSMENT EXERCISE 1

Distinguish between renewal and inflexibility cost of debt. How do they affect the total cost of credit?

3.4 Trade Credit as a Source of Capital

Trade credit is a form of short term financing common to almost all businesses. The essence of trade credit lies in deferred payment. Credit allows the financial manager to secure the benefits of goods and services immediately, while payment is deferred until a more convenient time - a

time, for example, when sufficient cash is available to take care of the obligation.

Since suppliers, generally, are more liberal in the extension of credit than financial institutions, trade credit is an important source of funds for small companies in particular.

The credit terms given by sellers are an important factor in the supply of this type of capital. Variations in the terms affect the supply function of the potential debtor.

i. Net Period, No Cash Discount:-

3.5 Short term Commercial Bank Loans

Commercial banks are in business to make profit from giving loans. Most banks compete, aggressively, for opportunities to grant loans, as well as for getting deposits. Most bank loans are represented by promissory notes. The notes, usually, have different duration of maturity; although, typically, they mature in one month, three or six months. Payment is expected at the end of the term and continued renewal is frowned at.

Bank loans and trade credit, automatically, expand according to the seasonal needs of a firm's customer, particularly, during periods of expansion and prosperity (boom). Loans tend to decline during off-season periods and period of recession. We also have **secured and unsecured loans.**

Many loans are secured only by the general credit of the firm. Other loans of higher risk are secured by the assets of the firm or by the firm's principals. Usually, majority of bank loans are secured in some form; some common types of bank loans are discussed below.

Types of Bank Loans

Firms with seasonal needs find it, particularly, desirable to obtain borrowing authority prior to actual need. This authority or line of credit provides the financial manager with the flexibility to increase or decrease bank debt whenever necessary. The credit line establishes the limit above which total bank debt is not to be extended; it gives the financial manager a source to rely upon in advance of need.

An individual or single loan (secured or unsecured), is treated as an individual transaction. Some banks do not grant line of credit, hence, they deal with customers on an individual basis.

A banker's acceptance is a bill of exchange drawn on a bank and accepted by it; it is an unconditional written order drawn by one bank on another bank and guarantees payment of the "bill", at maturity, for a fee. It enables the bank's customer to secure capital at a lesser cost than would otherwise have been possible.

An installment loan (secured or unsecured) involves the signature of a promissory note by the borrower; but, generally, it is classed as an intermediate loan because it usually takes more than one year to mature.

Other forms of credit may involve, discounting notes receivable, and the discounting of trade acceptances.

A secured loan may involve many forms of security like-personal guarantee, assignment of receivable, inventory, or other collateral such as stocks, bonds, cash value of life insurance etc. Obviously, the more favourable loan is one in which the securities are highly marketable.

3.6 Intermediate-Term Sources of Capital

The major intermediate term sources of capital include term loans, industrial equipment financing, bonds, and lease financing. These are further listed below.

1. Term Loans

a. Commercial banks
b. Life insurance companies
c. Government source

2. Industrial and commercial equipment financing
3. Other bank loans.
4. Bonds

a. Secured bonds
   Mortgage bonds
   Collateral bonds
   Equipment certificates

b. Unsecured bonds
   Debenture bonds
   Subordinated bonds

c. Bond retirement
   Convertible bonds
   Sinking funds
   Serial bonds.

5. Lease Financing
   a. Equipment leasing
   b. Sale-and-lease back financing.

In the case of intermediate term financing, usually, repayment is made on an installment basis, rather than paying a lump sum at maturity. Even bonds, frequently, require sinking funds as payment on the principal or gradual reduction in principal amount of the debt outstanding, through other methods. Due to the length of time needed for the supply of capital, risk is more closely related to factors such as profitability and size of cash flow, rather than to the current liquidity of the firm which is more important in short term loans.

3.6.1 Term Loans

Term loans, generally, involve maturities of one to ten years. More often, the loan requires monthly, quarterly, semi-annual, or annual payments that amortise the total principal over the life of the loan. On some occasions there may be a "balloon" payment at maturity, that is, if the installmental payments during the life of the loan are not enough to pay off the principal, completely, by the maturity date. In this case, the remainder, which is greater than any single installment, is payable at maturity. This is the final "balloon" payment. The repayment schedule can be tailored so that the loan is repaid out of the cash flow generated by the investment. More often than not, the term loan is secured. The security may be in the form of chattel mortgage on plant, equipment or other assets purchased with the loan. Customarily, the contract agreement on the loan protects the lender. This is designed to prevent deterioration of liquidity and net worth, and to direct the earnings of the company toward the liquidation of the loan.

Commercial banks that grant term loans prefer shorter duration for maturities than life insurance companies. Also, large unsecured loans for working capital purposes are commonly granted by insurance companies, rather than by bankers. On installment loans, the effective annual interest charged is higher than the rate for short term bank loans. Term loans often account for a large percentage of total business loans.

The monetary cost of loan must take into consideration the installmental payment, frequency of payment and the possibility, or otherwise, of a "balloon" payment. Other factors that affect the effective cost are provisions for, compensating balances, commitment fees, legal and other expenses in the loan contract.

The advantage of term loan is that the borrower can negotiate, directly, with the lender, and either construct or revise the agreement, thereby maintaining a relationship based on confidence.

3.6.2 Secured Credit

Many firms cannot obtain credit on an unsecured basis, either because of inexperience or because their ability to service debt is not regarded as adequate by lenders. In order to grant a loan, lenders thus require security so as to reduce their risk of loss. With security, lenders have two sources of loan repayment: the cash flow ability of the firm or failing which, the collateral value of the security must be forfeited.

3.6.3 Collateral Value

The excess of the market value of the security pledged, over the amount of the loan determines the lenders margin of safety. If the borrower is unable to meet his obligation, the lender can sell the security to satisfy the claim. If the security is sold for an amount in excess of the loan plus interest, the difference is remitted to the borrower. However, where the security is sold for less, the lender becomes an unsecured creditor for the amount of the shortfall. Consequently, because lenders do not want to become unsecured creditors, they usually seek security with a market value in excess of the principal, plus interest, in order to minimise the likelihood of not being able to sell the security in satisfaction of the loan. The degree of security protection a lender seeks varies with the credit worthiness of the borrower, the security available and the financial institution making the loan.

3.6.4 Security Devices

Whenever a lender requires collateral of a borrower, he obtains a security interest in the collateral. The collateral may be accounts receivable, inventory, equipment or other assets of the borrower. The security interest in the collateral is created by security agreement, also known as a security device. This agreement is signed by the borrower and lender and contains a description of the collateral. In order to "perfect" a security interest in collateral, the lender must file a copy of the security agreement or a financing statement with a public office of the state in which the collateral is located. The filling gives public notice to other parties that the lender has a security interest in the collateral described. Before accepting collateral as security for a loan, a lender will conduct a public search, to ascertain if the collateral has been pledged previously in respect of another loan. Only the lender with a valid security interest in the collateral has a prior claim on the assets and can sell the collateral in settlement of his loan.

3.6.5 Receivable Loans

Assignment of Account Receivables- account receivables represent one of the most liquid assets of the firm, and consequently, they make desirable security for a loan, from the stand point of the leader. The major difficulties with these types of security are the cost of processing the collateral and the risk of fraud.

A receivable loan can be on either a non- notification or a notification basis. Under the former arrangement, the customer of the firm is not notified that the account has been pledged to the lender. When the firm receives payment on the account, it forwards this to the lender, with a notification arrangement, the account is notified of the assignment, and remittances are made directly to the lender by the account holder.

At a commercial bank, the interest cost of borrowing against account receivable is usually fixed at some specified rates above the prime lending rate. In addition, a service charge of 1 percent to 2 percent, for processing, is also applicable.

3.6.6 Factor of Receivables

In the case of assignment of receivables, the firm retains title to the receivables. When the firm, however, factors its receivables, it actually sells them to a factor. For bearing risk and servicing the receivables, the factor receives a fee based on a percentage of the face value of the receivable sold. The fee varies according to the quality of the accounts, the volume of receivables sold and the quality of the accounts. If the firm desires payment for the sale (factoring) of its receivables before they are collected, it must pay interest on the advance. Advancing payment is a lending function of the factor in addition to his additional function of risk bearing and of receiving the receivables. For this additional function the factor requires compensation. Thus, the total cost of factoring is composed of a factoring fee plus an interest charge if the firm draws upon its account before the receivables are collected.

3.6.7 Inventory Loans

Inventories also represent liquid asset and are, therefore suitable as security for loan. As with receivables, the lender determines a percentage advance against the market value of the collateral. This percentage varies according to the quality of the inventory. For example, some inventories like gains are very marketable and resist physical deterioration over time, in such cases the margin of safety required by a lender on a loan against such security is small, and an advance may be as high as 90 percent. On the other hand, highly specialised equipment

has narrow markets and as such, lenders are unwilling to make advance against, the reported market value. Thus, the best collateral is inventory, which is, relatively, standard and for which a ready market exist.

Lenders determine the percentage that they are willing to advance by considering marketability; the risk of wastage, and market price stability. The cost of selling some inventory may be very high indeed. The lender, therefore, does not want to be in the business of liquidating collateral, but he wants to assure himself that the collateral has adequate value in case of default.

There are a number of different ways a lender can obtain a secured interest in inventories. These include floating lien, chattel mortgage, and trust receipt and conditional sales contract.

3.6.8 Floating Lien

Under some trade arrangements, the borrower may pledge his inventories "in general", without specifying the exact inventory involved. Under this situation, the lender obtains a floating lien on all inventory of the borrower. Such a lien is a very general and difficult policy on the part of the leader. Sometimes, a floating lien is requested as an additional protection, as it does not guarantee a lender full control over the collateral. In order to enhance its effectiveness, floating lien can be made to cover both receivables and inventories. This modification gives the lender a lien on a major portion of a firm's current assets; and sometimes, the floating lien can be made to cover almost any length of time i.e. present and future inventories.

3.6.9 Chattel Mortgage

A chattel mortgage is similar to a mortgage on real property except that the property is not land or building. With a chattel mortgage, inventories are identified, specifically, either by serial number or by some other means. While the borrower holds title to the goods, the lender has a lien on inventory. This inventory cannot be sold unless the lender gives his consent. Chattel mortgages are ill suited for inventories with rapid turnover and/or inventory that is not easily identifiable because of size or other reasons. They are better suited for such assets as machine tools and office equipment.

3.6.10 Trust Receipts

Under a trust receipt financing arrangement, the borrower holds the inventory and proceeds from the sale of inventory in trust for the lender. This type of financing arrangement is used extensively in the automobile

industry, for equipment leasing, and also in the consumer durables sector. For an illustration, suppose that an automobile manufacturer ships cars to a dealer, who in turn finances the payment for the cars through a finance company.

The finance company pays the manufacturer for the cars; and then the dealer signs a trust receipt security agreement, which specifies what can be done with the inventory. The car dealer is allowed to sell the cars, but must turn the proceeds of the sale over to the lender in payment for the loan. Inventory in trust, unlike inventory under floating lien, is specifically identified by serial number or by other means. In our example above, the finance company, periodically, audits the cars the dealer has on hand, against those shown on the security agreement. The audit is necessary to ensure that the dealer does not sell cars without remitting the proceeds of sales to the finance company.

Many durable goods manufacturers finance the inventories of their distributors or dealers. The purpose is to encourage dealers or distributors to carry reasonable stocks of goods, to enhance their sales turnover.

3.6.11 Conditional Sales Contract

This is frequently used when the seller does the financing. This permits, the seller to retain title, conditional upon the borrower completing the promised payments. In some cases, conditional sales contracts grant the lender easier repossession of the equipment than in the case of chattel mortgage. Such loans may, however, be sold to a bank or finance company.

Lenders who offer unsecured credit usually impose restrictions on the borrower. The restrictions are called protective covenants, and are contained in a loan agreement. If the borrower defaults under any of the provisions of the loan agreement, the lender may initiate immediate corrective measures. On a secured basis, firms can obtain intermediate term financing by pledging equipment that they own or that they are purchasing. Banks, finance companies and sellers of the equipment are active in providing this type of secured financing.

Typically, intermediate term financing is self-liquidating, for this reason, it resembles short term financing. However, intermediate term financing also can satisfy more permanent funds requirements; in addition, it can serve as an interim substitute for long term financing. If a firm wishes to float long term debt or issue a common stock, but conditions are unfavourable in the market, the firm may seek intermediate term debt to bridge the gap, until long term financing can

be undertaken on favourable terms. This intermediate-term debt may give a firm flexibility when the firm is uncertain as to the size and nature of its future funds requirements. The most important use of intermediate term financing, however, is to provide credit when the expected cash flows of the firm are such that the debt can be retired, steadily, over a period of several years and the size of the need precludes long term financing.

Intermediate Loans and Leases

A term loan or intermediate-term credit is defined as any debt obligation having an initial maturity of between 1 to 10 years. It lacks the permanence which is characteristic of long term debt.

3.6.12 Repayment Provisions

A term loan agreement usually requires that the principal be amortised over the life of the loan. This means that the firm is required to pay off the loan, in installments, rather than in one lump sum. This is to reduce the risk that the borrower will be unable to retire the loan in one lump sum when due. Amortisation of principal is also consistent with the idea that term loans are not a permanent part of a firm's capital structure.

The amortisation schedule of a term loan may require the firm to make equal quarterly, semiannual, or annual payments of principal and interest. For example, assume that a firm borrows N14100.000payable over 8 years, with an interest rate of 9% per annum on the unpaid balance. The repayment schedule calls for eight equal annual payments, the first occurring at the end of year 1. The equation for the present value of an annuity can be re-written thus -

$$PVAN = R(PVIFA\ in)$$

$$R = \frac{PVAN}{PVIA\ in}$$

Given that the present value of the annuity PVAN = N100,000.00, the interest rate, i = 9%, the number of time (periods) n = 8, and the PVIFAO.09,8 from the present value of an annuity table, is (5.535); the annual payment R, is computed as:

$$R = \frac{N100,000}{5.535} = N18,067$$

By making eight equal annual payments of N18,067, to the lender, the borrower will just pay off the loan and provide the lender with a 9%

return; the table below shows the principal and interest for each year's annuity payment.

Table 1.1: Simple Loan Amortisation Schedule

End of Year (1)	Annual Annuity	Interest (3)	Principal Repayment	Remaining Balance (5)
N	N	N	N	N
0	0	0	0	0
1	18.067	9,000	9,067	-90,933
2	18.067	8.183	9.884	8 1 ,049
3	18.067	7.294	10.773	70,276
4	18.067	6,324	11,743	58,533
5	18,067	5,267	12,800	45,733
6	18,067	4,116	13,951	31,782
1	18,067	2,860	15,207	16,575
8	18,067	1,492	16,575	0
	N14,536	44,536	100,00	

Note: 1. Figures are rounded in order to yield a zero ending balance
2. Interest is on a reducing balance method.
3. Principal repayment is column 2 minus column 3

Over the life of the loan, the firm will make total payment of N144,536. Out of this amount, N100,000 is the repayment of principal, and the other N44,536 is the interest. It is important to note that proportions of a loan payment are principal and interest, since interest payments are tax deductible.

In the above example, the repayment schedule calls for equal periodic payments consisting of both principal and interest. Other types of repayment schedules are also possible, just as stated below.

- The borrower may be required to make equal reduction in the principal outstanding each period, with the interest being computed on the remaining balance for each period.
- The borrower may be required to make equal periodic payment over the life of the loan, which will only ,partially, amortise the loan, leaving a lump payment which falls due at the termination of the loan period (this is called balloon loan)
- The borrower may be required to make a single, principal payment at maturity while making periodic (usually, quarterly) interest payments only, over the life of the loan, (this is called ballet loan)

3.6.13 Lease Financing

A lease is a means by which a firm can acquire the economic use of an asset for a stated period of time. There are two forms of lease - operating lease and financial lease. The distinguishing feature between financial and operating lease is cancelability- an operating lease can be cancelled by giving proper notice, whereas a financial lease cannot be cancelled. In this section, we shall concentrate on financial lease.

A financial lease is a non cancelable contractual commitment on the part of the lessee to make a series of payments to a lessor for the use of an asset. The lessee acquires most of the economic value associated with outright ownership of the asset, even though the lessor retains title to it.

The lease arrangement enables many firms to secure assets at reasonable costs, which they might not otherwise be able to do. Due to the contractual nature of a financial lease obligation, it must be regarded as a form of financing. It is used in place of other methods of financing to acquire the use of an asset. Thus, lease financing and debt financing are similar, from the stand-point of analysing the ability of the firm to service fixed obligation.
In the case of lease financing, the nature of the obligations of the lessor and the lease is specified in the lease contracts (agreement). Generally, such contracts contain:

a) the basic lease period, during which the lease is non-cancellable
b) the timing and amounts of periodic rental payments during the basic lease period
c) any option to renew the lease or to purchase the asset at the end of the basic lease period. Otherwise the lessor takes possession of the asset and is entitle to any residual value associated with it
d) provision for the payment of the costs of maintenance and repairs, taxes, insurance and other expenses. With a "net lease", the lessee pays all of these costs. Under a "maintenance lease", the lessor maintains the asset and pays the insurance.

(i) Forms of Lease

There are three main forms of lease financing, namely: Sale and Lease back, direct lease and leveraged lease.

a. Sale and Lease Back

Under a sale and lease back arrangement, a firm sells an asset it owns to another party, and this party leases it back to the firm. Usually the asset is sold at, approximately, its market value. The firm receives the sales

price in cash and the economic use of the asset during the basic lease period. The firm in turn contracts to make periodic lease payment and consequently loses title to the asset. The result of this arrangement is that the lessor is entitled to any residual value the asset might have at the end of the lease period, which, otherwise, would have been claimed by the firm. Organisations engaged in sale and lease back as lessor include, insurance companies, other institutional investors, finance companies and independent leasing companies.

b. Direct Leasing

Under direct leasing, a company acquires the use of an asset it does not own previously. For example, a firm may lease an asset from the manufacturer- Thermocool leases refrigerators, General Motors leases cars, Mandilas leases air- conditioners etc. A range of goods are now available on a lease finance basis. There are a wide variety of direct leasing arrangements available to meet the varying needs of the firm. The major types of lessor are manufacturers, finance companies, banks, independent leasing companies, special purpose leasing companies etc. Except for leases involving manufacturers, most other lessors purchase the asset from vendors and then lease it to the lessee. Some economies of scale are possible from such purchases of assets by lessors from vendors. Such economies of scale may be passed onto the lessee in the form of lower lease rental payments.

c. Leveraged Leasing

A special form of leasing combining leasing and financing of assets is known as leveraged leasing. This involves- (1) the lessee (2) the lessor and (3) the lender.

1. **The Lessee-** there is no difference in the position of the lessee under a leveraged lease and other forms of lease. The lessee contracts to make periodic payments over the basic lease period, and in return, is entitled to the use of the asset over the basic lease period.
2. **The Lessor-** the role of the lessor under a leveraged lease arrangement is changed. The lessor acquires the assets in keeping with the terms of the lease arrangement. The acquisition is, however, financed, partly, by an equity investment of, for instance, up to twenty percent by the lessor; (hence, the lessor is regarded as "equity part, apart"), and the remaining 80% is provided by a long term lender or lenders. The loan is usually secured by a mortgage on the asset, as well as by the assignment of the lease and lease payments. The lessor, however, is the borrower (not the lessee).

3. **The lender** supplies the long term to the lessor for the purchase of the asset on a non- recourse basis. That is, the lender cannot fall back on the lessor for repayment of the debt in the event of default. However, the lender, normally, receives mortgage bonds secured by-

- a first lien on the asset
- an assignment of the lease
- an assignment of the lease, retail payments
- sometimes, a direct guarantee from the lessee or a third party

SELF-ASSESSMENT EXERCISE 2

If the terms of credit sales are 2/10, n/45, what is the cost of not taking such cash discount and paying the full amount of a bill at the end of the forty-five day period?

4.0 CONCLUSION

In this unit, we discussed the sources of short term and intermediate term capital to the firm. The concepts of short term and intermediate term were not emphasised, but we considered short term to refer to capital sources of zero to one year duration; while intermediate-term sources range between one and five years. It needs to be emphasised that sources of capital are discussed in terms of the security granted by them. In general every source of capital is evidenced by a security such as a promissory note, a lease, or share certificate. Consequently, one way of reviewing all forms of securities is either as creditors or owners.

Security markets are segmented into two line dimensions - short term and long term; sometimes, securities may also be classified as intermediate. Here, dimensions are, rather, arbitrary and raises some problems

5.0 SUMMARY

- There are many different sources of capital for firms, and each of the sources may be classified into three.
- Sources of capital differ according to maturity, the degree of control they exert over the firm, and in terms of their monetary costs to the firm.
- The factors that affect the supply of capital may be grouped into two categories, namely-

- variables over which the firm has some control
- variables over which the firm has no control

- Short -term sources of capital include - trade credits, commercial bank credit (various forms), finance houses, small-loan companies etc.
- Intermediate-term financing has tenure of one to five years. There are a number of sources of intermediate-term financing - commercial banks, insurance companies, lease companies and other institutional investors.

ANSWER TO SELF-ASSESSMENT EXERCISES 1

Short termed sources of funds, have a high cost of renewal Long term sources of funds has a high degree of inflexibility which has an attendant cost. This cost of renewal decreases as the maturity of the capital supply is increased and the cost of inflexibility increases as the maturity is lengthened. Total maturity cost is the sum of renewal and flexibility costs.

ANSWER TO SELF-ASSESSMENT-EXERCISES 2

298 x 360 = 72 = 0.2099
343 = 21%

6.0 TUTOR- MARKED ASSIGNMENT

If a firm extends a cash discount on terms of 2810, n/60, what is the cost of not taking the cash discount and paying the bill at the sixtieth day?

7.0 REFERENCES/FURTHER READING

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UNIT 2 SOURCES OF LONG TERM AND PERMANENT CAPITAL

CONTENTS

1.0 INTRODUCTION

In the previous unit, we considered short term and intermediate term sources of capital. We noted that the segmentation into short term and intermediate is rather arbitrary. This arbitrariness gives rise to some problems namely - the difficulty of differentiating between short term and intermediate term, and even between intermediate term and long term. Such problems do not arise in the case of long term and permanent sources of capital.

Permanent capital is provided by the owners of the business, either by injecting funds from their own resources or by retaining profits in the business, instead of distributing them as dividends. Retained profits are shown as reserves in the balance sheet. Permanent capital is referred to as equity or ownership capital; and it is not subject to refund unless the business goes into liquidation.

Long term capital on the other hand is obtained by borrowing money that will have to be repaid at some time in the future. The borrowing may be from either individuals, financial institutions or others with money to invest, like the various pension fund administrators. Long term borrowing is referred to as debt capital and is liable to periodic interest payments, while the principal is to be fully remitted upon maturity. We shall look at each of these sources of capital in more details below.

2.0 OBJECTIVES

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

- differentiate between permanent and long term capital
- discuss the various forms of raising permanent capital
- compute the values of the firm after capitalisation, rights issue or offer for subscription
- calculate the costs of long-term capital.

3.0 MAIN CONTENT

3.1 Long Term Capital

Long term capital can be raised by borrowing from the money market, but the amount is restricted by the Articles of Association of the business. The borrowing will also be influenced by management's perception of the market (and its record) in recent years. A successful business will find it easier to borrow and obtain a lower rate of interest than a badly managed organisation. Long term loans are normally obtained through the issue of debentures in N100 stock units. The debenture is a piece of paper which states the number of N100 units and the length of time for repayment. The holder of debenture or loan stock- as it is sometimes called, is a creditor to the company and has a right to an annual return, regardless of whether or not profits are made.

Debentures may be secured or unsecured, but unsecured loan stock can only be raised by large conglomerates like UACN or LBN (Lever Brothers Nigeria Plc). It (unsecured stock) carries a rate of interest of about 1 percent higher than that for a secured debenture. Secured debentures have either a floating charge or a fixed charge on the assets of the borrowing organisation. An example of a fixed charge is a debenture which is issued against the security of the buildings. Such a debenture is called a mortgage debenture; it gives the lender the right to sell the buildings and recover the amount loaned should the business default on payment of interest or fail to repay the principal by the due date. A floating charge does not relate to any specific asset, but "floats' over all the assets until there is a default. Should this happen, the charge will cease to float, and it will descend on the assets so that they can be sold in order to repay the debenture holder.

The debenture stock may be issued at N100 cash for each N100 stock, or at slightly below, which is a way of manipulating the effective rate of interest payable, thus making the stock more attractive to lenders. If, for example, it is issued at N100, with a rate of interest of 11 percent, then the rate is, obviously, 11 percent. If, however, it is issued at N95, this

means that every N95 invested will secure N100 worth of stock, and the interest rate becomes 11.58 percent. Also, when the loan is redeemed the lender will receive N100 for each N95 invested.

The debenture can normally be redeemed, within a set time, at the discretion of the borrower. This increases the possibility that the business will be able to obtain the funds necessary to repay the loan on reasonable terms. Most businesses do not generate sufficient cash from their own activities to repay the borrowings as scheduled. They either issue additional shares or take fresh borrowings; a spread of dates on which this can be done enables the directors to choose a favourable time to do so. The effect (on the balance sheet) of raising long term capital, by issuing debentures, is that there will be an increase in current assets in the bank balance, while long term liabilities will also increase. This may be illustrated using the following example from the balance sheet of Ever Green Designs Plc. A debenture loan of N200, 000.00 is raised with 11 percent, it is redeemable from 2010-2014; the original balance sheet will then be as shown below-

	N000s	N000s
Fixed assets:		
Land and Buildings		400
Plant and Machinery		150
Fixtures and Fittings		80
Motor vehicles		20
		650
Current assets:		
Stock	100	
Debtors	80	
Bank	230	
	410	
Less		
Current liabilities	180	
Working capital		230
Net capital employed		880
Finance by		
Issued share capital		
2,000,000 ordinary shares		500
Reserves		
Share premium account		100
Profit and loss account		80
Long term liability		
(Creditors repayable after more than one year)		
11% Debenture		200
		880

The money will not, of course, remain in the bank for too long, but will be used to purchase new fixed assets or used in other ways to enable the business to run more effectively.

Whenever businesses need finance, managers have to carefully consider whether to go for long term permanent source of capital or not; also, they have to take prevailing market conditions into cognisance.

SELF-ASSESSMENT EXERCISE 1

International Carpets Company has N20 million of 12% debenture outstanding. After tax net income is N3 million. The bond indenture requires that the debt coverage ratio, measured by times-interest-earned, be maintained at 2.5; or better still, the company's tax rate is 40%. What is the company's times-interest-earned ratio?

3.2 Permanent Capital

Permanent capital can be raised by issuing shares (either 'ordinary' or; 'preference'). Ordinary shares carry voting rights and enable the shareholders to vote on matters of importance affecting the business. The ordinary shareholders are the owners of the business; they appoint directors to act on their behalf in running the business. Hence, the directors can, in principle, be removed by the ordinary shareholders. However, in practice, this is extremely difficult, and it rarely happens. This is because the directors themselves hold large number of shares. You should view with suspicion any organisation whose directors hold few or no shares. It means that the directors do not believe in the organisation, and if they have no faith in the company why should the general investor do?

Each ordinary share carries a voting right, hence, the more shares you own, the greater your say in what should be dome. Anyone who owns more than 50 percent of the ordinary share capital normally controls the business. The ordinary shareholders are the equity holders. They take the biggest risk, and can, if things go bad- as is common with commercial banks, lose virtually all their investments. Consequently, when things go well, they expect the biggest return, in terms of dividend received, and capital growth through an increase in the market price of a share. The capital is permanent because the business is under no obligation to buy back the shares held.

If a shareholder wishes to recover the money that has been invested in shares, then he or she has to do so by selling the shares to another prospective investor, through the mechanism of the Stock Exchange. If the price of the share has increased, it will lead to a capital gain. On the

other hand, if the price has fallen less than the amount at which it was purchased originally, then, a loss is incurred. The dividend paid to the ordinary shareholders is at the discretion of the directors; but it will not, normally, vary that much, from year to year. It has to be paid out of after tax profits, but may be paid out of previously unused profits if the directors so decide. As much as possible, directors will maintain dividends and not withhold them. It is interesting to note that in the difficult economic climate of 1997/98, many organisations asked their shareholders if they would like to receive their dividends in the form of additional shares instead of monetary disbursement. Some other organisations wanted to withhold dividends, altogether.

Preference shares, generally, carry no voting rights; and as the name implies, holders receive their dividends before the ordinary shareholders. The rate of dividend is stated on the face of the share, for instance, it can be a nine percent preference share. The nine percent is based on the nominal value of the share, and not on the profits earned or the market value of the share. The nominal value of any share is shown on the face of the share certificate, and it is normally 50k. There are other nominal values, 25k and Nl (one naira) are often seen. The nominal value is used to show the value of the issued share capital in the balance sheet. Shares are usually issued for more than the nominal value, and the difference between the nominal value and the amount actually received is shown in the share premium account under reserves.

Example: If a company issues 10,000 ordinary shares of 25k for N1 and 5,000; 9% preference shares of 25k for 50k, the balance sheet will show:

		N
Issued share capital		
10,000 ordinary shares (N0.25 per)		2,500
5,000 9% preference share (N0.75 per)		1,250
Reserves		
Shares premium account		8,750
The total amount raised is		
10,000 x N1	=	10,000
+ 5,000 x 50k		2,500
		12,500

Only N3, 750 of the above total balance is shown in the issued share capital section. The balance of N8,750 is shown under reserves as share premium account. In practice, shares will not, normally, be issued to raise such small sum of money. The smallest amount raised by a general issue of shares is, usually, in the range of N500,000.00. It is only

in the second-tier securities market (SSM), for small and medium scale companies, that smaller amounts can be raised.

The preference shareholders receive their dividend before the ordinary shareholders, and in the event of insolvency, they are paid what is due to them before the ordinary shareholders receive anything. The risk is smaller than that of the ordinary shareholders and because of this ordinary shareholders expect a bigger dividend and a greater capital gain than the preference shareholders if things go well. In other situations, the ordinary and preference shareholders are treated in the same way.

There are four ways in which ordinary shares are normally issued; but only two of these result in additional finance for the issuing company.

(a) Capitalisation issue (also known as a 'scrip', 'free' or 'bonus' issue)
(b) Rights issue
(c) Vendor consideration (Offer for sale/subscription)
(d) Placing

3.2.1 Capitalisation Issue

The purpose of a capitalisation issue is to bring the issued capital into closer relationship with the capital employed in a business. It raises no additional money for the business and no money changes hands. Shares are normally issued to the existing shareholders in proportion to their existing holding by capitalising reserves. This reduces the reserves and increases the number of ordinary shares on issue which makes the market value of each ordinary share to fall. Each shareholder is not better or worse off than he/she was previously, because the additional shares have gone to existing shareholders; somebody who, previously, had one share with a market value of N3, may now have three, each with a market value of N1.

The relevant section of a business' balance sheet before and after a capitalisation issue may be illustrated as follows:

	N
Issued share capital	
100,000 ordinary shares	25,000
Reserves	
Share premium account	175,000
Profit and loss account	100,000

After capitalisation of N100.000 of the reserves by the issue of N400,000 at 25k per share-

Issued share capital N
500,000 ordinary shares

125,000
Reserves
Shares premium account
75,000
Profit and Loss account
100,000

The total of the issue takes place the issued share capital of the business and the bank balance will both increase as will the reserves if the issue is made at above the par value. This may be illustrated using the following balance sheet.

N000s

N000s
Fixed assets:
Land and Building
400
Plant and Machinery
100
Fixtures and Fittings
50
Current assets:
Stock 60
Debtors 10
Bank 5
75
Deduct
Current liabilities 65
Working capital 10
Net capital employed
560
Fixed by
Issued share capital
1,800,000 ordinary shares
450
Reserves
Share premium account
80
Profit and loss account
30

560

If the business now makes a rights issue of one new share for every nine shares already held, then an additional 200,000

1,800,000

shares will be issued and the issued share capital will become N500,000, N450,000 + N50,000). Issuing the shares for N1, which is above their nominal value of 25k and below their assumed current market value of

N1.30k, will have a twofold effect. Firstly, the share premium account will be increased by N150,000 (200,000 x N0.75) to N230,000 (N80,000 +N150,000). Secondly, the bank balance will be increased by N200,000 to N205,000 N5.000 + N200,000). The discount of 30k, between the current market value of N1.30 and the issue price of N1 will help to ensure that the rights issue is taken up.

3.2.2 Vendor Consideration

The purpose of the issue of vendor consideration shares is to enable one business to acquire another business, purely, by issuing shares. It enables the acquiring business (the new investor) to keep its cash resources intact, while, at the same time, giving the business to be acquired the opportunity to raise money by selling some of the shares it has been given. Where, a part equity - part cash settlement is required by the vendor, it is achieved by splitting the shares issued into two parts. The first comprises those shares the vendors intend to retain; while the second comprises those shares that will later be sold by vendors for cash in the market place. The business issuing the shares does not receive any cash at all. The effect on the balance sheet will be for the issued share capital and reserves to increase and for a subsidiary company of the same value to appear amongst the fixed assets. This may be illustrated using the previous balance sheet (assuming the purchase is achieved by issuing 200.000 25k share for N1) as follows:

	N000s	N000s
Fixed assets:		
Land and building	400	
Plant and machinery	100	
Fixtures and fittings	500	
Investment in subsidiary company	200	750
Current assets:		
Stocks	60	
Debtors	10	
Bank	5	75
Deduct		
Current liabilities	65	
Working Capital		—
10		
Net capital employed		
760		
Financed by:		
Issued share capital		
2,000,000 ordinary shares		500
Reserves		

Shares premium account
230
Profit and loss account
30

760

The following example, using Ever Green Designs Plc, further illustrates the effects of issuing vendor consideration shares.

Ever Green Designs Plc Balance sheet as at 30 November 2001

	N000s	N000s
Fixed assets:		
Land and building	400	
Plant and machinery	100	
Fixtures and fittings	80	
Motor vehicles	20	650
Current assets:		
Stocks	100	
Debtors	80	
Bank	30	
	210	
Deduct		
Current liabilities	180	
Working Capital		30
Net capital employed		680
Financed by:		
Issued share capital		
2,000,000 ordinary shares		500
Reserves		
Shares premium account		100
Profit and loss account		80
		680

If another business is purchased for N300,000 by using 100,000 vendor consideration shares at N3 each, then the balance sheet will be altered in three respects. The issued share capital becomes 2.100.000 ordinary shares valued at N525, 000 N500, 000 + (100,000 x 25k). The share premium of N375.000 is (N100.000 x N2.75k). The fixed assets increase by N300.000, being the value of the subsidiary business acquired, and the balance sheet will be as shown below:

Ever Green Designs Plc Balance Sheet as at 30 November 2001

		N000s	N000s
Fixed assets:			
Land and building	400		
Plant and machinery	150		
Fixtures and fittings	80		
Motor vehicles	20		
Subsidiary undertaking	300	950	
Current assets:			
Stocks		100	
Debtors		80	
Bank		30	
		210	
Deduct			
Current liabilities		180	
Working Capital			30
Net capital employed			980
Financed by:			
Issued share capital			
2,000,000 ordinary shares			525
Reserves			
Shares premium account			375
Profit and loss account			80
			980

3.2.3 Placing/Placement

The purpose of a placement is to raise money or a business as cheaply as possible. It is only allowed where there is likely going to be no significant public demand for the shares; it is usually restricted to a proportionate value of shares at the placing price. The placing involves the sale of shares by an issuing house or broker, through the market to their own clients. The advantages of placing are that- they are relatively cheap to effect, because they are devoid of much marketing and administrative costs, also, the shares can be quickly and efficiently sold.

Placing will only normally be allowed in the following circumstances:

a) where existing shareholders wish to dispose of shares which they have because of a rights issue or a vendor consideration issue.
b) where ordinary shares in a company, not previously listed, on the Stock Exchange are to be issued.
c) where already listed business wishes to issue additional shares.

d) If existing shareholders object, this can only be done by way of a rights issue.

The effect (on the balance sheet) of issuing shares by means of placement is the same as that for rights issue which we have previously considered.

The permanent capital of a business comes only through the owners, either—directly by injecting additional funds or indirectly through retained profits.—However, the methods for raising permanent capital differ as we have seen in this section.

SELF-ASSESSMENT EXERCISE

1. You bought a stock at N27 per share and sold it at N34. Before selling it, you received a N2 per share dividend. What was your percentage return?

2. International Carpets Company has N20 million of 12% debenture outstanding. After tax net income is N3 million. The bond indenture requires that the debt coverage ratio should be measured by tunes-interest-earned be maintained at 2.5 or better the company's tax rate is 40%. What is the company's tunes-interest-earned ratio?

4.0 CONCLUSION

The sources of long term and permanent capital have been discussed. The permanent capital of a business comes only through the owners, either directly by injecting additional funds or indirectly through retained profits. However, the methods for raising permanent capital differ as we have seen in this section.

5.0 SUMMARY

- Long term capital is obtained through borrowing by issue of bonds or debenture by the firm.
- Such borrowed funds are repayable at some future time
- Permanent capital is provided by the owners of the business (shareholders) either by investing money from their own resources or through retaining profits in the firm, instead of distributing the profits as dividends.
- Retained earnings are recorded in the firm's balance sheet as reserves
- Permanent capital may be raised in form of ordinary or preference shares.

- Ordinary shares may be raised in four different ways, namely- capitalisation or bonus issue, rights issue, offer for sale/subscription and private placement.

ANSWER TO SELF-ASSESSMENT EXERCISE

Net Income - (Earnings before taxes) (1-t)
N3 million = (Earnings before taxes) (0.6)
Earnings before taxes - N3 ^ .6 - N5 million

EBIT = EBT + Interest – N5million + 0.12 (20 million) = N7.400,000
Times Interest Earned (TIE) = EBlT/lnterest
= 7.400,000/2.400,000
= 3.08

$$\text{Percentage Return} = \frac{\text{Selling Price - Cost + Dividend}}{\text{Cost}} \times 100$$

$$= \frac{34 - 27 + 2}{27} \times 100$$

6.0 TUTOR- MARKED ASSIGNMENT

Adwark Airlines Plc has the following financial statement and other information:

Balance Sheet (N million)

Current assets	N80	Current Liabilities	N30
other assets	100	Long term debt	40
		Preferred Stock	20
		shares (N2 par)	
Ordinary			
10		paid in Capital	
Additional			
35			
Retained			
45			
Total Assets	N180	Total liabilities and Capital	N180

Suppose Adwark declares a 10% stock dividend. Show the changes in the shareholders' equity portion of the balance sheet.

7.0 REFERENCES/FURTHER READING

Ezike, J.E. (2003). *Essentials of Corporate Financial Management*. Lagos: Jaylycent Communications.

UNIT 3 COST OF CAPITAL

CONTENTS

1.0 INTRODUCTION

In this unit, we shall be discussing the cost of capital. As we saw earlier, the financial manager has a responsibility to identify and select appropriate investment project and use the most cost-effective mode of financing it, towards the attainment of the company's objective. Every source of finance has a cost, and costs differ in terms of maturity, degree of control in the firm and monetary cost.

In this unit, we shall concentrate on the determination of the costs of the various components of a firm's capital. The cost of capital is a key variable in capital expenditure analysis. The cost of capital is concerned with what a firm has to pay for the capital - (i.e. debt, preferred stock, and ordinary shares) - which the firm uses to finance new investments.

2.0 OBJECTIVES

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

- explain the nature of risk premium and its implication for the cost of capital
- explain the relative costs of capital
- compute the component costs of capital
- determine the weighted-average cost of capital.

3.0 MAIN CONTENT

3.1 Nature of Risk Premium

In the field of finance, numerous trade-offs are often made between risk and expected return. In capital budgeting, for example, companies should require higher returns on projects perceived as "high-risk", than on objects considered to be "low risk". Our discussion here will focus on the relationship between risk and expected return on a firm's securities.

The required return 'K' on any security may be thought of as consisting of a risk-less or risk-free, rate of return 'rf plus a premium for the risk inherent in that security. This is expressed thus:

$$K = rf + \text{risk premium}$$

The risk-free rate of return is normally measured by the rate of return on risk-less securities such as short term (90 days) Nigerian Treasury Bill (NTB). This rate varies over time and is influenced by two key factors.

(a) The expected inflation rate
(b) The supply and demand for funds in the overall economy.

These two factors are the primary determinants of returns on risk-free securities. The returns required on all other securities are also influenced by the risk of those securities. There are four major risk components that determine risk premium on a specific security, at any point in time.

- The business risk of the firm
- The financial risk of the firm
- The marketability of the security
- The length of maturity of the security (interest rate risk).

(a) Business Risk- the business risk of a firm refers to the variability in a firm's sales and operating costs and by the amount of operating leverage the firm uses in producing sale.

(b) Financial Risk- this refers to the additional variability in a company's earnings per share resulting from the use of fixed cost sources of funds, such as debt and preferred stock. In addition, the financial risk premium includes a premium to compensate for the increased potential risk of bankruptcy arising from debt financing.

(c) Marketability Risk- refers to the ability of an investor to buy or sell a company's securities quickly and easily. For example, Nigerian Breweries Limited shares are readily marketable, and are always very near the current market price. Other less widely owned securities that are not traded actively on the stock exchange do not have such a ready market. This may cause delays in the sale of the securities and necessitate price concession. Generally, the less marketable a security is, the higher its required rate of return.

(d) Interest Rate Risk- refers to the risk of variability in the rate of return or yield on fixed income securities (such as bonds, or preferred stocks), which arises from changes in interest rates. As interest rates rise, the prices of fixed income securities fall, causing current holders of such securities to realise a lower rate of return or yield (than was expected when the security was purchased), when they sell the securities.

Finally, a firm's cost of funds may increase at any point in time with increase in the amount of needed financing. For example, a company may be able to sell 1 million new shares of common stock at N2.50 per share. If the firm decides to sell an additional 1 million shares, however, it would probably have to offer them at a lower price in order to attract enough buyers. This will, of course, increase the cost of the funds raised by the firm. In addition, as a firm seeks increasing amount of capital from investors, there is points at which the investors will begin to question the firm's ability to, effectively, manage the large number of investment projects to be financed with these funds. Before considering how the cost of capital may be estimated, it is necessary to examine the relationship between the costs of various capital sources.

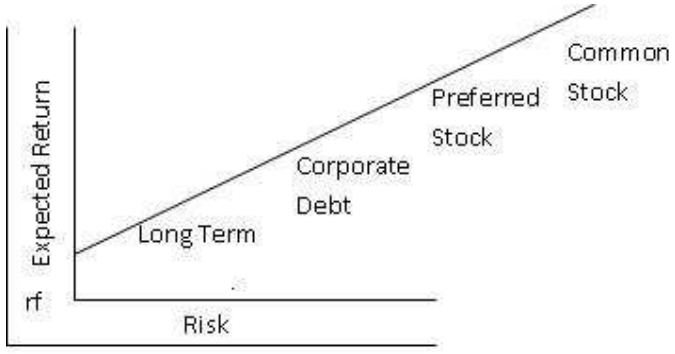

Fig. 3.1: General Risk-Expected Return Trade-Off

3.2 Relative Costs of Capital

Figure 3.1 illustrates the general risk-return trade-off between investors' required rates of return and various sources of funds. As indicated earlier, the risk-free rate 'rf' is usually measured as the rate of return on short term Federal Government Treasury Bills (NTB). Long-term government bonds, like Federal Government Development Stock (FDS), normally command a higher rate than short term debt securities, over time, depending on changes in interest rates. Thus, if interest rates rise, the price of long term bonds falls, resulting in losses for any investor who must sell the security. Investors, normally, require a premium to compensate for this interest rate risk.

Long term debt securities like Federal Government Development Stock, are always less risky than corporate long term debt securities of the same tenure of maturity (e.g., CFAO Mortgage Debenture Stock). Since the government controls the money supply, it can always meet its financial obligation by printing more money (deficit financing). The actual difference in returns or yields, between government debt and good - quality corporate debt (blue chip), is usually less than 1%, and sometimes, less than 0.5%. Companies with high default - risk must offer high coupon interest rates to investors in order to sell their debt issues. This is because they recognise that these high default risk companies are more likely to have difficulty meeting their obligations than low default-risk companies.

Preferred stock is normally riskier than debt. The claims of preferred stock-holders on the firm's assets and earnings are lesser to that of debt-holders. Also, dividends on preferred stock are more likely to be cut or omitted or deferred, than interest on debt. Consequently, investors in the market usually demand a higher return on preferred stock than on debt.

Finally, ordinary shares (or common stock) are the most risky of the types of securities considered here, because dividends paid to common stock holders are made from cash remaining after interest and preferred dividends are paid. Thus, common stock dividends are the first to be cut or skipped when the firm encounters difficulties. Therefore, because there is a greater degree of uncertainty associated with common stock dividends than with the interest on debt or preferred stock, dividends are adjudged more risky. In addition, the market price fluctuations of common stock tend to be wider than those of preferred stock and long term debt. As a result, of this higher risk, investors required return on common stock is higher relative to preferred stock and debt.

From the foregoing, it is evident that a particular security's risk affects the return required by investors. This analysis can, however, be

extended further. If capital markets are to clear (i.e. supply equals demand) the firm must offer returns consistent with investor expectations. Suppose, for example, that a firm offers a security for sale in the capital market at a return that is less than what investors, in general, expect. Obviously, not enough buyers will come forth (leading to warehousing of the stock). Unless the firm increases the return, (by dropping the price, and raising the interest or dividend rate etc.), the securities will remain unsold and the firm will not be able to raise its capital. In summary, therefore, *"the cost of capital to the firm is equal to the equilibrium rate of return, demanded by investors in the capital market, for securities with that degree of risk"*.

3.3 Computing the Component Costs of Capital

Cost of Debt- the cost of debt capital to the firm is the rate of return required by investors. For a debt issue, this rate of return -*'kd'*, equates the present value of all expected future receipts (i.e. interest *I* and principal repayment *M*) with the offering price *PO* of the security.

$$Po = \sum_{t=1}^{n} \frac{1}{(1+Kd)^t} + \frac{M}{(1+Kd)^n}$$

The cost of debt *kd* is found by sing the methods for yield to maturity calculation discussed in chapter 3.

Most, NEW, long term debt issued by companies are, sold at or close to par value (normally N1000) per bond, and the coupon interest rate is set at the rate required y investors. When debt is issued at par value, the pre-tax cost of debt *kd* is equal to the coupon interest rate:

$$Kd = \text{coupon interest rate.}$$

Therefore, payments made to investors, however, are tax deductible. Therefore, the after-tax cost of debt issued at par is computed by multiplying the coupon interest rate, by 1, minus the firm's marginal tax rate.

$$Kd\ (1-t) = \text{coupon interest rate} \times (1-t)$$

In principle, the cost of external capital to the firm (e.g. debt) is adjusted for floatation costs - but in respect of debt issues, the floatation costs are minimal and therefore, are ignored in practice.

Illustration A

To calculate the cost of debt- supposing that NITEL, sells N100 million of 8.5% mortgage bond at par, assuming a corporate marginal tax rate of 40% for NITEL, the after-tax cost of debt will be computed as-

$$Kd \quad (1+t) = 8.5\ (1-0.4)$$
$$= 5.1\%$$

3.4 Cost of Preferred Stock

The cost of preferred stock to the firm is the rate of return required by investors on preferred stock issued by the company. Since many preferred stocks are like perpetuities, it is possible to calculate the cost using a simplified preferred stock valuation model thus:

$$Po = \frac{DP}{KP}$$

Where *Po* is the preferred stock price, *Dp* the annual dividend and *Kp* the investors, require rate of return. The cost of preferred stock *Kp* is, thus, given by the following equation:

$$kp = \frac{DP}{P\ net}$$

In calculating cost of preferred stock, the price *"P net"* which should be used is the net proceeds to the firm, that is, the proceeds from the sales of the stock, after subtracting floatation costs.

Illustration B

Suppose that Okabo airlines issues $430 million of £42.75 cumulative preferred stock at a price of N25 per share to the public. Assuming a floatation cost of Nl per share, what is the cost of the preferred stock?

Solution: $kp = \frac{N2.75}{N25-N1} - \frac{2.75}{24} = 0.115$ or 11.5%

Since payment to the preferred stockholders are in the form of dividends, they are not tax deductible, so the after-tax cost of preferred stock is equal to the pre-tax rate.

SELF-ASSESSMENT EXERCISE 1

The ICU Water Company is planning to issue N15 million of $6^2/3\%$ preference shares at a price of N150 per share. Floatation cost will be N7 per share; ICU's tax rate is 40%. Calculate the after-tax cost of the preference stock.

3.5 Cost of Equity Capital

The cost of equity capital to the firm is the equilibrium rate of return required by the firm's common stockholders. Firms raise equity capital in two ways:

Internally	-	through retained earnings
Externally	-	through the sale of new ordinary shares

The concept of the cost of internal equity (simple equity), can be developed using several different approaches.

Constant Growth dividend Valuation Model

Dividend valuation model, (or the dividend capitalisation model, as it is often called) for common stock valuation (retained earnings) or internal equity is shown as follows:

$$Po = \sum_{t=1}^{\infty} \frac{Dt}{(1+ Ke)^t}$$

Where *Po* is the stock's present value or current market price; while *Dt is* the dividend received in period *t*, and *ke is* the return required by investors. This equation shows that *ke* - the required return, and thus, the cost of equity capital, equates the present value of all expected future dividends with the current market price of the stock. In principle, the cost of equity capital can be calculated by solving equation 14.7 for *ke.*

In practice however, the expected future dividends are not known and cannot be estimated with the same degree of confidence as preferred stock dividends, and debt interest. Consequently, the theoretically correct, general form of the dividend valuation model is not very useful in calculating the cost of equity capital. If the firm's future per share dividends are expected to grow each period, perpetually, at a constant rate *'g'* then the dividend valuation model can be written as -

$$Po = \sum_{t=1}^{\infty} \frac{Do\,(i + g_t)^t}{(1+ Ke)}$$

Where *Do* is the dividend in the current period, *(t=o).* Assuming that the cost of equity *ke* is greater than the expected dividend growth rate *'g',* equation (14.8) ~~can be~~ transformed, algebraically, as shown below.

$$Po = \frac{D}{Ke - g}$$

Where, D1 = Do (1+g)

Equation 14.9 can be re-arranged to obtain an expression for calculating the cost of equity, assuming that dividends are expected to grow perpetually at a rate 'g' per year (a constant growth rate of dividends).

$$Ke = \frac{D_1}{Po} + g$$

To illustrate the use of equation 14.10- Suppose that FAN company's common stock is currently selling at N32 per share. If present dividend Do is £42.00 per share, and the expected dividend growth rate is 7%. The investors' required return (i.e. the firm's cost of equity capital) will be computed as:

$$Ke = \frac{2.00(1.07)}{32} + 0.07$$

$$= 0.37 \text{ or } 13.7\%$$

3.6 Cost of External Equity

The cost of external equity is greater than the cost of internal equity for the following reasons:

a.

b.

floatation costs, associated with the new equity issues, are high enough that they cannot be ignored.

the selling price of new issues to the public is often less than the market price of the stock, before the announcement of the new issue - to enable easy sale of the issue. The stock price before a new issue is said to represent market equilibrium price (i.e., between supply and demand). The supply of additional stocks, by way of new issue, is expected to reduce the equilibrium price.

When a firm's future dividend payments are expected to grow at a constant rate of *'g'* per period for ever, the cost of external equity *'Ke'* is defined as:

$$\frac{Ke}{Pnet} = \frac{D1}{} + g$$

Where, *Pnet-* is the net proceeds to the firm on a per share basis (i.e. stock price, less floatation cost per share).

Illustration C

Let us consider Funso Trading Company with *Po* of N32, *Do* = N2.00, *g* = 0.07 and *Ke* = 13.7%. Assuming that new common stock can be sold at N31 to net the company N30 per share, after floatation costs; *Ke* will be calculated as:

$$Ke^1 = \frac{D^1}{Pnet} + g = \frac{2.14}{30} + 0.07$$

$$= 0.07+0.07 \text{ or } 14.00\%$$

Eternal equity cost is, relatively, high; thus, the question whether or not to raise capital, externally, with newly issued equity stock depends on the investment opportunities available to a company.

3.7 Weighted Average Cost of Capital

Firms calculate their cost of capital in order to determine a discount rate that will be used for evaluating proposed capital expenditure projects. The purpose of capital expenditure analysis is, basically, to determine which alternative project proposals before the firm will, actually, be undertaken. Thus, it is logical that the capital of concern and whose costs are compared with the expected benefits from the proposed projects will be the next or marginal capital to be raised by the firm. Normally, firms estimate the cost of each capital component as the cost they expect to pay on these funds during the coming year. In other words, the cost of the capital acquired by the firm in earlier periods (historical cost of capital), is not used as the discount rate in determining next year's capital expenditures.

Moreover, as a firm evaluates proposed capital expenditure projects, it, normally, does not specify the proportions of debt and equity financing for each project. Rather, each project is presumed to be financed with the same proportion of debt and equity contained in the company's target capital structure. Consequently, the appropriate capital figure used in

capital is based on, not only marginal capital to be raised, but is also weighted by the proportions of the capital components in the firm's long-rage target capital structure. The figure is called the weighted or overall cost of capital. The general formula for calculating the weighted cost of capital *Ka* is as follows. Where *D* is debt, *E* is equity and *P* is preferred stock.

Illustration D

If a company has a current (target) capital structure of 75% equity, and 25% debt (no preference share); the company plans to finance next year's capital budget with N75m from retained earnings, (*Ke* = 12%) and N25 million long term debt (*Kd*= 8%). Assume a 40% marginal tax rate, using these figures, compute the firm's weighted cost of capital to finance its project.

$$Ka = 0.75x12.0 + 0.25x8.0(1-0.40)$$
$$= 10.2\%$$

Figure 3.2: The security Market Long RTN (SML)

In the field of corporate finance, risk is defined as the variability of returns. The variability of returns for individual stocks is closely related to the variability of stock prices. But in the context of the *CAPM* and the *SML*, total variability of returns is not considered to be the relevant measure of risk. Rather, total variability is divided into two components namely:

a. unique or unsystematic risk - this is the variability of returns unique to the security itself and includes variability caused by such factors as differing management skills, strikes, natural disasters, products/service quality, effects of new competition etc.

b. systematic or non diversifiable risk - this is measured by the co-movement or co variation of a security's returns with the returns of the overall market. The overall market movement (variation) is measured by some broad market index such as NSE all share index. Systematic risk is caused by factors like changes in the level of interest rates, impact of economic recessions, government economic policies and so on.

SELF-ASSESSMENT EXERCISE 2

The Lever Crowther Company has a target capital structure of 70% long term debt, and 30% equity. Long-term debt will cost 8% and the cost of retained earnings is 15%. The firm's tax rate is 40%. Calculate the weighted cost of capital for the firm.

4.0 CONCLUSION

In this unit, we have considered the cost of capital. We also discussed the nature of the trade-off between risk and expected return made by investors in a firm's securities; and the measurement of the individual components of capital, and the weighted average cost of capital.

The cost of capital can be thought of as the rate of return required by investors in the firm's securities. As such, the firms cost of capital is determined in the capital market, and it is closely related to the degree of risk associated with new investments. The greater the return required by investors, the greater will be the cost of capital.

5.0 SUMMARY

In this unit, we have noted that-

- Cost of Capital consideration is a key variable in capital expenditure analysis.
- The cost of capital can be thought of as what a firm must pay for the capital it uses to finance new investments or the required return by investors in the firm's securities. It can also be regarded as the minimum return required on new investments undertaken by the firm.
- The cost of capital is determined in the capital markets and depends on the risk associated with the firm's operation
- The required return *'K'* on any security consists of a risk free rate of return, plus a premium for the risk inherent in that security it can be expressed thus

$$K = rf + \text{risk premium}$$

- The risk free rate of return *'rf'* is usually represented by the rate of return on riskless securities like short term government Treasury Bills.
- There are four basic elements that determine the risk - premium on a security, namely - business risk, financial risk, marketability risk and interest rate risk.
- The cost of capital to the firm is equal to the equilibrium rate of return demanded by investors in the capital market for securities with that degree of risk.
- The sum of the costs of the components of a firm's capital structure weighted by their relative proportion, determines a firm's overall cost of capital
- The cost of debt capital is the rate of return *"kd"*, which equates the present value of the future cash flows from interest and principal to *'po'* the offer price of the security, expressed as and solving *kd* using methods for yield to maturity.

$$Po = \sum_{t=1}^{\infty} \frac{1}{(1+Ke)^{1}} + \frac{M}{(1+kd)^{n}}$$

- Cost of debt can be computed before and after tax, and because most new debt is sold at near par value, the before tax cost of debt is usually approximated to be equal to the coupon rate.

  Kd = Coupon rate.
- The after-tax cost of debt is calculated by multiplying the before tax rate with (1-t)

  Kd (1+t) = Coupon rate (1-t)
- The cost of preferred stock is the required rate of return by investors in a firm's preferred stock adjusted for floatation cost.

  Kp = Dp/Pnet- here, Pnet is the proceeds of the issue to the firm

- The cost of equity is computed in two general format depending on whether equity is internal or external to the firm.
- The cost of internally generated equity (retained earnings is computed differently, depending on the dividend growth to the firm.
- If dividends are expected to grow at a constant rate *'g'*, the cost of internal equity is given as-

  Ke = D1/Po+g
- The cost of external equity is greater than the cost of eternal equity (retained earnings) and is computed by adjusting for floatation costs thus-

Ke = D1(where Pnet is the actual)
Pnet +g proceeds to the firm per share

- The overall cost of capital (or weighted average cost of capital) is computed as a weighted cost of individual components, where the weights are equal to the proportion of each component in the firm's capital structure.

$$Ka = \frac{E}{(D + E)} (Ke) + \frac{D}{(D + E} (Kd) (1-t)$$

Where, D is the amount of debt, E is amount of equity and t is the firm's tax rate.

ANSWER TO SELF-ASSESSMENT EXERCISE 1

The cost of preferred Stock is give as

Kp = D/Pnet
No adjustment for tax is required.

Therefore given that D = $6\frac{2}{3}$ of N150 = N10
Pnet = N150 – N700 = N143
Kp = 10/143 = 0.07 or 7%

ANSWER TO SELF-ASSESSMENT EXERCISE 2

The weighted Cost of Capital is given by

$$Ka = \frac{E}{D + E} (Ke) + \frac{D}{E} (kd) (1-t)$$

= (0.30) (0.150) + (0.70) (0.08) (0.60)
= 0.0786 or 7.86%

6.0 TUTOR- MARKED ASSIGNMENT

The SAKA Company Plc is planning to issue N15 million 16.5% preference shares at a price of N150 per share. Floatation cost amounts to N11 per share. If SAKA tax rate is 35 percent, calculate the after-tax cost of preference share of the company.

7.0 REFERENCES/FURTHER READING

Ezike, J.E. (2003). *Essentials of Corporate Financial Management.* Lagos: Jaylycent Communications.

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UNIT 4 CAPITAL STRUCTURE DECISION

CONTENTS

1.0 INTRODUCTION

Capital Structure may be simply defined as the composition of long term debt (loans), e.g. debentures, preferred stock, and ordinary shares (including reserves and retained earnings), that constitute a firm's finances (i.e. capital). This contrasts with Financial Structure which, in addition to the components of capital structure described above, also includes current liabilities. Thus, capital structure is a sub-set of financial structure, representing the permanent sources of a firm's financing.

Financial managers of firms are concerned about the capital structure of the firm, such that when a firm has a high level of business risk, they seek to balance this risk with a lower level of financial risk, by employing lower levels of debt (leverage in the capital structure) - a capital structure at which the cost of capital to the firm is minimised. At this minimum-cost capital structure, the net present value of new investment projects is maximised, and consequently, the firm's value is maximised. This minimum cost capital structure is therefore called the OPTIMAL Capital Structure. The question of determining an optimal capital structure is an important one in financial management.

An improved capital structure is critical to a firm's financial flexibility to the effect that sometimes firms feel a need to re-structure their capital structure by rearranging the composition of its capital financing to either reduce the cost of capital or improve its overall value. In this chapter, we attempt to present in some detail, the various theories as well as the

circumstances and methods of capital (or balance sheet) re-structuring or re-organisation. Some real practical examples are used to illustrate the principles involved in capital structure analysis and reorganisation.

2.0 OBJECTIVES

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

- explain the principal features of capital structure
- discuss the various theories of capital structure
- distinguish between the *NI* and *NOI* approaches to capital structure decisions
- determine an optimal capital structure.

3.0 MAIN CONTENT

3.1 Principal Features of Appropriate Capital Structure

An appropriate capital structure analysis must take cognizance of the following factors as they affect capital structure decisions.

a) **The Degree of Leverage -** one basic issue regarding capital structure involves the questions of whether a firm should use debt or equity financing and in what proportion. Logically, this question should be considered from the perspective of the firm's shareholders and the answer depends essentially on the firm's level of operating income.

b) **Operating Income -** the capital structure decisions of a firm is enhanced when the firm is profitable. This is because maximum use of leverage of minimum cost has the effect of stimulating the earning capacity of the - company. By employing leverage, (i.e. use of fixed cost assets and financing), a firm earns returns in excess of the fixed costs of assets and sources of funds, thereby increasing the returns to ordinary shareholders. An analytical technique called *EBIT - EPS* analysis can be used to determine when debt financing is advantageous and when equity financing is more advantageous.

c) **Risk-Return Trade-Off -** a firm can, potentially, show increased earnings (returns) for its shareholders by increasing its level of financial risk (i.e. adding debt to its capital structure). However, since increases in risk tend to increase cost of capital, the financial manager has to assess the trade-off between the higher returns for the shareholders, and the higher costs of capital, which could threaten the solvency of the firm.

d) **Flexibility -** a good capital structure should be flexible and adaptable to changing conditions. This feature of flexibility,

makes capital structure decisions responsive to changing circumstance at minimum cost and delay

e) Cost of Capital Consideration - the financial manager must be aware of and consider the relationship between the cost of debt and capital structure. All things being equal, investors in debt consider the debt instrument less risky if the firm has a low, rather than, a high proportion of debt in its capital structure. As the proportion of debt in the capital structure increases, investors require a higher return on the now more risky debt. Therefore, since the firm's cost of debt increases as the proportion of debt in the capital structure increases.

3.2 Theories of Capital Structure

Basically, the theory of capital structure is concerned with the question whether a firm can influence its total value and its cost of capital by changing its financing mix (i.e. its capital structure). Thus, the concern of theory is to determine what happens to the total value of the firm and to its cost of capital, when the ratio of debt to equity or degree of leverage is varied.

The capital structure theories are concerned with the following three rates.

$$\text{Kd: (Cost of Debt)} = \frac{I}{MVD} = \frac{\text{Annual interest charges}}{\text{Market Value of Debt}}$$

$$\text{Ke: (Cost of Equity)} = \frac{NE}{MVE} = \frac{\text{Net Earnings available to Ordinary Shareholder}}{\text{Market Value of Equity}}$$

$$\text{Ko: (Overall Cost of Capital} = \frac{NI}{MVF} = \frac{\text{Net Operating Income}}{\text{Total Marketing of Firm}}$$

Where *MVF = MVD + MVE*, Hero, *Ko* is the overall capitalisation rate and can be defined as a weighted average cost of capital thus:

$$Ko = kd\left(\frac{MVD}{MVD + MVE}\right) + Ke\left(\frac{MVD}{MVD + MVE}\right)$$

The theories are concerned with what happens to *kd, ke* and *ko* when the degree of leverage (i.e. the ratio of debt to equity, *MVD/MVE*) increases

The Approaches to Valuation of a Firm

There are two approaches developed by Durand, to the valuation of the earning of a company namely, the net Income Approach (NI) and the Net Operating Income Approach (NOI) both approaches represent the extreme views in the valuation of a firm, with respect to the degree of leverage.

3.2.1 The Net Income Approach

According to the Net Income Approach (NI), a firm can increase its value or lower its overall cost of capital by increasing the proportion of debt in the Capital Structure. The Net Income Approach (*NI)* approach is based on the following assumptions:

a) there are no income taxes
b) the ratio of debt to equity for affirm can be altered by issuing debt to repurchase equity or issuing shares to pay-off debt. There are no transaction costs.
c) the equity capitalisation rate (*ke*) and the debt capitalisation rate (*kd*) remain constant with changes in leverage, as the use of debt does not change the risk perception of investors.
d) the debt capitalisation rate is less than the equity capitalisation rate.

Illustration (A)

To illustrate the net incomea, assume that a firm has N3000,000 debt at 5 percent interest rate in its capital structure, and the expected annual operating income is N100,000; if the equity capitalisation rate is 10 percent, calculate the value of the firm and overall cost of capital.

The value of the firm may be calculated thus-

		N	
NI:	Net Operating Income	1,000,000	
Less:	Interest	150,000	
NE:	Net Earnings Available to Shareholders	850,000	
Ke:	Equity Capitalisation rate		0.10
MVE: Market Value of Equity		8,500,000	
MVD: Market Value of Debt		3,000,000	
MVF: Total Market Value of Firm		11,500,000	

Thus, under the *NI* approach, net earnings available to shareholders (NE) are capitalised at a constant rate Ke (here 10%)

The implied overall capitalisation rate for the firm is given as-

$$Ko = \frac{NI}{MVF} = \frac{1,000,000}{11,500,000} = \frac{.069}{8.7\%}$$

Illustration B

Now, let us assume that the firm decides to increase debt to N9000,000 and uses the proceeds to retire stock. The interest rate on debt still remains 5% and net operating income 1 million. The value of the firm now becomes-

	N
NI: Net Operating Income	1,000,000
Less: Interest	450,000
NE: Net Earnings Available to Shareholders	550,000
Ke: Equity Capitalisation rate	0.10
MVE: Market Value of Equity	5,500,000
MVD: Market Value of Debt	9,000,000
MVF: Total Market Value of Firm	14,500,000

The new implied overall capitalisation rate now becomes

$$Ko = \frac{NI}{MVF} = \frac{1,000,000}{14,500,000} = 0.0689 = 6.9\%$$

From the foregoing illustration, it is evident that under the N1 approach the firm can increase its total value *MVF* (from N11.5million to N14.5 million) and lower its overall cost of capital *"Ko"* (from 8.7% to 6.9%) by increasing the ratio of debt to equity in its capital structure(i.e. leverage from N3 million to N9 million). The consequence of the firm's action is to raise the market price per share.

Explanation (From illustration A)

We know that the firm had 850,000 shares (i.e. 8,500,000 –N10) outstanding. By issuing additional debt of N6.000,000 shares, the firm now has 250,000 shares outstanding. Given the new market value of Equity of N5,500,000, the market price per share will then be N5,500,000 + 250,000 = N22, an increase of N12 over the original share price of N10 per share.

3.2.2 The Net Operating Income Approach (NOI)

The *net operating income approach* states that the market value of the firm is not affected by the capital structure changes of the firm.

Basic assumptions:

(i) the *NOI* approach assumes that the overall capitalisation rate- *Ko* of the firm is constant for all degrees of leverage.
(ii) the market capitalises the firm as a whole. Thus, the distinction between debts and equity is not important.
(iii) the market capitalises the net operating income (NI) with the constant overall capitalisation rate.
(iv) the debt capitalisation rate *Kd* is a constant.
(v) the use of less costly debt funds, increases the risk to shareholders. This causes the equity capitalisation rate to rise.
(vi) like *NI* approach, income taxes are non- existent.

Illustration C

We shall use the same data in the net income (*N1*) approach to illustrate the net operating income (*NOI)* approach, except that here, *Ko* is assumed constant at 10 percent. Thus, for N3000,000 debt, at 5% interest and net operating income of N1000.000, we have the following:

The implied equity capitalisation rate is thus-

$$Ke = \frac{NE}{MVE} = \frac{850,000}{7000,000} = 0.1214 \quad 12.12\%$$

Illustration D

Now, assuming- as before, that the firm decides to increase debt from N3 million to N9 million and uses the proceeds to retire stock, the value of the firm and the implied equity capitalisation rate will be as follows:

		N
NI:	Net Operating Income	1,000,000
Ke:	Equity Capitalisation rate	0.10
MVE: Market Value of Equity		10,000,000
MVD: Market Value of Debt		9,000,000
MVF: Total Market Value of Firm		1,000,000

850,000 = 0.1214
7,000,000 12.12%

The implied equity capitalisation is thus-

$$Ke = \frac{NE}{MVE} = \frac{550,000}{1000,000} = 0.55 \text{ or } 55\%$$

From the above example, it can be seen that under the *NOI* approach, *Ke* rises with the degree of leverage, but the total value of the firm remains unaffected (10 million) by leverage.

According to the Net Operating Income Approach therefore, the real cost of debt and the real cost of equity are the same, namely *Ko* (the overall capitalisation rate). *NOI* argues that the cost of capital to the firm cannot be altered as a result of leverage, and thus by implication, there is no optimal capital structure. It assumes that all capital structure is optimal, as market price per share does not change with leverage.

This assertion can be proved thus- in our example, with a N3 million debt, the number of shares outstanding is 850,000. The market price per share is therefore, N7 million divided by 850,000 = N8.235 per share. Now with an additional N6000,000 debt, the firm re-purchases N6 million shares at N8.235(i.e. 728597 shares). Therefore, the market price per share, after the change in capital structure, is N1,000,000 divided by (850.000 728597), or N1.000.000 divided by 121403 = N8.237, almost the same as before. Therefore, the investor will be indifferent about capital structure, since it does not alter the market price per share.

	Zero Debt
NI:	1,000,000
I	0
NE	1,000,000
Ke	0.10
MVE	1,000,000
MVD	0
MVF	10,000,000

The new implied overall capitalisation rate is $\frac{1,000,000}{10,000,000} = .10$ or 10%

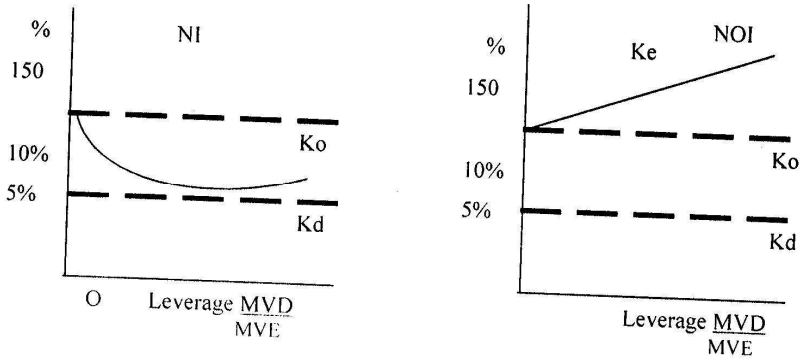


Fig. 4.1:

3.2.3 The Traditional Approach (The Mid-View)

The traditional approach is a compromise view between the *NI* and the *NOI* approaches. It believes that there exists an optimal capital structure and that a firm can increase its value or reduces its cost of capital by a judicious mix of debt and equity. The optimal capital structure occurs when the cost of capital is minimal, and the value of the firm is at the maximum. It argues that beyond some point in the debt to equity tradeoff, *Ke* rises at an increasing rate; and in addition *Kd* also rises beyond some point, with leverage.

Illustration E

We shall still use our hypothetical firm, but with slight modification. Assume ,just as before, that the firm has N3 million debt in its capital structure at 5 percent interest per annum, but it increases debt component to N6 million at 8% per annum. The net operating income still remains N1 million, and the equity capitalisation rates rises from 11.5 percent at a leverage level of N3 million to 14 percent, when the debt level rises to N6 million.

Given that these *Kd* and *Ke* levels differ from those obtained under the *NI* or *NOI* approaches, the valuation of the firm then becomes-

	5% N3 million debt	8% N6 million debt
NI: Net Operating Income	1,000,000	1,000,000
Less: Interest on debt	150,000	480,000
NE: Net Earnings for Shareholders	850,000	520,000
Ke: Equity Capitalisation rate	0.115	0.14
MVE: Market Value of Equity	7,391,304	3,714,286
MVD: Market Value of Debt	3,000,000	6,000,000

MVF: Total Market Value of Firm	10,391,304	9,714,286

The implied equity capitalisation rate is -

$$Ko = \frac{NI}{MVF} = \frac{1,000,000}{10,391,304} \quad \frac{1,000,000}{9,714,286}$$

$$= 9.62\% \quad = \quad 10.29\%$$

The traditional approach contends that the firm can lower its cost of capital and increase its value and share price by leverage.

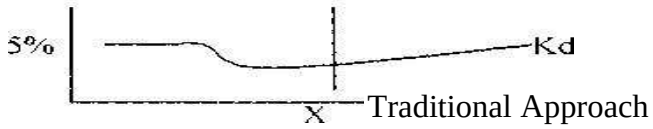
As can be observed from this example, without leverage (i.e. zero debt), the overall capitalisation rate *'ko"* is 10 percent. However, while investors will raise the equity capitalisation rate *ke*, as the firm becomes more risky with additional debt (leverage), the rise in *ke* does not totally wipe off the benefits of using low cost debt. Consequently the total value of the firm increases and the cost of capital decreases. For example, with N3 million in debt and 850.000 shares outstanding the market price per share will be N7,391.304 - 850.000 = N8.70b which contrasts with ^8.23 under the NOI approach.

However, the traditional approach shows that, beyond some point, both *Ke* and *Kd* rise as leverage increases. As we saw in the example, when leverage increased to N6 million, the total value of the firm decreased, and its cost of capital increased. The outcome is due to increases in *Ke* and *Kd*. We can deduce, from the above, that the optimal capital structure in this case, can be found before a leverage (or debt-to equity) ratio of N6,000,000 divided by 3,714.286 or 1.62.

Graphical Illustration

The traditional approach states that the cost of capital is not independent of the capital structure of the firm, and that there is an optimal capital structure.

(Point X) where the firm's marginal real cost of debt is the same as the marginal real cost of equity in equilibrium. At this point *Ko*, the weighted average cost of capital is very low.



Traditional Approach

SELF-ASSESSMENT EXERCISE 1

Marock Industries Limited has a net operating income of N1 million, and a N2 million debt, with 8% interest rate. Assuming the company pays no tax, using the *NI* approach, calculate the total value of the firm, and the implied overall capitalisation rate, if the equity capitalisation rate is 14 percent.

3.2.4 The Modigliani and Miller Hypothesis

Franco Modigliani and Merton Miller (1958), provided a behavioural analysis in support of the net operating income approach, i.e.- the independence of the valuation of the firm and its cost of capital from the firm's capital structure.

The M & M hypothesis is based on the following assumptions.

- There is an existence of perfect capital markets where securities are traded; where investors have access to free information, and transaction costs and securities are not divisible into infinite units. Investors behave rationally and can lend and borrow on equal terms and without restriction.
- The expected *NOI* of a firm is a random variable with a constant mean probability distribution and a finite variance. This implies that the expected values of the probability distributions of expected operating earnings, for all future periods, are the same as present operating earnings (Van Home, 1977).
- There are no income taxes.
- Firms are grouped into homogenous return classes and all firms, within each class, have identical degree of business risk.
- Firms are assumed to pay out 100% of their earnings in dividends.

Based on the above assumptions, M&M, strongly, support the Net Operating Income Approach, with three main propositions:

- that capital structure is irrelevant to the determination of a firm's value or its cost of capital. The total market value of a firm is given by capitalising the net operating income stream of a firm at a discount rate appropriate for its risk class. That the *Ko* is the
- appropriate discount rate.
  that *Ke* - the expected yield of a share of equity, is equal to the capitalisation rate of a pure equity stream, plus a risk premium equal to the difference between the pure equity capitalisation rate and *Kd* (the cost of debt), multiplied by the ratio of debt to equity *MVD/MVE*. Thus, *Ke* increases at a rate sufficient to wipe off the
- benefits of using cheaper debt capital.
  the cut-off rate for investment purposes is independent of the considerations as to how investment is financed. In other words, they posit a separation of investment and financing decisions of the firm.

Arbitrage Operation in the Capital Market:

Modigliani and Miller contend that the total risk facing security holders is not altered by changes in capital structure. Hence, the total value of the firm remains the same, irrespective of the financing mix. This argument is supported by the possibility of arbitrage operations in the capital market. According to Modigliani and Miller, arbitrage precludes perfect substitutes (e.g. two firms in the same homogenous risk class, but different only in capital structure), from selling at different prices in the same market.

Illustration F

Assuming that two firms, A and B, belong to a single risk class, identical in every respect, except that company A is not levered, while company B has N30,000 of 5% debenture in its capital structure. The valuations of the two firms are as follows, under the traditional Approach-

		A N'000	B N'000
NI:	Net Operating Income	10,000	10,000
I:	Interest on debt	0	1,500
NE:	Earning Available to Shareholders	10,000	8,500
Ke:	Equity Capitalisation rate	0.10	0.11
MVE:	Market Value of Equity	100,000	77,272
MVD:	Market Value of Debt	-	30,000
MVF:	Total Market Value of Firm	100,000	107,272
Ke:	Implied Equity Capitalisation rate	10%	9.3%
MVD/MVE	Debt-to-Equity ratio	0	38.8%

Modigliani and Miller, further contend that the values of the two firms, as given under the traditional approach, cannot be sustained for a long time as arbitrage will operate to bring the values of the two firms to be the same. This is how an arbitrage operation works.

Supposing that a rational investor holds 1 percent of company B, the levered firm, with a market value of N772.72, behaving rationally, he should act as follows:

- sell his shares in company B for N772.72
- borrow N300, at 5% interest (i.e. N15) to make his investment capital up to N1. Note the N300 personal loan is equivalent to 1 percent of the debt of company B - and his previous proportional ownership of the company.
- buy 1 percent of company A's shares for N1000

Before this arbitrage operation, the investor's expected return on investment in company B was 11 percent on a N772.72 investment, i.e. N85. His expected return on investment in Company A, the unlevered firm is 10 percent or N100 on an investment of N1000.

To determine his real return, he must deduct the interest on his personal loan of N300. His net return is as follows.

Return on investment in company A-	N100
Less interest charges on loan (300 x 0.05)	15
Net return	N85

It can be seen that his monetary return of N85 is the same for both investments, although his cash outlay of N700 (N1000 - N3000) is less than the N772.72 investment in company B; thus making company A more attractive under the condition. However, the action of many rational investors, making similar arbitrage transactions, will eventually push up the price of company A and lower its *Ke*, drive down the price of company B, increasing its *Ke*.

The process will continue until, at some point, there will be no further opportunity for anyone to reduce one's investment outlay and still achieve the same monetary return. At this equilibrium point, total value of the two companies will be the same, so also will be *Ko*, the average cost of capital. The principal argument of this proposition is that investors are able to reconstitute their former positions by off-setting changes in corporate leverage with changes in personal leverage, such that, the investment opportunities open to them are not altered by changes in the capital structure of the firms.

3.2.5 Determining a Firm's Optimal Capital Structure

Given the importance of an optimal capital structure to a firm, it is appropriate for us to know when a firm is operating at its optimal capital structure. It is unfortunate to state that a firm cannot determine this exactly. However, the tools of *EBIT - EPS* analysis and the theory of an optimal capital structure can help a firm decide an appropriate capital structure. We shall use an example to illustrate a 5-step procedure that can assist financial managers to make appropriate capital structure decisions.

Illustration G

Adaorah Departmental Stores has been, 100 percent, financed with equity funds, since the firm was established in 1990. While analysing a major expansion programme, the firm has decided to consider alternative capital structure. In particular, it has been suggested by management that the firm should use this expansion programme as an opportunity to increase long term debt to total assets ratio, from the current level of 0 percent, to a new level of 30 percent. Interest in the proposed new debt will amount to N100,000 per annum.

To analyse the above, we will use an Integrative Approach, as shown below.

Step 1: Compute the expected level of *KBIT,* after the expansion. Based on its past operating experience and a projection of the impact of the expansion, management estimated that the *EBIT* of Adaorah would be N500,000 per year after the expansion, under normal operating circumstance.

Step 2: Estimate the variability of this level of operating income. Based on past performance of the company, over several business cycles, the standard deviation of operating income is estimated to be N200,000 per year. (Note, operating income is assumed to be normally distributed or at least approximately so).

Step 3: Compute the indifference point between the two financing alternatives (i.e. add new debt or maintain the all equity capital structure). Using the techniques of *EBIT - EPS* analysis discussed earlier, the indifference point is computed to be N300.000.

Step 4: Analyse these estimates in the context of the risk the firm is willing to assume.

After considerable discussion, it has been decided that the firm is willing to accept a 25 percent likelihood that operating earnings in any year will

be below the indifference point and a 5 percent chance that the firm will have to report a loss in any year. In order to complete this analysis, it is necessary to compute the probability that operating earnings will be below the indifference point, in other words, the probability that *EBIT* will be less than N300,000. This is equivalent, on the standard normal curve, to-

$$Z = \frac{\text{N300,000-N500,000}}{\text{N200,000}}$$

= 1.0 (or 1.0 standard deviation, below the mean)

The probability that *EBIT* will be less than 1.0 standard deviation below the mean is 15.87%. This is determined from Table V (Normal Distribution). Thus, based on the indifference point criterion, the proposed new capital structure appears acceptable, since 15.87 percent is less than the level of risk, 25 percent, acceptable to the firm.

Now, the probability of incurring losses must also be considered. This is the probability that *KBIT* will be less than the required interest payments of
N100,000. On the standard normal curve, this is equivalent to-

$$Z = \frac{\text{N300,000 – N500,000}}{\text{N200,000}}$$

= -2,000 (or 2.0 standard deviation below the mean)

The probability that *EBIT* will be less than 2.0 standard deviation, below the mean, is 2.28 percent, as shown in the table V - standard normal curve. Again, based on this criterion, the proposed new capital structure is acceptable, as the calculated probability of 2.28 percent is below the 5 percent risk level acceptable to the firm.

Where, either or both of these tests, shows the proposed capital structure to have an unacceptable level of risk, the analysis will have to be repeated for lower levels of debt, rather than the originally proposed 30 percent. Conversely, since the proposed capital structure has exceeded the standards set by the firm, management may want to consider, higher levels of debt, for instance 35 percent or 40 percent.

Step 5: Examine the market evidence to determine whether the proposed capital structure is too risky in relation to the following:

- the firm's level of business risk,
- industry norms for leverage ratios and coverage ratios,
- the recommendations of the firm's investment bankers or issuing house.

We should note that this step is taken only after the proposed capital structure has met "internal" tests for acceptability. As earlier mentioned, by way of caution, financial leverage is a two- edged sword- it enhances expected returns, but it also increases risk. If the increase in perceived risk exceeds the increase in expected returns, the firm's weighted cost of capital may rise instead of decreasing, and the firm's value will consequently fall. The final choice of capital structure requires a careful analysis of expected future returns, and risk, in relation to other 11 'ins within the industry.

SELF-ASSESSMENT EXERCISE 2

The BG Glass Company is planning to raise £4100 million of new capital. They currently have N20 million of 5 percent debt outstanding, together with 5 million shares. They can raise the additional funds by using either 10 percent debt or issuing an additional 5 million shares at N20 per share. Their marginal tax rate is 40%. Determine, algebraically, the company's indifference level of *EBIT*.

4.0 CONCLUSION

In conclusion, we have affirmed long term debt as the composition of capital structure. However, the final choice of capital structure requires a careful analysis of expected future returns, and risk, in relation to other 11 'ins within the industry.

5.0 SUMMARY

Capital structure is the proportion of long term debt, preferred stock and ordinary shares (equity) used to finance a firm. It is thus, a sub-set of a firm's financial structure which, in addition, includes the amount of current liabilities (working capital) as well. We have also observed that:

- determing the appropriate capital structure for a firm leads to a minimum cost of capital and a maximum value for the firm's shares.
- a basic concern of capital structure analysis is the proportion of debt and equity in financing a firm.
- the two extreme views of capital structure are the Net Income Approach (NI) and the Net Operation Income Approach (NOI). Both approaches are concerned with three keys rates - cost of debt (kd), cost of equity (ke) and the overall cost of capital (ko).
- according to the *NI* approach, capital structure matters since a firm can increase its value or lower its cost of capital by increasing the proportion of debt in its capital structure. The *NI*

capitalises at an overall capitalisation rate (ko) to obtain the total market value of the firm.

- the Traditional Approach takes a middle view between the two extremes and believes that there exists an optimal capital structure. This optimal capital structure occurs where the cost of capital is at a minimum and the value of the firm is at a maximum.
- the Modigliani and Miller (MM) hypothesis provide a behavioural analysis in support of the *NOI* Approach. They strongly argue for the independence of the firm's value from the composition of its capital structure or cost of capital. They use arbitrage operations and other arguments to illustrate their proposition.
- the after-tax cost of debt is less than the cost of equity, and if the firm's cash flows from operations are taken as given, discounting them at the lowest possible cost of capital will maximise the value of the firm. In other words, the least cost capital is optimal
- exact determination of the optimal capital structure is not ordinarily possible, since it cannot be known, for certain, how the market will be in terms of *ke* and *kd*

ANSWER TO SELF-ASSESSMENT EXERCISE 1

To determine the optimum capital structure, we find the weighted cost of capital at each capital structure and choose the capital structure with the minimum weighted cost.

(Debt fraction) x (Kd(l-t) + (Equity Fraction) x (Ke) = Ka

0.00	-	1.00	15.0 =	15.00
0.10	8.0	0.90	15.1 =	14.39
0.20	8.2	0.80	15.2	13.80
0.30	8.4	0.70	15.4	13.30
0.40	8.6	0.60	15.6	12.80
0.50	9.0	0.50	14.0	11.50
0.60	10.0	0.40	17.0	12.00

ANSWER TO SELF-ASSESSMENT EXERCISE 2

The minimum cost of 11.50 occurs with a capital structure consisting of 50% debt and 50% equity and that is the optimal capital structure.
The indifferent point occurs when *EPS* is the same under either plan. This occurs when we have:

$$\frac{\text{EBIT - Interest Using Debt}}{\text{Shares Using Debt}} = \frac{\text{EBIT - Interest Using Equity}}{\text{Shares Using Equity}}$$

If the firm issues new equity interest is N1 million on the existing debt and the number of shares increases to 10 million. If new debt is issued, interest increases by 10% of N100 million to N1 million and the number of shares remains at 5 million. Thus we have-

$$\frac{EBIT - 11,000,000}{5,000,000} = \frac{EBIT - 1,000,000}{10,000,000}$$

This gives an EBIT level of N21 million.

6.0 TUTOR- MARKED ASSIGNEMENT

Majaro Bakery has determined the following costs of debt and equity capital for various capital structures.

Debt fraction	Ke	kd (1-t)
0.00	15.0	-
0.10	15.1	8.0
0.20	15.2	8.2
0.30	15.4	8.4
0.40	15.6	8.6
0.50	14.0	9.0
0.60	17.0	10.0

Determine the company's optimal capital structure and the associated cost of capital.

7.0 REFERENCES/FURTHER READING

Franco, Modigliani & Merton, Miller (1958).

UNIT 5 LEVERAGE/GEARING

CONTENTS

1.0 INTRODUCTION

In the previous unit, we discussed about capital structure. As we saw in that unit, capital structure is defined as the composition of various sources of funds (long term debt, preferred stock, and equity) that constitute a firms capital. A fundamental issue regarding capital structure has to do with whether a firm should use debt or equity to finance its operations. (In other words, the degree of leverage in a firm is financing). In finance, leverage refers to a firm's use of assets and liabilities having fixed costs in an attempt to increase potential returns to shareholders. The concepts of operating and financial leverage are useful to financial analysis and control, this is our focus in this unit.

2.0 OBJECTIVES

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

- describe leverage and income statement
- explain the place of fixed and variable costs in the analysis of leverage.
- distinguish between operating and financial leverage.
- explain break-even analysis and its uses
- calculate degrees of operating, financial and combined leverage.

3.0 MAIN CONTENT

3.1 Leverage and Income Statement

We shall use income statement to illustrate the concept of leverage. To do this, we present the income statement of Alao Manufacturing Company in two formats (i.e. the traditional and revised presentation format). The traditional format shows various categories of costs as separate entries. Operating costs include such items as cost of goods sold, general, administrative and selling expenses, interests and preferred dividends, which represent capital costs listed separately, and income taxes. The revised format, which is more useful in leverage analysis, divides the firm's operating costs into two categories - variable and fixed.

a. Fixed and Variable Cost

On the short run, certain operating costs within a firm vary directly with the level of sales, while other costs remain constant, regardless of changes in the level of sales. Costs which move in close relationship to changes in sales are termed variable costs. They are tied to the number of units produced and sold by the firm, rather than to the passage of time; they include raw material and direct labour costs, as well as sales commissions.

On the short run, certain other operating costs are independents of sales or output levels. These are termed costs and are primarily related to the passage of time, depreciation, rent, insurance, lighting and energy bills, property taxes, and the salaries of top management. These are all examples of fixed costs. If a firm expects to keep functioning as a going concern, it must continue to pay these costs, regardless of its sales level. A third, but uncommon category,, semi-variable costs can also be considered. Semi-variable costs are costs that increase, bit by bit, as output is increased.

Table 5.1: Traditional and Revised Income Statements of Alao Manufacturing Company

1. Trading Income Statement: Format

	Operating	Sales	N5,000,000
Leveraged	Less cost of goods sold		2,500,000
	Selling, admin. & general exp.	1,500,000	
	Total operating costs		4,000,000
	Earning before interest and taxes (EBIT)		1,000,000
Financial	Earning before interest and taxes (EBIT)		150,000
Leverage	Less income taxes (40% rate)		300,000
	Less Preferred Stock dividends		150,000
	Earning available to common stock holders		300,000
	Earning Per Share (EPS) -	100,000	
	Shares		N3.00

2. Revised Income Statement Format:

Sales		N5, 000,000	
Operating			
Leverage	Less variable operating cost	3,000,000	
	Fixed variable operating	1,000,000	
	Total operating costs	4,000,000	
	Earning taxes (EBIT)		1,000,000
Financial	Less fixed capital costs (interest)		250,000
	Earnings before taxes (EBIT)		750,000
Leverage	Less income taxes (variable), 4% rate		300,000
	Earnings after tax TEAT)		450,000
	Less fixed capital costs(Preferred Stock div)		150,000
	Earning available to common stock-holders		300,000
	Earning per share (EPS)		100,000
	Shares		N300

On the long run, all costs are variable. In time, a firm can change the size of its physical facilities, and the number of management staff, in response to changes in the level of sales. Some have both fixed and variable components. Cost for utilities such as water, electricity, frequently, fall into this category, while part of a firm's utility costs (such as electricity) are fixed and must be paid regardless of the level of sales or output. Another part is variable in that it is directly tied to sales or production levels. In the revised format of Alao Company's income statement, these are divided into their fixed and variable components, also included in their respective categories of operating costs. We also note that in the revised format, both interest charges and preferred stock dividends represent fixed capital costs. These costs are contractual in

nature, and thus, are independent of a firm's level of sales or earnings. Also, we note that income tax represents a variable cost, which is a function of earnings before tax.

3.2 Operating and Financial Leverage

When a firm incurs either fixed operating costs or fixed capital costs, it is said to be using leverage. Fixed obligations allow the firm to magnify small changes into larger ones - (e.g. small push on one end of an actual lever, results in a large "lift" at the other end).

Operating leverage has fixed operating costs as its base. When a firm incurs fixed operating costs, a change in sales revenue is magnified into a, relatively, larger change in earnings before interest and taxes (EDIT). The multiplier effect resulting from the use of fixed operating costs is known as the degree of operating leverage (DOL).

Financial leverage has fixed capital costs as its (base). When a firm incurs fixed capital costs, a change in *EBIT* is magnified into a larger change in earnings per share (EPS). The multiplier effect resulting from the use of fixed capital costs is known as degree of financial leverage (DFL).

3.3 Break-even Analysis

Many of the planning activities that take place within a firm are based on anticipated projected output levels. The study of the inter-relationships between a firm's sales, costs, and *EBIT*, at various output levels, is known as cost-volume-profit analysis or break-even analysis.

The term break-even analysis is, somehow, misleading, since this type of analysis is also used to evaluate and answer many other questions besides those dealing with the break-even output level of a firm. For example, break-even analysis is also used to evaluate the financial profitability of new firms and new product lines. In addition, it is a valuable analytical tool for measuring the effects of changes in selling prices, fixed costs, and variable cost on the output level, which must be achieved, before the firm can realise operating profits.

A break even analysis of a firm can be developed either, graphically or algebraically (or a combination of the two).

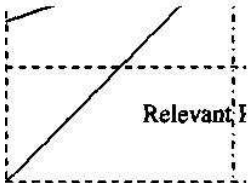


Fig 5.1:

(a) Graphic Method

Figure 5.1 is an example of a basic linear break-even analysis chart. Cost and revenues (in naira) are plotted on the vertical axis, while output (measured in units) is plotted on the horizontal axis. The total revenue function (TR), represents the total revenue that the firm will realise at each output level, given that the firm charges a constant selling price *'P'* per unit of output. Similarly, the total (operating) cost function (TC) represents the total cost the firm will incur at each output level. Total cost is computed as the sum of the firm's fixed costs *'F'*, which are independent of the output level, plus the variable costs, which increase at a constant rate *'V'* per unit of output. There are the assumptions of a constant selling price per unit, *'P'* and a constant variable cost per unit *'V'* which yield the total revenue and total cost functions. These linear relationships are only valid, however, over some relevant range of output values, such as from Qi to Q_2, as in figure 5.1 above.

The break-even point occurs at point 'Q^b" in figure 13.1 where the total revenue and total cost functions interest. If a firm's output level is below this break-even point - i.e. if *TR* < *TC* - it incurs operating losses, defined as negative *EBIT*. If the firm's output level is above this break-even point i.e. if *TV* > *TC*, it realises operating profits, defined as positive *EBIT*. Determining a firm's break-even point, graphically, involves three steps thus:

Step 1: drawing a line through the origin with a slope of *P* to represent the *TR* function

Step 2: drawing a line that intersects the vertical axis at *F* and has a slope of *V* to represent the *TC* function

Step 3: determining the point where the *TR* and *TC* lines intersect, dropping a perpendicular line to the horizontal axis and noting the resulting value of Qb.

(b) Algebraic Method

To determine the break-even point algebraically, we set the total revenue (TR) and total (operating) cost functions equal to each other and solve the resulting equation for the break-even volume. Total revenue is equal to the selling price per unit, multiplied by the output quantity:

$$TR = PxQ$$

Total operating cost (TC) is equal to fixed plus variable costs, where the variable cost is the product of the variable cost per unit, times the output quantity:

$$TC = F + (VxQ)$$

Setting the total revenue and total cost expressions equal to each other and substituting the break-even output Qb for Q results in:

$$TR = TC$$
$$\text{Or } PQb = F+VQb$$

Finally, solving equation 12.3b for the break-even output Qb yields

$$PQb-VQb = F$$
$$(P-V)Qb = F$$
$$Qb = \frac{F}{(P-V)}$$

The difference between the selling price per unit and the variable cost per unit, *(P-V)* is sometimes referred to as the contribution margin per unit. It measures how much each unit of output contributes to meeting fixed costs and operating profits. Thus, it can also be said that the break-even output is Break-even analysis can also be performed in terms of naira value of sales, rather than, units of output. Thus, the break-even sales volume in naira, can be determined by the following expression-

$$\frac{F}{1-V/P} Sb = F$$

Where, *V/P*, is the variable cost ratio (i.e. variable cost per naira of sales).

Occasionally, the analyst is interested in determining the output quantity at which a target profit (expressed in naira) is achieved. An expression similar to equation 13.5 can be used to find such a quantity.

$$\text{Target} = \frac{\text{fixed cos t + t arg et profit}}{\text{contributionm m arg in per unit}}$$

Illustration A

Equations 12.4, 12.5 and 12.6 can be used to perform break-even analysis for Alao manufacturing Company, for the year ending December 31, 2000. Let us assume that the firm manufactures one product which it sells for N250 per unit. The current output *'Q'* is obtained by dividing total naira sales (N5000,000) by the selling price (N250 per unit) to obtain 20,000 units per annum. Its variable (operating) costs per unit *'V'*, are determined by dividing total variable costs (N3000,000) by current output (20,000) to obtain N150 per unit. The firm's fixed costs- *F* are given in table 12.1 as N1, 000,000. Substituting these figures into equation 12.4 yields the following break-even output.

$$Qn = \frac{N1,000,000}{N250 - N150} = 10,000 \text{ units}$$

Alao's break-even output can also be determined, graphically, as shown below.

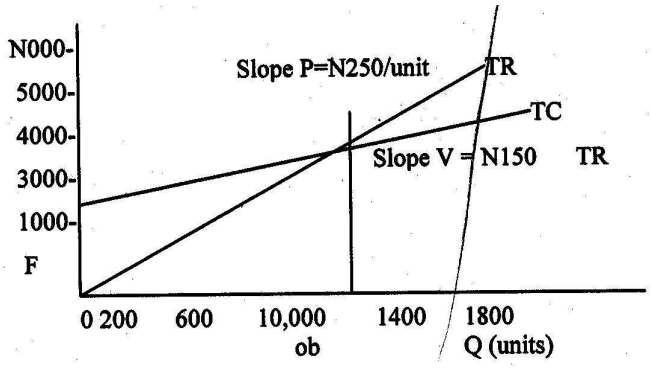


Fig.5.2:

Since a company's break-even output is dependent upon a number of variables –particularly, the price per unit and variable (operating) costs per unit - the company may wish to analyse the effects of changes in any one of the variables on the break-even output. For example, it may wish to consider either of the following:

- changing the selling price.
- substituting fixed cost for variable costs.

Assuming, for example, that Alao Company increased the selling price per unit *'P'* ,by N25 to N275. Substituting this figure into equation 13.4 gives a new break even output:

$$Q^{1}_{b} = \frac{N1.000.000}{N275\text{-}N150} \quad 8000 \text{ units}$$

This is illustrated in figure 5.3 below, where an increase in the price per unit increases the slope of the total revenue function- *TR* , reducing the break-even output.

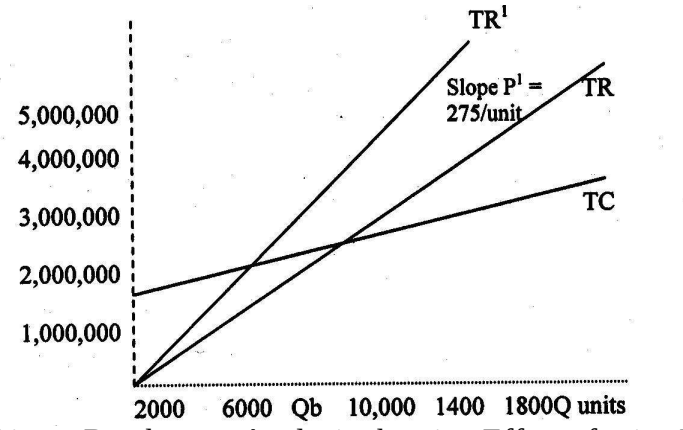


Fig 5.3: Linear Break-even Analysis showing Effect of price Increase

Also, instead of increasing the selling prices per unit, Alao's management may decide to substitute fixed cost for variable costs in some aspect of the company's operations. For example, as labour wage rates increase with time, many firms seek to reduce operation cost through automation, which in effect, represents the substitution of fixed cost capital equipment for variable cost-labour cost's by N25 by purchasing N1000,000 in additional machinery. Assume further that the new machinery depreciates over a 10 year life, using straight line method to a zero salvage value, given these conditions, annual depreciation of the new equipment will be N1000,000/10 = N1000,000; and the firm's new level of fixed costs *Fl* will be N1000,000 + N1000,000 = N11000,000. Variable cost's per unit, V^{1} would be N150-N25 = N125. Substituting P = N250 per unit, V^{1} = N125 per unit, and F = N1,100,000 into equation 6.5 yields a new break-even output thus:

$$Qb^{1} = \frac{N1,100,000}{(N250\text{-}N125)}$$

$$= 8800 \text{ units}$$

3.4 Degree of Operating Leverage (DOL)

The degree of operating leverage (DOL) of a firm is defined as the multiplier effect from the firm's use of fixed operating costs. In particular, *DOL* can be defined as the percentage change in earnings, before interest and taxes (EBIT), resulting from a given percentage change in sales or-

$$\text{DOL at } X = \frac{\text{Percentage change in EBIT}}{\text{Percentage change in sales}}$$

This can be re-arranged as follows:

$$\text{DOL at } X = \frac{\text{D EBIT}}{\text{EBIT}}$$

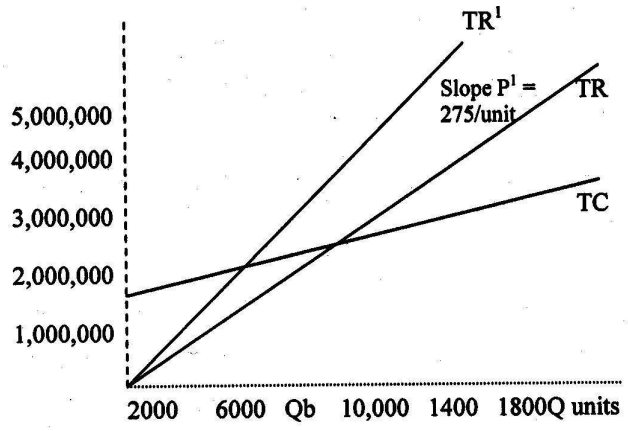


Fig. 5.4:

Where D *EBIT* and D Sales refer to changes in the firm's *EBIT* and sales levels respectively. It is noteworthy to state that since a firm's *DOL* differs at each sales (output) level, it is therefore necessary to state, specifically, the sales (or output level), point *X* at which operating leverage is measured. Using the revised income statement presented in table 5.1, for example, we find that Alao manufacturing company's variable operating costs is N3,000,000 at the current sales level of N5000,000. Therefore, the firm's variable (operating) cost ratio is N3,000,000/500,000 or 60 percent.

Assuming the firm increases sales by 10 percent to N5500,000 while keeping fixed operating costs constant at N1000,000, and variable (operating) cost ratio at 60%, it can be seen from table (5.2) below that this will increase the firm's earnings, before interest and taxes *(EBIT)* to

N1,200,000. Substituting the new sales figure of N5,500,000 and the new *EBIT* figure of N1,200,000, into equation (12.6) will yield the following *DOL*-

$$\text{DOL at N5,000,000} \quad \frac{\text{N1,200,000} - \text{N1,000,000}}{\text{N1,000,000}}$$

$$\frac{\text{N5,500,000} - \text{N500,000}}{\text{N5,000,000}}$$

$$= \frac{\text{N200,000}}{1{,}000{,}000} \times \frac{5{,}000{,}000}{500{,}000}$$

$$= 2.0$$

We can interpret a *DOL* of 2.0 to mean that each 1 percent change in sales from a base sales level of N5000,000 will result in a 2 percent change in *EBIT* in the same direction as the change in sales. Thus, a sales increase of 10 percent, will result in a 20% increase in *EBIT*. Similarly, a 10 percent decline in sales will produce a 10 percent x 2 or decline in *EBIT*.

Alternatively, *DOL* may be calculated by means of another set of equation which eliminates the need for two different levels of *EBIT* as in equation (12.6). Thus, *DOL* may be expressed in relation to sales, variable costs and *EBIT* as follows.

$$\text{DOL at X} = \frac{\text{Sales} - \text{Variable Costs}}{\text{EBIT}}$$

Using the data from table 5.1, on Alao Manufacturing Company, equation 21.7 yields:

$$\text{DOL at N5,000,000} = \frac{\text{N5,000,000} - \text{N3,000,000}}{\text{N1,000,000}}$$

$$= 2.0$$

This is the same result we arrived at using equation

A company's *DOL* is influenced by the nature of the production process. Thus, if a company uses large labour - saving equipment in its operations, it tends to have a relatively high fixed operating costs, and relatively low variable operating costs. Such structure will yield a high *DOL* which will result in large operating profits (positive EBIT) when sales are high, and large operating losses (negative EBIT) when sales are low.

DOL AND BREAK-EVEN ANALYSIS- the set of variable defined earlier on break-even analysis, can also be used to develop a formula for determining a company's *DOL* at any give output level. Given that sales are equivalent to *TR or PXQ*, variable cost is equal to *VXQ*, and *EBIT* is equal to total revenue (TR), less total (operating) cost, or (PxQ) - F - (VxQ). We can substitute these values into equation 12.7 to obtain the following expression for *DOL*:

$$\text{DOL at } Q = \frac{(PxQ) - (VxQ)}{(PxQ - F - (VxQ)}$$

OR

$$\text{DOL at } Q = \frac{(P-V)Q}{(P - V)\,Q - F)}$$

Table 5.2

Alao Manufacturing Company: Effect on earnings per share of a 10 percent Increase in Sales.

Year Ending December 31,.20……..x

Sales	N5,500,000
Less Variable Operating costs (0.60 x N5,5 million)	3,300,000
Total operating costs	1,000,000
Fixed operating costs	4,300,000
Earnings before interest and taxes (EBIT)	1,200,000
Less Fixed capital cost (interest)	250,000
Earnings after tax (ETB)	950,000
Less income taxes (variable) 40% rate	380,000
Earnings after tax (EAT)	570,000
Less fixed capital costs (Preferred Stock Dividends)	150,000
Earnings available to ordinary shareholders	420,000
Earnings per share (EPS) - 100,000 shares	N4.20

In discussing break-even analysis for Alao Manufacturing Company earlier, we determined the parameters of the break-even model to be as follows:

P = N250/units, V = N150/unit and F = Nl,000,000. Therefore, substituting these values into equation 13.8, in relation to the respective output levels, will yield the *DOL* value shown below in table 5.3.
Table 5.3

Alao Manufacturing Company: DOL at various Output Levels:

Output Q	Degree of Operating Leverage DOL
0	0
2,000	-0.25
4,000	-0.67
6,000	-1.50
8,000	-4.00
10,000	
12,000	+6.00
14,000	+3.50
16,000	+2.67
18,000	+2.25
20,000	+2.00

SELF-ASSESSMENT EXERCISE 2

Sigma Club runs Saturday movies for children, charging ten kobo gate fee per child. The fixed costs are N40 per weekend for film rental and cleanup. The Sigma Club also sells candy, coke and popcorn, with a variable cost ratio (variable cost divided by selling price of 0.40). If the average child buys N0.75 of junk food, what is the break-even number of children?

3.5 Financial Leverage and Financial Risk

Financial leverage occurs whenever a firm uses funds having fixed costs in its investment operations. Firm's try to employ fixed cost capital in their operations in order to magnify the earnings available to ordinary share-holders; and the main sources of such fixed cost capital are debt and preferred stock. Fixed costs represent contractual obligations which the company must fulfill, no matter the level of its *EBIT*. However, in case of serious financial distress, firms may be allowed to omit preferred stock dividend payments. This is done with undesirable consequence for the firm.

A company's financial leverage represents the change in earnings per share (EPS), resulting from a given change in *EBIT*. This is illustrated in figure 5.6 below.

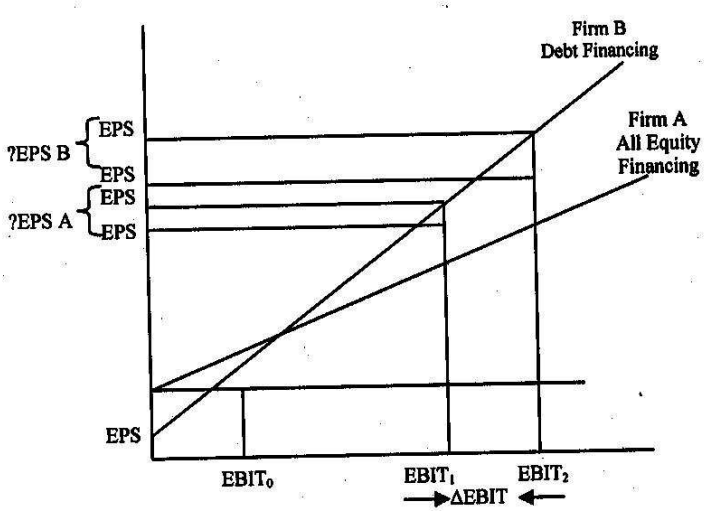


Fig 5.6:

Line B represents a firm which uses debt or other sources of fixed cost capital. This increases the slope of the *EPS - EBIT* line, such that a given change in *EBIT* leads to a more than proportionate change in *EPS*. It can equally be seen, from figure 5.6 above, that the use of financial leverage magnifies returns, both positively and negatively, to the shareholder. Using Alao Manufacturing Company's data, we can also illustrate the effect of financial leverage, as presented in table 5.4 below.

Table 5.4: Alao Manufacturing Com company: EPS at Alternative Levels of EBIT

Year Ending December 200 x		=	=	=	=
EBIT	N400.000	N800,000	N 1,000,000	Ml, 2m	N1.6m
Less Interest. Exp	250,000	250,000	250,000	250,000	250,000
EBT	150,000	550,000	750,000	950,000	135,000
Less Tax (40%)	60,000	220,000	300,000	350,000	540,000
EAT	90,000	330,000	430,000	570,000	810,000
Less Preferred Dividend	150,000	150,000	150,000	150,000	150,000
Earning -available to shareholders	60,000	150,000	300,000	420,000	660,000
EPS	-N.6,00	N1.80	N3.00	N4.20	N6.60

It can be seen from the above that a 20 percent increase in Alao's *EBIT* from N1000,000 to N1,200,000 results in a 40 percent increase in *EPS* from N3.0 to N4.20 (4.20-3,00/3,00 = 0.4). Likewise, a 20 percent decrease in *EBIT* from N100,000 to N800,000 yields a 40 percent decrease in *EPS* from N3.00 to N1.80.

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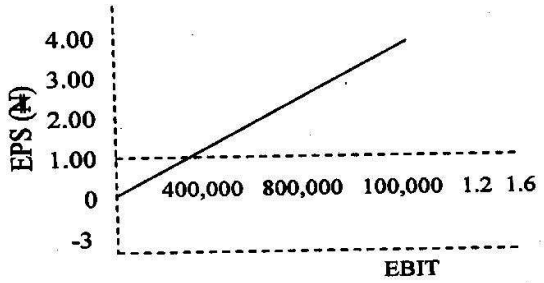

Fig. 5.7: Below is an *EPS-EBIT* Graph for Alao Manufacturing Company

3.6 Degree of Financial Leverage (DFL)

The degree of financial leverage of a company (DFL) is defined as the percentage change in earnings per share (EPS) resulting from a given percentage change in *EBIT*.

$$\text{DEL at X} = \frac{\text{Percentage change in EPS}}{\text{Percentage change in EBIT}}$$

Which can be re-arranged as follows:

$$\text{DFL at X} = \frac{\text{EPS}}{\text{D EPS}} \quad \text{EBIT}$$

Where *AEPS* and *AEBIT*, refer to changes in *EPS* and *EBIT*, respectively. Since a firms *DEL* is different at each *EBIT* level, it is necessary to indicate, precisely, the *EBIT*, point X at which financial leverage is being measured,

Based on the data given in table 5.4, we can compute the degree of financial leverage used by Alao Manufacturing Company. As given in that table, the firm's *EPS* level is N3.00 at an *EBIT* level of N1000,000, while at *EBIT* level of N1.200,000, the *EPS* is N4.20. Therefore, substituting these values into equation 13.9, gives the following.

$$\text{DFL at N1,000,000} = \frac{\text{N4.20} - \text{N3.00}}{\text{N3.00}} \Big/ \frac{\text{N1,200,000} - \text{N1,000,000}}{\text{N1,000,000}}$$

$$= \frac{\text{N1.20}}{\text{N2.00}} \times \frac{100{,}000}{\text{N200,000}}$$

$$= 2.0$$

A *DFL* of 2.0 implies that a 1 percent change in *EBIT* from a base *EBIT* level of N1,000,000 will result in a 2 percent in *EPS* in the same direction as the *EBIT* changes. In other words, a 10 percent increase in EBIT will result in a 10percent x 2 = 20 percent increase in *EPS*. Also, a 10 percent decline in *EBIT* will result in a 20 percent decline in *EPS*. The larger a firm's *DFL*, the greater the magnification of EBIT change into EPS changes.

Equation 13.9 can be simplified by eliminating the need for two *EBIT*, *EPS* projects by the use of the following relationships.

$$\text{DFL at } X = \frac{\text{EBIT}}{\text{EBIT-I-DP/(l-t)}}$$

Where *I* is the company's interest payments, *Dp* is the company's dividend payments, and *t* is the company's marginal income tax rate, and *X* is the level of *EBIT* at which the firm's *DFL* is being measured.

It is important to note that unlike interest payments, preferred stock dividends are not tax deductible. Thus, comparatively, one naira of preferred stock dividend costs the company more than one naira of interest payment. In order to bring the interest and preferred dividend payment to an equivalent pre-tax basis, we need to divide the preferred stock dividends by *(1-t)*

Going back to the data in table 5.1, for Alao manufacturing company, we have-
EBIT = N1000,000 I = N250,000, Dp = N150,000 and t = 40%.
Substituting these data into equation 13.10 gives: =^1000,000

DFL at ^1000,000 =N1000,000-N250,000 - N150,0007(1-0.40) = 2.0-
the same result we obtained using equation 13.9

In much the same way as a firm can change its *DOL* by raising or lowering fixed operating costs, a firm can equally change its *DFL* by increasing or decreasing fixed capital costs. The amount of fixed capital

costs incurred by a firm depends, principally, on the mix between debt and equity in the firm's capital structure.

Capital structure may be defined as all the permanent sources of capital available to a firm; including long term debt, preferred stock, and ordinary shares (equity). By permanent sources of capital we refer to those sources of capital having maturities of more than one year. In other words a firm which has a, relatively, large proportion of debt and preferred stock in its capital structure will have a relatively large fixed capital costs and, consequently, a high *DFL*. A high *DFL* implies a high financial risk for a firm.

3.7 Combined Leverage and Overall Risk

Combined leverage occurs whenever a firm, employs both operating leverage and financial leverage, in an effort to increase the returns to ordinary shareholders. It represents the magnification of sales increases (or decreases) into relatively larger earnings increases (or decreases), resulting from the firm's use of both types of leverage. The joint multiplier effect is known as the degree of combined leverage (DFL).

3.8 Degree of Combined Leverage (DCL)

A firm's degree of combined leverage (DCL) is defined as the percentage change in earnings per share (EPS), resulting from a given percentage change in sales (Output).

Mathematically, this is expressed as-

$$\text{DCL at X} = \frac{\text{Percentage change in EPS}}{\text{Percentage change in sales}}$$

This can be re-written, thus-

$$\text{DCL at} = \frac{\frac{\text{D EPS}}{\text{EPS}}}{\frac{\text{D Sales}}{\text{Sales}}}$$

Where D *EPS* and D sales refer to changes in a firm's *EPS* and Sales respectively, and X represents the level of sales at which the firms combined leverage is measured. The degree of combined leverage can also be expressed as being equal to the product of the degree of operating leverage and the degree of financial leverage.

This follows, logically, from the definitions of *DOL*, *DFL* and *DCL* thus:

To simplify, this can be expressed as-

DCL X = DOL X DFL

To further simplify the analysis, equation 13.7 and 13.10 can be substituted into equation 13.12 to obtain a new formula for determining the *DCL*, in terms of basic income statement quantities i.e.-

Equation 13.7: $DOL \text{ at } X = \frac{\text{Sales Variable Costs}}{\text{EBIT}}$

Equation 13.10: $DFL \text{ at } X = \frac{\text{EBIT}}{\text{EBIT} - I - Dp/(1-t)}$

$$DCL \text{ at } X = \frac{\text{Sales} - \text{Variables Costs}}{\text{EBIT} - I - Dp/(1-t)}$$

Equation 13.13 can be used to calculate Alao Company's *DCL*, using data from table 5.1. EPS = N3; at sales level of N5,500,000 and N4.20 at a sales level of N500,000. Substituting these values into equation 13.11 yields:

$$DCL \text{ at N5,000,000} = \frac{\text{N4.20} \quad \text{N3.00}}{3.00} = \frac{\text{N1.20}}{\text{N5,500,000} - 5,000,000} \times \frac{5,000,000}{\text{N3.00}} = \frac{500,000}{5,000,000} = 4.0$$

Alternatively, substituting- sales = N5000,000, variable costs = N3000,000 *EBIT* = N1000,000, *I* = N250,000, *Dp* = N150,000 and *t* = 40% or .40 into equation 13.13 give the same result for Alao's *DCL*. Thus,

DCL at N5,000,000 = N5,000,000 -N3,000,000
N1,000,000 - 250,000 - 450,0007(1-0.40)
= 4.00

Thus, *DCL* is interpreted to mean that each percentage change in sales, from a base sales level of N5,000,000 results in a 4 percent change in Alao's *EPS*.

SELF-ASSESSMENT EXERCISE 3

Maxis Leisure Crafts makes raffia crafts which they sell for N400 each. Their fixed costs are N75,000 and variable costs are N250 per craft. If

their sales level is 800 units, what is the percentage increase in *EBIT* and the degree of operating leverage, if sales increase to 20 percent?

4.0 CONCLUSION

In this unit, we have discussed, generally, the concepts of operating and financial leverage which are important concepts for financial planning and control. Specifically, operating leverage involves the use of assets having fixed costs, while financial leverage involves the use of sources of funds having fixed costs. A firm uses operating and financial leverage in the hope of earning returns in excess of the fixed costs of the assets and sources of funds, thereby increasing the returns to ordinary shareholders.

5.0 SUMMARY

In this unit, we have discussed the followings.

- The concept of leverage is useful in financial analysis and control. Leverage in finance, is defined as the use of assets and liabilities having fixed cost with a view to increasing potential returns to shareholders.
- The composition of a firm's operating and financial costs is seen on its income statement. It is therefore useful in preparing income statements to distinguish between fixed and variable costs.
- Fixed operating and financial costs give rise to operating and financial leverage. While fixed operating costs cause *EBIT* to be, relatively, more volatile than sales, fixed capital costs cause *EPS* to be, relatively, more volatile than *EBIT*.
- Break-even analysis, (also called Cost-Volume-Profit analysis) describes the relationship between sales, profits and costs.
- At break-even point, profit is zero, as total revenue equals total costs. The break-even level of output in units *(Qb)* is given as: *Qb - F/(P-V),* where *F* is fixed costs, *P* is price per unit and *V* is variable cost per unit. The difference between the selling price per unit and the variable cost per unit is called Contribution margin per unit.

ANSWER TO SELF-ASSESSMENT EXERCISE 1

$$Qb = \frac{F}{P-V} = \frac{40.00}{0.85 - 0.30} = 72.7 \text{ Children}$$

ANSWER TO SELF-ASSESSMENT EXERCISE 2

At 800 units, EBIT = PQ – VQ - F
= 400 (800) – 250 (800) – 75,000
=320,000 – 200,000 – 75,500
= N45,000

20% increase = 800 x 1.20 = 960 unit

At 960 units, EBIT = 400 (960) – 250 (960) – 75,000
= 384,000 – 240,000 – 75,000
= N69,000

Increase in EBIT = 69,000 – 45,000 = N24,000
Percentage increase in EBIT = 24,000 (100%) = 53.33%
45,000

$$\text{DOL} = \frac{\text{Percentage Increase in EBIT}}{\text{Percentage Increase in Sales}} = \frac{53.33}{20.00} =$$

6.0 TUTOR- MARKED ASSIGNMENT

Medalion Company earns a net profit of N2.4 million in a sales volume of N88 million. The Company's tax rate is 40 percent. It's only product sells at N20 each, out of which N15 is variable cost.

a) What is the annual cost of Medalion?
b) Calculate the break-even point, in Quantity and in monetary value.

7.0 REFERENCES/FURTHER READING

Brealey, R. & Moyer, S.C. (1991). *Principles of Corporate Finance. New* York: McGraw Hill Publishing Co.

Ezike, J.E. (2003). *Essentials of Corporate Financial Management.* Lagos: Jaylycent Communications.