NATIONAL OPEN UNIVERSITY OF NIGERIA
FACULTY OF MANAGEMENT SCIENCES

COURSE DEVELOPMENT

Course Code BFN721

Course Title Investment and Portfolio Management

Writer Dr. Okoh, Johnson Ifeanyi
Department of Financial Studies
Faculty of Management Sciences

Course Editor Assoc. Prof. Uwaleke, U. Joseph, ACIB, FCA
Department of Banking and Finance
Faculty of Administration

Programme Coordinator DR. OKOH JOHNSON IFEANYI
Department of Financial Studies
Faculty of Management Sciences

Head of Department Dr. Ofe. Inua

Department of Financial Studies
Faculty of Management Sciences

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INTRODUCTION

BFN 721: Investment and Portfolio Management is a first semester course, two credit unit, 700 level core courses. It will be available for all students offering postgraduate diploma programme in Banking and Finance in the Faculty of Management Sciences. The study covers portfolio selection as a problem of constrained utility maximization under conditions of uncertainty; Discussion of the different markets, along empirical evidence for validity theory; activities involved in making selection among alternative financial assets from the viewpoints of individuals and institutional investors; implications of the efficient market theory for the profitability of alternative investment; valuation of financial statements and analysis. The empirical evidence for various mean variance models of assets for evaluating portfolio performance were also emphasized.
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COURSE GUIDE

The course guide tells students briefly what the course is about, what course material will be used, and how you can work your way through the study material. It suggest some general guidelines for the amount of time you are likely to spend on each unit of the course in order to complete it successfully.

The guide also gives you some guidance on your tutor-marked assignments, which will be made available to you in the Study Centre. There are regular tutorial classes that are linked to the course. You are advised to attend these sessions.

WHAT YOU WILL LEARN IN THIS COURSE

The BFN 721 course consists of 5 Modules and 20 units. Specifically, the course discusses the following:
* Risk and uncertainty in portfolio management
* Portfolio theory
* Portfolio selection
*   Regulatory institutions in the Nigeria financial market – CBN
* Regulatory institutions in the Nigeria financial market –NDIC
* Regulatory institutions in the Nigeria financial market – SEC
* Money market operations
* **Capital market operations**
* Capital market investment as aid to Economic Development
* Current State of empirical evidence of models for evaluating portfolio performance
* Capital Asset Pricing Model (CAPM)
* Activities involved in making selection among alternative Financial Assets Investments
* Implication of Efficient Market theory for investors' profitability
* Valuation of financial statements and selection of alternative Financial Assets- analysis of Quoted equities
* Valuation of unquoted equities contents
* Payback Period (Non- Discounting Technique)
* Accounting Rate of Return (Non- Discounting Technique)
* The Net Present Value (NPV) (Discounting Technique)
* The Internal Rate of Return I (Discounting Technique)
* The Profitability Index (Discounting Technique)

COURSE AIMS

The aim of this course can be summarized as follows:
The study covers portfolio selection as a problem of constrained utility maximization under conditions of uncertainty; Discussion of the different markets, along empirical evidence for validity theory; activities involved in making selection among alternative financial assets from the viewpoints of individuals and institutional investors.

COURSE OBJECTIVES

To achieve the aims set out, the course sets overall objectives. Each unit also has specific objectives. The unit objectives are always specified at the beginning of a unit, you should read them before you start working through the unit. You may want to refer to them during your study of the unit to check your progress.

You should always look at the unit objectives after completing a unit. When you do that, you will ensure that you have followed the instructions in the unit. Below are the overall objectives of the course. By meeting these objectives, you should have achieved the aims of the course as a whole. On successful completion of the course, you should be able to:

- State the different types of Risk
- Discuss the risk Management Strategies
- Discuss the different methods of measuring Risk and Uncertainty
- Understand how to select the best Portfolio
- What Risk free investments are all about
- The main categories of investment
- What Portfolio management means
- How to measure the risk and return on portfolio

WORKING THROUGH THIS COURSE

To complete this course, you are required to read the study units, read set books and read other materials provided by the National Open University of Nigeria (NOUN). Each unit contains assignments which you are required to attempt and submit for assessment purposes. At the end of the course, there will be a final examination. The course should take you a total of 16 - 17 weeks to complete.

Below, you will find listed all the components of the course. What you have to do and how you should allocate your time to each unit in order to complete the course successfully on time. The list of all the components of the course is as presented.

COURSE MATERIALS

Major components of the course are:

- Course Guide
- Study Units
- Textbooks
- Assignment
- Presentation Schedule

Study units

The study units in this course are as follows:

MODULE 1

Unit 1   Risk and uncertainty in portfolio management
Unit 2   Portfolio theory
Unit 3   Portfolio selection

MODULE 2
UNIT 1**:** Regulatory institutions in the Nigeria financial market – CBN
Unit 2   Regulatory institutions in the Nigeria financial market –NDIC
Unit 3   Regulatory institutions in the Nigeria financial market – SEC

MODULE 3:
Unit 1   Money market operations
Unit 2: Capital market operations
Unit 3   Capital market investment as aid to Economic Development
Unit 4   Current State of empirical evidence of models for evaluating portfolio performance
Unit 5   Capital Asset Pricing Model (CAPM)

MODULE 4

Unit 1   Activities involved in making selection among alternative Financial Assets Investments
Unit 2   Implication of Efficient Market theory for investors' profitability
Unit 3   Valuation of financial statements and selection of alternative Financial Assets- analysis of Quoted equities
Unit 4:   Valuation of unquoted equities contents

MODULE 5
Unit1   Payback Period (Non- Discounting Technique)
Unit2   Accounting Rate of Return (Non- Discounting Technique)
Unit 3   The Net Present Value (NPV) (Discounting Technique)
Unit 4   The Internal Rate of Return I (Discounting Technique)
Unit 5   The Profitability Index (Discounting Technique)

Textbooks

At the end of each unit of the course, there are reference materials to which you can refer in order to increase the depth of your knowledge on the course. Please take this seriously.

Assignment Files

A number of assignments have been prepared to help you succeed in this course. They will guide you to have understanding and good grasp of the course.

Presentation Schedule

The presentation schedule included in your course materials also have important dates of the year for the completion of tutor-marked assignments (TMAs) and your attending to tutorials.

Remember, you are to submit all your assignments by the due date. You should guard against falling behind in your work.

Assessments

There are two aspects to the assessment of the course: first are the tutor-marked assignments and a written examination.

In tackling the assignments, you are expected to apply information, knowledge and techniques gathered 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**. The work you submitted to your tutor will count for 30 percent of your total course mark.

At the end of the course, you will need to sit for a final written examination of 'three hours' duration. This examination will also count for 70 percent of your total coursework.

TUTOR-MARKED ASSIGNMENTS (TMAs)

Each of the units in the course material has a tutor-marked assignment (TMA) in this course. You only need to submit five of the eight assignments. You are to answer all the TMAs and compare your answers with those of your course mates. However, you should ensure that you collect four (TMAs) from the Study Centre. It is compulsory for you to answer four (4) TMAs from the Study Centre. Each TMA is allocated a total of 10 marks. However, the best three (3) of the four marks shall be used as your continuous assessment score.

You will be able to complete your assignment from the information and materials contained in your reading, references and study units. However, it is desirable in all degree level education to demonstrate that you have read and researched more widely than the required minimum. Using other references will give you a broader viewpoint and may provide a deeper understanding of the subject.

FINAL EXAMINATION AND GRADING

The final examination for BFN721 will not be more than three hours' duration and has a value of 70 percent of the total course grade. The examination will consist of questions, which reflect the types of practice exercises and tutor-marked problems you have previously encountered. All areas of the course will be assessed.

Use the time between finishing the last unit and sitting for the examination to revise the entire course. You may find it useful to review your tutor-marked assignments and comments on them before the examination. The final examination covers information from all parts of the course.

COURSE MARKING SCHEME
Table showing the total course marking scheme is shown below:

ASSESSMENT	MARKS
Assignment 4 (TMAs)	Best three marks of the 4 TMAs @ 10 marks is 30 marks of the course = 40%
Final Examination	60% of overall course marks
Total	**100% of course marks**

COURSE OVERVIEW

This table brings together the units and the number of weeks you should spread to complete them and the assignment that follow them are taken into account.

Unit	Title of Work	Week Activity	Assessment (end of unit
	Module 1		
1	Risk and uncertainty in portfolio management	1	Assignment 1
2	**Portfolio theory**	1	Assignment 2
3	Portfolio selection	1	Assignment 3
	Module 2		
4	Regulatory institutions in the Nigeria financial market – CBN	1	Assignment 4
5	Regulatory institutions in the Nigeria financial market –NDIC		
6	Regulatory institutions in the Nigeria financial market – SEC		
	Module 3		
7	Money market operations	1	Assignment 5
8	Capital market operations	1	Assignment 6
9	Capital market investment as aid to Economic Development		
10	Current State of empirical evidence of models for evaluating portfolio performance	1	Assignment 7
11	Capital Asset Pricing Model (CAPM)		
	Module 4		
12	Activities involved in making selection among alternative Financial Assets Investments		

13	Implication of Efficient Market theory for investors' profitability		
14	Valuation of financial statements and selection of alternative Financial Assets- analysis of Quoted equities		
15	Valuation of unquoted equities contents		
	Module 5:		
16	Payback Period (Non- Discounting Technique)	1	Assignment 8
	Accounting Rate of Return (Non- Discounting Technique)		
	The Net Present Value (NPV) (Discounting Technique)		
	The Internal Rate of Return (Discounting Technique)		
	The Profitability Index (Discounting Technique)		
	Revision		
	Total	**20**	

HOW TO GET THE MOST FROM THIS COURSE

In distance learning, the study units replace the university lecturer. This is one of the great advantages of distance education. You can read and work through the specially designed study materials at your own pace, and at a time and place that suits you best. Think of it as you read the lecture notes and that a lecturer might set you some readings to do.

The study unit will tell you when to read your other materials. Jut as a lecturer might give you an in-class exercise, your study units also provide assignments for you to do at appropriate points.

Each of the study units follows a common format. The first item is an introduction to the subject matter of the unit, and how a particular unit is related with the other units and the course as a whole.

Next is a set of learning objectives. These objectives let you know what you should be able to do by the time you have completed the unit. You should use these objectives to guide your study. When you have finished the unit, you must go back and check whether you have achieved the objectives set. If you make a habit of doing this, you will significantly improve your chances of passing the course.

The main body of the unit guides you through the required reading from other sources. This will usually be either from **Reading Section** or some other sources.

Self-tests/assignments are interspersed throughout the end of units. Working through these tests will help you to achieve the objectives of the unit and prepare you for the examinations. You should do each of the assignments as you come to it in the study unit. There will also be numerous examples given in the study units, work through these when you come to them too.

The following is a practical strategy for working through the course. If you run into any trouble, telephone your tutor. When you need help, don't hesitate to call and ask your tutor to provide it. In summary:

(1)   Read this course guide.

(2)   Organise a study schedule. Refer to the course overview for more details. Note the time you are expected to spend on each unit and how the assignments relate to the unit. Important information e.g. details of your tutorials and the date of the first day of the semester is available. You need to gather together all information in one place, such as your diary or a wall calendar. Whatever method you choose to use, you should decide on and write in your own dates for working on each unit.

(3)   Once you have created your own study schedule, do everything you can to stick to it. The major reason that students fail is that they get behind with their coursework. If you get into difficulty with your schedule, please let your facilitator know before it is too late for help.

(4)   Turn to unit 1 and read the introduction and the objectives for the unit.

(5)   Assemble the study materials. Information about what you need for a unit is given in the 'Overview' at the beginning of each unit. You will always need both the study unit you are working on and one of your set books, on your desk at the same time.

(6)   Work through the unit. The content of the unit itself has been arranged to provide a sequence for you to follow. As you work through this unit, you will be instructed to read sections from your set books or other articles. Use the unit to guide your reading.

(7)   Well before the relevant due dates (about 4 weeks before the dates) access the Assignment file on the web and download your next required assignment. Keep in mind that you will learn a lot by doing the assignments carefully. They have been designed to help you meet the objectives of the course and, therefore, will help you pass the examination. Submit all assignments not later than the due dates.

(8)   Review the objectives for each study unit to confirm that you have achieved them. If you feel unsure about any of the objectives, review the study material or consult your tutor.

(9)   When you are confident that you have achieved a unit's objectives, you can then start on the next unit. Proceed unit by unit through the course and try to pace your study so that you keep yourself on schedule.

(10)   When you have submitted an assignment to your tutor for marking, do not wait for its return before starting on the next unit. Keep to your schedule. When the assignment is returned, pay particular attention to

your facilitator's comments. Consult your tutor as soon as possible if you have any questions or problems.

(11)   After completing the last unit, review the course and prepare yourself for the final examination. Check that you have achieved the unit objectives and the course objectives.

TUTORS AND TUTORIALS

There are eight (8) hours of tutorials provided in support of this course. You will be notified of the dates, times and location of these tutorials, together with the names and phone number of your tutor, as soon as you are allocated a tutorial group.

Your tutor will mark and comment on your assignments, keep a close watch on your progress and on any difficulties you might encounter as they would provide assistance to you during the course. You must mail your tutor-marked assignments to your tutor well before the due date (at least two working days are required). They will be marked by your tutor and returned to you as soon as possible. Do not hesitate to contact your tutor by telephone, e-mail, or discussion board if you need help. The following might be circumstances in which you would find help necessary.
Contact your tutor if:

- you do not understand any part of the study units or the assigned readings;
- you have difficulty with the tutor-marked assignments;
- you have a question or problem with an assignment or with your tutor's comments on an assignment or with the grading of an assignment.

You should try your possible best to attend the tutorials. This is the only chance to have face-to-face contact with your tutor and to ask questions which are answered instantly. You can raise any problem encountered in the course of your study during such contact. To gain the maximum benefit from course tutorials, prepare a question list before attending them. You will learn a lot from participating in discussions actively.

SUMMARY

As earlier stated, the course BFN 721, Investment Analysis and Portfolio management is designed to cover portfolio selection as a problem of constrained utility maximization under conditions of uncertainty.

We hope you enjoy your acquaintances with the National Open University of Nigeria (NOUN) and wish you every success in the future.

STUDY UNITS (INVESTMENT AND PORTFOLIO MANAGEMENT)

There are 5 Modules and 20 units in this course. The units should be studied carefully

MODULE 1

Unit 1   Risk and uncertainty in portfolio management
Unit 2   Portfolio theory
Unit 3   Portfolio selection

MODULE 2
UNIT 1: Regulatory institutions in the Nigeria financial market – CBN
Unit 2   Regulatory institutions in the Nigeria financial market –NDIC
Unit 3   Regulatory institutions in the Nigeria financial market – SEC

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Unit 1   Money market operations
Unit 2:   Capital market operations
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MODULE 1

UNIT 1   RISK AND UNCERTAINTY IN PORTFOLIO MANAGEMENT

CONTENTS

1.0   INTRODUCTION

Any business venture contains an element of risk. Risk means the possibility of an expected return not being realized. It is the possibility that the actual return (cash flows) from holding on investment will deviate from the expected return. This means that investors cannot predict the future with 100% precision, because returns from investment and the timing of those returns are not certain. The greater the magnitude of deviation of actual from expected return, the greater the risk of an investment. Investors always require a rate of return high enough to compensate them for risk and uncertainty in an investment.

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

- State the different types of Risk
- Discuss the risk Management Strategies
- Discuss the different methods of measuring Risk and Uncertainty

3.0 MAIN CONTENT

3.1 Different Types of Risk

3.1.1 Risk versus Uncertainty

Uncertainty refers to situation in which one has no knowledge of the future outcome of the investor's wealth maximization, whereas risk refers to cases in which the investor has a probability knowledge of the outcome of return on investment Since no one has perfect knowledge of the future, investors attempt to capture uncertainties in the future through risk specification.

Risk is created by a wide range of factors which include instability in the economy, competition, technological changes, market condition, labor condition and even some unexpected natural occurrences such as flood, drought, earthquake. Others include war, political instability, burglary, fire etc.

3.1.2 Systematic Versus unsystematic Risk

Generally, risk can be classified as either systematic or unsystematic

Systematic Risk

Systematic Risk, otherwise known as market risk or unavoidable risk are risks arising from the overall market condition. These risks affect all securities and consequently cannot be diversified away by any investor.

Examples are risk associated with:
1. Tax Reform
2. Changes in the economy
3. Exchange rate fluctuations
4. Interest Rate Fluctuations
5. Stock market crash
6. Earthquake
7. Changes in the world energy situation etc.

Unsystematic Risks

Unsystematic Risks otherwise known as avoidable risk are risk caused by factors that are unique to a particular company. These risks do not affect all securities and so can be reduced or even eliminated through efficient diversification.

Examples are risk due to:

- Strikes in a company
- Changes in management
- Competition
- Shortage of raw materials
- Changes in technology etc

Total risk associated with an investment is the addition of the systematic and unsystematic risk.

3.1.3 Other classifications of Risk

Risk associated with securities investment can be categorized as follows:

(i) **Business Risk:** This refers to the total risk associated with a company's business operation. Business risk is given for all firms operating in an economy

(ii) **Financial Risk:** This risk results from the capital structure of a company. It results from the way a company's operation is financed, and it arises when a company makes use of debt in its capital structure. Debt financing involves a fixed cost (interest) being paid from operating profits. Fall in profit as a result of rising cost of production or a fall in turnover will result to fixed interest charges taking a larger proportion of the profit leaving little or nothing for equity investors. Financial risk depends on the amount of debt financing the company uses, the more

(iii) **Purchasing power:** This is risk due to inflation and changes in price levels. Rising prices reduces the real values of return receivable from investment. In an inflationary environment, the longer the maturity of an investment, the greater the decline in the purchasing power of money and the higher the required compensation risk premium desired by investors.

(iv) **Liquidity Risk:** This Risk arising from the inability of a stock holder to dispose or divest his investment. This may be as a result of prevailing economic circumstances, market conditions, or poor performance of the investment.

(v) **Interest Rate Risk:** This refers to possibility of capital loss arising from increase in interest rates. It affects all investors in high-quality bonds regardless of whether the investor holds short-term or long-term bonds. However, changes in interest rate have the greatest impact on the market price of long-term bonds. Though changes in interest rate may have less effect on market price of short-term bonds, it nevertheless affects its interest

income, which may be observed to fluctuate from period to period as interest rate changes.

(vi) **Exchange Rate Risk:** This refers to risk arising from change in exchange rate. It is mostly applicable to investments with foreign interest. Foreign partners are susceptible to loss of income arising from devalued real income due for repatriation abroad as a result of revaluation of foreign currencies.

(vii) **Default Risk:** This refers to risk of losing interest and principal when investment matures.
Investors use higher discount rate to capitalize the expected cash inflows from the investment to compensate for the risk of possible loss.

(viii) **Re-Investment Risk:** Risk associated with the re-Investment of income from investment (interest or dividend) to generate more income.

(x) **Call Risk:** Risk arising from earlier call of a bond or earlier liquidation of an investment.

(xi) **Political Risk:** Risk associated with the political environment in a country as well as actions of government as it relates to economic policies on dividend declaration and payment, taxation on investment income etc The degree of political stability in a country determines level of new investment as well as income expectation from existing investment.

(xii) **Legal Risk:** Is the risk from changes in the laws with adverse effect on income accruable to investors.

(xiii) **Moral Risk:** Refers to the risk of dishonesty. For example insider's trading on shares in which management perpetuate fraud on its shareholders.

3.2 Risk Management Strategies

While the risk of investment can never be completely eliminated, they can be managed Risk Management is the process of identifying and evaluating the trade-off between risk and expected return, and choosing the appropriate course of action.

The process of risk management requires that:
(i)   You identify the risk
(ii)   You evaluate the risk

(iii) You manage the risk

Identifying Risk: An investor need to be quite sure of exactly what risk he is taking. What risks are associated with each investment options.

Evaluating Risk: There are various ways in which the risk of investment can be forecast and evaluated. The decision as to whether the risk exposure should be reduced will depend or investor attitude to risk (his degree of risk aversion) and the cost involved. Hedgers take position to reduce exposure to risk. Speculators take position to increase risk exposure.

Managing Risk: An Investor can manage risk exposure in four ways:
(i) Risk Retention
(ii) Risk Avoidance
(iii) Risk Reduction
(iv) Risk Transfer

Risk Retention

An investor can carry on many risks, once identified. The larger and more diversified his investments, the more likely it is to be able to sustain losses in some investments.

Risk Avoidance

Some investors prefer to keep away from risky investments. They prefer investing all their funds in risk - free securities like Government bonds and stocks. The problem here is that this category of investment has low return.

Risk Reduction

Investors can reduce risk through diversification. They can invest in companies in different industries or company of different sizes or product lines. Diversification can only help reduce unsystematic risk i.e risk associated with a particular company.

Risk Transfer

Where a risk cannot be avoided or reduced and is too big to be absorbed by an investor, it can be turned into someone else's problem or opportunity by "selling" or transferring it to a willing buyer. Most risks are two-sided. There may be a speculator willing to acquire the very risk that the hedger wishes to do away with.

Risk can be transferred through diversification, insurance or hedging.

Hedges can be created for risk in interest rate. (e.g interest rate option, forward rate agreement etc) commodity prices (e.g commodity options, commodity futures etc) and many more transaction.

Diversification as a Means of Risk Reduction

Individual Investments cannot be viewed simply in terms of their risk and return. The relationship between investments can be of three main types

(a)   **Positive correlation:** When there is positive correlation between investments, if one investment does well or badly, it is likely that others will perform likewise. For example, if you buy shares from a company selling umbrella and from another company selling rain coat, you would expect both companies to do badly in dry season.

(b)   **Negative correlation:** If one investment does well, the other will do badly and vice versa. Thus if you hold shares in one company selling umbrella and in another company selling pure weather, the weather will affect the companies differently.

(c)   **No Correlation:** The performance of one investment will be independent of how the other performs. If you hold share in Oil Company and also in an entertainment company, it is likely that there will be no relationship between the profit and returns from each.
The relationship between the returns from different investment is measured by the correlation coefficient (r) where:
r = +1 = high positive correlation
r = -1 = high negative correlation
r = 0 = No correlation

If investments show high negative correlation then by combining them in a portfolio, overall risk will be reduced. Risk can also be reduced by combining in portfolio, investments which have no significant correlation.

Investors Attitude to Risk

The implication of systematic risk and unsystematic risk are that:
(i)   if an investor wants to avoid risk altogether, he must invest in a portfolio consisting entirely of risk-free securities.

(ii)   If an investor holds shares in just a few companies, there will be

some unsystematic risk as well as systematic risk in his portfolio because he would not have spread his risk enough to diversity away the unsystematic risk. To eliminate unsystematic risk he must build up a well-diversified portfolio of investments.

(iii) If an investor holds a balanced portfolio of all the stock and share on the stock market, he will be incurring systematic risk, which is exactly equal to the average systematic risk in the stock market as a whole.

(iv) Share in individual companies will have systematic risk characteristics, which are different to the market average. Some share will be less risky and some more risky, than the stock market average.

(v) By accepting systematic risk, an investor will expect to earn a return, which is higher than the return on a risk free investment, to compensate them for systematic risk.

(vi) Investors should not require a premium for unsystematic risk because this can be diversified away by holding a well spread portfolio.

3.3 Methods of Measuring Risk and Uncertainty

The following are some techniques of taking risk into consideration when making investment decision.

(i) Risk-Adjusted Discount Rate
(ii) Certainty-Equivalents or conservative forecasts
(iii) Expected value
(iv) Standard Deviation of cash flows
(v) Co efficient of variation
(vi) State of the world model
(vii) Simulation
(viii) Finite Horizon

(i) **Risk-Adjusted Discount Rate**
Securities differ in their associated risk Investors expected return (as indicated by the discount rate) is therefore a function of its risk i.e the higher the risk, the higher the expected return and vice versa. The rate of discount is that which covers both the basic money cost element as well as risk premium i.e additional return required to compensate for uncertainty (risk) associated with the investment.

It is quite possible to synthesize all the securities available in the

market according to their risk and return combinations, by an imaginary line referred to as the security market line. It shows the rate of discount to be an increasing function of the risk-free rate (RF) and the risk premium **(RP)** i.e. **r = RF+RP**

(ii) **Certainty-Equivalents or conservative forecasts**
This method accounts for risk by adjusting the future (forecast) cash flows to the best estimate or certainty-equivalent. This is done by multiplying future cash flow by a risk-adjustment factor or certainty equivalent coefficient. The certainty equivalent coefficient assumes a value of between 0 and 1 and varies inversely with risk. These coefficient reflects the investors' confidence in obtaining a particular cash flow in the future, which may be subjectively or objectively determined certainty-equivalent coefficient ((ct) simply define the relationship between the certain cash flows and the risky cash flows

ie $C_t = \dfrac{\text{Certain flows}}{\text{Risky cashflows}}$

Illustration 1
An investment which costs N50,000 and has cash flows of N30,000 N20,000, N10,000, N7,500 and N5,000 years 1 to 5 respectively, with certainty equivalent (C t) of 1.0, 0.85, 0.70, 0.65, 0.5 attached.
Required
Determine the certain cash flow useful in appraising the investment.

Solution
The certain cash flows are obtained by multiplying the cash flow forecasts (estimate) by the certain equivalent for each of the period.
Is N30,000 (I), N20,000 (0.85), N10,000 (.70); N7.500 (0.65); N5000 (0.5) = N30,000; N17,000 ; N7000 ;N4875 ; N2500.

These are the certain cash flows to be appraised.

(iii) **Expected value method**
Investment decision deals with making of capital outlay now in respect of expected future cash flows, which is at best, an estimate. It is not certain whether the estimates will be accurate. In order to increase its level of precision, a forecaster might decide to use a range of estimate rather than one estimate. Based on past experience and analysis of events affecting each estimate. It is possible to assess the likelihood of each estimate occurring by assigning probabilities.
Expected value is obtained by multiplying the monetary value of

possible events by the associated probabilities.

Illustration 2
The cash flows and probability estimate of dividend for a year on UAC Plc share are as shown below:

Event	Cash flow	Probability
1	N8.50k	0.65
2	N7.50k	0.25
3	N6.00k	0.10

Required
Calculate the expected value of cash flow

Solution

Event	Cash flow	Probability	Expected value
1	N8.50	0.65	5.525
2	N7.50	0.25	1.875
3	N6.00	0.10	0.60
			N8.00k

Expected Dividend from UAC plc is N8.

(iv) **Standard Deviation of Cash flows**
Standard deviation is a measure of dispersion; hence it is useful in measuring the risk of an asset. It shows the deviation about the expected cash flow of each of the possible cash flows. The procedure for calculating standard deviation is as follows:

(a) Calculate the expected cash flows as shown above

(b) Subtract the expected cash flow from each possible cash flows to obtain a set of deviation about the expected cash flow.

(c) Square each deviation. Multiply the squared deviation by the probability of occurrence for its related cash flows, and sum these products to obtain the variance of the probability distribution.

(d) The standard deviation is found by calculating the square root of the variance.

Mathematically, the standard deviation is given as
$$S = S \ (X— X)^2 p$$

Where

S = standard deviation
X = Future Net cash flow
X = Expected value of net cash flow
P = probability attached to each cash flow

Illustration 3
Compute for the risk (Standard deviation) of returns for UAC Plc shares

Solution

Event	(X_1) Cash flow	Probability	X_2	X_1-X_2	$(X_1$-$X_2)^2$	$(X$-$X)^2P$
1	N8.50	0.65	5.525	0.50	0.25	0.1625
2	N7.50	0.25	1.875	-0.50	0.25	0.0625
3	N6.00	0.10	0.60	-0.20	4	0.4
						0.625

$$\therefore b = \sqrt{0.63} = 0.79$$

From the estimation above UAC Plc has an expected value (return) of N8 and standard deviation (risk) of 0.63 on its shares.

(v)   Coefficient of variation
Coefficient of variation is a relative measure of risk and it is measured. Coefficient of variation $= \dfrac{\text{Standard deviation}}{\text{Expected value}}$

It is used to measure risk when comparing two alternative investments with the same standard deviation but different expected value or the same expected value but different standard deviation or when their standard deviation and expected values are different. The higher the coefficient of variation, the higher the risk of the project.

Illustration 4
Given the following two securities with the attached standard deviation and expected value of cash flows

	Security A	**Security B**
Standard deviation	N5. 60	N 8.60
Expected value	N12.00	N15.5

Required
Estimate their coefficient of variation and decide on the riskier security.

Solution
Coefficient of variation   = $\dfrac{\text{Standard deviation}}{\text{Expected value}}$

	Security A	Security B
Coy =	N5.60	N8.60
	N12.00	N15.50
=	0.47;	0.55

Security B is riskier, hence, a risk averse investor will choose security A

(vi)   State of the World Model
This method suggests that instead of mean and variance that investor think of the various possible state of the world than can occur and the amount that is obtainable under different state. This theory distinguishes between two types of asset namely pure and complex asset.

Pure or primitive assets are investment-generating return in one state but not in other state of nature. On the other hand complex or composite asset are those generating return in more than one state of nature such as capital market securities.

This model helps to idealize about the price to be placed on an asset based on future income expectation on it through the following process:

a.   Investor idealize the various states of nature
b.   Forecast of the amount realizable
c.   The price (probability) to be attached to all cash flow that will accrue under such state. This ranges from 0 to 1

Illustration 5
Assume two securities A and B with the flowing information

	Current Market Price	Good state	Bad state
A	N1.50	N1.90	N1.30
B	N0.90	N1.20	N0.50

Required
Determine the price to offer for the securities under the state of nature

Solution
Let P1 = price of security under good state
     P2 = price of security under bad state
     PA = current price of security A
     PB = current price of security B

Hence: PA =   PA P1 + PA P2
          PB =   PB P1 + PB P2
i.e 1.50 =   1.90 P1 + 1.30 P2   equation (1)
0.90   =   1.20P, + 0.50 P2   equation (2)

To solve simultaneously multiply equation (2) by 2.6 to give
2.34 = 3.12p + 1.30P2   equation (3)

Subtracting equation (1) from (3) we have
     1. $22P_1 = 0.84$

    $P, = \underline{0.84}$
         1.22 = 0.69

Substitute value of P_1 (0.69) into equation (1), we have
1.50 =   1.90 (0.69) + 1.30P2
1.50 =   1.311 + 1.30P2
1.50 =   1.311 = 1.30P2

P2   = $\dfrac{0.819}{1.30} = 0.15$

An investor will be willing to pay N0.69 for every N1 in good state and N0.15 for N1 to be received in a bad state.

Note:
Matrix Algebra can be used to solve three variable equations.

(vii) Simulation
This is a modeling process of experimentation on a mathematical structure of a real-life system in order to describe and evaluate the system Behavior. There are two types of simulation.
(i)   Deterministic simulation
(ii)   Probabilistic simulation

Deterministic simulation: otherwise called **Sensitivity Analysis** involves conducting sensitively analysis on financial projections with a view to testing the impact of alternatives assumptions on project viability and thus the level of risk. It analysis the "what if" sensitivity margin. It determines the tolerable extent the NPV of the project will be able to accommodate unfavorable changes/errors of estimation in its variables.

Probabilistic simulation
This is also known as morte-carlo simulation. It deals with the selection of random numbers for the calculation of decision criterion. It works in a random situation. The random numbers are derived from the cumulative probabilities assigned for the possibilities.
Most investment projects depend on so many probabilistic variables such that analytical solutions are unobtainable. The use of simulation method in such cases could be very useful

(viii) Finite Horizon

If the life of an asset is very long, the Finite Horizon method (FHM) is used. The finite Horizon method calculate present values of cash flows over a significant time period, perhaps 15 or 20 years and ignores the cash flows beyond the fixed horizon. Present value of cash flow beyond this level are unlikely to affect the relative cost of investment options.

4.0 CONCLUSION

We have seen in this unit that the greater the risk of an investment the greater the returns. Investors always require a rate of return high enough to compensate them for risk and uncertainty in an investment. We have discussed the different types of Risk, the Risk Management Strategies and the Methods of Measuring Risk and Uncertainty.

5.0 SUMMARY

In this unit you have learnt the different types of Risk, the Risk Management Strategies and the Methods of Measuring Risk and Uncertainty.

6.0 TUTOR-MARKED ASSIGNMENT

1. Write short notes on the following risk management strategies:
  (i)   Risk Avoidance
  (ii) Risk Reduction
  (iii) Risk Retention
  (iv) Risk Transfer

2. Identify and explain five methods that can be used in measuring risk in investment analysis.

3. The cash flows and probability estimate of return for a year on Total Plc shares are given as follows:

Cash flow	N6	N8	N5	N10	N9
Probability	0.3	0.20	0.3	0.10	0.10

Required
Calculate the expected value of cash flow.

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UNIT 2 PORTFOLIO THEORY

CONTENTS

1.0 INTRODUCTION

Portfolio is the combination or collection of investments. That is, not investing in a single security but in a handful of securities to eliminate the unsystematic risks or at 1st be able to reduce the level of risk as more and more securities are combined or added to the portfolio.

2.0   OBJECTIVES

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

- Understand how to select the best Portfolio
- What Risk free investments are all about
- The main categories of investment
- What is Portfolio management
- How to measure the risk of portfolio

3.0   MAIN CONTENT

3.1 Selecting the best Portfolio:
In choosing the best portfolio, the investor will make use of indifference curves which will measure the investor's attitude to risk and matching it with the efficient portfolio.

On the indifference curve, the following relationships exist:
- Every point on each curve has a higher ENPV and a lower risk level than other points on the curve.
- A rational investor will choose combinations of risk and expected return on one curve with equal indifference, but he would prefer combinations of return and risk on a higher for the same level of risk.

3.2 Risk free investments

Risk free investments are investments in government securities like Treasury bills, Treasury Certificates and Treasury bonds that promise a fixed return with security of capital. The usual characteristic of this type of investment is that the return is often very lower but with high security.

3.3 The main categories of investment
1. Fixed Capital Investments
2. Fixed Income Investments
3. Variable Income and Capital Investments

Fixed Capital Investments

This is a situation where an investor deposits a sum of money normally for a period of time and receives interest at an agreed fixed or variable rate while the deposit last. It could be a direct loan to a company or bank deposit. It carries a percentage (%) of interest.

Fixed Income Securities

This is usually investments in bonds and government securities that carry a fixed interest rate. Some of these securities are often redeemable at an agreed period and can also be traded on the exchange if listed.

The main investments in this category are;
- Preference Shares
- Corporate bonds or stocks
- Gilt edge securities (Treasury Bills and Treasury Certificates)
- Corporate debentures.

Variable Income and Capital Investments

These are instruments whose returns vary with the market condition and their capital also appreciates overtime. The common investment in this category is ordinary shares whose market value varies with the performance of the company in which the investment was made.

3.4 Portfolio management

Portfolio involves investing in a handful of securities. This wide range of investments would help diversify away the risk of the portfolio. That

is, the management of portfolio combination in such a way that would maximize returns and minimize the associated risks.

Portfolio management therefore involves the following activities:

- Securities Analysis
- Portfolio Analysis
- Portfolio Selection
- Portfolio Revision
- Portfolio Evaluation.

(a)   **SECURITY ANALYSIS**
This is the first stage of portfolio management. There are many securities that are listed in the stock market which can be included in the portfolio; so there are many securities available and can be selected for the inclusion in the portfolio. For instance, there are companies equities, preference shares, government bonds and many money market instruments. Without properly analyzing them with respect to return vis-A-vis the risk level and their possible liquidity, the securities selected may not be optimal.

There are two approaches to security analysis which are fundamental and technical analysis.

(b)   **PORTFOLIO ANALYSIS**
Security analysis provides investors with a set of worthwhile and derivable securities for inclusion in the portfolio.

A portfolio is a group of securities held together as investment. This is investment in a handful of securities rather than single securities to diversify away with unsystematic risks. Therefore portfolio of investments is an attempt to spread risks by not putting all eggs in a single basket and this is what is known as diversification. Since all the stocks in the market will not be included in the securities in the portfolio. Portfolio analysis is very important unless one is trading on index.

(c)   **PORTFOLIO SELECTION**
The goal of portfolio selection is to provide a doorway to a portfolio that yields optimal returns within a minimal risk tolerance level. Any portfolio that combines these characteristics is known as efficient portfolio. It is therefore imperative to use the input of portfolio analysis in this regard.

(d)   **PORTFOLIO REVISION**
Having constructed a balanced portfolio, the investor or the investment

manager has to constantly monitor the portfolio to ensure that it continue to be optimal. The reason being that the economy and financial markets are dynamic and therefore subject to change on regular basis. Therefore as time passes and the event and circumstances of market changes, the portfolio combination need to follow suit so as to still be able to maintain its optimality.

(e) PORTFOLIO EVALUATION

The sole objective of constructing a balanced portfolio and revising it regularly is to earn maximum return with minimum level of risk. Therefore regular portfolio evaluation is of utmost importance to find out the performance of the portfolio relative to time.

Portfolio evaluation is therefore the process of assessing the performance of the portfolio over a defined period of time in terms of return and risk tolerance level. This process involves qualitative measurement of actual return realized and risk borne by the portfolio over the period of the investment. The major advantage of portfolio evaluation is that it provides mechanism for identifying weaknesses in the investment process and amending or improving the deficient areas and this suggests that portfolio management is an ongoing type of thing.

How to measure the risk of portfolio

Risk is defined as variability in return and this level of variability is often measured by the use of variance and or standard deviation of the expected return.

Illustration 1

Suppose that a portfolio has the following returns with the associated probabilities.

Return X	Probability
7%	0.2
8%	0.3
12%	0.4
15%	0.1

Required:

Calculate the expected return and the risk of the portfolio.

Solution:

Calculation of the expected return

Return X	Probability	Expected Value
7%	0.2	1.4
8%	0.3	2.4

12%	0.4	4.8
15%	0.1	1.5
		10.1%

The expected return based on the calculation made above is 10.1%. The standard deviation of the expected return will be calculated as follows.

Return X (%) =	$(X - \bar{X})$ $(X - 10.1)$ %	Probability	Pro. $(X - \bar{X})^2$
7	-3.1	0.2	1.922
8	-2.1	0.3	1.323
12	1.9	0.4	1.444
15	4.9	0.1	2.401
	Variance (α^2)		7.09

Standard Deviation = $\sqrt{7.09}$
= 2.663%

The Expected return is 10.1% with a standard deviation of 2.663%.

PORTFOLIO DIVERSIFICATION

Portfolio diversification is an attempt to reduce the level of risk associated with the portfolio by investing in a handful of securities.
The relationship between investments can be classified into three;
1.   Positive Correlation
2.   Negative Correlation
3.   No Correlation

Positive Correlation
When there is positive correlation between the behaviors of the investments, the investments are likely to behave the same way. Thus, if one performs badly, the other one will also perform badly since their behavior is related. For instance, if you buy shares in a company selling cowbell milk and another selling peak milk. If there is general decline in the consumption of milk they are not likely to release good results to the market and hence their share price would be affected in the same way and vice versa. The correlation coefficient is (+1). It is noteworthy that some investment can be perfectly positive like (+1) while scenarios of strong positive less than (+1) may also exist.

Negative Correlation
This is a situation whereby if one investment is performing very well the other will perform badly because their performance is not related as they are independent of each other. The correlation coefficient is therefore (-1).

No Correlation
The performance of one is independent of the performance of the other. That is there is no relationship between them at all. The correlation coefficient is (o).

The relationship between the returns from different investments is measured by the correlation co-efficient. A figure close to (+1) indicates strong correlation while the one close to (-1) indicate high negative correlation. A figure of (0) indicates no correlation.

It can therefore be argued that if the investments show a high negative correlation, then combining them in a portfolio would reduce the overall risk of the portfolio. Risk can also be reduced by combining the portfolio of securities which have no significant correlation at all.

Illustration 2

Security X and Y have the following expected returns and Probabilities.

Probability	Security X	Security Y
0.3	20%	18%
0.2	25%	27%
0.4	30%	35%
0.1	50%	40%

Required:
Calculate the Expected Return and Risks

Security X

Return	Probability	EV (%)
20%	0.3	6.0
25%	0.2	5.0
30%	0.4	12.0
50%	0.1	5.0
Expected Return		28.0%

Security Y

Return	Probability	EV (%)
18%	0.3	5.4
27%	0.2	5.4

35%	0.4	14.0
40%	0.1	4.0
Expected Return		28.8%

Calculation of the variances and standard deviation of:

Security X

Return	$(X - \bar{X})$	Prob.	$(X - \bar{X})^2$ Pro.
20	-8	0.3	19.2
25	-3	0.2	1.8
30	+2	0.4	1.6
50	+22	0.1	48.4
		α^2	71.00

$$\text{Standard Deviation} = \sqrt{71.00}$$
$$= 8.426\%$$

Security Y

Return	$(X - \bar{X})$	Prob.	$(X - \bar{X})^2$ Pr.
18	-10.8	0.3	34.992
27	-1.8	0.2	0.648
35	6.2	0.4	15.376
40	11.2	0.1	12.544
		α^2	63.56

$$\text{Standard Deviation} = \sqrt{63.56}$$
$$= 7.972\%$$

Security Y offered a higher return than X with a lower level of risk also. It will therefore be preferred by rational investors.

Perfect Positive Correlation
The standard deviation of the portfolio may be calculated as follows given the expected return as 28.4% and asset allocation of 50%X, 50%Y

Security X 50%	Security Y 50%	Sec. X&Y Combined	Prob.	$(X - \bar{X})$	Prob.$((X - \bar{X})^2$
10.0	9.0	19.0	0.3	-9.4	26.508
12.5	13.5	26.0	0.2	-.2.4	1.152
15.0	17.5	32.5	0.4	4.1	6.724
25.0	20.0	45.0	0.1	16.6	27.556
			Variance α^2		61.94

$$\text{Standard Deviation} = \sqrt{61.94}$$
$$= 7.87$$

Perfect Negative Correlation

The standard deviation of the portfolio given an expected return of 28.4% is as follows:

$$\text{Standard Deviation} = \sqrt{4.42}$$
$$= \underline{2.1\%}$$

No Correlation
If there is no noticeable correlation between returns, the probability distribution of returns would be:

X		Multiplier	Prob.
20	18	0.3 x 0.3	0.09
20	27	0.3 x 0.2	0.06
20	35	0.3 x 0.4	0.12
20	40	0.3 x 0.1	0.03
25	18	0.2 x 0.3	0.06
25	27	0.2 x 0.2	0.04
25	35	0.2 x 0.4	0.08
25	40	0.2 x 0.1	0.02
30	18	0.4 x 0.3	0.12
30	27	0.4 x 0.2	0.08
30	35	0.4 x 0.4	0.16
30	40	0.4 x 0.1	0.04
50	18	0.1 x 0.3	0.03
50	27	0.1 x 0.2	0.02
50	35	0.1 x 0.4	0.04
50	40	0.1 x 0.1	<u>0.01</u>

The Standard Deviation Given Expected Return:

Return 50% X	Return 50% Y	Combined Return	$(X - \bar{X})$	Prob.	$Pr((X - \bar{X})^2$
10.0	9.0	19.0	(9.4)	0.09	7.9524
10.0	13.5	23.5	(4.9)	0.06	1.4406
10.0	17.5	27.5	(0.9)	0.12	0.0972
10.0	20.0	30.0	1.6	0.03	0.0768

12.5	9.0	21.5	(6.9)	0.06	2.8566
12.5	13.5	26.0	(2.4)	0.04	0.2304
12.5	17.5	30.0	1.6	0.08	0.2048
12.5	20.0	32.5	4.1	0.02	0.3362
15.0	9.0	24.0	(4.4)	0.12	2.3232
15.0	13.5	28.5	0.1	0.08	0.0008
15.0	17.5	32.5	4.1	0.16	2.6896
15.0	20.0	35.5	7.1	0.04	2.0164
12.5	9.0	34.0	5.6	0.03	0.9408
12.5	13.5	38.5	10.1	0.02	2.0402
12.5	17.5	42.5	14.1	0.04	7.9556
12.5	20.0	45.0	16.6	0.01	2.7556
					33.914

Standard deviation $\sqrt{33.914}$ = 5.824

Given an expected return of 28.4%, we discovered the followings:
1.   The risk is at the highest when there is perfect positive correlation.
2.   The Skis lower when there is no correlation
3.   The risk is at the least when there is perfect negative correlation.

Another method of calculating the standard deviation of a portfolio:
A quicker method of calculating the standard deviation of the returns of a portfolio of two securities is to use the following formula;

$$\sigma P = \sqrt{(Wa)^2\sigma^2a + (Wb)^2\sigma^2b + 2(Wa)(Wb)(r)(\sigma a)(\sigma b)}$$

Where:
σP	=	Standard deviation of a portfolio of two securities
σa	=	Standard deviation of return from security (A)
σb	=	Standard deviation of return from security (B)
σa²	=	Variance of return from security (A)
σb²	=	Variance of return from security (B)
Wa	=	Resource allocation to Security A
Wb	=	Resource allocation to Security B
r	=	Correlation coefficient of return from securities A & B
	=	$\dfrac{\text{Covariance of Securities A\&B}}{\sigma a \times \sigma b}$

Using our last example; let's consider the portfolio of 2 securities with equal resource allocation (50% each)

Variance of X	=	71
Standard deviation of X	=	8.426
Variance of Y	=	63.56
Standard deviation	=	7.972

With perfect correlation $=$ (1)

Formula

$$\sigma p \quad = \quad \sqrt{(Wx)^2\sigma^2x + (Wy)^2\sigma^2y + 2(Wx)(Wy)(r)(\sigma x)(\sigma y)}$$

The formula is considering a situation of perfect correlation hence, it is using the correlation coefficient of $= 1$

$$\sigma^2p \quad = \quad (0.5)^271 + (0.5)^2\,63.56 + 2(0.5\,(0.5)\,(1)\,(8.426)\,(7.972)$$
$$= \quad (0.25)\,71 + (0.25)\,63.56 + 33.586$$
$$= \quad 17.75 + 15.89 + 33.586$$
$$\sigma^2p \quad = \quad 67.226$$
$$\sigma p \quad = \quad \sqrt{67.226}$$
$$= \quad \underline{8.2\%}$$

(b)   Assume the two securities is negatively correlated (-) the correlation coefficient $= -1$

    Using the formula again

$$\sigma p \quad = \quad \sqrt{(Wx)^2\sigma^2x + (Wy)^2\sigma^2y + 2(Wx)(Wy)(-1)(\sigma x)(\sigma y)}$$
$$= \quad (0.5)^2\,71 + (0.05)2\,63.56 + 2(0.5(0.5)\,(-1)\,(8.426)\,(7.972)$$
$$= \quad 17.75 + 15.89 - 33.586$$
$$= \quad 33.64 - 33.586$$
$$= \quad 0.054$$
$$\sigma p \quad = \quad \sqrt{0.054}$$
$$= \quad \underline{0.232\%}$$

(c)   In a situation where there is no relationship between the two securities, the correlation coefficient will be zero $= 0$

$$\sigma p \quad = \quad \sqrt{(Wx)^2\sigma^2x + (Wy)^2\sigma^2y + 2(Wx)(Wy)(0)(\sigma x)(\sigma y)}$$
$$\sigma^2p \quad = \quad (0.5)^2\,71 + (0.5)2\,63.56 + 2(0.5(0.5)\,(0)\,(8.426)\,(7.972)$$
$$\sigma^2p \quad = \quad 17.75 + 15.89 + 0$$
$$\sigma^2p \quad = \quad 33.64$$
$$\sigma p \quad = \quad \sqrt{33.64}$$
$$= \quad \underline{5.8\%}$$

Illustration 3
An investor wishes to construct a portfolio of two securities A & B in proportion of 60% to 40% respectively. The expected return from Security A is 20% with standard deviation of 5%. The expected return from security B is 30% with standard deviation of 8%.

(a)   What is the expected return from the portfolio and the standard

deviation under the following scenarios?

(b) (i)   Perfectly positive correlation   =   1
     (ii)   r   =   0.5
     (iii) No correlation   =   0
     (iv)   Negatively correlated   =   -1

(a) Expected return
     =   (0.6) (20)% + (0.4) (30)%
     =   12% + 12% = 25%

(b) (i)   The standard deviation if r = 1
     $\sigma^2 p$ = $(0.6)^2 (0.05)^2 + (0.08)^2 + 2(0.6 (0.4) (1) (0.05) (0.08)$
            =   (0.36) (0.0025) + (0.16) (0.0064) + 0.00192
            =   0.0009 + 0.001024 + 0.00192
            =   0.003844
     σp = $\sqrt{0.003844}$ = 0.062 = 6.2%

(ii) If r   =   0.5
            0.0009 + 0.001024 + 2(0.6) (0.4) (0.5) (0.05) (0.08)
            =   0.001934 + 0.00096
            =   0.002894
            0.0009 + 0.001024 + 2(0.6) (0.4) (0.5) (0.05) (0.08)
            =   0.001924 + 0.00096
            =   0.002894
     σp = $\sqrt{0.002884}$
            =   0.0537   =   5.37%
(iii) If r =   0
            0.0009 + 0.001024
     = $\sqrt{0.001924}$
=   0.0439 = 4.39%

(iv) If r   =   -1
     $\sigma^2 p$ = $(0.6)^2 (0.05)^2 + (0.4)^2 + (0.08)^2 + 2(0.6(0.4) (-1)$
                 (0.05) (0.08)
            =   0.0009 + 0.001024 – 0.00192
            =   0.001924 – 0.00192
            =   +0.000004
     σp = $\sqrt{0.000004}$
            =   0.002 = 0.2%

Importance of Portfolio Theory to the Investor

Portfolio theory helps the investor to denote the combination of investments which will reduce the overall risk of his portfolio. The reason being that it will be wrong to appraise a new project in isolation; the effect of the new security on overall risk and return of the portfolio needs to be examined.

Portfolio theory therefore bases the portfolio selection on three major criteria:
- The expected return of the security
- The risk (standard deviation or variance) of the security return.
- The correlation of the security returns with the returns from all other securities of the investment portfolio.

The ultimate aim of the portfolio manager is to select an optimal set of investment portfolio based on the above characteristic.

4.0   CONCLUSION
We have seen in this unit that Risk is defined as variability in return and this level of variability is often measured by the use of variance and or standard deviation of the expected return. Also, that the goal of portfolio selection is to provide a doorway to a portfolio that yields optimal returns within a minimal risk tolerance level. Any portfolio that combines these characteristics is known as efficient portfolio.

5.0   SUMMARY
In this unit you have learnt how to select the best Portfolio, what Risk free investments are all about, the main categories of investment, the meaning of Portfolio management and how to measure the risk of portfolio

6.0 TUTOR-MARKED ASSIGNMENT

1   Suppose that a portfolio has the following returns with the probabilities attached to it;

Return	Probabilities
10	0.4
12	0.3
15	0.2
20	0.1

(a)   What is the expected return on the portfolio?
(b)   Calculate the risk of the portfolio (hints Standard deviation of returns).
2.   Explain the following terms in relation to classification of investment relationship

    (a)   Positive Correlation
    (b)   Negative Correlation

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UNIT 3 PORTFOLIO SELECTION

CONTENTS

1.0 INTRODUCTION

The objective of every rational investor is to maximize his returns and minimize the risk. Diversification is the method adopted for reducing risk It essentially results in the construction of portfolios.

The goal of portfolio construction would be to generate a portfolio that provides the highest return and the lowest risk such a portfolio would be known as the optimal portfolio. The process of finding the optimal portfolio is described as portfolio selection.

The conceptual framework and analytical tools for determining the optimal portfolio in disciplined and objective manner have been provided by Harry Markowitz in his pioneering work on portfolio analysis described in his 1952 journal of Finance article and subsequent book in 1959. his method of portfolio selection has come to be known as the Markowitz model. In fact, Markowitzs work marks the beginning of what is known today as modern portfolio theory.

2.0 OBJECTIVES

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

- Feasible Set of Portfolios
- Efficient Set of Portfolios
- Selection of Optimal Portfolio
- Limitations of Markowitz Model

- Measuring Portfolio Return and Risk under Single Index model
- Multi-Index Model

3.1 Feasible Set of Portfolios

With a limited number of securities an investor can create a very large number of portfolios by combining these securities in different proportions. These constitute the feasible set of portfolios in which the investor can possibly invest. This is also known as the **portfolio opportunity set.**

Each portfolio in the opportunity set is characterized by an expected return and a measure of risk, viz, variance or standard deviation of returns. Not every portfolio in the portfolio opportunity set is of interest to an investor. In the opportunity set some portfolios will obviously be dominated by others. A portfolio will dominate another if it has either a lower standard deviation and the same expected return as the other, or a higher expected return and the same standard deviation as the other. Portfolios that are dominated by other portfolios are known as inefficient portfolios. An investor would not be interested in all the portfolios in the opportunity set he would be interested only in the efficient portfolios.

3.2 Efficient Set of Portfolios

Let us consider various combinations of securities and designate them as portfolios 1 to n. the expected returns of these portfolios may be worked out The risk of these portfolios may be estimated by measuring the standard deviation of portfolio returns. The table below shows illustrative figures for the expected returns and standard deviations of some portfolios.

Portfolio no	Expected return (percent)	Standard deviation (Risk)
1	5.6	4.5
2	7.8	5.8
3	9.2	7.6
4	10.5	8.1
5	11.7	8.1
6	12.4	9.3
7	13.5	9.5
8	13.5	11.3
9	15.7	12.7
10	16.8	12.9

If we compare portfolio nos. 4 and 5, for the same standard deviation

of 8.1 portfolio no 5 gives a higher expected return of 11.7 making it more efficient than portfolio no 4 again, if we compare portfolio nos. 7 and 8, for the same expected return of 13.5 per cent, the standard deviation is lower for portfolio no. 7, making it more efficient than portfolio no.8. thus, the selection of portfolios by the investor will be guided by two criteria
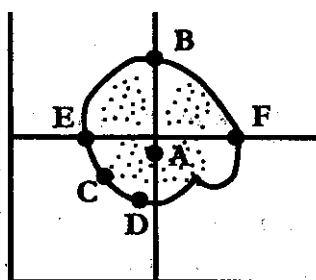
i.   Given two portfolios with the same expected return, the investor would prefer the one with the lower risk.
ii   Given two portfolios with the same risk, the investor would prefer the one with the higher expected return.

These criteria are based on the assumption that investors are rational and also risk averse. As they are rational they would prefer more return to less return. As they are risk averse, they would prefer less risk to more risk.

The concept of efficient sets can be illustrated with the help of a graph. The expected return and standard deviation of portfolios can be depicted on an 3CY graph measuring the expected return on the Y axis and the standard deviation on the X axis. The figure below depicts such a graph.

X

As each possible portfolio in the opportunity set or feasible set of portfolios has an expected return and standard deviation associated with it, each portfolio would be represented by a single point in the risk-return space enclosed within the two axes of the graph. The shaded area in the graph represents the set of all possible portfolios that can be constructed from a given set of securities. This opportunity set of portfolios takes a concave shape because it consists of portfolios containing securities that are less than perfectly correlated with each other.

Let us closely examine the diagram above. Consider portfolios F and E both the portfolios have the same expected return but portfolio E has less risk. Hence, portfolio E would be preferred to portfolio F. now consider portfolios C and E both have the same risk, but portfolio B offers more return for the same risk. Hence, portfolio E would be preferred to portfolio C. Thus, for any point in the risk-return space, an investor would like to move as far as possible in the direction of decreasing risk. Effectively, he would be moving towards the left in search of decreasing risk and upwards in search of increasing returns.

Let us consider portfolios C and A. Portfolio C would be preferred to portfolio A because it offers less risk for the same level of return. In the opportunity set of portfolios represented in the diagram, portfolio C has the lowest risk compared to all other portfolios. Here portfolio C in his diagram represents the global minimum variance portfolio.

Comparing portfolios A and B, we find that portfolio B is preferable to portfolio A because it offers higher return for the same level of risk. In this diagram, point B represents the portfolio with the highest expected return among all the portfolios in the feasible set.

Thus, we find that portfolios lying in the north west boundary of the shaded area are more efficient than all the portfolios in the interior of the shaded area. This boundary of the shaded area is called the Efficient Frontier because it contains all the efficient portfolios in the opportunity set. The set of portfolios lying between the global portfolios in the opportunity set. The set of portfolios lying between the global minimum variance portfolio and the maximum return portfolio on the efficient frontier represents the efficient set of portfolios. The efficient frontier is shown separately in graph below.

The efficient frontier
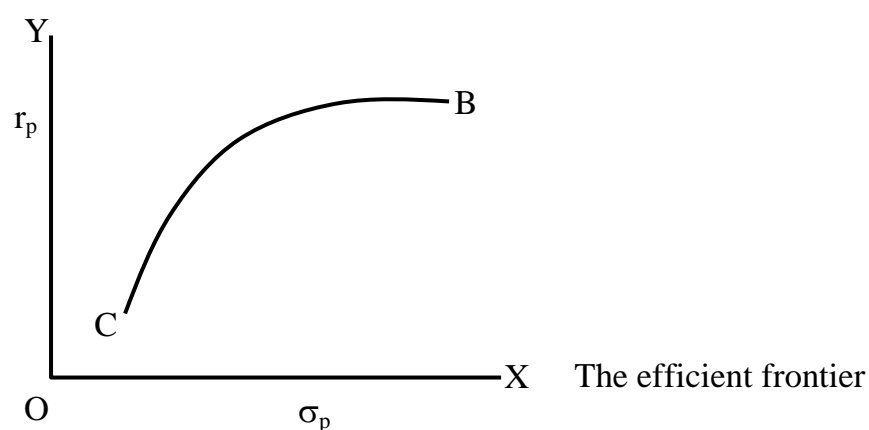
The efficient frontier is a concave curve in the risk-return space that extends from the minimum variance portfolio to the maximum return portfolio.

3.3 Selection of Optimal Portfolio

The portfolio selection problem is really the process of delinearing the efficient portfolios and then selecting the best portfolio from the set.

Rational investors will obviously prefer to invest in the efficient portfolios. The particular portfolio that an individual investor will select from the efficient frontier will depend on that investor's degree of aversion to risk. A highly risk averse investor will hold a portfolio on the lower left hand segment of the efficient frontier, while an investor who is not too risk averse will hold one on the upper portion of the efficient frontier.

The selection of the optimal portfolio thus depends on the investor's risk aversion, or conversely on his risk tolerance. This can be graphically represented through a series of risk return utility curves or indifference curve represents different combinations of risk and return all of which are equally satisfactory to the concerned investors. The investor is indifferent between the successive pints in the curve. Each successive curve moving upwards to the left represents a higher level of satisfaction or utility. The investor's goal would be to maximise his utility by moving upto the higher utility curve. The optimal portfolio for an investor would be the one at the point of tangency between the efficient frontier and his risk-return utility or indifference curve.

This is shown in graph below. The point 0 represents the optimal portfolio. Markowitz used the technique of quadratic programming to identify the efficient portfolios. Using the expected return and risk of each security under consideration and the covariance estimates for each pair of securities, he calculated risk and return for all possible portfolios. Then, for any specific value of expected portfolio return, he determined the least risk portfolio using quadratic programming. With another value of expected portfolio return, a similar procedure again gives the minimum value of expected portfolio return, a similar procedure again gives the minimum risk portfolio. The process is repeated with different values of expected return, the resulting minimum risk portfolios constitute the set of efficient portfolios.
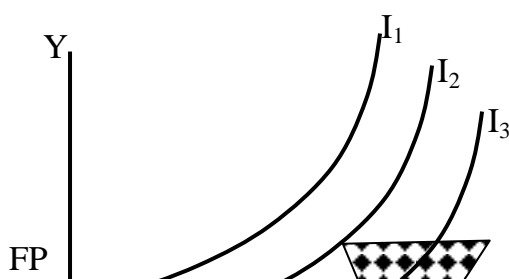
3.4 Limitations of Markowitz Model

- One of the main problems with the Markowitz model is the large number of input data required for calculations. An investor must obtain estimates of return and variance of returns for all securities as also covariances of returns for each pair of securities included in the portfolio. If there are N securities in the portfolio, he would N return estimates, N variance estimates and $N(N-1)/2$ covariance estimates, resulting in a total of $2N+ [N(N-1)/2]$ estimates. For example, analysing a set of 200 securities would require 200 return estimates, 200 variance estimates and 19,900 covariance estimates, adding upto a total of 20,300 estimates. For a set of 500 securities, the estimates required would be 1,25,750. it may be noted that the number of estimates required becomes large because covariances between each pair of securities have to be estimated.

- The second difficulty with the Markowitz model is the complexity of computations required. The computations required are numerous and complex in nature. With a given set of securities infinite number of portfolios, can *be* constructed. The expected returns and variances of returns for each possible portfolio have to be computed. The identification of efficient portfolios requires the use of quadratic programming which is a complex procedure.

Because of the difficulties associated with the Markowitz model, it has found little use in practical applications of portfolio analysis. Much simplification is needed before the theory can be used for practical applications. Simplifications are needed in the amount and type of input data required to perform portfolio analysis; simplification is also needed in the computational procedure used to select optimal portfolios.

The simplification is achieved through index models. There are essentially two types of index models, single index model and multi-

index model. The single index model is the simplest and the most widely used simplification and may be regarded as being at one extreme point of a continuum, with the Markowitz model at the other extreme point. Multi-index models may be placed at the mid region of this continuum of portfolio analysis techniques.

Single Index Model

The basic notion underlying the single index model is that all stocks *are* affected by movements in the stock market. Casual observation of share prices reveals that when the market moves up (as measured by any of the widely used stock market indices), prices of most share tend to increase. When the market goes down, the prices of most shares tend to decline. This suggests that one reason why security returns might be correlated and there is co-movement between securities, is because of a common response to market changes. This co-movement of stocks with a market index may be studied with the help of a simple linear regression analysis, taking the returns on an individual' security as the dependent variable (Ri) and the returns on the market index (Rm) as the independent variable.

The return of an individual security is assumed to depend on the return on the market index. The return of an individual security may be expressed as:

$R1 = a_i\ B_i\ R_m + e_i$
Where
ai = Component of security Ps return that is independent of the market's performance.
Rm = Rate of return on the market index
Bi = Constant that measures the expected change in Ri given a change in Rm
ei = Error term representing the random or residual return.

This equation breaks the return on a stock into two components, one part due to the market and the other part independent of the market. The beta parameter in the equation, Bi**,** measures how sensitive a stock's return is to the return on the market index. It indicates how extensively the return of a security will vary changes in the market return. For example, if the Bi of a security is 2, then the return of the security is expected to increase by 20 per cent when the market returns increase by 10 per cent In this case, if the market return decreases by 10 per cent, the security return is expected to decrease by 20 percent. For a security with Bi of 0.5, when the market return increases or decreases by 10 per cent, the security return is expected to increase or decrease by 5 per cent (that is 10 x 0.5). a beta coefficient greater than one would suggest greater responsiveness on the part of the stock in relation to the market greater

responsiveness.

The alpha parameter ai indicates what the return of the security would be when the market return is • zero. For example, a security with an alpha of +3 per cent would earn 3 per cent return even when the market return is zero and it would earn an additional 3 per cent at all levels of market return. Conversely, a security with an alpha of 4.5 percent would lose 4,5 percent when the market return is zero, and would earn 4.5 per cent less at all levels of market return. The positive alpha thus represents a sort of bonus return and would be a highly desirable aspect of a security, whereas a negative alpha represents a penalty to the investor and is an undesirable aspect of a security.

The final term in the equation, ei, is the unexpected return resulting from influences not identified by the model. It l^{e}s referred to as the random or residual return. It may take on any value, but over a large number of observations it will average out to zero.

William Sharpe, who tried to simplify the data inputs and data tabulation required for the Markowitz model of portfolio analysis, suggested that a satisfactory simplification would be achieved by abandoning the covariance of each security with each other security and substituting in its place the relationship of each security with a market index as measured by the single index model suggested above. 'This is known as Sharpe index model.

In the place of [N(N-1)/2] covariances required for the Makowitz model, Sharpe model would requires only N measures of beta coefficients.

Measurin' g Security Return and Risk under Sing e Index Model
Using the single index model, expected return of an individual security may be expressed as:

$$R_i \quad = \quad ?_i \quad + \quad \beta_i \, R_m$$

The return of the security is a combination of two components:
a.   A specific return component represented by the alpha of the security; and (b) a market related return component represented by the term $\beta_i \, R_m$. The residual return disappears from the expression because its average value is zero i,e. it has an expected value of zero.

Correspondingly, the risk of a security oi becomes the sum of a market related component and a component that is specific to the security. Thus,

Total risk = market related risk + specific risk

$$\sigma^2i \quad = \quad \beta^2i \, \sigma^2m + \sigma^2ei$$

Where
σ^2i = variance of individual security
σ^2m = variance of market index returns
σ^2ei = variance of residual returns of individual security
βi = beta coefficient of individual security.

The market related components of risk is referred to as systematic risk as it affects all securities. The specific risk component is the unique risk or unsystematic risk which can be reduced through diversification. It is also called diversification risk.

The estimates of ?i βi and σ^2ei of a security are often obtained from regression analysis of historical data of returns of the security as well as returns of a market index. For any given or expected "value of Rm the expected return and risk of the security can be calculated. For example, if the estimated values of ai βi and σ^2ei of a security are 2 percent, 1.5 and 300 respectively and if the market index is expected to provide a return of 20 per cent, with variance of 120, the expected return and risk of the security can be calculated as shown below.

Ri = ?i + βi Rm
= 2 + 1.5 (20) = 32 per cent
σ^2i = $\beta^2i\sigma^2m$ + σ^2ei
= (1.5)2 (120) + 300
= 570

3.5 Measuring Portfolio Return and Risk under Single Index Model
Portfolio analysis and selection require as inputs the expected portfolio return and risk for all possible portfolio that can be constructed with a given set of securities. The return and risk of portfolios can be calculated using the single index model.

The expected return of a portfolio may **be** taken as portfolio alpha plus portfolio beta times expected market return. Thus,

Rp = ?p + βp Rm

The portfolio alpha is the weighted average of the specific returns (alphas) of the individual securities. Thus:
          n
?p = ? wi ai

=1

Where
wi   =   proportion of investment in an individual security.
ai   =   specific return of an individual security

The portfolio beta is the weighted average of the beta coefficients of the individual securities. Thus,

$$\beta p = \sum_{i=1}^{n} wi\ \beta i$$

Where
wi = proportion of investment in an individual security.
ai = beta coefficient of an individual security

The expected return of the portfolio is the sum of the weighted average of the specific returns and the weighted average of the market related returns of individual securities.

The risk of a portfolio is measured as the variance of the portfolio returns. The risk of a portfolio is simply a weighted average of the market related risks of individual securities plus a weighted average of the specific risks of individual securities in the portfolio. The portfolio risk may be expressed as:

$$\sigma 2p = \beta 2p\sigma 2m + \sum_{i=1}^{n} w2i\ \sigma 2ei$$

The first term constitutes the variance of the market index multiplied by the square of portfolio beta and represents the market related risk (or systematic risk) of the portfolio. The second term is the weighted average of the variances of residual returns of individual securities and represents the specific risk or unsystematic risk of the portfolio.

As more and more securities are added to the portfolio, the unsystematic risk of the portfolio becomes smaller and is negligible for a moderately sized portfolio. Thus, for a large portfolio, the residual risk or unsystematic risk approaches zero and the portfolio risk becomes equal to B2po2m. Hence, the effective measure of portfolio risk is Bp.

Let us consider a hypothetical portfolio of four securities. The table below shows the basic input data such as weightage, alphas, betas and residual variance of the individual securities required for calculating portfolio return and variance.

 Input Data

Security	Weightage (wi)	Alpha (ai)	Beta (βi)	Residual variance (σ2i)
NBC	0.2	2.0	1.7	370
PHB	0.1	3.5	0.5	240
TOTAL	0.4	13	0.7	410
FBN	0.3	0.75	1.3	285
Portfolio value 1.0		1.575	1.06	108.45

The values of portfolio alpha, portfolio beta, and portfolio residual variance can be calculated as the first step.

α_P = $\sum_{I=1}^{n}$ wi βi

= (0.2) (2) + (0.1) (3.5) + (0.4) (1.5) + (0.3) (0.75)

= 1.575

β_P = $\sum_{I=1}^{n}$ wi βi

(0.2) (1.7) + (0.1) (0.5) + (0.4) (0.7) + (0.3) (1.3)

= 1.06

portfolio residual variance = $\sum_{I=1}^{n}$ wi βi

$= (0.2)2 (370) + (0.1)^2(240) + (0.4)^2 (410) + (0.3)^2 (285)$

$= 108.45$

These values are noted in the last row of the table. Using these values, we can calculate the expected portfolio return for any value of projected market return. For a market return of 15 per cent, the expected portfolio return would be:

R_P = $\alpha_P + \beta_P R_m$

= 1.575 + (1.06) (15)

= 17.475

For calculating the portfolio variance we need the variance of the market returns. Assuming a market return variance of 320, the portfolio variance can be calculated as:

$\alpha^2_p = \beta^2_p \sigma^2 m + \Sigma w^2_i \sigma^2$

i = 1
n
$= (1.06)2 (320)^n + 108.45$
$= 468.002$

The single index model provides a simplified method of representing the covariance relationships among the securities. This simplification has resulted in a substantial reduction in inputs required for portfolio analysis. In the single index model only three estimates are needed for each security in the portfolio, namely specific return ?i measure of systematic risk B i and variance of the residual return ?2ei. In addition to these, two estimates of the market index, namely the market return Rm and the variance of the market return ?2m are also needed. Thus, for N securities, the number of estimates required would be 3N+2. For example, for a portfolio of 100 securities, the estimates required would be 302. in contrast to this, for the Markowitz model, a portfolio with 100 securities would require 5150 estimates of input data (i.e. 2N + [N(N-1)12] estimates).

Using the expected portfolio returns and portfolio variances calculated with the single index model, the set of efficient portfolios is generated by means of the same quadratic programming routine as used in the Markowitz model.

3.6 Multi-Index Model
The single index model is in fact an oversimplification. It assumes that stocks move together only because of a common co-movement with the market. Many researchers have found that there are influences other than the market that cause stocks to move together. Multi-index models attempt to identify and incorporate these non-market or extra-market factors that cause securities to move together also into the model. These extra-market factors are a set of economic factors that account for common movement in stock prices beyond that accounted for by the market index itself. Fundamental economic variables such as inflation, real economic growth, interest rates, exchange rates etc. would have a significant impact in determining security returns and hence, their co-movement.
A multi-index model augments the single index model by incorporating these extra market factors as additional independent variables. For example, a multi-index model incorporating the market effect and three extra-market effects takes the following form:

$$R_i = \alpha_i + \beta_m R_m + \beta_i R_2 + \beta_3 R_3 + e_i$$

The model says that the return of an individual security is a function of four factors, the general market factor Rm and three extra-market factors

R1R2and R3 The beta coefficients attached to the four factors have the same meaning as in the single index model. They measure the sensitivity of the stock return to these factors. The alpha parameter ?i and the residual term ei also have the same meaning as in the single index model. These values can then be used as inputs for portfolio analysis and selection.

A multi-index model is an alternative to the single index model. However, it is more complex and requires more data estimates for its application. Both the single index model and the multi-index model have helped to make portfolio analysis more practical.

Illustration 1: An investor owns a portfolio whose market model is estimated as:

$R_p = 2.3 + 0.85\ R_m + e_p$

If the expected return on the market index is 17.5 per cent, what is the expected return on the investor's portfolio?

Solution: Assuming that $ep = 0$

$Rp = 2.3 + \mathbf{0.85(17.5)}$
$= \mathbf{2.3 + 14.875}$
$= \mathbf{17.175\ per\ cent}$

Illustration 2: An investor owns a portfolio composed of five securities with the following characteristics:

Security	Beta	Random error term standard deviation (percent)	Proportion
AP	1.35	5	0.10
GTB	1.05	9	0.20
BCC	0.80	4	0.15
UACN	1.50	12	0.30
IEI	1.12	8	0.25

If the-standard deviation of the market index is 20 per cent, what is the total risk of the portfolio?

Solution: The total portfolio risk may be expressed as:

$$\sigma^2{}_p = \beta^2{}_p \sigma^2{}_m + \sum_{I=1}^{n} w_i^2\ \delta_{ei}^2$$

Where

β = portfolio beta

$\sigma^2{}_m$ = **variance of the market index**

w_i = **proportion of investment in each security**

$\sigma^2{}_{ei}$ = residual variance (random error) of individual securities

β_p or portion beta has to be calculated using the formula

$$\beta_p = \sum_{i=1}^{n} W_i \beta_i$$

$= (0.1)\,(1.35) + (0.2)\,(1.05) + (0.15)\,(0.80) + (0.3)\,(1.5) + (0.25)\,(1.25)$
$(1.12) = 1.195$

Portfolio residual variance $\left(\sum_{I=1}^{n} w_i^2 \, \delta_{ei}^2\right)$ can be calculated as

$= (0.1)^2\,(5)^2 + (0.2)^2\,(9)^2 + (0.15)^2\,(4)^2 + (0.30)^2\,(12)^2 + (0.25)^2\,(8)^2$
$= 20.81$

portfolio total risk can now be calculated as:

$$\sigma^2{}_p = \beta^2{}_p \sigma^2{}_m + \sum_{I=1}^{n} w_i^2 \, \delta_p^2$$

$= (1.195)^2\,(20)^2 + 20.81$
$= 571.21 + 20.81 = 592.02$

Illustration 3: Consider a portfolio composed of five securities. All the securities have a beta of 1.0 and unique or specific risk (standard deviation) of 25 per cent. The portfolio distributes weight equally among its component securities. If the standard deviation of the market index is 18 per cent, calculate the total risk of the portfolio.

Solution: The input data may be arranged in the form of the following table.

Security	Beta	specific risk (standard deviation)	proportion
Unilever	1.0	25	0.2
IBTC	1.0	25	0.2
UBN	1.0	25	0.2
Cadbury	1.0	25	0.2
Oando	1.0	25	0.2

Standard deviation of market index is 18 percent

$$B_p = W_i\beta_i$$
$$i = 1$$
$$= (0.2 \times 1.0) \times 5 = 10$$

Portfolio residual variance $= \sum_{i=1}^{n} w_i^2 \, \delta_{ei}^2$

$(0.2)^2 (25)^2 \times 5 = 125$
portfolio total risk

$$\sigma_p^2 = \beta_p^2 \sigma_m^2 + ? \sum_{I=1}^{n} w_i^2 \, \delta_{ei}^2$$

$$= (1.0)^2 (18)^2 + 125$$
$$= 324 + 125 = 449$$

Illustration 4: How many parameters must be estimated to analyse the risk-return profile of a 50 stock portfolio using (a) the original Markowitz model, and (b) the Sharpe single index model?

Solution: In Markowitz model we require the following estimates:
N return estimates
N variance estimates
N (N-1)/2 covariance estimates
Total estimates = 2N + [N-1)/2]
$\qquad$ = (2x50) + [50 (50- 1) /2]
$\qquad$ = 100 + 1225 = 1325

In Sharpe single index model we must have
N α estimates
N β estimates
N residual variance estimates
Market return, Rm
Variance of market return σ_m^2
Total estimates = 3 N +2
$\qquad$ = (3 x 50)+ 2 = 152

Illustration 5: Consider a portfolio of four securities with the following characteristics:

Security	Weighing	a_i	B_i	Residual variance (σ_{ei}^2)
UBA	0.2	2.0	12	320
IBN	0.3	1.7	0.8	450
PZ	0.1	-0.8	1.6	270

Nestle	0.4	1.2	1.3	180

Calculate the return and risk of the portfolio under single index model, if the return on market index is 16.4 per cent and the standard deviation of return on market index is 14 per cent.

Solution: 1 Portfolio return under single index model is calculated using the formula:

$R_p = \alpha_p + \beta_p R_m$
For applying this formula up and B_p have to be calculated

$\alpha_p = \sum\limits_{i=1}^{n} w_i \alpha_i$

$= (0.2)\ (2.0) + (0.3)\ (1.7) + (0.1)\ (-0.8) + (0.4)\ (1.2)$
$= 1.31$

$\beta_p = \sum\limits_{i=1}^{n} w_i \beta_i$

$= (0.2)\ (1.2) + (0.3)\ (0.8) + (0.1)\ (1.6) + (0.4)\ (1.3)$
$= 1.16$

$R_p = \alpha_p + \beta_p R_m$
$= 1.31 +)1.16)\ (16.4)$
$= 1.31 + 19.024$
$= 20.334$

2.   Portfolio risk under single index model is calculated as:

$$\delta_p^2 = \beta_p^2 \delta_m^2 + \sum\limits_{I=1}^{n} w_i^2\ \delta_{ei}^2$$

For applying this, portfolio residual variance needs to be calculated as:

Thus,
$(0.2)^2(320) + (0.3)^2(450) + (0.1)^2(270) + (0.4)^2(180)$
$= 12.8 + 40.5 + 2.7 + 28.8$
$=84.8$

Now,

$$\sigma_p^2 = \beta_p^2 \sigma_m^2 + \sum\limits_{I=1}^{n} w_i^2\ \sigma_{ei}^2$$

$= (1.16)2 (14)2 + 84.8$

$= 263.74 + 84.8 = 348.54$

Hence,

$$\sigma_p = \sqrt{348.54}$$

$= 18.67$

Example 6: The data for three stocks are given. The data are obtained from correlating returns on these stocks with the returns on the market index.

Stock	α^2	B_i	Residual variance (in percent) (σ^2_{ei})
A	-2.1	1.6	14
B	1.8	0.4	8
C	1.2	1.3	1.8

Which single stock would an investor prefer to own from a risk-return view point if the market index were expected to have a return of 15 per cent and a variance of return of 20 per cent?

Solution: Here we have to calculated the expected return and risk of each security under the single index model.

Expected return

$$\overline{R}_i = \alpha_i + \beta_i R_m$$

Security A = 2.1 + (1.6) (15) = -2.1 + 24 = 21.9
Security B = 1.8 + (0.4) (15) = 1.8 + 6 = 7.8
Security C = 1.2 + (1.3) (15) = 1.2+ 19.5 = 20.7

4.0 CONCLUSION

In this unit, we have seen that the conceptual framework and analytical tools for determining the optimal portfolio in disciplined and objective manner have been provided by Harry Markowitz in his pioneering work on portfolio analysis described in his 1952 journal of Finance article and subsequent book in 1959. His method of portfolio selection has come to be known as the Markowitz model. In fact, Markowitzs work marks the beginning of what is known today as modern portfolio theory. A portfolio will dominate another if it has either a lower standard deviation and the same expected return as the other, or a higher expected return and the same standard deviation as the other. Portfolios that are dominated by other portfolios are known as inefficient portfolios. An investor would not be interested in all the

portfolios in the opportunity set he would be interested only in the efficient portfolios.

5.0 SUMMARY

You have learnt in this unit the feasible Set of Portfolios, the efficient Set of Portfolios, how to select the Optimal Portfolio, the various limitations of Markowitz Model as well as how to measure Portfolio Return and Risk under Single Index model and Multi-Index Model

6.0 TUTOR-MARKED ASSIGNMENT

- Differentiate between efficient and inefficient Portfolios
- Discuss the obvious limitations of Markowitz Model

7.0 REFERENCES/FURTHER READINGS

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MODULE 2
UNIT 1**:** Regulatory institutions in the Nigeria financial market – CBN
Unit 2   Regulatory institutions in the Nigeria financial market –NDIC
Unit 3   Regulatory institutions in the Nigeria financial market – SEC

UNIT 1: REGULATORY INSTITUTIONS IN THE NIGERIA FINANCIAL MARKET – CBN

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    3.2 Functions of Central Bank of Nigeria
    3.3 Policy Implementation and Criticism
4.0 Conclusion
5.0 Summary
6.0 Tutor Marked Assignment
7.0 References and Further Reading

1.0   INTRODUCTION

The Nigerian financial institutions and indeed, the financial markets are not regulated by only one entity. Different institutions regulate different players in the various sub-sets of the financial markets. The Central Bank of Nigeria (CBN) is the apex regulatory authority in the Nigerian Banking Sector.

2.0 OBJECTIVES

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

- Overview of the Historical background of the Central Bank of Nigeria
  The Origin of Central Bank of Nigeria

- State the functions of Central Bank of Nigeria
- Clearly discuss the Policy Implementation and Criticism of CBN

3.0 MAIN CONTENT

3.1 Overview of the Background of the Central Bank of Nigeria CBN)

The history of Central Bank of Nigeria includes its authorizing legislation and its origin which are discussed in the following subsections.

3.1.1 Authorizing legislation

In 1948, an inquiry under the leadership of G.D. Paton was established by the colonial administration to investigate banking practices in Nigeria. Prior to the inquiry, the banking industry was largely uncontrolled. The G.D Paton's Report, an offshoot of the inquiry became the cornerstone of the first banking legislation in the country: the Banking Ordinance of 1952. The ordinance was designed to prevent non-viable banks from mushrooming, and to ensure orderly commercial banking. The banking ordinance triggered a rapid growth in the industry, with growth also came disappointment. By 1958, a few numbers of banks had failed. To curtail further failures and to prepare for indigenous control, in 1958, a bill for the establishment of Central Bank of Nigeria was presented to the House of Representatives of Nigeria. The Act was fully implemented on July 1, 1959, when the Central Bank of Nigeria came into full operation. In April 1960, the Bank issued its first treasury bills. In May 1961 the Bank launched the Lagos Bankers Clearing House, which provided licensed banks a framework in which to exchange and clear checks rapidly. By July 1, 1961 the Bank had completed issuing all denominations of new Nigerian notes and coins and redeemed all of the West African Currency Board's previous money.

3.1.2 The Origin of Central Bank of Nigeria

In 1892, Nigeria's first bank, the African Banking Corporation, was established. No banking legislation existed until 1952, at which point Nigeria had three foreign banks (the Bank of British West Africa, Barclays Bank, and the British and French Bank) and two indigenous banks (the National Bank of Nigeria and the African Continental Bank) with a collective total of forty branches. A 1952 ordinance set standards, required reserve funds, established bank examinations, and provided for

assistance to indigenous banks. Yet for decades after 1952, the growth of demand deposits was slowed by the Nigerian propensity to prefer cash and to distrust checks for debt settlements.

British colonial officials established the West African Currency Board in 1912 to help finance the export trade of foreign firms in West Africa and to issue a West African currency convertible to British pounds sterling. But colonial policies barred local investment of reserves, discouraged deposit expansion, precluded discretion for monetary management, and did nothing to train Africans in developing indigenous financial institutions. In 1952, several Nigerian members of the Federal House of Assembly called for the establishment of a central bank to facilitate economic development. Although the motion was defeated, the colonial administration appointed a Bank of England official to study the issue. He advised against a central bank, questioning such a bank's effectiveness in an undeveloped capital market. In 1957, the Colonial Office sponsored another study that resulted in the establishment of a Nigerian central bank and the introduction of a Nigerian currency. The Nigerian pound on a par with the pound sterling until the British currency's devaluation in 1967, was converted in 1973 to a decimal currency, the naira (N), equivalent to two old Nigerian pounds. The smallest unit of the new currency was the kobo, 100 of which equaled 1 naira. The naira, which exchanged for US$1.52 in January 1973 and again in March 1982 (or N0.67=US$1), despite the floating exchange rate, depreciated relative to the United States dollar in the 1980s. The average exchange rate in 1990 was N8.004=US$1. Depreciation accelerated after the creation of a second-tier foreign exchange market under World Bank structural adjustment in September 1986. As 2014, the Naira further depreciated to N166 per $1.

The Central Bank of Nigeria, which was statutorily independent of the Federal Government until 1968, began operations on July 1, 1959. Following a decade of struggle over the relationship between the government and the Central Bank, a 1968 military decree granted authority over banking and monetary policy to the Federal Executive Council. The role of the Central Bank, similar to that of central banks in North America and Western Europe, was to establish the Nigerian currency, control and regulate the banking system, serve as banker to other banks in Nigeria, and carry out the government's economic policy in the monetary field. This policy included control of bank credit growth, credit distribution by sector, cash reserve requirements for commercial banks, discount rates and interest rates the Central Bank charged commercial and merchant banks and the ratio of banks' long-term assets to deposits. Changes in Central Bank's restrictions on credit and monetary expansion affected total demand and income. For example, in 1988, as inflation accelerated, the Central Bank tried to

restrain monetary growth. During the civil war, the government limited and later suspended repatriation of dividends and profits, reduced foreign travel allowances for Nigerian citizens, limited the size of allowances to overseas public offices, required official permission for all foreign payments, and, in January 1968, issued new currency notes to replace those in circulation. Although in 1970, the Central Bank advised against dismantling of import and financial constraints too soon after the war, the oil boom soon permitted Nigeria to relax restrictions. The three largest commercial banks held about one-third of total bank deposits. In 1973, the Federal Government undertook to acquire a 40-percent equity ownership of the three largest foreign banks. In 1976, under the second Nigerian Enterprises Promotion Decree requiring 60 percent indigenous holdings, the Federal Government acquired an additional 20 percent holding in the three largest foreign banks and 60 percent ownership in the other foreign banks. Yet, indigenization did not change the management, control, and lending orientation toward international trade, particularly of foreign companies and their Nigerian subsidiaries of foreign banks.

At the end of 1988, the banking system consisted of the Central Bank of Nigeria, forty-two commercial banks, and twenty-four merchant banks, a substantial increase since 1986. Merchant banks were allowed to open checking accounts for corporations only and could not accept deposits below N50, 000. Commercial and merchant banks together had 1,500 branches in 1988, up from 1,000 in 1984. In 1988, commercial banks had assets of N52.2 billion compared to N12.6 billion for merchant banks in early 1988. In 1990, the government put N503 million into establishing community banks to encourage community development associations, cooperative societies, farmers' groups, patriotic unions, trade groups, and other local organizations, especially in rural areas.

Other financial institutions included government-owned specialized development banks: the Nigerian Industrial Development Bank, the Nigerian Bank for Commerce and Industry, and the Nigerian Agricultural Bank, as well as the Federal Savings Banks and the Federal Mortgage Bank. Also active in Nigeria were numerous insurance companies, pension funds, and finance and leasing companies. Nigeria also had a stock exchange (established in Lagos in 1961) and a number of stockbrokerage firms. The Securities and Exchange Commission (SEC) Decree of 1988 gave the Nigerian SEC powers to regulate and supervise the capital market. These powers included the right to revoke stockbroker registrations and approve or disapprove any new stock exchange. Established in 1988, the Nigerian Deposit Insurance Corporation increased confidence in the banks by protecting depositors against bank failures in licensed banks up to N50,000 in return for an annual bank premium of nearly 1 percent of total deposit liabilities.

Finance and insurance services represented more than 3 percent of Nigeria's GDP in 1988. Economists agree that services, consisting disproportionately of nonessential items, tend to expand as a share of national income as a national economy grows. However, Nigeria lacked comparable statistics over an extended period, preventing generalizations about the service sector. Statistics indicate, nevertheless, that services went from 28.9 percent of GDP in 1981 to 31.1 percent in 1988, a period of no economic growth. In 1988, services comprised the following percentages of GDP: wholesale and retail trade, 17.1 percent; hotels and restaurants, less than 1 percent; housing, 2.0 percent; government services, 6. percent; real estate and business services, less than 1 percent; and other services, less than 1 percent. (Jhingan, 2004)

3.2 Functions of Central Bank of Nigeria

The functions of CBN are;

a. **Issuance of Legal Tender Currency Notes and coins:** The Central Bank of Nigeria engages in currency issue and distribution within the economy. The Bank assumed these important functions since 1959 when it replaced the West African Currency Board (WACB) pound then in circulation with the Nigerian pound. The decimal currency denominations, Naira and Kobo, were introduced in 1973 in order to move to the metric system, which simplifies transactions. In 1976, a higher denomination note – N20 joined the currency profile. In 1984, a currency exchange was carried out whereby, the colors of existing currencies were swapped in order to discourage currency hoarding and forestall counterfeiting. In 1991, a currency reform was carried out which brought about the phasing out of 2kobo and 5kobo coins, while the 1k, 10k and 25k coins were redesigned. In addition, the 50k and N1 notes were coined, while the N50 note was put in circulation. In the quest to enhance the payments system and substantially reduces the volume and cost of production of "legal tender notes", the N100 and N200 notes were issued in December 1999 and November 2000, respectively. Similarly, the N500 note was issued in 2001;

b. **Maintenance of Nigeria's External Reserves:** In order to safeguard the international value of the legal tender currency, the CBN is actively involved in the management of the country's debt and foreign exchange;

c. **Debt Management:** In addition to its function of mobilizing funds for the Federal Government, the CBN in the past managed its domestic debt and services external debt on the advice of the Federal Ministry of Finance. On the domestic front, the Bank advises the Federal Government as to the timing and size of new debt instruments, advertises for public subscription to new issues, redeems matured stocks, pays interest and principal as and when due, collects proceeds of issues for and on behalf of the Federal Government, and sensitizes the Government on the implications of the size of debt and budget deficit, among others. On external debt service, the CBN also cooperates with other agencies to manage the country's debt. In 2001, the responsibility of debt management was transferred to Debt Management Office (DMO);

d. **Foreign Exchange Management:** Foreign Exchange management involves the acquisition and deployment of foreign exchange resources in order to reduce the destabilizing effects of short-term capital flows in the economy. The CBN monitors the use of scarce foreign exchange resources to ensure that foreign exchange disbursements and utilization are in line with economic priorities and within the annual foreign exchange budget in order to ensure available balance of payments position as well as the stability of the Naira;

e. **Promotion and Maintenance of Monetary Stability and a Sound and Efficient Financial System:** The effectiveness of any central bank in executing its functions hinges crucially on its ability to promote monetary stability. Price stability is indispensable for money to perform its role of medium of exchange, store of value, standard of deferred payments and unit of account. Attainment of monetary stability rests on a central bank's ability to evolve effective monetary policy and to implement it effectively. Since June 30, 1993 when the CBN adopted the market-based mechanism for the conduct of monetary policy, Open Market Operations (OMO) has constituted the pound. The decimal currency denominations, Naira and Kobo, were introduced in 1973 in order to move to the metric system, which simplifies transactions. In 1976, a higher denomination note – N20 joined the currency profile. In 1984, a currency exchange was carried out whereby, the colors of existing currencies were swapped in order to discourage currency hoarding and forestall counterfeiting. In 1991, a currency reform was carried out which brought about the phasing out of 2kobo and 5kobo coins, while the 1k, 10k and 25k coins were redesigned. In addition, the 50k and N1

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f. **Banker and Financial Adviser to the Federal Government:** The CBN as banker to the Federal government undertakes most of Federal Government banking businesses within and outside the country. The Bank also provides banking services to the State and Local Governments and may act as banker to institutions, funds or corporation set up by the Federal, State and Local Governments. The CBN also finances government in period of temporary budget shortfalls through Ways and Means Advances subject to limits imposed by law. As financial adviser to the Federal Government, the Bank advises on the nature and size of government debt instruments to be issued, while it acts as the issuing house on behalf of government for the short, medium and long-term debt instruments. The Bank coordinates the financial needs of government in collaboration with the treasury to determine appropriately the term, timing of issue and volume of instruments to raise funds for government financing.

g. **Banker and Lender of Last Resort to Banks:** The CBN maintains current account for deposit money banks. It also provides clearing house facilities through which instruments from the banks are processed and settled. Similarly, it undertakes trade finance functions on behalf of banks' customers. Finally, it provides temporary accommodation to banks in the performance of its functions as lender of last resort.

3.3 Policy Implementation and Criticism of the CBN

The CBN's early functions were mainly to act as the government's agency for the control and supervision of the banking sector, to monitor the balance of payments according to the demands of the Federal Government and to tailor monetary policy along the demands of the federal budget. The central bank's initial lack of financial competence over the finance ministry led to deferment of major economic decisions to the finance ministry. A key instrument of the bank was to initiate credit limit legislation for bank lending. The initiative was geared to make credit available to the neglected national areas such as agriculture and manufacturing. By the end of 1979, most of the banks did not adhere to their credit limits and favoured a loose interpretation of CBN's

guidelines. The central bank did not effectively curtail the prevalence of short-term loan maturities. Most loans given out by commercial banks were usually set within a year. The major policy to balance this distortion in the credit market was to create a new Bank of Commerce and Industry, a universal bank. However, the new bank did not fulfill its mission.

Another policy of the bank in concert with the intentions of the government was direct involvement in the affairs of the three major expatriate commercial banks in order to forestall any bias against indigenous borrowers and consumers. By 1976, the Federal Government had acquired 40% of equity in the three largest commercial banks. The bank's slow reaction to curtail inflation by financing huge deficits of the Federal Government has been one of the sore points in the history of the central bank. Coupled with its failure to control the burgeoning trade arrears in 1983, the country was left with huge trade debts totaling $6 billion.

4.0 CONCLUSION

The Central Bank of Nigeria (CBN) plays a prominent role in economic growth and development. It plays a promotional, financial, operational, regulatory and participatory role in the money market and the capital market.

There is the need for close integration between the CBN's policies and those of the Federal Government in order to achieve macro-economic stability. There is also the need to guarantee CBN autonomy and should be insulated from interference by the government.

5.0 SUMMARY

In this unit, you learnt the history of Central Bank of Nigeria, its authorizing legislation and origin. You also learnt the functions of Central Bank of Nigeria and its policy implementation and criticism.

6.0 TUTOR MARKED ASSIGNMENT

1. Clearly state the functions of the Central Bank of Nigeria.

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UNIT 2   REGULATORY INSTITUTIONS IN THE NIGERIA FINANCIAL MARKET –NDIC

1.0 Introduction
2.0 Objectives
3.0 Main Content
    3.1 Meaning of NDIC
    3.2 Historical development of the Nigerian Deposit Insurance Corporation (NDIC)
    3.3 The Role of NDIC in the Banking Industry
    3.4 Functions of NDIC
    3.5 Essentials of Banking Regulation
4.0 Conclusion
5.0 Summary
6.0 Tutor Marked Assignment
7.0 References/Further Readings

1.0 INTRODUCTION
In this unit, we shall discuss the meaning, the historical development of the Nigerian Deposit Insurance Corporation (NDIC), its mandates of establishment and functions.

2.0 OBJECTIVES
At the end of unit you should be able to:
• Trace the historical development of the NDIC
• Discuss the roles of NDIC in the banking industry
• Discuss the essentials of banking regulation,

2.0 MAIN CONTENT

3.1 MEANING OF NDIC

NDIC stands for Nigerian Deposit Insurance Corporation. The NDIC is an autonomous body which acts as an Supervisory authority over licensed banks. The corporation not only provides financial guarantee to depositors but also ensures that banks comply with regulations and practices that foster safety and soundness in the market place

3.2 HISTORICAL BACKGROUND OF THE NIGERIA DEPOSIT INSURANCE CORPORATION (NDIC)

The history of Nigeria Deposit Insurance Corporation (NDIC) has its origin in the report of a committee set up in 1983 by the Board of Central Bank of Nigeria (CBN), to examine the operations of the banking system in Nigeria. The Committee in its Report recommended the establishment of a Depositors Protection Fund. Consequently, the Nigeria Deposit Insurance Corporation was established through the promulgation of Decree No. 22 of 15 th June 1988.

This was part of the economic reform measures taken by the then government, to strengthen the safety net for the banking sector following its liberalization policy and the introduction of the 1986 Structural Adjustment Programme (SAP) in Nigeria.

The phenomenal increase in the number of banks from 40 in 1986 to 120 in 1992 led to:

- Increased Competition amongst banks leading to sharp practices
- People of questionable integrity becoming bank owners and managers
- Inadequate Manpower
- The coming together of strange bedfellows due to the licensing requirement that banks maintain adequate geographical spread.

All these led to serious breakdown in Corporate Governance and Boardroom squabbles. The unpredictable policy environment, downturn in the economy and political upheavals at the time, also exacerbated the difficult situation the Corporation found itself in. The banking industry was therefore, already in distress by the time the Corporation commenced operations in March 1989. NDIC operated under a difficult terrain at the time and was immediately saddled with the management of distress in the banking industry, to avert the impending systemic crises and its resultant consequences. Some of the measures undertaken by the Corporation at the time, to manage distress in the interest of the depositors and the System included:

- Moral suasion; continuous interaction with bank managers/owners
- Imposition of Holding Actions on distressed banks to restrict operations and encourage self-restructuring – about 52 distressed banks had Holding Actions imposed on them at that time.
- Rendering of Financial Assistance to banks; In 1989 alone, NDIC in collaboration with the CBN granted facilities to the tune of N2.3 billion to ten banks with serious liquidity problems
- Takeover of Management and Control of 24 distressed banks between 1991 and 1996.
- Acquisition and restructuring of seven (7) distressed banks which were handed over to new investors in 1999 and 2000

- Implementation of Failed Banks Decree No. 18 of 1994. At the end of 1995, about one out of every two banks in Nigeria was distressed. The Decree was intended to assist distressed banks recover their classified assets and punish the malpractices that contributed to the distress. As at June 1996, the Corporation had recovered about N3.3 billion.

3.3 Rationale for the establishment of Deposit Insurance Scheme in Nigeria

- The deposit insurance scheme was established in Nigeria in 1989 with the promulgation of an enabling legislation, Decree No. 22 of 1988.
- There were at least five major reasons for establishing a formal bank deposit insurance scheme in Nigeria. The first was the lesson of history connected with the experience of prior bank failures in Nigeria. In the 1950s, many small depositors suffered untold hardship as twenty-one (21) out of the twenty-five (25) indigenous banks operating in Nigeria closed doors.
- The establishment of the Corporation was also informed by the approach which some other countries adopted to ensure banking stability. For example, Czechoslovakia which was the first country to establish a nation-wide deposit scheme in 1924, used the scheme to revitalize the country's banking system after ravages of the First World War. In addition, the scheme served to encourage saving, by increasing the safety of deposits and ensuring the best possible development of banking practice in that country. Similarly, the United States of America (USA) established the Federal Deposit Insurance Corporation (FDIC) in 1933 in response to a banking collapse and panic.
- Also, the Structural Adjustment Programme (SAP) embarked upon by government in 1986 was aimed at deregulating the economy in the direction of market-determined pricing. It was envisaged that since deregulation would involve the liberalisation of the bank licensing process, there would be a substantial increase in the number of licensed banks to be supervised by the CBN. The establishment of an explicit deposit insurance scheme with supervisory powers over insured institutions was expected to complement the supervisory efforts of the CBN. Indeed, since the establishment of the Corporation in 1989, it has been possible for both institutions (CBN and NDIC) to carry out routine and special examinations of licensed banks more frequently than before, despite the increase in the number of banks. The banks are now examined more frequently prior to the establishment of the Corporation.

- Finally, prior to the establishment of the Corporation, government had been unwilling to let any bank fail, no matter a bank's financial condition and/or quality of management. Government feared the potential adverse effects on confidence in the banking system and in the economy following a bank failure. Consequently, government deliberately propped up a number of inefficient banks over the years, especially those banks in which state governments were the majority shareholders. Thus, government established the Corporation to administer the deposit protection scheme on its behalf and to serve as a vehicle for implementing failure resolution options for badly managed insolvent banks.

3.4 NDIC's mandates

Deposit Guarantee: This is the most significant and distinct mandate of the Corporation. Deposit Guarantee ensures Depositors are protected against loss of their insured deposits in the event of a bank unable to meet its obligations to the depositors

Bank Supervision:
- The Corporation supervises banks in order to protect depositors and to ensure safety and soundness of the banking system
- Ensures potential risk of failure is reduced
- Ensures the unsafe and unsound banking practices do not go unchecked

Failure Resolution:
- One of the primary roles of the NDIC is to ensure that failing and failed institutions are resolved in a timely and efficient manner

Bank Liquidation
- Liquidation process involves orderly and efficient closure of the failed institutions with minimum disruption to the banking system
- Cost-effective realization of assets
- Settlement of claims to Depositors, Creditors and where possible, Shareholders

3.5 Functions of NDIC
Section 2 of the NDIC Act 2006 stipulates the functions for the Corporation as follows**:**
- Insuring all deposit liabilities of licensed Banks and such Other Financial Institutions operating in Nigeria to engender confidence in the Nigerian banking system

- Giving Financial and Technical Assistance to eligible Insured Institutions in the interest of Depositors
- Guaranteeing payments to Depositors, in case of imminent or actual suspension of payments by Insured Institutions up to the maximum provided for in section 20 of NDIC Act;
- Assisting monetary authorities in the formulation and implementation of policies so as to ensure sound banking practice and fair competition among insured institutions in the country;
- Pursuing any other measures necessary to achieve the functions of the Corporation provided such measures and actions are not repugnant to the objects of the Corporation.

4.0 CONCLUSION
We therefore conclude that the NDIC was established to prevent the incidence of bank failure in Nigeria,
5.0 SUMMARY
We have learnt the meaning, historical development and functions of the NDIC. In addition we have also learnt the essentials of banking regulation.

6.0 TUTOR-MARKED ASSIGNMENT
Outline the functions of the NDIC in the banking sector.

7.0 REFERENCES/FURTHER READINGS

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UNIT 3   REGULATORY INSTITUTIONS IN THE NIGERIA FINANCIAL MARKET – SEC

1.0 Introduction
2.0 Objectives
3.0 Main Content

   3.1 Historical development of the Securities and Exchange Commission (SEC)
   3.2 Objectives of the Securities and Exchange Commission (SEC)
   3.3 The Functions of the Commission
   3.4 Composition of Membership of SEC
   3.5 How Securities & Exchange Commission Protects the investing Public
   3.6 Prospectus

4.0 Conclusion
5.0 Summary
6.0 Tutor Marked Assignment
7.0 References/Further Readings

1.0 INTRODUCTION

The Securities and Exchange Commission (SEC) is the apex regulatory institution of the Nigerian capital market. Since inception, the SEC has been playing within the capital market a similar role to that played by the Central Bank of Nigeria in the money market.

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

- Understand the historical development of the Security and Exchange Commission (SEC)
- State objectives of the Securities and Exchange Commission (SEC)
- State the Functions of the Commission
- Understand the Composition of Membership of SEC
- Explain how Securities & Exchange Commission Protects the investing Public
- Explain what Prospectus is all about

3.0 MAIN CONTENT

3.1 Historical development of the Security and Exchange Commission (SEC)

The Securities and Exchange Commission (SEC) is a federal government agency established by the Securities and Exchange Commission act 71 of 1979 which was re-enacted as Decree number 29 of 1988. Before attaining its present status, the commission had undergone a number of changes from the initial days of its progenitor, the Capital Issues Committee that had ad-hoc powers 'to Capital Issues Commission that was statutorily established by the Capital Issues Decree of 1973. As would be expected, its role with each change continued to vary over the years with the changing objective carved for its evolving structure. The policy determination of the commission is the responsibility of its board of directors, which includes the director-general of the commission as a member. The director-general in turn oversees the day-to-day administration of the commission on behalf of the board.

Generally, members of the board are chosen in consideration of their ability, experience, specialized knowledge and professional attainments in securities business in particular and the national economy in general.

At inception, the staff of the commission was drawn from the Central bank, (an inevitable fact of its history). But since attaining separate existence, it has recruited more professionals in the accountancy, economics, finance, statistics and law, in addition to administrative, clerical and secretarial staff. Administratively, the commission is divided into departments headed by departmental directors and divisions under divisional heads, who must be at least of managerial status. In broad terms, the main functions of the commission are to regulate and develop the Nigerian capital market in order to achieve its wider objectives of investor protection and capital market development toward enhanced socio-economic development. The pursuit of these broad objectives involves:

- Full disclosure requirements by operators and issuers in the market.
- Regulation of trading in securities through market surveillance activities.   Registration of securities and institutions in the

market.
- Public enlightenment, research and general education about securities industry.
- Creating the necessary atmosphere for the orderly growth and development of the capital market.
- Investigation of complaints and suspected breaches of the securities laws and,
- Making of rules to direct the market towards a desired course.

Apart from the Securities and Exchange Commission decree of 1988, which the commission administers, it also operates within the provisions of other statutory enactment's that relate to securities business, corporate finance and investments in Nigeria. Significant among these are the companies and allied matters decree, 1990 which vests the administration of unit trust schemes in the SEC, the trustees investments acts of 1957 and 1962, and the technical committee and privatization and commercialization decree of 1988.

As a statutory corporation under the supervision of the federal finance ministry, the commission submits reports of its activities annually to the ministry. Despite its now familiar public enlightenment strategy for broadening awareness, a certain level of ignorance still exists about the commission, its functions, roles and place in the Nigerian socio-economic set-up.

3.2 Objectives of the Security and Exchange Commission (SEC)

The basic objectives of the commission are:
- Investor protection, and
- Capital market development towards enhanced socio-economic growth and development.

The need for investor protection emanates from the nature of financial assets and financial services industry itself. The former, for instance, cannot have their worth determined by ordinary physical examination, like most other products do. Financial services on the other hand, are

perceived to be terse and intricate. It is therefore more difficult for investors to evaluate with any degree of confidence, the quality of the services and products that are offered. It is equally not easy for a single investor to gain access to all the relevant information he may need in order to make an informed and rational investment decision.

The objective of investor protection is to ensure that issuers of financial instruments provide investors with relevant, timely and adequate information about securities and institutions that are subject of public issues. Secondly, such protection is pursued to prevent fraudulent practices such as false claims, deceit, price manipulation and unfair use of undisclosed price sensitive information that could dent public confidence in the securities business.

By and large, the rules and regulations of the commission have been formulated to guide all market operations and operators with the aim of offering far-reaching protection to all investors, whether local or foreign.

Capital market development on the other hand, involves creating general awareness about the market as an important source of investment finance and therefore, a catalyst for rapid socio-economic advancement. Capital market development has involved research activities aimed at improving market efficiency and competitiveness as well as introducing new instruments and initiating policies with positive implications for the market. The commission ensures that it balances regulation with development and progressive ideas.

As the apex regulatory body for the capital market, the SEC is the principal adviser to the Nigerian government on capital market issues and is in this regard, called upon to give upon - from time to time to give opinions on related subjects.

3.3 Composition of Membership of SEC
(a)   A Chairman
(b)   One person not below the rank of Director to represent the Federal Ministry of Finance.
(c)   One person not below the rank of Director to represent the Central Bank of Nigeria.
(d)   Two full time Commissioners who shall be persons with ability, experience and specialized knowledge in capital market matters.

(e)   The Director-General of the Commission; and
(f)   Five other Commissioners who shall be persons with proven ability and expertise in corporate matters generally.

3.4   Functions of Securities and Exchange Commission:
(a)   Determining the price at which Securities are to be sold, the amount to be sold as well as the appropriate time to issue the securities either through offer for sale or offer for subscription.
(b)   Registration of Securities proposed for offer for sale or offer for subscription.
(c)   Maintaining surveillance over the securities market to ensure orderly, fair and equitable dealings in securities.
(d)   Registering stock exchange or their branches, registrars, securities dealers and other capital market operators with a view to maintaining proper standards of and professionalism in the securities business.
(e)   Protect the integrity of the securities market against any abuse arising from the practice of insider trading.
(f)   Acting as regulatory apex organisation for the Nigerian Stock exchange and its branches to which it would be at liberty to delegate power.
(g)   Reviewing, appointing and regulating of business combination.
(h)   Creating the necessary atmosphere for the orderly growth and development of the capital market.

3.5 How Does Securities & Exchange Commission Protect The investing Public?
The Securities and Exchange Commission protects the investing public by ensuring that companies make:-
(a)   Full disclosure in prospectus.
(b)   Adequate and timely financial reporting
(c)   Fair and equitable issuance of securities
(d)   Fair trading practice.

3.6 Prospectus
A company issuing securities either through offer for sale or offer for Subscription is expected to submit a prospectus to Securities and Exchange Commission (through its issuing house) detailing information about the offer.

The prospectus often shows the following information:
(a)   Summary of the offer:
        - Name of the company
        - Number of shares being offered
        - Nominal price and offer price
        - Market capitalization of the company (at offer price)

- Market capitalization of the offer (at offer price)
- Share capital (authorized issued)
- Forecast EPS, Earnings Yield, dividend and dividend yield.

(b)   Parties to the offer:
- Names of directors, Company Secretary, issuing houses, stockbrokers, Solicitors, reporting accountants, auditors and registrar.

(c)   Chairman's Letter:
- Purposes of the offer
- History and business of the company
- Company's management staff
- Staff training, industrial relations and welfare
- Staff pensions
- Future expansion programmes.

(d)   The Profit Forecast:
- Forecast PBT, PAT, Reserves, Dividend and Retained profit.
- Assumptions on which the forecast is based
- Reporting Accountant's letter relating to the following.
(i)   Review of accounting policies used for the forecast.
(ii)   Review of the calculations of the forecast
(iii)   Review of the reasonableness of the assumptions
(iv)   Review of the consistency in the application of accounting policies.
- Issuing House letter with respect to:
(i)   Discussion with the Directors of the company and Reporting Accountant with respect to assumptions, calculations and accounting policies used for the forecast.
(ii)   Acceptance of responsibility by the Directors for the forecast.

(e)   Accountant's Report (content):
- A letter expressing opinion on the following:
(i)   Examination of audited accounts for five years
(ii)   Financial statements are prepared from audited accounts after making necessary adjustments.
(iii)   Whether the financial statements show true and fair view and comply with CAMD and accounting standards.
(iv)   Name of company auditor.
- Five-year financial summary of P & L, Balance sheet, Statements of sources and applications of funds.
- Schedule of adjustments (e.g with respect to Extra-ordinary items, prior year adjustments etc.).

(f)   Statutory and General Information:

- Incorporations and capital history
- Extract from Memorandum and Articles of Association
- Company's borrowing power
- Material contracts.
- Claims and pending litigations.

4.0 CONCLUSION

We have seen in this unit the historical background of SEC, the functions of SEC, how SEC protects the investors as well as what Prospectus Document is all about.

5.0 SUMMARY

In this unit, you have learnt the historical development of the Security and Exchange Commission (SEC), its objectives, the Functions of the Commission and the Composition of Membership of SEC. We have also explained how Securities & Exchange Commission Protects the investing Public and what Prospectus is all about.

6.0 TUTOR MARKED ASSIGNMENT

- State five functions of SEC
- Explain how SEC protect the investing public

7.0 REFERENCES/FURTHER READINGS

Igbinosa, S.O. (2012). *Investment analysis and management* , Lagos: Elite Trust Ltd

Jhingan, M.L. (2004). *Monetary Economics.* Delhi: Vrinda publications (P) Ltd

Osaze, E.B. (2007). *Capital markets,* Lagos : The Bookhouse Company

MODULE 3:
Unit 1   Money market operations
Unit 2:   Capital market operations
Unit 3   Capital market investment as aid to Economic Development
Unit 4   Current state of empirical evidence of models for evaluating portfolio performance
Unit 5   Capital Asset Pricing Model (CAPM)

UNIT 1 MONEY MARKET OPERATIONS

CONTENTS

1.0   Introduction
2.0   Objectives
3.0   Main Content
       3.1 Instruments Traded in the Money Market
       3.2 Reason for Establishing the Nigerian Money Market
       3.3 Functions of Money Market
       3.4 Operators in the Financial Market
       3.5 Non-Banks Financial Institution
4.0   Conclusion
5.0   Summary
6.0   Tutor-Marked Assignment
7.0   References/Further Readings

1.0   INTRODUCTION

Money market is the market for sourcing short-term funds; the funds having duration of one year and below. It is to meet the needs of commercial activities and not for permanent investment as the instruments traded are of short time duration.

2.0 OBJECTIVES
At the end of this unit, you should be able to:
- Understand the Instruments Traded in the Money Market
- State the reasons for Establishing the Nigerian Money Market
- State the functions of Money Market
- Know the Operators in the Financial Market
- Know the non-Banks Financial Institution

3.0 MAIN CONTENT

3.1 Instruments Traded in the Money Market

The instruments traded in the money market are: Banker • acceptances, Commercial papers, Treasury bills, Treasury certificates, Certificates of Deposit.
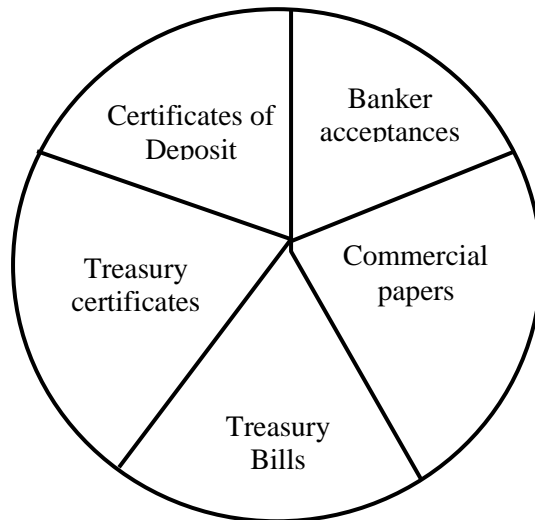

Figure. Instruments Traded in the Money Market

(a)   Banker Acceptances

The money market uses Banker Acceptances for the purpose of meeting short term financial needs of corporate bodies. It is usually issued as a bridging facility to finance either domestic or international trade. It is often issued by the debtor company and accepted by its banker and immediately it is endorsed it is a guarantee for payment by the bank. However the success of that endorsement and the inherent risk in the instruments is, more often than not, a function of the financial health of the bank that endorsed it.

(b)   Commercial Paper

This is another instrument for meeting short term need of corporate bodies. It is often used as a bridging facility to meet the financial needs of the company pending the time a more permanent source(s) of finance is arranged. It is usually of 90 days tenure.

(c)   Treasury Bills

Treasury bill is an instrument issued by Federal government to raise money from the public through Central Bank. It is usually of short term duration say 90 days and up to 180 days. They are often issued in tranches and are redeemable; new ones can be issued to replace the old ones being repaid.

(d)   Treasury Certificates

Treasury Certificate is another short term instrument available to the Federal Government to raise longer term fund. It is of a shorter duration than the Treasury bills counterpart.

(e)   Certificates of Deposit

This is the certificate, which the bankers issued to their customer that deposit money with them for a specified period. It is usually within a minimum time limit of 30 days with definite rate of interest attached to it.

This affords the customers the opportunity to earn interest on their money pending the time they would think of the use they want to put them. It also affords the bank some level of flexibility in matching their deposit obligation with risk assets.

3.2   Reason for Establishing the Nigerian Money Market

- To provide necessary short term financing requirements.
- To harness funds from small and big savers and channel such towards productive purposes.
- To provide platform for the implementation of government monetary policies.
- To provide credit base by providing local investment outlets for the retention of funds in Nigeria and for investment of funds repatriated from abroad following the laid down procedures.
- To provide basis for Nigeria monetary autonomy.

3.3   Functions of Money Market

- To harness funds from savers and channels them towards productive use. It provides an orderly flow of short-term funds.
- To ensure supply of necessary means of expanding and contracting credit.
- To provide the basis for operating and executing effective monetary policies.
- To provide mechanism for the injection of Central Bank cash into the Economy.
- To maintain stable cash and liquidity ratios as a base for the operation of the open market operation.
- To provide machinery needed for the government short-term financial requirements.
- To provide the mechanism through which liquidity of bank can be maintained at desired level.
- To provide effective management of financial instruments.
- To provide a central pool of liquid financial resources

upon which the banking system can draw when it needs additional funds to make payments.

3.4   Operators in the Financial Market

(a)   Commercial Banks

Commercial banks are at the center of money market operations. They are able to carry out their duties effectively through their numerous branch networks and instruments. According to Bank and other Financial Institutions Act 1991, bank in Nigeria is defined as an institution whose business includes the acceptance of deposits and withdrawal is made by cheques. The universal banking status granted to the banks has now widened their operational scope to include other businesses like Insurance, Capital market, Mortgage and any other businesses that can be reasonably combined with their operations. The minimum share capital of banks was therefore put at N25b to cope with the millennium challenges.

(b)   Functions of Commercial Banks

Apart from the above functions which are general to all financial institutions; Bank in addition performs the following functions:

- They accept deposits from customers on savings, current and all forms of deposit accounts.
- They lend money to their customers.
- They provide standing order facilities.
- They finance viable projects.
- They are quite involved in the issue of traveler's cheques.
- They help government in the process of implementing its monetary policies.
- They solve problems of foreign exchange for their customers.
- They give business advice to their customers.
- They keep valuable assets for their customers
- They act as guarantors to their customers.
- They provide standing order facilities to their
- customers.
- They settle bills of exchange on behalf of their customers
- They offer employment opportunities to young graduates and professionals.

(b)   Development Banks

Development banks are Specialized Financial Institutions set up by government to bridge the gap between short and long-term funding created by the commercial banks that trades in short term instruments.

They are established to develop a particular sector of the economy, hence they are specialized banks.

Nwankwo (1980) put it as 'gap and exigency thesis. According to him they are to bridge the gap between short term funding of commercial banks by the reason of their deposit structure and the long term finance of projects with long gestation period. Another reason, according to him, is the exigency of providing long term finance to priority areas of the economy which commercial banks are reluctant to fund. This, he referred to as 'gap and exigency thesis'

Presently, there are six development banks operating in the country with each of them having their specific functions to perform:

(c)   Nigerian Bank for Commerce and Industry (NBCI)
The Nigerian Bank for Commerce and Industry was set up in 1973 following the promulgation of the Nigerian Enterprises Promotion Decree of 1972, known as indigenization Decree. The main function of the bank is to provide much needed assistance to the Nigerian investors in the areas of share underwriting, identification of viable projects, writing of feasibility studies and offering of managerial and Technical advice. It was also established to provide needed capital to meet the needs of Enterprises promotion and to make money available to Nigerians to set up their business or buy into foreign businesses as provided for by the Act.

(d)   Nigerian Agricultural and Cooperative Bank (NACB)
The Nigerian Agricultural and Cooperative Bank was established in 1973 to provide the needed finance for Agricultural development. This is a step aimed at encouraging or improving the development of such Industries as fisheries, snail rearing, poultry farming, animal husbandry, timber production, forestry and any other type of farming.

The purpose is to promote Agricultural production by providing facilities and financial support and assistance to interested individuals, Cooperative societies, Companies and government agencies. It was also to offer technical assistance in the area of giving advice including preparation of feasibility report.

(e)   *Nigerian Industrial **Development Bank (NIDB)***
Nigerian Industrial Development Bank was established in 1964 to foster growth and encourage the establishment of medium and large scale industries in Nigeria. This it is to pursue by giving medium and long term loans to the public and private enterprises.

It is also to provide technical, financial and managerial assistance to indigenous enterprises. Initially the focus was on large scale industries but recently it has amended its operations to cover small and medium scale industries which are the mainstay of the economy.

(f)   **Urban Development Bank**
Urban Development Bank was established in 1992 to take care of the provision of infrastructural supply like housing, transportation, electricity and water supply that poses serious social problems in most cities in Nigeria. Its main function is to provide financial resources to both public and private sectors of the economy to finance the aforementioned projects.

(g)   **Federal Mortgage Bank (FMB)**
Federal Mortgage Bank of Nigeria was instituted by Decree 7 of 1977 of the Federal Military Government of Nigeria to take over the activities of former Nigerian Building Society (NBS) established in 1957. Its main function is to provide funds for Nigerian who wants to invest in housing estate. The decree also imposes the following additional responsibilities on the bank:

- To provide long term loans to mortgage institutions in Nigeria at such rates and subject to such terms as may be determined by the Federal Government being rates and terms designed to enable the mortgage institutions to grant comparable credit facilities to individual Nigerians that want to acquire houses of their own.
- To encourage and promote, the development of mortgage institution in the states and at National level.

- To supervise and control the activities of the primary mortgage institutions in Nigeria based on federal government directed principles.

- To provide credit facilities to Nigerians at such rates and upon such terms as may be determined by the board in accordance with the policy directed by the Federal Government.

- To provide credit facilities with the approval of Government at competitive commercial rates of interest to commercial property developers, estate developers, developers of offices and other specialized types of buildings.

- The enabling decree also allows the bank to accept deposits and savings from primary mortgage institutions, trust funds, the post office and private individuals as board may determine to promote the harnessing of savings from the public.

(h)   Nigerian Export-Import Bank (NEXIM)

Nigerian Import and Export Bank was established in 1991 to encourage Nigerians to develop other non oil export income generating areas, such as agricultural produce to bail Nigeria out of mono-cultural economy. This is the resultant product of the fall in oil revenue in the '70's as a result of fall in prices. The bank is charged with the responsibility of helping the nation to attain increases in export growth as well as structured balance and diversification on the product composition and destination of Nigerian products. The bank is also to provide export credit guarantee and export credit insurance functions as well as providing credit to support the establishment and management of export funds art4 other ancillary services.

3.5   Non-Banks Financial Institution

(a)   Insurance Companies

Insurance is a pool of risk or means of spreading risks or losses of few people over a large number of people or companies. It is the conversion of indeterminate risks into fixed costs by way of consolidating or an economic device whereby risks of living and of economic enterprises are spread over a reasonable number of insured. In performing these functions, the insurance Companies collect premium from several insured. The role they perform is similar to that of banks because the premium they collect is in form of deposit mobilization by banks.

Insurance business is classified into two categories:

(a)   Life Insurance

Life insurance policy is a contract by which an insurer undertakes to pay a sum of money on the death of the insured person or attaining a particular age in the case of endowment.

The commonest types of policy are:
- Whole life policy
- Endowment policy
- Term assurance.
- Annuity.

(b)   Non Life Insurance

This comprises every other type of insurance business aside from

life insurance.

Functions of Insurance Companies

o   Insurance companies provide the most effective machinery for handling individuals and corporate risks.

o   It subrogates the risks of firms as well as that of the individuals.

o   It underwrites some of the issues in the capital market using its pool of funds.

o   It executes performance bonds for its customers. It grants credit facilities to estate developers.

o   It facilitates the smooth running of international trade by insuring imports and exports through marine insurance and reinsurance facilities that spreads the risks among themselves.

o   Before the advent of Pension Reform Act of 2004, it operated pension scheme on behalf of companies.

o   Insurance policies are also in some cases used as collateral securities for bank loans.

o   It improves the saving habits of people and even companies through their premium policy.

o   It harnesses huge long term funds which can be used for investment.

o   It also generates employment for the professionals and non professionals.

Finance Companies
Finance Companies mobilize deposits from people and give them to their customers to improve their business. They *use* money market instruments like Commercial Paper (CP) and certificate of deposit and other short time instruments. They make the funds mobilized available to their customers for a short and medium term by making finance available for such businesses like Local Purchase Orders (LPO), Debt factoring and securities trading.

National Economic Reconstruction Fund (NERFUND)
National Economic Reconstruction Fund was established by Decree 25

of 1988 to provide soft medium and Long-term finance to small and medium scale Enterprises that are wholly owned by Nigerians. The primary purpose of its establishment is to act as financial intermediaries. That is, the channel through which the government can fund the aforementioned as they are financed by the Federal Government, Central Bank of Nigeria and some International Development Financial Institutions such as African Development Bank.

Primary Mortgage Institution
Every other institution involved in mortgage finance apart from Federal Mortgage Bank is all referred to as primary mortgage institutions. The reason for the name is that they deal directly with individuals and estate firms; while the Federal Mortgage Bank remained the supervisory body. They are also involved in the intermediation process as they accept deposits from small savers and borrowing from other institutions W finance the development of housing sector. They offer long term credit facilities to encourage people to build or buy their own houses.

Functions of Mortgage Banks
They accept deposits from members of public.
They encourage members- of public to cultivate saving habits.
They build and provide houses for low income earners.
They finance estate developers.
They give loans to individuals and thereby encourage them to have their own houses.

Traditional Financial Institutions
These are traditional financial groups like Credit and thrift societies (Esusu) which encourage savings and also grant credit facilities to their members. It is a sort of cooperative society in which people agree to contribute certain sum of money regularly and the money so contributed is handed over to the next member on the row each time contribution is made.

Benefits of Traditional Financial Institutions
- They encourage savings among their members.
- They lend money to their members.
- They encourage their members to invest by the reasonable sum of money their members contribute in form of thrift. 'Ajo'.
- They save their members the rigorous procedures of getting loans from banks.
- They reduce unnecessary spending of their members.
- They eliminate their members' financial planning and queue theory.

Discount Houses

These are the institutions that specialize in the provision of discounting facilities; that is, buying and selling of securities; that is, buying and selling of securities especially government securities. They also discount bills for banks and save them the rigor of going to the Central Bank. They also issue their own securities to the bank as a means of raising funds.

Thrift and Credit Cooperative Society
The purpose of this type of society is to mobilize savings from the members so that the needy members can borrow at minimum interest rate. They meet regularly say monthly and contribute an agreed amount of money to the purse of the association. This type of society is like savings cub and usually found among traders, artisans and peasant farmers.

Advantages
• Members obtain loans easily without collateral to boost their trade.
• It is a means of encouraging savings among members.
• It is a means of mobilizing capital for members.
• They offer free advice to their members during their monthly meetings.
• They often make it easy for their members to own real properties by buying land with the cooperative money at lower prices and distribute it to them.

Micro-Finance Bank
Micro-Finance Bank was formed to cater for the finance of small businesses. They are to take over the activities of the former community banks hence their operational scope is similar to that of former community bank The bank is divided into two categories; the one that is restricted to only one local Government area is having a minimum share capital of N20 million; while that of state is N1 billion.

Unit Micro Finance Bank
Unit Microfinance banks are licensed to operate within a particular local government area and grow organically until their operational scope covers 2/3 of the local government. Thereafter they can spread to the next local government within the state. Their require minimum paid up share capital to register as operator is N20 million.

State Microfinance Bank
State Microfinance banks are however required to have a minimum paid up capital of N1 billion to operate. They can maintain operational base within 2/3 of the Local Government areas in the state before moving to the next state until they cover the entire country.

Functions of Micro-Finance Banks
- To accept various types of deposits from their customers.
- To clear negotiable instruments for their customers.
- To maintain bank accounts with commercial banks in Nigeria.
- To give micro-credit to their customers.
- To invest their surplus funds in income yielding instruments.
- To render advisory services to their customers to boost their business.

Peoples Bank of Nigeria
- Peoples Bank of Nigeria is a non conventional bank established by Decree 22 of 1990 to provide specialized services to urban and rural poor masses. According to the establishing Decree, the bank was established to:

- Provide basic requirements for under-privileged people who engage in legitimate businesses in both urban and rural areas and who cannot normally benefit from the services of the orthodox banking system because of their inability to provide usual collateral security.

- To accept savings from the same group of customers and making repayment of such savings together with any interest thereon after investing the money in bulk in short term instruments.

Objectives of Peoples Bank
- To bridge the gap between the rich and the poor.
- To reduce rural-urban migration.
- To increase investment and savings among rural dwellers.
- To increase usefulness and productivity among poor people.
- To raise per capita income of the people.
- To provide credit facilities to the disadvantaged classes who could not have ordinarily benefited from credit facilities in conventional banks.

Federal Savings Bank
Federal savings bank is a post office linked savings bank established in 1889. The Bank went through series of reorganization until another Act which renamed it Federal Savings Bank (FSB) came up in 1974. According to Post Office Savings Act of 1958; the bank is to:

- Provide a ready means of savings especially among the rural dwellers.

- Encourage thrift and mobilize savings in the rural areas.
- Mobilize funds for National Development.

The bank uses an instrument called postal order as a means of transfer of payment.

Units and Mutual Trusts
Investment and Units Trust is an arrangement whereby funds are pooled together from both small and big time investors for investment purposes. It is a form of collective investment which provides investors with a simple doorway to the stock market and also enjoys the services of professional managers. Investors in this context pooled their money in a fund which is managed by professional managers who invest the money in a wide range of securities. The proportion of individual holding is denoted by the number of units they hold as they are denominated in units in the case of Unit Trust.

4.0   CONCLUSION
We have seen in this unit that money market instruments are used to meet the needs of commercial activities and not for permanent investment as the instruments traded are of short time duration.

5.0 SUMMARY
In this unit you have learnt the various Instruments Traded in the Money Market, the reasons for establishing the Nigerian Money Market, the functions of Money Market, the operators in the Financial Market as well as the non-Banks Financial Institution.

6.0 TUTOR-MARKED ASSIGNMENT
- What are the reasons for establishing the Nigerian money market?
- What are the benefits of traditional financial institutions?
- Write short note on Unit/Mutual Trust.

7.0 REFERENCES/FURTHER READINGS

Igbinosa, S.O. (2012). *Investment analysis and management* , Lagos: Elite Trust Ltd

Jhingan, M.L. (2004). *Monetary Economics.* Delhi: Vrinda publications (P) Ltd

Osaze, E.B. (2007). *Capital markets,* Lagos : The Bookhouse Company

UNIT 2: CAPITAL MARKET OPERATIONS

CONTENTS

1.0   INTRODUCTION

Capital market is the market for medium and long-term funds. It is created to meet the inadequacies created by the money market that trades in instruments of short-term duration. The capital market therefore deals with instruments of medium and long term to meet the requirements of projects of long time gestation period.

2.0   OBJECTIVES
- At the end of this unit, you should be able to:
- Trace the development of Capital Market in Nigeria
- State the instruments traded in the Capital Market
- Understand what Shareholding is all about
- Know the Operators in the Capital Market
- Give the importance of Nigerian Capital Market

3.0 MAIN CONTENT

3.1   Development of Capital Market in Nigeria

The initial attempt to establish a Nigerian Capital Market was dated

back to 1959 with the issue of the first Nigerian Development Loan stocks by the Central Bank of Nigeria. This was followed by the inauguration of the Lagos Stock Exchange now Nigerian Stock Exchange in the latter part of 1960 and its commencement of operation in June, 1961.

The enactment of the Companies act of 1968 also catalyzed the growth of the market. In 1972 the promulgation of Nigerian Enterprises promotion act called indigenization program gave further impetus to the market development and accounted for more than 120% growth in the number of listed companies' equities on the Exchange. It is also important to mention that the development of the market was greatly influenced by the flow of government securities and the implementation of the two indigenization programmes (1972 and 1977) and the statutory requirements relating to investment in certain public sector institutions like the pension and provident funds and the development banks.

3.2 Instruments Traded in the Capital Market

Instruments traded in the capital market include:

Equities
- Ordinary Shares
- Preference Shares

Debt Instruments
Long-term/Syndicated Loans
Debentures Stocks
Government Bonds/Stocks

3.3 Shareholding

A share is a unit of ownership interest in a company translated into financial commitment. That is, the investors interest in the activities of a company demonstrated by the units of shares they hold in the company. These shares are denominated in units, with their price determined by day to day activities on the stock exchange for quoted companies.

Equity trading is the most active sector on the floor of the Nigerian Stock Exchange with large volume of shares changing hands on daily basis with high degree of price volatility. The need to spread risk among diverse investors formed one of the major characteristics of publicly quoted companies. It is also a means of harnessing funds to finance blue chip companies. It is also important to say that shareholding has now becomes popular means of determining ownership and also voting

powers of quoted companies. Two types of shares emerged from this ordinary shares and preference shares.

Ordinary Shares

Ordinary shares are usually referred to as equity shares. They are the ultimate risk bearer of the company. They carry the residue in terms of dividends and assets in the event of liquidation, after all other categories of creditors have been settled including preference shareholders. That is why they are referred to as the ultimate risk bearer. More often than not part of their profits is passed to them in terms of bonus or script issues. Equity can be acquired through the primary market where the company issues new shares for subscription to the investing public. The investors in this context obtain the form and prospectus, complete and return it to the Issuing House or Registrar of the company along with the cheque through the receiving agents. After allotment, the Registrar will send to the investor, their share certificate.

Equity share holding can also be acquired through the secondary market. This takes place at the stock-exchange trading session through the stockbroker. The existing shareholder wanting to divest; forwards his certificate to his stockbroker and signs appropriate columns of the transfer form. The new investor also signs the appropriate column of the similar transfer form and stockbroker effect the sale/purchase on the floor of the exchange. After the transfer has been effected, the new investor's account with the Central Securities Clearing Systems Limited is credited with the units acquired, while the same quantity is removed from the account of the seller. This entitles the new owner to all the subsequent privileges accruing to the shareholders in the company.

Rights of Ordinary Shareholders

- Shareholders are entitled to dividend on the number of units they hold if declared and approved at the AGM.

- They are entitle to vote at Annual General Meeting except the class of share they hold does not carry voting right.

- To receive notice of general meetings

- To receive the appropriate portion of residual asset distribution in the event of liquidation.

- To receive the copy of the financial statement before the AGM

- To appoint proxy to attend meeting on their behalf

- To inspect freely the various records maintained by the company.

- To petition for winding up in case of illegality or oppression/ denial of rights.

- To transfer their shares freely except in the case of private companies.

- To inspect the copies of any of the directors contract with the company etc.

Preference Shares

Preference shareholders are entitled to first consideration in terms of dividends and residual assets in the event of the liquidation of the company. Preference shares could be cumulative, non-cumulative and participative. In all, they carry fixed rates of dividends while still carrying the tag of ownership in the company. Depending on how it was packaged, they may have or may not have voting right.

Rights/Features of Preference Shares

This is hybrid securities that have both nature of Equity shares and Debt. That is, it is in form of equity capital which in addition has the features of debt instruments. This is because they are always attached with fixed or variable interest rate. Another important benefit of this class of shares is that they are paid before paying the Equity holders in the event of liquidation. Their other features/privileges include the following:

(a) **Cumulative and Non-Cumulative Preference Shares:**
Preference shares are cumulative when interest/ dividend not paid in the year they are earned is carried forward to the other year(s) and it is non-cumulative when interest not paid in one year is lost forever.

(b) **Redeemable and Irredeemable:**
Preference shares are redeemable when the issue instrument contains provision for the repayment of capital at a predetermined future dates and they are irredeemable when there is no provision for the repayment (callable) in the issued document.

(c) **Convertible and N on-Convertible Preference Shares:**
Preference shares are convertible when the issued document contains provision of their convertibility into ordinary shares of

the company at a specific future dates at fixed ratio and price. This is inform of a call option contract and it is not mandatory for any debentures holder. Non-convertible preference shareholder does not have such option of conversion.

Long Term/Syndicated Loans

This is usually a medium term or long term bank loan device through which projects of long-term gestation are financed. One or more banks may fund such loans depending on the magnitude. Sometimes consortium of banks as creditors would package such loan requirement for a project; with one of the banks serving as the lead bank. This is usually referred to as syndicated loan or consortium lending. The packaging of this type of loan, involves the borrower signing a loan agreement with the lead bank, spelling out in the loan agreement documents, the terms and conditions of the loan, on one hand, and the lead bank also signing an agreement with the participating banks. The latter will state each banks commitment, fees and commission etc. Companies considered this system as more convenient for a larger loan commitment, especially when they have not exhausted their capacity to borrow. Comparatively it is a more costly medium of financing, in the short-run. In the long run the issue of dividend bonus or script issues makes equity more expensive.

Government Bonds/Stocks

These are long-term debt instruments evidencing that government has borrowed a certain amount from the holder. This could be Federal Government, State or Local government stocks issued to raise funds for government to finance development projects. If it is state or local government stock, it is usually secured with revenue allocation from the federal government, which often than not, is deducted at source. Federal government stocks can come in form of bonds or development stocks and of various tenor or maturity(ies)/ periods. They carry fixed amount of interest but usually of low interest yielding but as good as the Naira and usually redeemable**.**

Debentures

These are long-term instrument evidencing the borrowing of money by a Company from the holder. It is usually denominated in units with value attached to it. They often carry fixed interest rate and the holders are

often treated as creditors to the Company and therefore given preference upon liquidation over all classes of shareholders.

There are Redeemable Debentures, Irredeemable Debentures; while some Debentures are convertible to ordinary stocks of the borrowing company at a definite time and at a predetermined rate.

Equity Attraction

Before the recent demise, investments in capital market have proved to be highest yielding investment with low level of risk for a well constructed and diversified portfolio. The following sectors has by market indices proved to be the toast of the investors and speculators over the years as a result of returns they enjoyed which is well commensurate and or meet their investment objectives.

- Oil Sector
- Banking Sector
- Conglomerates
- Food and Beverages

Insurance sectors have not been so attractive because of poor dividend payout policy which always falls below the investors' expectation or comparable with return from other sectors/investments. Hence, the price has been on the low side.

However, hope exists for the sector with the reforms going on in the industry and the fact that their prices are very low compared with other sector and occasional declaration of bonuses which temporarily at times trigger price increases and for those buying for price sake.

3.4   Operators in the Capital Market

The following are the operators in the Nigerian Stock Market:

Regulators

1.   Securities and Exchange Commission
2.   Nigerian Stock Exchange
3.   Central Securities Clearing System
4.   Chartered Institute of Stockbrokers

Operators

1.   Issuing House
2.   Stockbroker to the Issue

3.   Auditors to the company
4.   Reporting Accountants
5.   Solicitors to the company
6.   Solicitors to an issue
7.   Registrars
8.   Receiving bank
9.   Receiving Agents
10.   Trustees (in case of debt instruments)

Securities and Exchange Commission (SEC)
Securities and Exchange Commission is the apex regulatory authority in the Capital market. It registers the shares to be issued and registers all other operators in the market and also monitors the operations on the trading floor of the exchange

Nigerian Stock Exchange
Nigerian Stock Exchange is a self-regulatory authority in the capital market. It provides trading floors and equipment for trading on every trading day. It also trains the new members of the exchange in the use of Automated Trading System (ATS).

Chartered Institute of Stockbrokers
The Chartered Institute of Stockbrokers trains all the securities dealers and equips them to meet the millennium challenges.

Stockbrokers
Stockbrokers are the dealing members of the Nigerian Stock Exchange. Their activities in the market spanned through participation in the primary issue as a financial adviser or issuing house or as Stockbroker to the issue, thus presenting the issue for listing and continuous trading on the floor of the exchange.

The stockbrokers play active role in the capital market in both primary and secondary but more in the secondary aspect of the market than the primary side. They also participate actively in the primary aspect of the market by making all necessary efforts to see that the shares are listed on the daily official list of the exchange as the member of the family of the exchange.

They also market the issue, on behalf of the issuer through their wide range of clientele.

Issuing House
Issuing House is more often than not an investment barter and plays a dominant role in the primary side of the market, by coordinating other consultants to see that the public issue succeeds; by acting as financial

consultant to the issue.

The issuing house and the issuer co-joined in the appointment of other professionals to the issue. They can also give bridging loans to the issuer pending the time the issue will be completed and also underwrite the issue to certain extent.

Auditors to the Company
The auditors to the company also perform an important role in the public issue by supplying all the information required by the reporting accountants to do their job efficiently. They attend all meetings and answer any questions on the financial statements.

Reporting Accountants
This is a firm(s) of Chartered Accountants acting as reporting accountants to a public issue. Their job is so enormous; they vet all the financial statements that are to be presented to the public for fairness and reasonableness. They also vet all the projections made by the issuer and ascertain their reasonableness. In practice, their job is so enormous to the extent that they are often assisted by the issuing house(s).

Solicitors to the Company
The solicitors to the company also assist in the public issue by assisting the solicitors to the issue in providing information regarding the legal form and all other related documents. They also assist in the area of increase of share capital to accommodate the new issue and sees to the fact that all the necessary documents are filed appropriately.

Solicitors to the Issue
This is also a firm of legal practitioners that act as consultant in public issues. They are usually registered by the Securities and Exchange Commission as Capital Market consultant.

Their major duties are to be a watchdog in the process of public issue. First of all, they see to the fact that all the necessary documents are filed with the relevant bodies and also that all the other consultants that participate in the issue are qualified to do so and that they are formally registered by SEC. They see to the orderliness of the whole arrangement.

Registrar
As the name implies they are the company that act as registrar to publicly quoted companies. Their job is so enormous and continuous. As a matter of fact their major activities are post issue activities. They keep the register of the members after allotment and maintain it on daily

basis. They are the one that distribute dividend to shareholders and interest in case of debt instruments. They also issue certificates on both public and bonus issues and send circulars and annual report and accounts before AGM can hold.

Receiving Bank/Agent's
This is a bank that receives all the return monies on application and surrenders it to the issuer after allotment.

Trustees
In the case of Debt Instrument, trustees have to be appointed to take care of the interest of the bond-holders/creditors. Their work is similar to that of the Registrar in that they see to the day to day management of the debt until They are fully redeemed. They *see* to the regular payment of interest and capital and if there is any unclaimed interest they are transferred to them for management. They see to the fact that the company follows the terms of the debentures instrument strictly.

Another important thing to note is that aside from stockbrokers whose constituency is capital market all these other professionals are also formerly registered with the Securities and Exchange Commission (SEC.) as Capital market consultants.

3.5 Importance of Nigerian Capital Market

- It helps to harness the savings of individuals and channel them towards productive means.

- It provides opportunities for Nigerians to participate in the ownership structure of multinational Companies.

- It provides local opportunities for Long term borrowing and lending.

- It provides opportunities for government to mobilize Long term funds for economic development of the country.

- It provides opportunities for inflow of capital from the Diaspora.

- It provides employment opportunities for Nigerians especially the market operators

- It provides a barometer for measuring the economic performance of the country.

4.0 CONCLUSION

We have seen in this unit that Capital market is created to meet the inadequacies created by the money market that trades in instruments of short-term duration. Capital market is a market for long term funds.

5.0   SUMMARY
In this unit you have learnt the development of Capital Market in Nigeria; the Instruments traded in the Capital Market, the Shareholding; the various Operators in the Capital Market and the Importance of Nigerian Capital Market.

6.0 TUTOR-MARKED ASSIGNMENT

1.   Explain the word 'Capital Market'.
2.   Who are the operators in the Nigerian Capital Market?
3.   Who are the regulators in the Nigerian Capital Market?

7.0 REFERENCES/FURTHER READINGS

Igbinosa, S.O. (2012). *Investment analysis and management* , Lagos: Elite Trust Ltd

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UNIT 3   CAPITAL MARKET INVESTMENT AS AID TO ECONOMIC DEVELOPMENT

CONTENTS

1.0   INTRODUCTION

From a global perspective, the state of the capital market investment gives an idea of the state of health of the national economy. It also measures the stability of the economy with regards to the extent to which economic activities can rely on it. "Essentially, the level of national economic development and the extent to which most economic activities can effectively rely on the safety of the capital market are major indicators of a healthy balance between a sound financial system and macro-economic stability" (NEEDS, 2003). It is in the light of these assumptions that the capital market performs several roles and functions.

2.0   OBJECTIVES

At the end of this unit, you should be able to:
- Understand the functions of the Capital Market Investment
- State the roles of the Capital Market in Economic Development
- Understand how the Capital Market Currently Aids the Economy

3.0   MAIN CONTENT
3.1   Functions of the Capital Market investment

The capital market performs several functions in any economy. These include:

(a)   Financial intermediation from funds surplus to funds deficit institutions.
(b)   Offering enterprises new and wider opportunities for obtaining funds.
(c)   Acting as a means of exchanging securities at mutually beneficial proves thereby creating liquidity through its pricing mechanism.
(d)   Acting as means of ascertaining security prices.
(e)   Acting as an easily accessible means of efficiently trading in securities
(f)   Allocating and rationing funds among competing demand and uses.

3.2   Roles of the Capital Market in Economic Development

The capital market plays the following important roles in the economic development process:

- Providing a means of raising long-term finance to assist companies to expand and modernize;
- Providing a means of allocating the nation's real and financial resources between various industries and companies;
- Providing liquidity for investment funds from the standpoint of the individual and the economy;
- Serving as a measure of confidence in the economy and as an important economic barometer;
- Providing industrial management with some idea of the current cost of capital through its pricing mechanism, an important issue in determining the level and rate of investment;
- Acting as a reliable medium for broadening the ownership base of erstwhile family dominated firms (NSE, 1990);
- Providing an avenue for marketing of securities in order to raise fresh funds for expansion;
- Encouraging inflow of foreign capital when foreign companies or investors invest in domestic securities;
- Providing facilities for foreign businesses to offer their shares to Nigerian investors thereby giving Nigerians ownership stake in foreign companies;
- Providing the opportunities for government to finance economic development-oriented projects;
- Creating an avenue for government to privatize its erstwhile state-owned companies;
- Encouraging transparency and good accounting and management practices through adequate disclosure of relevant and adequate information for investors to make well-informed decisions;
- providing needed seed money for venture capital development which often serves as a vehicle for industrial growth and development (SEC, Abuja, 2006).

3.3   How the Capital Market Currently Aids the Economy

- Through the second-tier Securities Market by promoting small and medium sized industries.

- Through the securitization of the domestic national debt, by promoting a bonds market to specifically cater for domestic national debts. This makes the debts negotiable via the Debt Management Office of Nigeria; and helps to provide liquidity to lenders who would wish to encash their bonds.

- Through funding the bank consolidation exercise by Initial Public Offers, Public Offers and Private Placements.

- Through financing upstream and downstream activities in the oil and gas industry-specifically hydrocarbons (petrochemicals and liquefied natural
- gas).

- Through the privatization and commercialization of government controlled enterprises by offer for sale or subscription in the capital market.

- Through the promotion of commodities exchanges to facilitate liquidity for agricultural products in an organized market

- Through the internationalization of the capital market by cross-border listings, cross listings on other stock exchanges and provision of investment information on all securities listed on the Nigerian Stock Exchange to the international community. This encourages foreign inflow of capital through enquiries.

In summary, the significance of the capital market lies in the fact that:
- it is where the value of a business can be accessed through the price of its stock;
- it is where changes in the ownership of businesses take place through the purchase and/or sale of stock;
- it is where a business or government raises new capital and tests its support in the broader business community by selling stock at a given price; and
- it is the only forum where speculation and gambling take place legitimately (Kidron & Segal, 1987).

4.0   CONCLUSION

We have seen in this unit the capital market investment gives an idea of the state of health of the national economy and that it measures the stability of the economy with regards to the extent to which economic activities can rely on it.

5.0   SUMMARY

In this unit, you have learnt the various functions of the Capital Market Investment, the roles of the Capital Market in Economic Development and how the Capital Market Currently Aids the Economy

6.0 TUTOR-MARKED ASSIGNMENT

- Explain briefly five roles of Capital Market investment in the economic development of Nigeria

7.0 REFERENCES/FURTHER READINGS

Igbinosa, S.O. (2012). *Investment analysis and management* , Lagos:
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Unit 4 CURRENT STATE OF EMPIRICAL EVIDENCE OF MODELS FOR EVALUATING PORTFOLIO PERFORMANCE

CONTENTS

1.0 INTRODUCTION

Prices in financial markets aggregate dispersed information from millions of investors. A vast literature considers portfolio choice problems under symmetric information, but ignores this fundamental function of financial markets. It is no coincidence that the overwhelming majority of empirically successful equilibrium asset pricing models that embed portfolio problems assume that information is symmetric, or equivalently, that a representative agent exists. Equilibrium asset pricing models with dispersed information are complicated, informationally demanding and suffer from testability issues that limit their usefulness. However, a realistic though challenging portfolio problem must recognize that investors allocate capital across multiple assets without much knowledge of other, investors, their tastes or the precision of their information. Money managers and retail investors alike must therefore ask themselves two questions: First, what do current prices tell them about the private information of others? Second, is the information in prices valuable given their private information?

To answer the second question, we quantify the improvement in portfolio performance of a privately informed investor who updates his beliefs using market prices with those of an equally informed "dogmatic" investor who only uses his private information. We do this by providing the investor with a noisy signal of next period's actual returns, which we, the econometricians, can correctly observe. Our simple approach allows us to overcome the fundamental problem of testing a model in which agents have private information unobservable to the econometrician.

To answer the first question, Black and Litterman (1992) extract market-implied expected returns using a symmetric information equilibrium model, the CAPM, as an elegant approximation.[1] They combine this information from prices with the private information of the investor in a Bayesian fashion. The approach is popular among active money managers who believe they hold information superior to that of other market participants, but wish to update their beliefs using market prices. However, the benefits of using a misspecified asset pricing model to learn from market prices about other investors' views on expected returns remains an empirical question.

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

- Understand the empirical debates on the models for evaluating portfolio performance
- Understand the Procedures in estimating and evaluating asset pricing models.
- Understand the Pitfalls in the Current Practice and Suggestions for Improving Empirical Work

3.0   MAIN CONTENT
3.1 Empirical debates on the models for evaluating portfolio performance
The performance evaluation of investment portfolios has been widely debated in the financial literature, and is still an evolving subject. Only through measures of performance may investors and portfolio managers know if the type of information used resulted in abnormal returns. Furthermore, the issue of assessing whether fund managers add value is a challenging one, since it is closely related to questions (not easily answered) about market efficiency and information dissemination in capital markets.

The traditional approaches to measure performance are unconditional in the sense that it is assumed that no information about the state of the economy is used to form returns expectations. So, expected returns and

risk are assumed to be constant over time. It is well recognized that traditional measures are biased when portfolio managers use dynamic strategies resulting in time-varying risk (Jensen [1972], Dybvig and Ross [1985], Admati and Ross [1985] and Grinblatt and Titman [1989]). Several studies have shown that predetermined information variables are useful in predicting stock and bond returns (among others, Keim and Stambaugh [1986], Fama and French [1989]. This evidence resulted in important developments on asset pricing models but, with few exceptions, little has been explored at the level of portfolio performance evaluation.

Many asset pricing theories predict that the price of an asset should be lower (its expected return higher) if the asset provides a poor hedge against changes in future market conditions (Rubinstein, 1976, Breeden, 1979). The classic capital asset pricing model (CAPM) of Sharpe (1984) and Lintner (1965) considers the case in which investment opportunities are constant and investors hold efficient portfolios so as to maximize tier expected return for a given level of variance. The CAPM predicts that an asset's risk premium will be proportional to its beta – the measure of return sensitivity to the aggregate market portfolio return. The considerable empirical evidence against the CAPM points to the fact that variables other than the rate of return on a market portfolio proxy command significant risk premia. The theory of the intertemporal CAPM (ICAPM) (Merton, 1973, Long, 1974) suggests that these additional variables should proxy for the position of the investment opportunity set. Although the ICAPM does not identify the various state variables, leading Fama (1991) to label the ICAPM as a "fishing license". Breeden (1979) shows the Merton's ICAPM is actually equivalent to a single-beta consumption model (CCAPM) since the chosen level of consumption endogenously reflects the various hedging-demand effects of the ICAPM.

Over the years, researchers have made many attempts to refine the theoretical predictions and improve the empirical performance of the CAPM and CCAPM. Popular extensions include internal and external habit models (Abel, 1990; Constantinides, 1990; Ferson and Constantinides, 1991; Campbell and Cochrane, 1999), models with non-standard preferences and rich consumption dynamics (Epstein and Zin, 1989, 1991; Well, 1989; Bansal and Yaron, 2004), models that allow for slow adjustment of consumption to the information driving asset returns (Parker and Julliard, 2005), conditional models (Jagannathan and Wang, 1996; Lettau and Ludvigson, 2001), disaster risk models (Berkman, Jacobsen, and Lee, 2011), and the well-known "three-factor model" of Fama and French (1993). Although empirical observation primarily motivated the Fama-French model, its size and book-to-market factors are sometimes viewed as proxies for more fundamental economic

variables.

The asset pricing theories listed above, to be of practical interest, need to be confronted with the data. Two main econometric methodologies have emerged to estimate and test asset pricing models: (1) the generalized method of moments (GMM) methodology for models written in stochastic discount factor (SDF) form and (2) the two-pass cross-sectional regression (CSR) methodology for models written in beta form.

The SDF approach to asset pricing indicates that the price of a security is obtained by "discounting" its future payoff by a valid SDF so that the expected present value of the payoff is equal to the current price. In practice, finding a valid SDF, i.e., an SDF that prices each asset correctly, is impossible and researchers. have to rely on some candidate SDFs to infer the price of an asset. Although testing whether a particular asset pricing model is literally true is interesting, a more useful task for empirical researchers is to determine how wrong a model is and to compare the performance of competing asset pricing models. The latter task requires a scalar measure of model misspecification. While many reasonable measures can be used, the one introduced by Hansen and Jagannathan (1997) has gained tremendous popularity in the empirical asset pricing literature. Many researchers have used their proposed measure, called the Hansen-Jagannathan distance (NJ-distance), both as a model diagnostic and as a tool for model selection. Examples include Jagannathan and Wang (1996), Li, Xu, and Zhang (2010), and Gospodinov, Kan, and Robotti (2011a). Asset pricing models in SDF form are generally estimated and tested using GMM methods. Importantly, the SDF approach and the HJ-distance Metric are applicable whether or not the pricing model is linear in a set of systematic risk factors.

When a model specifies that asset expected returns are linear in the betas (beta-pricing model), the CSR method proposed by Black, Jensen, and Scholes (1972) and Fama and MacBeth (1973) has been the preferred method in empirical finance given its simplicity and intuitive appeal. Although there are many variations of the CSR methodology, the basic approach always involves two steps or passes. In the first pass, the betas of the test assets are estimated using the usual ordinary least squares (OLS) time series regression of returns on some common factors. In the second pass, the returns on the test assets are regressed on the betas estimated from the first pass. Running this second-pass CSR on a period-by-period basis enables obtaining the time series of the intercept and the slope coefficients. The average values of the intercept and the slope coefficients are then used as estimates of the zero-beta rate

(expected return for risky assets with no systematic risk) and factor risk premia, with standard errors computed from these time series as well. given its simple intuitive appeal, the most popular measure of model misspecification in the CSR framework has been the R^2 for the cross-sectional relation (Kandel and Stambaugh, 1995; Kan, Robotti, and Shanken, 2010). This R^2 indicates the extent to which the model's betas account for the cross-sectional variation in average returns, typically for a set of asset portfolios.

After reviewing the SDF and beta approaches to asset pricing, this chapter describes several pitfalls in the current econometric analyses and provides suggestions for improving empirical tests. Particular emphasis is given to the role played by model misspecification and to the need for more reliable inference procedures in estimating and evaluating asset pricing models.

3.2 Procedures in estimating and evaluating asset pricing models.

Stockastic Discount Factor Representations

The SDF approach to asset pricing provides a unifying framework for pricing stocks, bonds, and derivative products and is based on the following fundamental pricing equation (Cochrane, 2005).
$$P_t = E_t[m_{t+1}X_{t+1}] \qquad (3.2.1)$$
Where P_t is an N-Vector of asset prices at time t; $x_{t+1} = P_{t+1} + d_{t+1}$ is an N-vector of asset payoffs with d_{t+1} denoting any asset's dividend, interest or other payment received at time $t+1$; m_{t+1} is an SDF, which depends on data and parameters; and E_t is a conditional expectation given all publicly available information at time t.

Dividing both sides of the fundamental pricing equation by p_t (assuming non-zero prices) and rearranging yields

$$E_t[m_{t+1}(1+R_{t+1}) - 1_N] = O_N \qquad (3.2.2)$$

where $R_{t+1} = \frac{x_{t+1}}{p_t} - 1 = \frac{p_{t+1} + d_{t+1}}{p_t} - 1$ is an N-vector of asset returns and 1_N and 0_N are N-vectors of ones and zeros, respectively.

Portfolios based on excess returns, $R_{t+1}^e = R_{t+1} - R_t^f 1_N$, where R_t^f denotes the risk-free rate at time t, are called zero-cost portfolios. Since the risk-free rate is known ahead of time, it follows that $E_t[m_{t+1}(1+ R_t^f)]$ $= E_t[m_{t+1}](1+R_t^f) = 1$ and $E_t[m_{t+1}] = \frac{1}{1+ R_t^f}$. In this case, with zero prices and payoffs the fundamental pricing equation is given by
$$E_t[m_{t+1}R_t^e + 1] = 0_N. \qquad (3.2.3)$$

As an example of the SDF approach, consider the problem of a representative agent maximizing her lifetime expected utility

$$\sum_{t=1}^{\infty} \beta^t \, E_0[u(c_t)] \tag{3.2.4}$$

subject to a budget constraint

$$a_{t+1} = (a_t + y_t - c_t)(1 + R_{t+1}). \tag{3.2.5}$$

where β, c_t, a_t and y_t denote the time preference parameter, consumption, asset's amount and income at time t, respectively. The first-order condition for the optimal consumption and portfolio choice is given by

$$E_t\left[\beta \frac{u'(c_{t+1})}{u'(c_t)}(1 + R_{t+1}) - 1_N\right] = 0_N. \tag{3.2.6}$$

where $u'(c)$ denotes the first derivative of the utility function $u(c)$ with respect to c. This first-order condition takes the form of the fundamental pricing equation with SDF given by the intertemporal marginal rate of substitution

$$m_{t+1} = \beta \frac{u'(c_{t+1})}{u'(c_t)} \tag{3.2.7}$$

While the SDF in Equation 3.7 is positive by construction, an SDF can possibly price assets correctly and, at the same time, take on negative values, especially when the SDF is linear in a set of risk factors. Although a negative SDF does not necessarily imply the existence of arbitrage opportunities, dealing with positive SDF's is generally desirable, especially when interest lies in pricing derivatives (positive payoffs should have positive prices). Therefore, a common practice in the derivative pricing literature is to consider Equation 3.1 with $m_{t+1} > 0$, which implies the absence of arbitrage. In some situations, however, imposing this positivity constraint can be problematic. For example, if one is interested in comparing the performance of competing asset pricing models on a given set of test assets using the distance metric proposed by Hansen and Jagannathan (1997), constraining the admissible SDF to be positive is not very meaningful. Gospodinoc, Kan, and Robotti (2010a) provides a rigorous analysis of the merits and drawbacks of the no-arbitrage HJ-distance metric.

Beta Representation

By the law of iterated expectations, the conditional form of the fundamental pricing equation for gross-returns can be reduced to its

unconditional counterpart:

$$E[m_{t+1}(1 + R_{t+1})] = 1_N. \qquad (3.2.8)$$

From the covariance decomposition (suppressing the time index for simplicity), the pricing equation for asset I can be rewritten as

$$1 = E[m(1 + R^i)] = E[m]E[1 + R^i] + Cov[m,(1 + R^i)]. \quad (3.2.9)$$

Then, dividing both sides by $E[m] > 0$ and rearranging,

$$E[R^i] = \frac{1}{E(m)} + \frac{Cov[m,R^i]}{Var[m]}\left[-\frac{Var[m]}{E[m]}\right] = \gamma_0 + \beta i,m \,^\lambda m. \qquad (3.2.10)$$

using that $\frac{1}{E(m)} = 1 + R^f = 1 + \gamma_0$ from above. Note that $\beta i,m = \frac{Cov[m,R^i]}{Var[m]}$

is the regression coefficient of the return R^i on m and $^\lambda m = -\frac{Var[m]}{E[m]} < 0$

denotes the price of risk.

Recall that the SDF in is a function of the data and parameters. Suppose now that in can be approximated by a linear function of K (risk) factors f that serves as proxies for marginal utility growth:

$$m = \bar{f}\,'e, \qquad (3.2.11)$$

where $\bar{f} = (1,f')'$. Then, substituting for m into the fundamental pricing equation and rearranging (see Cochrane, 2005, pp.107-108),

$$E[R^i] = \gamma_0 + \gamma'_1\beta i, \qquad (3.2.12)$$

where the βi's are the multiple regression coefficients of R^i on f and a constant, γ_o is the zero-beta rate and y_1 is the vector of risk premia on the K factors. The *beta* representation of a factor pricing model can be rewritten in compact form as

$$E[R] = B\gamma, \qquad (3.2.13)$$

where $B = [1_N, \beta]$, $\beta = Cov[R, f]Var[f]^{-1}$ is an $(N \times K)$ matrix of factor loadings and $\gamma = (\gamma_o, \gamma'_1)'$. Constant portfolio characteristics can easily be accommodated in Equation 3.13 (Kan et al., 2010). Jagannathan, Skoulakis, and Wang (2010) show how to write the beta-pricing relation when characteristics are time-varying.

3.3 Pitfalls in the Current Practice and Suggestions for Improving Empirical Work

One empirical finding that consistently emerges from the statistical tests and comparisons of competing asset pricing models is that the data are too noisy for a meaningful and conclusive differentiation among alternative SDF specifications. Given the large noise component in returns on risky assets, explaining the cross-sectional variability of asset returns by using slowly changing financial and macroeconomic variables appears to be a daunting task. Even if the asset pricing theory provides guidance for the model specification, the properties of the data and some limitations of the standard statistical methodology can create further challenges in applied work. This section discusses several pitfalls that accompany the estimation of risk premia and evaluation of competing asset pricing models using actual data. Particular attention is paid to the possibility of model misspecification presence of useless factors, highly persistent conditioning variables, large number of test assets, potential lack of invariance to data scaling, and interpretation of the risk premia.

Misspecified Models

A widely-held belief is that asset pricing models are likely to be misspecified and should be viewed only as approximations of the true data generating process. Nevertheless, empirically evaluating the degree of misspecification and the relative pricing performance of candidate models using actual data is useful.

Two main problems with the econometric analyses are present when performed in the existing asset pricing studies. First, even when a model is strongly rejected by the data (using one of the model specification tests previously described, for example), researchers still construct standard errors of parameter estimates using the theory developed for correctly specified models. This process could give rise to highly misleading inference especially when the degree of misspecification is large. Kan and Robotti (2009) and Gospodinov et al. (2011a) focus on the HJ-distance metric and derive misspecification-robust standard errors of the SDF parameter estimates for linear and nonlinear models. In contrast, Kan et al. (2010) focus on the beta representation of an asset pricing model and propose misspecification-robust standard errors of the second-pass risk premia estimates. For example, for linear SDF specifications, the misspecification adjustment term, associated with the misspecification uncertainty surrounding the model, can be decomposed into three components: (1) a pure misspecification component that captures the degree of misspecification, (2) a spanning component that measures the degree to which the factors are mimicked by returns, and (3) a component that measures the usefulness of the factors in explaining

the variation in returns. The adjustment term is zero if the model is correctly specified (component (1) is zero) and/or the factors are fully mimicked by returns (component (2) is zero). If the factors are poorly mimicked by the returns, the adjustment term could be very large. This issue will be revisited in the discussion of the useless factors case.

Second, many researchers are still ranking competing models by simply eyeballing the differences in sample HJ-distances or sample R^2's without any use of a formal statistical criterion that accounts for the sampling and model misspecification uncertainty. Kan and Robotti (2009), Kan et al. (2010), and Gospodinov et al. (2011a) develop a complete statistical procedure for comparing alternative asset pricing models. These model selection tests take into account the restrictions imposed by the structure of the competing models (nested, non-nested or overlapping) as well as the estimation and model misspecification uncertainty. Gospodinov et al. (2011a) also propose chi-squared versions of these tests that are easy to implement and enjoy excellent finite-sample properties.

One recommendation for empirical work that emerges from these remarks is that the statistical inference in asset pricing models should be conducted allowing for the possibility of potential misspecification. This will ensure robust and valid inference in the presence of model misspecification as well as when the models are correctly specified.

Useless Factors

Consistent estimation and valid inference in asset pricing models crucially depends on the identification condition that the covariance matrix of asset returns and risk factors is of full rank. Kan and Zhang (1999a, 1999b) study the consequences of the violation of this identification condition. In particular, they show that when the model is misspecified and one of the included factors is useless (i.e., independent of asset returns), the asymptotic properties of parameter and specification tests in GMM and two-pass cross-sectional regressions are severely affected.

The first serious implication of the presence of a useless factor is that the asymptotic distribution of the Wald test (squared t-test) of statistical significance of the useless factor's parameter (HJ-distance case) is chi-squared distributed with $N - K - 1$ degrees of freedom instead of one degree of freedom as in the standard case when all factors are useful. The immediate consequence of this result is that the Wald test that uses critical values from a chi-squared distribution with one degree of freedom will reject the null hypothesis too frequently when the null hypothesis is true. The false rejections are shown to become more severe

as the number of test assets *N* becomes large and as the length of the sample increases. As a result, researchers may erroneously conclude that the useless factor is priced when, in reality, it is pure noise uncorrelated with the stock market.

Another important implication is that the true risk premium associated with the useless factor is not identifiable and the estimate of this risk premium diverges at rate $\sqrt{T}$. The standard errors of the risk-premium estimates associated with the useful factors included in the model are also affected by the presence of a useless factor and the standard inference is distorted. Similar results also arise for optimal GMM estimation (Kan and Zhang, 1999a) and two-pass cross-sectional regressions (Kan and Zhang, 1999b).

The useless factor problem is particularly serious because the traditional model specification tests previously described cannot reliably detect misspecification in the presence of a useless factor. This manifests itself in the failure of the specification tests to reject the null hypothesis of correct specification when the model is indeed misspecified and contains a useless factor.

More generally, similar types of problems are symptomatic of a violation of the crucial identification condition that the covariance matrix of asset returns and risk factors must be of full rank. Therefore, a rank restriction test (see, for example, Gospodinov, Kan, and Robotti, 2010b) should serve as a useful pre-test for possible identification problems in the model (see also Burnside, 2010). However, this test cannot identify which factor contributes to the identification failure. Kleibergen (2009) proposes test statistics that exhibit robustness to the - degree of correlation between returns and factors in a two-pass cross-sectional regression framework. In the SDF framework, Gospodinov, Kan, and Robotti (2011b) develop a simple (asymptotically**,** d-distributed) misspecification-robust test that signals the direction of the identification failure. Only after the useless factor is detected and removed from the analysis, the validity of the (misspecification-robust) inference and the consistency of the parameter estimates can be restored.

4.0   CONCLUSION

The Sharpe (1964), Lintner (1965) and Black (1972) Capital Asset Pricing Model (CAPM) is considered one of the foundational contributions to the practice of finance. The Model postulates that the equilibrium rates of return on all risky assets are linear function of their covariance with the market portfolio. Recent work by Fama and French (1996, 2006) introduce a Three Factor Model that questions the "real world application" of the CAPM Theorem and its ability to explain stock returns as well as value premium effects in the United States

market.

One of the fundamental tenants in financial theory is the CAPM as developed by Sharpe (1964), Lintner (1965) and Black (1972). The CAPM's impact over the decades on the financial community has led several authors inclusive of Fama and French (2004) to suggest that the development of the CAPM marks "the birth of Asset Pricing models".

The CAPM is an ex-ante, static (one period) model. The model's main prediction is that a market portfolio of invested wealth is mean-variance efficient resulting in a linear cross-sectional relationship between mean excess returns and exposures to the market factor (Fama and French, 1992).

5.0   SUMMARY

An important but still partially unanswered question in the investment field is why different assets earn substantially different returns on average. Financial economists have typically addressed this question in the context of theoretically or empirically motivated asset pricing models. Since many of the proposed "risk" theories are plausible, a common practice in the literature is to take the models to the data and perform "horse races" among competing asset pricing specifications. A "good" asset pricing model should produce small pricing (expected return) errors on a set of test assets and should deliver reasonable estimates of the underlying market and economic risk premia. This unit provides an up-to-date review of the statistical methods that are typically used to estimate, evaluate, and compare competing asset pricing models. The analysis also highlights several pitfalls in the current econometric practice and offers suggestions for improving empirical tests.

6.0 TUTOR MARKED ASSIGNMENTS

- For linear SDF specifications, the uncertainty surrounding the misspecification model can be decomposed into three components. Discuss.
- Two main econometric methodologies have emerged to estimate and test asset pricing models. Discuss succinctly.

7.0 REFERENCES/FURTHER READINGS

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UNIT 5   CAPITAL ASSET PRICING MODEL (CAPM)

CONTENTS

1.0   INTRODUCTION

The CAPM was developed by Sharpe (1964). Lintner (1965) and Mossin (1966). The model shows the relationship between the expected return of a security and its unavoidable risk. It also promotes a framework for the valuation of securities and can be used to find the cost of a company's equity.

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

- Understand the concept of Risk and Capital Asset Pricing Model (CAPM)
- The Assumptions of CAPM
- The Implications of CAPM
- The Capital Market Line (CML)
- The Return under CAPM
- The Workings and Illustrations

- The Limitations of CAPM
- The Arbitrage Pricing Theory (APT)

3.0 MAIN CONTENT
3.1 Risk and Capital Asset Pricing Model (CAPM)

By risk we mean that the actual returns on the investment might turn out better or worse than hoped. Risks that can on the whole be diversified away are referred to as Unsystematic sold-risk. Investments have an element of risk, which is inherited, or characteristic to the nature of investment itself. This inherent risk characteristic cannot be diversified away, and it is referred to as Systematic risk (or market risk). By accepting systematic risk, investor will expect to earn a return, which is higher than the return on a risk free investment. Investors should not require a premium for unsystematic risk because this can be diversified away by holding a well spread portfolio.

3.2 Assumptions of CAPM

1. Investors are risk averse individuals who would maximize the expected utility of their end of period wealth. This implies that the model is a one-period model.
2. Investors are price takers and have homogenous expectations about securities or return that have a joint normal distribution
3. There exist a risk-free security such that investors may borrow or lend unlimited amount at the risk-free rate.
5. All securities are marketable and perfectly divisible
6. Security markets are frictionless. This implies that information are costless and simultaneously available to all investors.

7. There are no market imperfections such as taxes, regulations or transaction costs. There is negligible restriction on investment and no investor is large enough to affect the market price of the stock.

8. The stock market is efficient; ie, security values reflect all known information which is available to all investors at low cost.

3.3 Implications of CAPM

The CAPM has the following practical implications:

1. Investors should invest in a portfolio of securities in a way that diversify or eliminate most of the unique unsystematic risk from their portfolios.

2.   The CAPM can be used in computing the discount rate for equity valuation in the dividend valuation model.

3.   Shares in individual companies will have systematic risk characteristic, which are different to the market average. Some shares will be less risky and some are more risky than the stock market average.

4.   If investor holds a balanced portfolio of all the stocks and shares on the stock market, be will be incurring systematic risk, which is exactly equal to the average systematic risk in the stock market as a whole.

5.   If an investor wants to avoid risk all together, he must invest in a portfolio consisting entirely of risk-free securities.

3.4 The Capital Market Line (CML)

This is also referred to as the security marker line (SML). Given the assumptions of CAPM the price of each financial asset would be expected to fall on the SML. The SML is given as:

$$E(Ri) = Rf + (E(RM) - Rf) \; Bj$$
$$\text{Where } Bj = \frac{Cov(Rj.Rm)}{d^2m}$$

Where:
E (Rj) = expected return on security
Rf = Risk free rate
E(Rm) = Expected rate of return on market portfolio

Cov(Rj,Rm) = Covariance of security; with the returns on the market portfolio
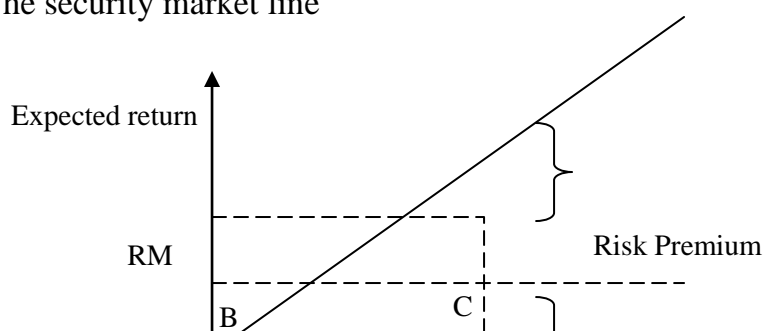D^2m = variance of return on the market portfolio
B = beta factor of security

equal to the risk free rate plus a risk premium, the later being defined as the price of risk multiplied by the quantity of risk.
Graphically, the SML can be shown as:

Expected

The security market line

An investor is expected to purchase security along the SML to maintain a balance between its expected return and the risk exposure of his/her portfolio.

3.5 Return under CAPM

Under CAPM the required rate of return is made up of two parts namely:
i.   The risk free rate
ii.   Risk premium

The Risk Free Rate
The Risk Free rate is the basic rate, which all projects must earn to compensate for the value of interest on borrowed fund.

Risk Premium

Risk premium is the additional return above the risk free rate to compensate investors for systematic risk. It is estimated by multiplying the security's beta factor by the difference between the market return and risk free rate of return.

Therefore, the expected minimum required return is given as:
Expected Return = Risk free rate + Risk premium
That; E (r) = Rf 9E (rm) – Rf) B,
That is, E (r) = RF (E(RIM) – RF) Bj
This can simply be written as:

Where:
        Rs = Expected return on the individual security
        Rf = Risk free rate
        Rm = Market rate of return (ie market portfolio return)
        B = Beta factor of the individual security

The Beta Factor

The measure of the relationship between market returns and an individual security's return can be developed into a beta factor for the individual Security.

Beta factor is defined in the CIMA's official terminology as the measures of shares volatility in terms of market risk",

The Beta factor measures the degree of responsiveness /sensitivity of the returns of individual security to changes in the returns of the market securities. For example if the average market return rises by say 2%, the

return from a share with a beta factor of 0.8 should rise by 1.6% in response to the same conditions which have caused the market return to change.

The Beta coefficient represents the systematic risk of the security i.e. that part of the total risk of the security, which cannot be eliminated through efficient diversification CAPM states that it is the systematic risk that would attract extra returns (risk premium) under equilibrium. This is to say that the only risk for which an investor is compensated is the systematic risk (non-diversifiable risk). Every investor is assumed to have efficiently diversified his or her portfolio.

The Beta Factor Measurement

Given a security j in a market of portfolio M, Beta is the Covariance between return on security, and the market portfolio M divided by the variance of the return on the market portfolio.

$$B = \frac{Cov\,(Rj,Rm)}{d^2m}$$

All gilt-edge securities (government securities) have a beta of zero because the sensitivity of its return to market movement is zero.

The market portfolio has a beta of 1 (Bm = 1). This is because its covariance with itself should under normal circumstance be equal to 1. i.e. it should be the same as the variance of the market portfolio.

The Beta factor determines the size of the risk premium. The higher the beta, the higher will be the premium (Compensation for the risk assumed by the investors).

(i)   **If Beta = 1:** It means that the return on the company's security will be the same or will move in the same direction as the returns of the market securities.

(ii)   **If Beta > 1**: This implies that the systematic risk is high or the returns on the company's security will fluctuate substantially in relation to the market returns.

(iii) **If Beta < 1:** This means the company's security has a low systematic risk i.e. they are considered less risky because they would experience lower fluctuations with the market returns.

(iv)   **If Beta > 1:** This implies that the systematic risk is high i.e the returns on the company's

(v)   **If Beta = 0:** This means the company's security has no relationship with the market. Consequently, changes in the market will not affect the returns of the company's security. Example is Government securities generally referred to as risk-free assets.

3.6 Workings and Illustrations

How to calculate Beta Factor

Beta factor coefficient can be calculated using any of the following approaches:

i.   Excess Return Approach
ii.   Linear Regression Approach
iii.   Probability Approach.
iv.   Covariance Approach
v.   Standard Deviation Approach

1.   Excess Return Approach

Under this method, Beta factor is given as:
B   =   Excess return on investment
                       Excess return on market

$$B = \frac{Rs-Rf}{Rm-Rf}$$

Where   Rs = Expected return on security
                Rf = risk-free rate
                Rm = market return

Illustration 1
Given a security with an expected return of 9% and a market return of 12%. Also given that government security rate is 7%. Calculate the Beta factor.

Solution

$$B = \frac{Rs-Rf}{Rm-Rf}$$

Given Rs = 9%
      Rm = 12%
      Rf = 7%

$$B = \frac{9-7}{12-7} = 2/5$$

B = 0.40

ii.   Line Regression Approach

This approach measures Beta as the gradient of the line of best fit when the return on a security and the market return are plotted in a graph. Therefore Beta is given as:

$$B = \frac{n\Sigma xy - \Sigma x \Sigma y}{N\Sigma X^2 - (\Sigma X)^2}$$

where
    B = The Beta Coefficient
    X = Return from the market

    N = number of pairs of data from x and y

Example 2

Wisdom Plc wishes to determine its historic beta coefficient in order to decide the cost of capital. Its financial manager has decided to use linear regression using a sample of 6 months data about the return on Wisdom PLC ordinary shares and the market as a whole.

The sample data for the first 6 months are given below:

Monthly Return On:

Month	Market Index (%)	Wisdom's shares (%)
1	+7	+4
2	+5	+3
3	-2	-5
4	0	-3
5	+1	+2
6	+2	+4

A dividend of 15k per share was paid by Wisdom plc in six months. The month-end price is shown ex-dix,

Required
a.   use the data above to calculate a beta value for Wisdom Plc
b.   If the risk free rate of return is 8% per annum, calculate the required return on the shares of Wisdom Plc.

Solution

Wisdom Plc

x	y	x^2	xy
7	4	49	28
5	3	25	15
-2	-5	4	10
0	-3	0	0
1	2	1	2
2	4	4	8
13	5	83	63

b. $= \dfrac{nSxy - SxSy}{NSX^2 - (SX)^2}$

$= \dfrac{6(63) - (13)(5)}{6(83) - (13)^2}$

$= \dfrac{378 - 65)}{498 - 169} = \dfrac{313}{329} = 0.951$

Beta $= 0.951$

B.   Required Return is: Rs $=$ Rf $+$ (Rm $-$ Rf) b
Rf for 6 months $= 4\%$ (Annual rate 8%

Rm for 6 months $= 7\%$ (Annual rate 14%)

Rs $= 4 + (7\text{-}4)\, 0.951$
Rs $= 4 + 2.853$

Rs $= 6.853\%$

ii.   **Probability approach**

This is given as

$b = \dfrac{(Rs - R's)(Rm - R'm)}{S(Rm - R'm)^2 p}$

where
        p $=$ Probability attached to each possibility.

R = Expected return on security

Rs = Forecast return on security

Rm = Expected return on market

Rm = Forecast return on market

The probability approach is an extension of the co-variance approach.

iv.   Covariance Approach
Under this approach, Beta is given as:
b = Co-variance x & y

   Variance of x

$$\underline{Coy.\ xy}$$

$$Varx$$

Where: Cov xy = covariance of individual security return and market return as a whole. Var. x = Variance of returns for the market as a whole

Illustration 3
Assume that:
a.   the risk free rate of return is 6%
b.   the market rate of return is 11%
c.   the standard deviation of return on the market as a whole is 40%
d.   the co-variance of return for the market with returns for the shares of Endurance Ltd over the same period has been 19.2%.

Calculate:

i.   The Beta

ii.   The security expected return for Endurance Ltd

Solution

i) $B = \dfrac{Cov\ xy}{Var.x}$

Since the variance is the square of a standard deviation then

ii)   Rs = Rf + (Rm – Rf) B
        6% + (11 – 6%) 1.20
        = 6% + (5) 1.20
        = 12%

v)   Standard Deviation Approach
        This approach determines Beta by using the formular

        $B = \dfrac{\text{Standard deviation of security}}{\text{Standard deviation of market}} \times r$

                        $\dfrac{dsxr}{dm}$

where r = co-efficient of correlation between the security and the market.

Illustration 4

Given the following information:

The average stock market return on equity = 15%

The risk-free rate of return (pre-tax)   = 8%
Company x: dividend yield   = 4%

Company x: share price rise   = 12%

Standard deviation of total stock market

On equity   = 9%

Standard deviation of total return on

Equity of company   X   10.8%

Correlation coefficient between company X

return on equity and average stock market

return on equity   0.75

Required

   i. What is the beta factor for company X share

ii.   What does this information imply for the actual returns and actual value of company x shares?

Solution

(i) $B = \dfrac{d\ s\ r}{d\ m} = \dfrac{10.8\% \times 0.75}{9\%} = 0.9$

(ii) The cost of company X equity should therefore be:

$$Rs = Rf + (Rm - Rf)\,B$$
$$= 8\% + (15 - 8)\,0.9$$
$$= 14.\,3\%$$

The Implications:

The actual returns on company X equity are 4% +12% = 16%. This implies either that the actual returns include extra returns due to factors which can be categorized as unsystematic risk factors or if

lower than it should be.

Beta of a portfolio

The Beta factor of an investor's portfolio is the weighted average beta factor of each security in the portfolio. The portfolio Beta is the weight of individual security multiplied by its respective Beta.

ie $Bp = S^n\ Wipi$

(i = 1

Illustration 5

Justine is considering allocating his portfolio funds to the following securities

Security	Weight	Beta
A	15%	0.85
B	10%	1.30
C	20%	1.181
D	25%	1.25
E	30%	0.70

If the risk free rate is 12% and the return on the market portfolio is 18%, calculate:

i. Portfolio Beta
ii. Expected Return on Jude's portfolio

Solution

i.   Portfolio Beta $(Bp) = S^n Wipi$

$$i=1$$

$Bp = 0.15 (0.85) + 0.10(1.30) + 0.20 (1.181) + 0.25 (1.25) + 0.30 (0.7)$

$= 1.016$

ii.   Expected portfolio return:

$Rp = Rf (Rm - Rf) Bp$

$= 0.12 + 1.016 (0.18 - 0.12)$

$= 0.18096$

$= 18.1\%$

Beta of a Geared company

The gearing of a company will affect the risk of its equity. It then follows that if a company is geared; its financial risk will be higher than the risk of an all equity company. Therefore, the B value of A geared company's equity will be higher than the B value of a similar ungeared company's equity.

There is a direct connection between M & M's views about gearing and weighted average cost of capital and the CAPM M *&* M argued that as gearing rises, the cost of equity rises to compensate shareholders for the extra financial risk of investing in a geared company. This financial risk is an aspect of systematic risk and ought to be reflected in a company's Beta factor.

The connection between M&M theory and CAPM means that it is possible to establish a mathematical relationship between the B value of an ungeared company and the B value of a similar

We should expect the B value of a geared company to be higher; because of the extra financial risk, and the formulae to learn are:

$$Bu = \frac{Bg}{1 + D (1 - t)}\dots\dots\dots\dots\dots(1)$$
$$veg$$

Where:

Bu = the beta factor of an ungeared company i.e. the ungeared beta
Bg = the beta factor of a similar, but geared company i.e. the geared beta
D = the market value of the debt capital in the geared company.
Veg = the market value of the equity capital in the geared company
t = the rate of company's income tax

Re-arranging this, we have

$$Bg = Bu \left(1+ \frac{D\,(1-+)}{Veg}\right) \dots\dots\dots\dots (2)$$

Which is also $= Bu + Bu \dfrac{(D\,(1-t)}{Veg}$

Notice especially in formular 2 that the geared beta is equal to the ungeared beta plus a premium for financial risk which equals.

$$Bu \frac{\{D(1 - 1\,)\}}{Veg}$$

This is the geared Company's gearing ratio, multiplied by a tax adjustment factor (1-t) and also multiplied by the beta of an ungeared company

Illustration 6

Suppose that two companies are identical in every respect except for their capital structure. Their market values are in equilibrium, as follows:

	Geared Ltd. N'000	Ungeared Ltd. N'000
Annual profit b/f Int & Tax	1,000	1,000
Interest (4,000 x 8%)	320	-
	680	1,000
Tax at 35%	238	350
Profit after Tax = dividends	442	650
	N'000	N'000
Market value of equity	3,900	6,500
Market value of debt	4,000	-

The total value of geared Ltd is higher than the total value of ungeared , which is consistent with MM's proposition that:

$$Vg = Vu + Dt.$$

The beta value of ungeared Ltd has been calculated as 1.0.
The debt capital of Geared Ltd can be regarded as risk-free

Required:

Calculate
a.   the cost of equity in Geared Ltd
b.   the market Return Rm
c.   the beta value of Geared Ltd

Solution

a.   The cost of equity in Geared Ltd is

$$\frac{d}{mv} = \frac{442}{3.900} = 11.33\%$$

This can be checked using the MM formula

$$Kg = Ku = + \frac{(1-t)(k_{ey}kd)d}{Veg}$$

Since $kg = \frac{650}{6.500} = 10\%$, and $kd = \frac{320}{4000} = 8\%$

kg = 10% + { (1-0.35) (10-8) 4000) %
                          3,900
                  = 11.33%

b.   The beta value of ungeared Ltd is 1.0 which means that the
        expected returns from ungeared Ltd are exactly the same as the
        market returns and so Rm = 10%

This allows us to reverify cost of equity in Geared Ltd as:

Kg = Rf + Bu (Bu (Rm – Rf) {1 + (1-+) D

= 8%+ 10 (10-8)% (1+0.65x400 veg
                          3,900

                  = 11.33%

c. $Bg = Bu \{\underline{f\ 1+ (1-t)\ D}\}$
                      veg

$$\frac{1.0\ \{1+0.65 \times 4000\}}{3,900}$$

$= 1.67$

Illustration 7

Musagift Ltd has an opportunity to invest in a project lasting one year.

The net cash flows and the beta factor for each of the projects are as follows:

Musagift	N'000	B
Ltd	500	1.20
Sure Success Ltd	200	1.25
	100	0.80
	200	1.35

The market returns is 12% and the risk free rate of interest is 7%.

   Required:

a.   Calculate the total present value of the project that can be undertaken by

1.   Musagift Ltd
2.   Sure success Ltd

b.   Calculate the overall beta factor for sure success Ltd; Project, assuming that all three are undertaken.

c.   Using the information, discuss which company is likely to be valued more highly by investors and suggest how portfolio diversification by a company can reduce the risk experienced by an investor.

Solution
a.   Project discount rates

Musagift Ltd 7% + 1.2 (12-7)% = 13%
Sure success Ltd
i.   7% + 1.25 (12 – 7)% = 13.25%
ii.   7% + 0.8 (12 – 7)% = 11%
iii.   7% + 1.35 (12 – 7)% = 13.75%

Project net present values, assuming the cash flows all occur at the end of year 1, are

		N'000
Musagift	$\dfrac{500}{1.13}$ =	442.48

Sure success Ltd.   i. $\dfrac{200}{1.1325}$ 176.60

ii. $\dfrac{100}{1.11}$ = 90.09

iii. $\dfrac{200}{1.1375}$ = 442.51

Allowing for rounding errors, the PV of the three projects of sure success Ltd added up to the same amount as the PV of the project of Musagift

b.   Sure Success' overall beta factor is a weighted average of the beta factor of the three projects

Project	Value	B	Weighting
(i)	200	1.25	250
(ii)	100	0.80	80
(iii)	200	1.35	270
	500		600

Overall beta factor $= \dfrac{600}{500} = 1.2$

This is the same as Musagift Ltd's project Beta factor.

c.   This information shows that for the projects under review both companies have the same PV and the same systematic risk (ie the same beta factors). It therefore follows that on the basis of these projects alone, investors should value both companies equally.

It might be tempting to assume that since sure success Ltd is divesting into three separate projects, whereas Musagift is putting all its eggs in one basket and investing in one project, that investors should show a preference for the low risk sure success Ltd because Musa gift's unsystematic risk will be higher. But with CAPM theory, it is assumed that investor can eliminate unsystematic risk by diversifying their own investment portfolio, and do not have to rely on companies to do the diversifying on their behalf.

Portfolio diversification reduces risk beta use the returns from projects will not be perfectly positively correlated, and diversification reduces risk more when project returns show little or no positive correlation (or preferably a negatively correlation when only this is achievable). However, diversification by a company reduces the risk of bankruptcy for the company itself As stated earlier, investors can diversify themselves without having to rely on a company to do it for them, and provided that bankruptcy brings, no added costs to the investor, CAPM theory states that diversification by a company should have no effect on the risk experienced by a well diversified investor.

The Alpha Factor

The alpha factor in CAPM theory is another term for abnormal return due to the specific (unsystematic) risk of an individual security that can be "eliminated" by diversifying. It is the return on a share that is not due to movements in the general market. Alpha factors is the recorded difference between the actual return and **Rf+ B(Rm – Rf).**

3.7 Limitations of CAPM

1.   There may be difficulty in determining the risk free rate.

2. Beta is difficult to measure accurately for an individual company future event.

3. In the real world, a perfect market does not exist.

4. The model only considers systematic risk. The model assumes that investors always hold balanced portfolio, which eliminate unsystematic risk.

5. Beta values may be unstable over time.

6. Beta estimated from historical data may not be appropriate when considering future event.

7. CAPM is a one-period model and should be used with caution especially when dealing with multi-period projects.

8. The model only examines investments from the shareholders point of view and does not consider other interest.

9. CAPM assumes insolvency cost to be zero. It assures that all assets can be sold at going concern prices and that there are no selling, legal or other costs.

10. Result reached using CAPM may conflict with that reached using

WACC.

3.8 Arbitrage Pricing Theory (APT)

APT was suggested by Ross (1976) because of the dissatisfaction with the CAPM. Unlike the CAPM that is a one-factor model (i.e. single Beta generating model), the APT is a multi-factor model (i.e. multi-beta model). APT makes use of relevant factor structure that affects security returns.

Three Main Assumptions
1. Competitive capital markets
2. Investors prefer wealth to less wealth with certainty
3. The stochastic process generating asset returns can be represented

as a factor model

The Model is given by:

$$R_i = E(R_i) + b_i f_i + b_{i2} f_2 + \ldots + b_{in} f_n + e_i \ldots$$

This can be simply restated as:

$$R_i = E(R_1) + S^n b_{ij} f_j + e_i$$
$$i=1$$

Where:

Ri =   return on asset 1 during a specified time period

E(Rr)   =   expected return for asset i

Bij   =   reaction in asset 1 is returns to movement in a common

factor j;.

Fj   =   a set of common factors with a zero mean that influence

the returns on all assets

Such factors include:
1.   Inflation
2.   Interest supply
3.   Money supply
4.   Political disturbance
5.   Growth in GNP etc

ei = the error term (which has unique effect on asset 1's return, assumed to be uncorrelated with the factor). By assumption, it is completely diversifiable in large portfolio and has a mean of zero.

The APT suggests that there is a linear relationship between a security return and some factors, and

$$E(R_1) = R_f + l_i b_{i1} + l_2 b_{i2} + \ldots l_n b_{in}$$

Where Rf = risk free rate

In = risk premium related to each of the common factors

4.0 CONCLUSION

CAPM was developed in an attempt to simplify the individual portfolio theory as it relates to investment in securities. The model brings together aspect of portfolio theory, share valuation, the cost of capital and gearing. It can help to establish what the "correct" equilibrium market value of a company's share to be.

6.0 TUTOR MARKED ASSIGNMENTS

1a)   State the assumptions underlying the use of the "Capital Asset Pricing Model" and indicate with definition the linear representation of the model for stock valuation.

b.   Assume that you have invested in some stocks that have a Beta of 1.35. The risk free rate is 10 while the expected return on marked portfolio is 17%. What return would you expect on the stocks using the CAPM.

2.   Discuss the limitations of CAPM. How has APT model proffered solutions to some of these problems.

3.   The returns from the market as a whole have been 20% for some time, which compares with a risk free rate of return of 9%. Peace ltd's shares have a measured beta factor of 1.25. What would the expected returns be for Peace Ltd's share:

a.   If the market returns went up to 21.5%
b.   if market return slumped to 8%

4. Holy Hills Plc currently pays a divided of N150 per share and investors expect it to grow at 12% per annum indefinitely. If the risk free rate is 14% and Holy Hills Plc has a Beta of 1.4, Find the current market price per share of Holy Hills Plc, using

6.0 SUMMARY

In this unit you have learnt the Risk and Capital Asset Pricing Model (CAPM), the different Assumptions of CAPM, the Implications of CAPM, the concept of Capital Market Line (CML), what Return under CAPM is all about, the various Workings and Illustrations, the Limitations of CAPM and why Arbitrage Pricing Theory (APT) was evoked.

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MODULE 4

Unit 1	Activities involved in making selection among alternative Financial Assets Investments
Unit 2	Implication of Efficient Market theory for investors' profitability
Unit 3	Valuation of financial statements and selection of alternative Financial Assets- analysis of Quoted equities
Unit 4:	Valuation of unquoted equities contents

UNIT 1   ACTIVITIES INVOLVED IN MAKING SELECTION AMONG ALTERNATIVE FINANCIAL ASSETS INVESTMENTS

CONTENTS

1.0   Introduction
2.0   Objectives
3.0   Main Content
        3.1   Factors to Consider in Portfolio Planning
        3.2   Investment Timing
        3.3   Stock Selection Strategies
4.0   Conclusion
5.0   Summary
6.0   Tutor-Marked Assignment
7.0   References/Further Readings

1.0   INTRODUCTION

The portfolio planner should be well informed of the securities/financial instruments available in the financial market and their distinguishing characteristics. He/She must possess a good working knowledge of the different types of markets within the financial system, locally and internationally. Viz the money market, capital market and foreign

exchange market.

2.0   OBJECTIVES

3.0   MAIN CONTENT

3.1   Factors to Consider in Portfolio Planning

The following factors should be considered when planning investment.
(i)   Investor's Objective
(ii)   Liquidity
(iii)   Safety
(iv)   Security
(v)   Return
(vi)   Growth
(vii)   Tax Implication

(i)   Investor's Objective
The objective of the investor is very important in portfolio planning. It is essential that portfolio formed must be able to meet investor's peculiar circumstance or preference.

Generally, the objective of holding portfolio of financial asset is to generate income or capital appreciation or both. Investors desiring immediate income for current consumption will go for securities with propensity of high dividend rate. Investors having preference for capital appreciation will go for securities, which pay little dividends, but with high growth potentials. Companies in this category reinvest high proportion of their profit with the hope of improving its share price as a result of the profitable investment opportunities undertaken.

(ii)   Liquidity
The Investor's liquidity need should be taken into consideration in portfolio planning. His liquidity need for housing, family feeding, medical and other unforeseen contingency need should be considered so as to ascertain the level of excess funds that is available for investment.

(iii)   Security
This refers to risk preference class of the investor. How much risk is he ready to take? What level of risk can he absorb? To what degree will the income and principal repayments be guaranteed?

(iv)   Safety
The investor wants to be sure of the safety of his principal. He will not want his initial capital investment to be lost.

(v) Return

This is the expected rate of return. The higher the expected return, the higher the sacrifice of investors.

(vi) Growth

This is concerned with the possibility of capital appreciation. How much capital gains is the investor targeting?

(vii) Tax Implication

Investors usually consider the tax implications of their investment decisions. Some investors will prefer tax- exempted investment. For instance, they may go for shares of companies enjoying pioneer status.

3.2 Investment Timing

Investment Timing refers to the possibility of profiting from buying and selling activities on securities given that such actions are taken at the right time. Investors, especially speculators fair better in dealing on their securities when they can reasonably forecast the trend of the economy and business activities, thus making predicting the trend of prices in the securities market possible.

Investment Timing requires possession of foresight, ability to read the signs and then initiate necessary actions in order to defend one's investment or profit from the envisaged situation in the future. Speculator's profit often results from predicting the difference that may likely exist between the market index return and the return on security. However loss occurs when there is an error of judgment.

There are three main schools of thought in Investment Timing strategies. They are:
(i)   Aggressive Policy
(ii)   Defensive Policy
(iii) Naira-Cost Averaging

3.2.1 Aggressive Policy

This policy seeks to find a set of indicators that are reliable predictors of market conditions. The holders of the policy employ business and economic statistics and data as well as stock market statistics in their analysis. The former include indicators of economic conditions such as rate of employment, Interest rate, growth of industrial production and the growth of money supply; stock market statistic at least give information on share prices and volume of trading.

It is believed that an accurate forecast of business condition can result

into reasonable prediction of share prices, particularly at major turning points in the rate of business activities. An expansion in business activities result into increased turnover and profit leading to increase in the prices of shares and vice-versa. Investors are therefore actively involved in buy and sell strategy and sometimes buy and hold as an active policy rather than a passive one.

3.2.2 Defensive Policy

This policy is built on the opinion that it is difficult if not impracticable to forecast the direction of the economy and market, hence discovering the turning point, market levels; etc may not yield any appreciable benefits.

Therefore, investors should be primarily concerned with investing on shares of companies with good long run prospects and care less about the market and timing of investment. Investors use the strategies of buy for the long pull or the long-haul or buy and hold.

3.2.3 Naira-Cost Averaging

This is a middle-of-the-road investment timing method. The objective of the investor is to spread his purchase over time on blue chip so that the average cost per unit of shares in his portfolio is below the average market price at any point in time.

Naira-Cost averaging involves two basic steps:

1.	Shares that are included in the portfolio are those with long-run prospect. These shares are fairly volatile and thus provide maximum benefit from Naira cost averaging.

2.	It requires commitment to purchase a specified amount of shares at regular interval regardless of the share price, the company's prospects or the economic outlook.

### 3.3	Stock Selection Strategies

When selecting stocks for their portfolio, many investors employ certain style strategies based on past performance and price changes of the stock. These strategies include:
i.	Value stocks
ii.	Growth stocks Price momentum
iii.	Price strength
iv.	Bottom fishing

Many investors have a preference for a particular method, while others change methods as their preferences and market conditions evolve.

i.   Value stocks

Stock selection based on the search for undervalued companies offers extremely favorable values in fundamental terms. Usually value stocks have a low price to earnings ratio or alternatively a low price to sales ratio. The classic rationale behind this strategy is buying stocks at a fraction of what they are worth and waiting for the market to fully recognize the hidden value.

This "look for cheap stocks" strategy is a popular theme among defensive investors since the reasonable price multiples offer a good hedge against future adversity. It is usually a sound, solid strategy that might, however, require an extra dose of patience and fortitude. The market may take months, quarters, if not years to discover and appreciate pure value plays. On the other hand the ratio of upside and potential versus downside risk is often very appealing

ii.   Growth Stocks

Growth stocks usually belong to companies with superior track records or prospects in terms of earnings growth and/or revenue growth. The idea is to buy stock in companies that grow fast regardless of the price one has to pay to acquire them. Classic examples of this investment approach are high tech stocks or stocks of small but rapidly expanding and well managed Banks.

This strategy is usually quite risky. Protection against negative company surprises or stock market dips is minimal, leaving the investment vulnerable to steep losses. On the other hand, if the expected growth materializes in the future, the stock price appreciation is substantial. Many of the best performing stocks over the last 5 years have been pure growth plays, for large caps as well as small cap stocks.

iii.   Price Momentum

Price Momentum is usually referred to as trend following This investment strategy focuses on stocks whose price action is strong, often outperforming the relevant stock index. Stocks with positive price momentum tend to rise faster than the market, showing continuous price appreciation for weeks or months. The philosophy behind momentum investing is along the lines of the belief that "the trend is your friend". A number of market forces can be behind the continuous price strength of a momentum play, but what really matters is that when a strong price trend is in action, it often carries through for a while-enough to make a good profits riding the momentum.

Statistically speaking, this is a sound strategy, although a number of

things can go wrong such as unexpected negative company surprises, abrupt price trend reversals, sharp price corrections, or a dramatic shift in investors' psychology. The previously strong momentum may disappear overnight.

iv.   Price Strength
Price Strength is a variation of Price Momentum because it is calculated against the appropriate market or sector index. It is referred to as a "relative" measure of the same momentum. The idea is to buy only stocks that are performing stronger than relevant competing companies.

v.   Bottom Fishing
Bottom Fishing is an opportunistic investment approach focusing on stocks that, after a dramatic plunge in price (usually across a few quarters), seem to be poised for a rebound. These are usually out-of-favor stocks, appropriate for contraries investors that have been neglected from the investment community for some time. The basic idea is to go against the crowd and buys stocks (usually at very discounted multiples) in hopes of participating in the expected rebound.

The price rebound may take a long time to materialize, but usually when it comes dramatic and sharp. The ensuing profits can be significant in percentage terms. Distressed securities sometimes fall in the category or stocks with troubles in fundamental terms. However, some of these companies may never recover. For this reason, bottom fishing should be always associated with careful fundamental review.

4.0 CONCLUSION
We have seen from this unit that generally, the objective of holding portfolio of financial asset is to generate income or capital appreciation or both. Investors desiring immediate income for current consumption will go for securities with propensity of high dividend rate. Investors having preference for capital appreciation will go for securities, which pay little dividends, but with high growth potentials.

5.0 SUMMARY

You have learnt in this unit the various factors to consider in Portfolio Planning, Investment Timing and the different stock Selection Strategies

6.0 TUTOR-MARKED ASSIGNMENT
1. State the factors to Consider in Portfolio Planning
2. State the stock Selection Strategies

7.0 REFERENCES/FURTHER READINGS

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UNIT 2 IMPLICATION OF EFFICIENT MARKET THEORY FOR INVESTORS' PROFITABILITY

CONTENTS

1.0 Introduction
2.0 Objectives
3.0 Main Content
        3.1 Tests of Weak Form Efficiency
        3.2 Tests of Semi-Strong Form Efficiency
        3.3 Tests of Strong Form Efficiency

4.0 Conclusion
5.0 Summary
6.0 Tutor-Marked Assignment
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1.0 INTRODUCTION

A financial market is informatively efficient when market prices reflect all available information about value. What is "all available information? All available information includes:
• Past prices – weak form.
• Public information (prices, news etc) – semi strong form.
• All information including inside information – strong form.

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

• Understand the tests of Weak Form Efficiency
• Understand the tests of Semi-Strong Form Efficiency
• Understand the Tests of Strong Form Efficiency

3.0   MAIN CONTENT

3.1   Tests of Weak Form Efficiency

The weak form of the efficient market hypothesis (EMH) says that the current prices of stocks already fully reflect all the information that is contained in the historical sequence of prices. The new price movements are completely random. They are produced by new pieces of information and are not related or dependent on past price movements. Therefore, there is no benefit in studying the historical sequence of prices to gain abnormal returns from trading in securities. This implies that technical analysis. Which relies on charts of price movements in the past, is not a meaningful analysis for making abnormal trading profits.

The weak form of the efficient market hypothesis is thus a direct repudiation of technical analysis.

Two approaches have been used to test the weak form of the efficient market hypothesis. One approach looks for statistically significant patterns in security price changes. The alternative approach searches for profitable short-term trading rules.

i.   **Serial Correlation Test:** Since the weak form EMH postulates independence between successive price changes, such independence or randomness in stock price movements can be tested by calculating the correlation between price changes in one period and changes for the same stock in another period. The correlation coefficient can take on a value ranging from -1 to 1; a positive number indicates. a direct relation, a negative value implies an inverse relationship and a value close to zero implies no relationship. Thus, if correlation coefficient is dose to zero, the price changes can be considered to be serially independent.

ii.   **Run Test:** The run test is another test used to test the randomness in stock price movements. In this test, the absolute values of price changes are ignored, only the direction of change is considered. An increase in price is represented by + sign. The decrease is represented by - sign. When there is no change in prices, it is represented by '0'. A consecutive sequence of the same sign is considered as a run. For example, the sequence +++--- has two runs. In other words, a change of sign indicates a new run. The sequence ---++0---++++has five runs; a run of three - 's, followed by a run of two +'s, another run of one 0, a fourth run of three -'s and a fifth run of four +'s. In a run rest, the actual number of runs observed in a 'series of stock price movements is compared with

the number of runs in a randomly generated number series. If no significant differences are found, then the security price changes are considered to be random in nature.

iii. **Filter Tests:** If stock price changes are random in nature, it would be extremely difficult to develop successful mechanical trading systems. Filter tests have been developed as direct of specific mechanical trading strategies to examine their validity and usefulness. It is often believed that, as long as no new information enters the market, the price fluctuates randomly within two barriers -one lower, and the other higher-around the fair price. When new information comes into the market, a new equilibrium price will be determined. If the news is favourable, then the price should move up to a new equilibrium above the old price. Investors will know that this is occurring when the price breaks through the old barrier. If investors purchase at this point, they will benefit from the price increase to the new equilibrium level. Likewise, if the news received is unfavourable, the price of the stock will decline to a lower equilibrium level. If investors sell the stock as it breaks the lower barrier, they will avoid much of the decline. Technicians set up trading strategies based on such patterns to earn excess returns. The strategy is called a **filter rule**.

The filter rule is usually stated in the following way; Purchase the stock when it rises by x per cent from the previous low and sell it when it declines by x percent from the subsequent high. The filters may range from 1 per cent to 50 per cent or more. The alternative to this active trading strategy is the passive 'buy and hold' strategy.

The returns generated by trading according to the filter are compared with the returns earned by an investor following the buy and hold strategy. If trading with filters results in superior returns that would suggest the existence of patterns in price movements and negate the weak form EMH.

Distribution Pattern: It is a rule of statistic that the distribution of **random** occurrence will conform to a normal distribution. Then, if price changes are random their distribution should also be approximately normal. Therefore, the distribution of price changes can be studied to test the randomness or otherwise of stock price movements. In the 1960s the efficient market theory was known as the random walk theory. The empirical studies regarding share price movements were testing whether prices followed a random walk.

Two articles by Robert and Osborne, both published in 1959, stimulated

a great deal of discussion of the new theory then called **random walk theory.**

Roberts study compared the movements in the Dow Jones Industrial Average (an American stock market index) with the movement of a variable generated from a random walk process. He found that the random walk process produced patterns which were very similar to those of the Dow Jones index.

Osborne's study found a dose resemblance between share price changes and the random movements of small particles suspended in a solution, which is known in Physics as the Brownian motion. Both the studies suggested that share price changes are random in nature and that past prices had no predictive value.

During the 1960s there was an enormous growth in serial correlation testing. None of these found any substantial linear dependence in price changes. Studies by Moore, Fama and Hagerman and Richmond serial correlation coefficient of (-) 0.06 for price changes measured over weekly intervals. Fama's study tested the serial correlation for the thirty stocks comprising the Dow Jones industrial average for the five years prior to 1962. The average serial correlation coefficient was found to be 0.03. Both the coefficients were not statistically different from zero, thus both the studies supported the random walk theory.

Fama also used run tests to measure dependency. The results again supported the random walk theory. Many studies followed Moore's and Fama's work each of which used different databases. The results of these studies were much the same as those of Moore and Fama.

Hagerman and Richmond conducted similar studies on securities traded in the over-the-counter market and found little serial correlation. Serial correlation tests of dependence have also been carried out in various other stock markets around the world. These have similarly revealed little or no serial correlation.

Much research has also been directed towards testing whether mechanical trading strategies are able to earn above average returns. Many studies have tested the filter rules for its ability to earn superior returns. Early American studies were those by Alexander, who originally advocated the filter strategy, and by Farna and Blume. There were similar studies in the United Kingdom by Dryden and in Australia by Praetz. All these studies have found that filter strategies did not achieve above average returns. Thus, the results of empirical studies have been virtually unanimous in finding little or no statistical dependence and price patterns and this has corroborated the weak form

efficient market hypothesis.

3.2   Tests of Semi-Strong Form Efficiency

The semi-strong form of the efficient market hypothesis says that current prices of stocks not only reflect all informational content of historical prices, but also reflect all publicly available information about the company being studied. Examples of publicly available information are corporate annual reports, company announcements, press release, announcements of forthcoming dividends, stock splits, etc. The semi-strong hypothesis maintains that as soon as the information becomes public the stock prices change and absorb the full information. In other words, stock prices instantaneously adjust to the information that is received.

The implication of semi-strong hypothesis is that fundamental analysts cannot make superior gains by undertaking fundamental analysis because stock prices adjust to new pieces of information as soon as they are received. There is no time gap in which a fundamental analyst can trade for superior gains. Thus, the semi-strong hypothesis repudiates fundamental analysis.

Semi-strong form tests deal with whether or not security prices fully reflect all publicly available information. These tests attempt to establish whether share prices react precisely and quickly to new items of information. If prices do not react quickly and adequately, then an opportunity exists for investors or analysts to earn excess returns by using this information. Therefore, these tests also attempt to find if analysts are able to earn superior returns by using publicly available information.

There is an enormous amount and variety of public information. Semi-strong form tests have been performed with respect to many different types of information. Much of the methodology used in semi-strong form tests has been introduced by Fama, Fisher, Jensen and Roll. Theirs was the first of the studies that were directly concerned with the testing of the semi-strong form of EMH. Subsequent to their study, a number of refinements have been developed in the test procedure.

The general methodology followed in these studies has been to take an economic event and measure its impact on the share price. The impact is measured by taking the difference between the actual return and expected return on a security. The expected return on a security is generally estimated by using the market model (or single index model) suggested by William Sharpe. The model used for estimating expected returns is the following:

Ri   = $a_i + b_i R_m + e_i$

Where
R_i = Return on security i
R_m = Return on a market index
a_i and b_i = Constraints
e_i = Random error

This analysis is known as 'Residual analysis. The positive difference between the actual return and the expected return represents the excess return earned on a security. If the excess return is close to zero, it implies that the price reaction following the public announcement of an information is immediate and the price adjusts to a new level almost immediately. Thus, the lack of excess returns would validate the semi -strong form EMH.

Major studies on the impact of capitalisation issues such as stock splits and stock dividends have been conducted in the United States by Fama, Fisher, Jensen and Roll and Johnson, in Canada by Finn, and in the United Kingdom by Firth. All these studies found that the market adjusted share prices instantaneously and accurately for the new information. Both Pettit and Watts have investigated the market's reaction to dividend announcements. They both found that all the price adjustment was over immediately after the announcement and thus, the market had acted quickly in evaluating the information.

Other items of information whose impact on share prices have been tested include announcements of purchase and sale of large blocks of shares of a company takeovers, annual earnings of companies, quarterly earnings, accounting procedure changes, and earnings estimates made by company officials. All these studies which made use of the Residual analysis approach, showed the market to be relatively efficient.

Ball and Brown tested the stock market's ability to absorb the informational content of reported annual earnings per share information. They found that companies with good earnings report experienced price increase in stock, while companies with bad earnings report experienced decline in stock prices. But surprisingly, about 85 per cent of the informational content of the earnings announcements was reflected in stock price movements prior to the release of the actual earnings figure. The market seems to adjust to new information rapidly with much of the impact taking place in anticipation of the announcement.

Joy, Litzenberger and McEnally tested the impact of quarterly earnings announcements on the stock price adjustment mechanism. Some of their results, however, contradicted the semi-strong form of the efficient

market hypothesis. They found that the favourable information contained in published quarterly earnings reports was not always instantaneously adjusted in stock prices. Thus may suggest that the market does not adjust share prices equally well for all types of information.

By way of summary it may be stated that a great majority of the semi-strong efficiency tests provide strong empirical support for the hypothesis; however, there have been some contradictory results too. Most of the reported results show that stock prices do adjust rapidly to announcements of new information and that investors are typically unable to utilise this information to earn consistently above average results.

3.3 Tests of Strong Form Efficiency

The strong form hypothesis represents the extreme case of market efficiency. The strong form of the efficient market hypothesis maintains that the current security prices reflect all information both publicly available information as well as private or inside information. This implies that no information, whether public or inside, can be used to earn superior returns consistently.

The directors of companies and other persons occupying senior management positions within companies have access to much information that is not available to the general public. This is known as insider information. Mutual funds and other professional analysts who have large research facilities may gather much private information regarding different stocks on their own. These are private information not available to the investing public at large.

The strong form efficiency tests involve two types of tests. The first type of tests attempt to find whether those who have access to insider information have been able to utilize profitably such inside information to earn excess returns. The second type of tests examine the performance of mutual funds and the recommendations of investment analysts to see if these have succeeded in achieving superior returns with the use of private information generated by them.

Jaffe, Lode and Niederhoffer studied the profitability of insider trading (i.e. the investment activities of people who had inside information on companies). They found that insiders earned returns in excess of expected returns. Although there have been only a few empirical studies on the profitability of using inside information, the results show, as expected, that excess returns can be made. These results indicate that markets are probably not efficient in the strong form.

Many studies have been carried out regarding the performance of

American mutual funds using fairly sophisticated evaluation models. All the major studies have found that mutual funds did no better than randomly constructed portfolios of similar risk. Firth studied the performance of Unit Trusts in the United Kingdom during the period 1965-75. He also found that unit trusts did not outperform the market index for their given levels of risk. A small research has been conducted into the profitability of investment recommendations by investment analysts. Such studies suggest that few analysts or firms of advisers can claim above average success with their forecasts.

The results of research on strong form EMH may be summarized as follows:
1.   Inside information can be used to earn above average returns.
2.   Mutual funds and investment analysts have not been able to earn superior returns by using their private information.

In conclusion, it may be stated that the strong form hypothesis is invalid as regards inside information, but valid as regards private information other than inside information.

EMH, Fundamental, and Technical Analyses Compared

There are three broad theories concerning stock price movements. These are the fundamental analysis, technical analysis and Efficient Market Hypothesis. **Fundamental analysts** believe that by analyzing key economic and financial variables they can estimate the intrinsic worth of a security and then determine what investment action to take. Fundamental seeks to identify underpriced securities and overpriced securities. Their investment strategy consists in buying underpriced securities and selling overpriced securities, thereby earning superior returns.

A **technical analyst** maintains that fundamental analysis is unnecessary. He believes that history repeats itself. Hence, he tries to predict future movements in share prices by studying the historical patterns in share price movements.

The Efficient Market Hypothesis (EMH) is expressed in three forms. The weak form of the EMH directly contradicts technical analysis by maintaining that past prices and past price changes cannot be used to forecast future price changes because successive price changes are independent of each other. The semi-strong form of the EMH contradicts fundamental analysis to some extent by claiming that the market is efficient in the dissemination and processing of information and hence, publicly available information cannot be used consistently to

earn superior investment returns.

The strong form of the EMH maintains that not only is publicly available information useless to the investor or analysts but all information is useless.

Even though the EMH repudiates both fundamental analysis and technical analysis, the market is efficient precisely because of the organised and systematic efforts of thousands of analysts undertaking fundamental and technical analysis. Thus, the paradox of efficient market hypothesis is that both fundamental and technical analyses are required to make the market efficient and thereby validate the hypothesis.

Competitive Market Hypothesis (CMH)
An efficient market has been defined as one where share prices always fully reflect available information on companies. In practice, no existing stock market is perfectly efficient. There are evident shortcomings in the pricing mechanism. Often, the complete body of knowledge about a company's prospects is not publicly available to market participants. Further, the available information would not be always interpreted in a completely accurate fashion. The research studies on EMH have shown that price changes are random or independent and hence unpredictable. The prices are also seen to adjust quickly to new information. Whether the price adjustments are correct and accurate, reflecting correctly and accurately the meaning of publicly available information is difficult to determine.

4.0 CONCLUSION

We have seen in this unit that what can be validly concluded is that prices are set in a very competitive market, but not necessarily in an efficient market. Thus competitive market hypothesis provides scope for earnings superior returns by undertaking security analysis and following portfolio management strategies.

5.0 SUMMARY
You have learnt from this unit the tests of Weak Form Efficiency, the Tests of Semi-Strong Form Efficiency and the tests of Strong Form Efficiency

6.0 TUTOR MARKED ASSIGNMENT
- What do you understand by the Weak Form Efficiency?

7.0 REFERENCES/FURTHER READINGS

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UNIT 3 VALUATION OF FINANCIAL STATEMENTS AND SELECTION OF ALTERNATIVE FINANCIAL ASSETS-ANALYSIS OF QUOTED EQUITIES

CONTENTS

1.0   Introduction
2.0   Objectives
3.0   Main Content
        3.1 Balance sheet valuation model
        3.2. Dividend Discount Model
        3.3. Other valuation Model

4.0   Conclusion
5.0   Summary
6.0   Tutor-Marked Assignment
7.0   References/Further Readings

1.0   INTRODUCTION

Equity has unlimited life with undefined cashflow stream. This is unlike Fixed Income Securities that have a limited life and a well defined cashflow stream. This makes the valuation of Equity a little bit more difficult.

Although the basic principle of valuation are the same for Fixed Income securities as well as equity shares, the factors of growth and risk create-more complexity in Equity Valuation.

If the markets are efficient, the actual market price of a share of common stocks is a direct function of the cashflow expected, the time value of money the risk involved, and the returns required by Investors. The return required by investors is usually the risk-free rate plus a risk premium.

2.0 OBJECTIVES
At the end of this unit, you should be able to understand :
   i. Balance Sheet Valuation
   ii. Dividend Discount Model
   iii. Other Valuation Models

3.0 MAIN CONTENT

3.1.   Balance sheet valuation model

Looking at the Balance Sheet of a firm, one can determine some share values as follows:
(i)   Book Value
(ii)   Replacement Value
(iii)   Liquidation Value

(i)   Book Value per Share
Book Value per Share is determined by dividing the networth by the number of equity shares in issue. The networth or net asset of a company is equal to paid up equity capital plus all reserves and retained profit of the firm. It is also equal to total assets less total liabilities.

Example:
Favour Plc with N50, 000,000 net worth has 10,000,000 shares in issue. Calculate the book value per share.

BVP =   =   = N5

Advantage
1.   It is easy to calculate
2.   It represents an "Objective" measure of value
3.   Derived directly from the firm's financial statement.

Disadvantages
1.   Based on accounting conventions and policies
2.   Accounting policies is characterized by subjectivity and or arbitrariness.
3.   The Balance is historical in nature and does not reflect current economic realities.

(ii)   Replacement Value
Under this method, the share value is derived by considering the replacement cost of the firm's assets Less Liabilities. The justification of this approach is that the market value of a firm cannot deviate too much

from its replacement cost. If any difference occurs between the two value, competitive pressure will operate to align them. The ratio of market price to replacement is called Tobinq.

Advantages
1.   The idea is very popular among Economist.
2.   In the long run Tobin's q will tend to 1, this justify the valuation model.

Disadvantages
1.   The Organizational capital is not reflected in the Balance Sheet.
2.   Organizational capital is the value created by bringing together of employees, customers, suppliers, managers and others in a mutually beneficial and productive relationship. Organizational capital cannot easily be separated from the firm as a going concern.

(iii)   Liquidation Value

The liquidation value per share is equal to

$$\frac{\text{Value realized from liquidating all the assets of the form} \quad - \quad \text{Amt. payable to all creditors and preference shareholders}}{\text{Number of equity shares in issue}}$$

Illustration
Sinnomore Plc would realize N100 Million from the liquidation of all of its assets and pay N20 million to its creditors and preference shareholders in full settlement of their claims. **Sinnomore Plc** has 4 million shares in issue. Calculate the liquidation value per share.

Solution:

$$\frac{N100,000,000 - N20,000,000}{4,000,000} = N20$$

Advantages
1.   Easy to calculate
2.   More realistic than book value per share.
3.   Very suitable for a company about to close shop.

Disadvantages

1.   Difficulty in estimating amount realizable from assets.
2.   Does not reflect earning capacity of the company.
3.   Not suitable for a going concern.

3.2.   Dividend valuation model

To start, think of common stock valuation as being exactly like bond valuation. The present current market price of a share of common stock is theoretically equal to the value of the expected cash dividends and future market price, where

$$\text{Price, } P0 = \sum_{t=1}^{n} \frac{D_1}{(1+k_s)t} + \frac{P_1}{(1+k_s)^n} \text{---------------- (1)}$$

Where

Dt	=	the amount of cash dividends expected to be received at the end of the tth period (or year)
ks	=	the rate of return required by investors on the stock
n	=	the number of time periods, or years
Pt	=	the expected market price of the stock at the end of period t

The current market price of a stock that is expected to pay cash dividends of N1.00 at t = 1, N1.50 at t = 2, and N2.00 at t = 3, and have an expected market value of N40.00 at t = 3, can be determined in a straightforward manner. If the return demanded by investors is 14 per cent, the price of this stock is

P0 =

$$= \frac{N1.00}{(1.14)^1} + \frac{N1.50}{(1.14)^2} + \frac{N42.00}{(1.14)^3} = N30.38$$

If an investor pays N30.38 for the stock, and the stream of dividends and ending market price occurs as projected, the compound rate of return realized on the stock will be 14 per cent.

What if we keep adding more years of dividends to Equation 1, so that we can think of the cash dividends going on forever? In that case, we have the fundamental common stock model - the **dividend valuation model** - which states that the market price of a share of common stock is equal to the present value of all future dividends:

$$\text{Price, } P0 = \Sigma \frac{D_1}{(1+k_s)^t} + \frac{D_1}{(1+k_s)^t} + \frac{D_2}{(1+k_2)^2} + \text{ ... } \frac{D}{(1+k_s)} \text{ ------ (2)}$$

D1 and D2 in Equation 1 refer to cash dividends at time t = 1 and t = 2, respectively. In Equation 1 the second term is Pn/(1 + k2)n, where Pn

represents the market price at time t = n. But what determines the market price at time n? It is simply the present value of all cash dividends expected to be received from period n + 1 to infinity, discounted at the investor's required rate of return of ks. Equation 1 is simply a special case of the more general Equation. This relationship will prove useful when we consider valuing stocks that are expected to have non-constant growth in future cash dividends. However, before doing that, we want to consider the simpler cases of no growth in cash dividends and constant growth in cash dividends.

No Growth in Cash Dividends
In the special case of no future expected growth in cash dividends, assume that the stock will pay a constant dividend of, say, N2 per year from now until infinity Although the **no-growth model** is often unrealistic, it provides a convenient bench-mark. In such a case, the dividend valuation equation (Equation2) is simply a perpetuity For a common stock with a constant expected cash dividend from t = 1 to infinity its current market price is given by

price with no growth, $P0 = \dfrac{D}{k_s}$

If we have a no-growth stock that is expected to pay a cash dividend of N2 per year from time t = 1 until infinity, and the investor's required rate of return is 16 per cent (or 0.16), then its current price, PO, is N2/0.16 = N12.50. A rational investor would pay no more than N12.50 for this stock if his or her required rate of return is 16 per cent.

Constant Growth in Cash Dividends (Gordon Model)
In another special case, consider what happens if cash dividends are expected to increase at a constant (percentage) rate each year. This situation is just a growing perpetuity, so we can use our knowledge of the constant-growth model (which is often called the Gordon model) is:

price with constant growth, $P0 = \dfrac{D1}{K_2 - g}$ --------- (4)

where g is the constant percentage growth rate in cash dividends. In valuing a took with constantly growing cash dividends, we must use the cash dividends expected 1 year hence, or Dl. If we have a stock whose current cash dividend, D0, (at time t = D) is N2, the constant compound growth rate in dividends is 10 percent per year, and the return demanded by investors is 16 per cent, the value of this stock is

$$P0 = \frac{D1}{k_s - g} = \frac{D0(1+g)}{k_s - g} = \frac{N2(1.10)}{0.16 - 0.10} = \frac{N2.20}{0.06} = N36.67$$

Note that this price of N36.67 is substantially higher than the N12.50 computed using the no-growth model. This makes common sense because, other things being equal, an investor would value a growing cash flow stream at a higher rate than a non-growing stream.

Non-constant Growth in Cash Dividends
The next situation we consider is when a firm grows at a fast rate for a few years as then and reverts to constant – or no-growth situation. This might occur because a firm made previous positive net present value investments that produced high cash flows and increases in value but faces increasing competition that is expected to reduce the future growth rate. For example, if the required rate of return demanded by investors remains at 16 percent, consider how we would value this stock:
(1)   Dividend at time t = 0 are N2; (2) followed by 10 percent growth in dividends for each of years 1, 2 and 3; (3) followed by 3 percent compound growth thereafter until infinity This set of cash flows is graphed below.

We would use the following four-step procedure to solve this problem:

> **STEP 1:** Determine the cash dividends until the series reverts to either constant growth to infinity or no growth. Thus,
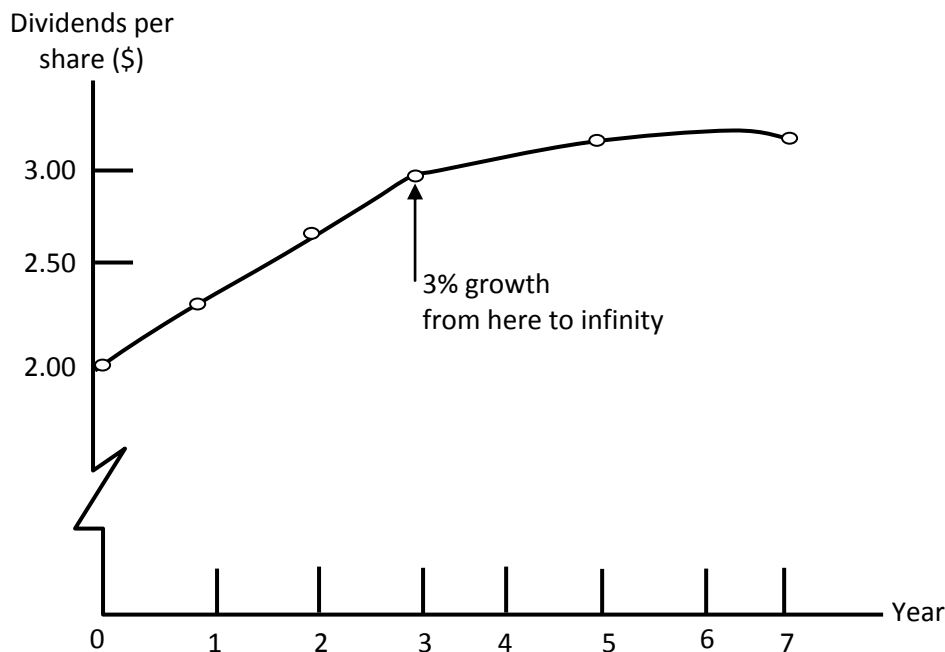> D1 =   N2.00(1.10)^1 =   N2.20
> D2 =   N2.00(1.10)^2 =   N2.42
> D3 =   N2.00(1.10)^3 =   N2.66

> **STEP 2:** Determine the first years dividend after the growth rate changes to either constant growth to infinity or no grow:

> D4 =   D3(1.03)   =   N2.66(1.03) =   N2.74

Because the growth rate changed to 3 per cent (from 10 per cent), the new growth rate of 3 per cent must be used in this step.

STEP 3: Determine the market price of the stock as of time t = 3 for the constant-growth period. Thus

$$P3 = \frac{D4}{k_s - g} = \frac{N2.74}{0.16 - 0.03} = \frac{N2.74}{0.13} = N21.08$$

Note that (1) the growth rate used is the constant one expected from time t = 3 until infinity; and (2) the market price is as of time t = 3.

STEP 4: Using Equation 1 and the required rate of return of 16 per cent, discount both the expected cash dividends from Step 1 and the expected market price from Step 3 back to the present. As shown in Figure below, the present value of this stream of expected cash flows is N18.91. Thus, the current market value of the stock should be N18.91.

Timeline and solution for Non constant Dividend series.
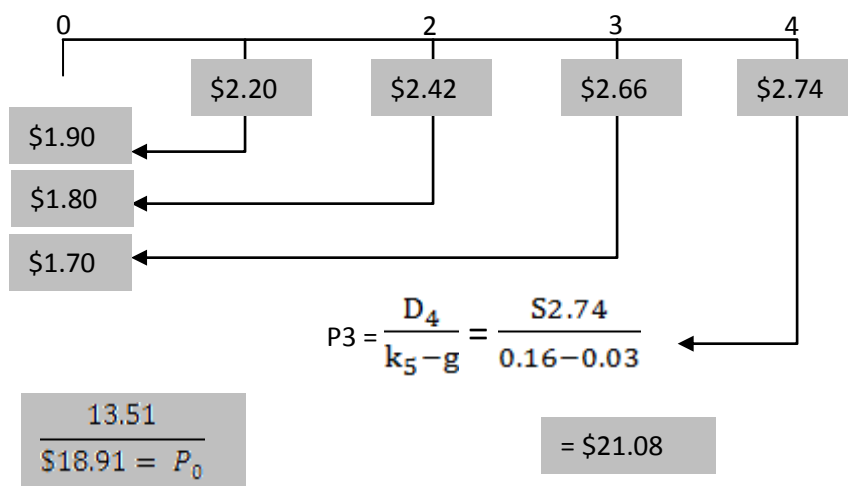
Note: The dividend in year 4 equals N2.66 $(1.03)^1$. The market price determined using D4 is the price at t = 3. This market price must be brought back to time 1 = 0, as are the cash dividends for years 1,2 and 3, by discounting at 16%.

Relationship between Expected Growth and Market Price
There is a direct relationship between the amount and length of expected

growth in cash dividends and a stock's market price.

Conditions*	Resulting Market Price (P0)
No future growth in expected cash dividends	N12.50
10 percent compound growth in expected cash dividends for times t = 1, t = 2, and t = 3, followed by no future growth	16.05
10 percent compound growth in expected cash dividends for times t = 1, t = 2, and t = 3, followed by 3 percent compound growth to infinity	18.91
10 percent compound growth in expected cash dividends to infinity	36.67

* D0 = N2 and ks = 16 percent for all conditions.

* If there was no growth in cash dividends expected after year 3 P3 = $D4/K_s$ = N2.66/0.16 = N16.625. Discount back to time zero at 16 per cent and adding it to the discounted value of the cash dividends to be received for period and 3 produces a market price of N16.05.

To see the relationship between growth opportunities, the rate in expected cash dividends, and the current market price of a stock, consider Table 1, which summarizes our calculations. In the case of no future growth, the market price is N12.50, whereas it is N36.67 at a 10 per cent compound rate to infinity Finally, growth at 10 per cent for 3 years followed by low or no growth thereafter produces market prices of N18.91 and N16.05, respectively. Clearly, the rate and duration of expected growth opportunities leading to growth in cash dividends have a major impact on the market price of a common stock. Accurate estimation of growth opportunities and expected growth rates is the most important aspect of common stock valuation using the dividend valuation approach. It is also one of the most difficult.

When investors require a higher rate of return on common stock, the result is a lower stock price today. A lower stock price means a higher cost of raising equity funds if the firm sells additional common stock.

Non-Dividend-Paying Stocks
We have discussed stock valuation when the firm pays cash dividends, but not all firms pay dividends. How, then, should we value non-dividend-paying stocks? There are three ways. The first is to estimate when the firm will start paying dividends, their size, growth rate, and so forth; then simply proceed as we have discussed. The second is a variation of the first, except you must estimate some future market price and then discount it back to the present, as we have done previously.

The final approach employs earnings and multiplies (or capitalizes) them by some factor (based on perceived growth, risk, and/or estimates derived by looking at "similar" firms) to arrive at an estimated value. Often this approach relies on price/earnings (P/E) ratios.

4.0 CONCLUSION

Most investors, amateurs or professionals, do not employ the dividend valuation model exactly as we have described it. However, their decision making does have characteristics in common with the model: (1) They focus on cash flows and dividends, (2) they consider the returns needed to compensate them for the risk incurred (given their alternatives and economic conditions), and (3) they look for growth opportunities. Thus, the intuition behind the dividend valuation model underlies much of what drives decisions made by investors.

5.0 SUMMARY
You have learnt from this unit that Financial analyst usually adopt two kinds of analysis i.e. fundamental analysis and technical analysis. Fundamental analysts determine the fair value of equity by examining the assets, earnings prospects/cash flow projective, dividend potential and other economy-wide factors. Technical analysts rely on price and volume trends, charts in determining share price.

i.   Balance Sheet Valuation
ii.   Dividend Discount Model
iii.   Other Valuation Models

6.0 TUTOR-MARKED ASSIGNMENT
- State three advantages and disadvantages of the Book Value per Share model of dividend Valuation.

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UNIT 4: VALUATION OF UNQUOTED EQUITIES

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1.0 INTRODUCTION

Equities are ordinary shares or common stocks. By unquoted equities, we mean ordinary share of companies that are not listed on the stock exchange. Unquoted equities are "prohibited dealings" ie they cannot be traded on the stock Exchange unless they get quoted. For example the ordinary shares of Global com., MTN etc are presently unquoted and their price are not known in the stock market except they are specially valued.

2.0OBJECTIVES

At the end of this unit, you should be able to understand the following:
- Why value unquoted equities
- Methods of valuation
- Factors that influence P/E Ratio
- Dividend Yield Method
- Super Profit Method
- Dual Capitalization Approach
- DCF Method
- Dividend valuation Method
- Accounting Rate of Return (ARR)
- When to use Net Asset Basis
- Data required for equity security analysis and valuation

3.0 MAIN CONTENT
3.1 Why value unquoted equities
It is necessary to value the common stock of a company under the following circumstances

(i)   When there is a scheme of merger and a need arises to assess the worth or values of share of each company involved in the merger.

(ii)   When the shares are being offered as a security for a loan.

(iii)   When there is intention to acquire or dispose of majority shareholdings.

(iv)   When there is need to assess the value of shares for the purpose of taxation.

(v)   When a will bequest stipulates a holding of shares of a certain value which must then be ascertained to determine the number of shares passing to the legatee.

(vi)   When trust funds or other investors buy significant holdings in unquoted companies

(vii)   When a company is planning to "go public" and therefore need to know the price at which the shares will be sold to the public.

(viii) When shares are allotted in a capital restructuring.

(ix)   When shares are sold to employees under shares option or incentive schemes.

(x)   When a right issue is made, the valuation will point out the value of the right to assist the prospective purchaser make informed decision.

(xi)   In a corporate demerger, when a larger company may be broken up into two or more parts to be run by separate management.

(xii)   When institutional investors are financially backing an unquoted company and take a minority stake of between 15% to 25%.

(xiii) When there is a takeover bid

(xiv)   For the purpose of determining the purchase consideration in an amalgamation or absorption scheme.

(xv)   For the purpose of ascertaining the breakup value of a company in liquidation

(xvi)   For the purpose of determining the amount of capital to be contributed by a new partner

(xvii) For the purpose of ascertaining the total amount of the Estate of a deceased.

3.2 Methods of valuation
The most common methods of ascertaining the value of shares of unquoted companies are

(i)   P/E Ratio method / Earning Basis
(ii)   Dividend yield method
(iii)   Super profit method
(iv)   Dual capitalization Approach
(v)   DCF method
(vi)   Dividend valuation method
(vii)   Accounting Rate of Return
(viii) Net Asset Basis
(ix)   Berliner method

1.   **P/E Ratio method (Earning Basis)**
        P/E Ratio measures the relationship between the company's share price and earning per share (EPS)

        P/E Ratio $\dfrac{MPS}{EPS}$

Where MPS =   market price per share
      EPS   =   earnings per share

When future expected earning are given, these should be used as they represent a more accurate earning than historical figures.

Illustration I
Endurance Plc is proposing to take over **Quickwin Ltd**. Presently **Quickwin Ltd** is valued at PE ratio of 16. It has in issue 1,000.000 at ordinary share and earned profit after tax of N200,000 per annum.

Required
How much will **Endurance Plc** pay for the share of **Quickwin Ltd** using PE ratio approach.

Solution

$$EPS = \frac{N200,000}{1,000,000} = \frac{0,20}{50}$$

$$P/E \ ratio \quad \frac{MPS}{EPS}$$

$$16 = \frac{MPS}{0.2}$$

$$MPS = 16 \times 0.2 = N3.10$$

Total value of **Quickwin Ltd** shares $=$ N3.2 x 1,000,000

= N3,200,000

Endurance Plc will pay at least N3.2million to acquire **Quickwin Ltd**.

3.3 Factors that influence P/E Ratio
The choice of P/E ratio can be influenced by a number of factors, which include:

(i)   General economic and financial conditions
(ii)   The type of industry and the prospect of that industry
(iii)   The size of the undertaking and its status within its industry
(iv)   Marketability - the market is always a restricted one for the unquoted shares
(v)   The diversity of shareholdings and the financial status of any principal shareholder
(vi)   The size of the holding to be valued
(vii)   Reliability of profit estimates and the past profit record
(viii) Assets backing and liquidity
(ix)   Gearing - a relatively high ratio will generally mean greater risk

and call for a higher rate of return

(x)   The extent to which the business is dependent on the technical skills of one or more individuals.

Implication of P/E Ratio

A high P/E ratio usually indicates that investors have a high regard for company's prospects and the quality of its earnings. Well — established and successful companies with sound growth prospects in a profitable industry should expect to have a high P/E ratio. On the other hand, a low P/E ratio indicates that investors regard the company's earning as "risky" and of low quality.

Investors do not use a P/E ratio to value a quoted company's shares; rather the P/E ratio is a measure of the relationship between the 'investors' valuation of share and its earnings. The P/E ratio is a means of comparison but it has no inherent significance of its own right. It would therefore be unusual to try to value a quoted company's shares with a P/E ratio, because the market value will already have been established by market transactions of buying and selling.

The P/E ratio method of valuation is suitable for estimating a value of unquoted company shares. By this method an appropriate P/E ratio is selected and used to derive a share value.

3.4 Dividend Yield Method

This measures the relationship between Dividend per share (DPS) and market price per share (MPS). Under this method, the market value of a company's share is determined by capitalizing the ordinary dividend using the company's dividend yield. That is

$$DY = \frac{DPS}{MPS}$$

i.e. $$MPS = \frac{DPS}{DY}$$

Where   MPS = Market price share
        DY = Dividend yield which is the rate of return required by ordinary shareholders
        DPS = Dividend per share.

Illustration 2

Shares of **Good Life Ltd** on yearly basis experience dividend yield of 15% and this is expected to continue into the nearest future. Good Life earns N5m after tax and interest yearly. The company's policy is to retain 80% of profit after Tax while 20% is paid out as dividend. Good Life has in issue 1million ordinary shares.

Required

As a consultant to a predator company, that has interest in Good Life, how much do you think Good Life is worth using dividend yield method

Solution

$$\text{DPS} = \frac{20\% \text{ of } 6,000,000}{1,000,000} = 1.2$$

$$\text{DY} = \frac{\text{DPS}}{\text{MPS}}$$

$$\text{MPS} = \frac{\text{DPS}}{.15} = 1.2 \quad = \text{N8}$$

The total value of Better life share is N8 x 1,000.000 = N8,000,000

Note:

Dividend yield method of share valuation is most useful when valuing minority shareholding since holders of such shares do not have any say in the management of the company.

3. 5   Super Profit Method

This method, which is rather out of fashion at present, starts by applying a "Fair return" to the net tangible assets and comparing the result with the expected profits.

Any excess of profit (the super profits) is regarded as providing the basis for a calculation of goodwill. The goodwill is normally taken as a fixed number of years super profits. The excess profit generated by the company above the industry average is calculated and capitalized by an agreed number of years.

Illustration 3

Safe Ltd has net tangible asset of N180, 000. The company's profit for the year amounted to N30,00. The industry in which **Safe Ltd** operates has an expected return on net tangible asset of 10%. A predator company value **Safe Ltd** goodwill at 4 years of super profit.

Required

Calculate how much **Safe Ltd** is worth.

Solution

Present Earnings	=	N30,000
Normal profit	=	N18,000 (10% of N180,000)

Super profit $=$ N12,000

X

Goodwill $= \dfrac{4}{N48,000}$

Net worth of Sinkills Ltd $=$ Goodwill + Net Total Assets
$=$ N48,000 + N180,000
N228,000

Safe Ltd is worth N228,000

The Super profit method is therefore a combination of the an assets basis valuation and a type of earning - based valuation for goodwill. The principal demerits of this method are

The "normal" rate of return required is a subjective valuation The number of years purchase of super — profits is arbitrary

3.6 Dual Capitalization Approach

Under this method return on intangible asset is recognized alongside return from tangible assets. This is done by placing value on intangible assets of the company. Hence the total value of the company is the summation of both tangible and intangible asset and it is derived as

$$\frac{\text{Net Tangible Assets} + \text{Expected profit} - [\text{Rate of Return on Intangible Asset x Tangible Asset}]}{\text{Rate of Return on Intangible Assets}}$$

I.e. $\dfrac{\text{NTA} + \text{EP} - (\text{RTA x TA})}{\text{RITA}}$

Illustration 4

Given that the Net Tangible Asset of a **Repentance Ltd** is N200,000, expected profit N60,000, rate of return on Net Tangible Asset is 20%, Return on intangible asset is 30%

Required
Value the company using dual capitalization approach

Solution

$$\frac{N200 + N600,000 - (.20 \times N200,000)}{.30}$$

$=$ N200,000 + N66,666.67

=   N266,666.67

Illustration5
Given the following information relating to **Mercy Ltd**

Net tangible Assets	=	N100,000
Required rate of return on net tangible asset	=	15%
Required rate of return on intangible asset	=	20%
Expected profit	=	N20,000

Required
Determine the total market value of **Mercy Ltd**

Solution

Calculation of Intangible Assets

	N
Expected profit	20,000
Less return on net tangible	
Asset (ie 15% of N100,000)	15,000
Return on intangible assets	5,000

Value of intangible assets   =   N25,000

market value of the company = value of tangible Asset + intangible asset
$$= N100,000 + N25,000$$
$$=   N125,000$$

3.7 .   DCF Method
This is used when the investment is for a short period of time. The methodology of this approach is that the buying company will evaluate return that will accrue from the target company using the predator cost of capital as discount factor.

Illustration 6
Express Ltd is negotiating a take-over bid with the Directors of **Ways Ltd.** The projected profits of Ways Ltd for the next 5 years are as follows:

Years	Projected profit
1	N300,000
2	N250,000
3	N450,000

4	N500,000		
5	N500,000		

The objective of **Express Ltd** is to hold shares in Ways ltd for a short period of 5 years after which **Express Ltd** hopes to sell the share for N150,000. Furthermore, the company is thinking of buying 10% of Ways Ltd equity

Required
How much is the maximum price **Express Ltd** should pay if the predator cost of capital is 15%

Solution

Year	(10% of profit) Cash flow	Discount factor	Present value
	N	@15%	N
1	30,000	0.8696	26,085
2	25,000	0.7561	18,902.5
3	45,000	0.6575	29,587.5
4	50,000	0.5718	28,590.0
5	50,000	0.4972	24,860
6	150,000	0.4972	74,580
			N202,608

Express Ltd. will be willing to paid N202,608 for the share of Ways Ltd.

3.8.   Dividend valuation Method
This method of share valuation is based on the principle that the value of a share is the present value of all future dividend payments, discounted at a suitable (marginal) rate of shareholder's time preference.

Under this method, the value of the company's share is determined by:
$$Ke = \frac{d}{Mps}$$

Where $MPS = \frac{d}{Ke}$ (This is used when there is no growth in dividend)

But where there is growth in dividend

$$MPS = \frac{d(1+g)}{Ke-g}$$

Where Ke   =   cost of equity
     g   =   growth rate of dividend

3.9   Accounting Rate of Return (ARR)

Under this method, the future earning of the target company is divided by the predator's return on capital employed (ROCE). It is important to note that the future income will be adjusted to take care of expected increase in administration and other costs notably the following:

(i)   New level of Director's remuneration
(ii)   New level of interest
(iii)   Charge for notional interest
(iv)   The effect of product rationalization, improved management etc.

This method considers the accounting rate of return, which will be required from the shares to be valued. It is therefore distinct from the WE ratio method, which is concerned with the 'market rate of return' required.

The following formula is normally used

$$\text{Valuation} = \frac{\text{Estimated future profits}}{\text{Return on capital employed}}$$

Illustration 7

Heaven Ltd is considering acquiring **Earth Ltd.** At present **Earth Ltd** is earning an average of **N480,000** after tax. The directors of Heaven Ltd feels that after reorganization, this figure could be increased to N600,00. All the companies in the Heaven group are expected to yield a post - 0 tax return of 15% on capital employed.

Required

What is the value of **Earth Ltd**

Solution

Valuation of **Earth Ltd**   = $\dfrac{\text{N600,000}}{15\%}$ N4,000,000

8   Net Asset Basis

In order to arrive at price per share, the net asset of the company is determined and this is divided by the number of ordinary share in issue. In determining net asset, we consider only tangible asset. Intangible asset like trademarks, preliminary expenses etc are excluded.

Value per share   = $\dfrac{\text{Tangible Assets - liabilities}}{\text{No of ordinary shares in issue}}$

Under this method the value of a share in a particular class (equity) is equal to the net tangible assets attributable to that class, dividend by the number of shares in it. Intangible assets which should be excluded are –

(i)   Goodwill if shown in the account would also have a value, which is related to future profits rather than to the worth of the

company's physical asset.

(ii)   Development expenditure if shown in the accounts would also have a value, which is related to future profit rather than to the worth of the company's physical assets.

The difficulty in an asset valuation method is not the arithmetic involved, but in the process of establishing the asset value to use. It must be remembered that the figure attached to an individual assets may vary considerably depending on whether it is valued on a going concern or break-up basis.

The following list should give some idea of the factors that must be considered.

1.   Do the asset need professional revaluation, if so, how much will this cost?

2.   Haven the liabilities been accurately quantified, e.g, deferred taxation?
       Are there any contingent liabilities? Will any capital gain tax arise on disposal?

3.   If the assets have been previously revalued, was 'tax provided on the excess over cost?

4.   How have the current asset such as those given below been evaluated?
       (i)   Debtors — are they all collectable?
       (ii)   Stocks — are they all realizable?

5.   Can all assets be physically located and brought into a sellable condition? This may be difficult in certain circumstances where the assets are situated in different parts of the world.

6.   Can the hidden liabilities be accurately assessed eg redundancy payments and closure costs.

7.   Is there an available market in which the asset can be realized?

8.   Are there any period charges on the asset?

3.10 When to use Net Asset Basis
The net assets basis of valuation should be used
(i)   When the company is about to go into liquidation. A break - up valuation method should thereby be used

(ii) When unquoted shares are offered as collateral for a loan. A break up valuation method should be used.

(iii) As a measure of the 'Security' in a share value, a share may be valued using the earnings basis or dividend yield basis, and this valuation may be:

(a) Higher than net asset value per share, if the company went into liquidation, the investor could not expect to receive the full value of his shares when the underlying asset are realized.

(b) Lower than the net assets value per share, in which case the share would have a higher asset backing. If the company went into liquidation, the investor might expect to receive the full value of his shares (perhaps much more) when the underlying assets are realized.

The asset backing for shares thus provides a measure of the possible loss if the company fails to make the expected earnings or dividend payment.

(iv) As a measure of comparison in a scheme of merger

9. Berliner Method

This is a simple average of
(i) The Net Asset Basis and
(ii) Any other Basis

It is a combination of Net asset basis plus any other method of valuation dividend by two.

Illustration 9
Assuming the price derived using Net Asset basis and earnings basis are given as:

$$
\begin{array}{ll}
 & \text{N} \\
\text{Net Asset per share} & 1.15 \\
\text{Price using Earning} & 0.9 \\
\end{array}
$$

The share price using Berliner method will be:
$$\frac{1.15+0.9}{2} = \frac{2.05}{2} = \text{N}1.025$$

Other qualitative Factors to consider
The final price of the shares of a company depends on the following qualitative factors:

1. The company fixture prospects

        2.   Composition of the Board of Directors of the company
3.   The extent of foreign investment in the ownership and management of the company
4.   The company's expansion programme and capital commitment
5.   The individual shareholders intention
6.   The ability of the company to buy back its shares
7.   The age of the company's fixed asset
8.   The tax position of the company and the shareholders
9.   The company's Dividend yield or cost of capital
10.   Involvement of regulatory authorities in the activities

3.11 Data required for equity security analysis and valuation

In order to value any security, the following documents and information are imminently important.

(i)   Audited Annual Accounts for the five years immediately preceding the valuation or actual number of years since commencement of operation if less than five years.

(ii)   Detailed manufacturing, trading profit and loss Accounts for the period listed in (I) above.

(iii)   Profit forecast and management accounts if the company has operation for up to six months at time of valuation.

(iv)   Full description of the nature of business and the operation of the company

(v)   Statement about the staff and management of the company and staff requirement in case of new companies that have not commenced operation.

(vi)   Particulars of any litigation in which the enterprise is presently engaged or likely to be involved.

(vii) A copy of the Memorandum and Articles of Association — changes in the authorized capital if any should be supported with relevant documents of authorized capital if any should be supported with relevant documents of registration with the Corporate Affairs Commission. Increase in paid up capital to be supported with Board Resolutions.

(viii) A certified copy of the Certificate of incorporation.

(ix)   Any other information which the issuing House may consider necessary

Issuing Houses usually work on a five — year track record when valuing shares. In case of enterprises having less than five years track record, individual enterprises is then treated on its own merit.
In the case of new companies, since they may not have any supportive audited accounts, the following documentation is required of them:

(i)   A copy of the feasibility Report, if any
(ii)   Operational and Cash flow projections for three to five years
(iii)   Statement of find utilization.

Issuing houses work only on audited and signed accounts audited accounts are not acceptable.

4.0   CONCLUSION

We have seen in this unit that by unquoted equities, we mean ordinary share of companies that are not listed on the stock exchange. Unquoted equities are "prohibited dealings" ie they cannot be traded on the stock Exchange unless they get quoted. We have also seen the various methods of valuation of unquoted stocks.

5.0   SUMMARY

In this unit you have learnt the various methods of valuation of unquoted stocks as well as the data required for equity security analysis and valuation

6.0 TUTOR-MARKED ASSIGNMENT

1.   Egg Plc is proposing to take over Poop Ltd, an unquoted company. Presently, Poop Ltd is valued at PE ratio of 18. It has in issue 2,000,000 ordinary shares and earned Profit after tax of N450,000 per annum.

        Required
        Advise Egg Plc on how much to offer Poop Ltd.

5.   The management of Horn Plc, a medium size company playing in the Telecom Sector, has just approached you. The company wishes to approach the Nigeria Capital market to raise funds to finance the roll out of its GSM lines, having been recently licensed by Nigeria Communication Commission.

The company wants to do a preliminary valuation of its share and wishes to get your advice.

Required

(i)   What documents or information will you require from Horn Plc before carrying out the valuation of its shares?

(ii)   What other financing options will you recommend to the Management of Horn Plc?

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MODULE 5

Unit1   Payback Period (Non- Discounting Technique)
Unit2   Accounting Rate of Return (Non- Discounting Technique)
Unit 3   The Net Present Value (NPV) (Discounting Technique)
Unit 4   The Internal Rate of Return I (Discounting Technique)
Unit 5   The Profitability Index (Discounting Technique)

UNIT 1   PAYBACK PERIOD ((Non- Discounting Technique)

CONTENTS

1.0 INTRODUCTION

Capital budgeting is the appraisal of capital projects (Long-term assets) so as to enable management take decision on what asset to invest on most efficiently in anticipation of future earnings. Capital investment decisions include decisions on expansion, acquisition, modernization or replacement of producing fixed assts.

2.0   OBJECTIVES

1)   To understand what payback period is all about and the formula involved in calculating it.
2)   To know how to make decisions after calculations especially when there are mutually exclusive projects.
3)   To understand the advantages and disadvantages of the technique.

3.0 THE MAIN CONTENT

3.1 Meaning of Payback period: Appraising capital investment on the basis of time that would be taken to get back your initial investment is called as payback period.

Payback period is one of the easiest methods of capital investment appraisal techniques. Projects with a shorter payback period are usually preferred for investment when compared to one with longer payback period.

However, there is the discounted Payback Period – Capital Investment Appraisal using discounted payback period which is similar to payback period but here, the time value of money or discounted value of cash flow is considered for calculation of payback period.

3.2   Workings

The formula to calculate payback period of a project depends on whether the cash flow per period from the project even or uneven. In case they are even, the formula to calculate payback period is:

Payback Period $= \dfrac{Initial\ Investment}{Cash\ flow\ per\ Period}$

N/B: When cash inflows are uneven, we need to calculate the cumulative net cash flow for each period and then use the following formula for PBP –

Payback period $= A + \dfrac{B}{C}$

Where:

A = the last period with a negative cumulative cash flow

B = the absolute value of cumulative cash flow at the end of the period A.

C = is the total cash flow during the period after A.

N/B: Payback period uses only cash flows not profit.

Example 1

Onyinye Company Ltd is planning to undertake a project requiring initial investment of N200,000,000. The project is expected to generate N45, 000,000 per year for 6 years, calculate the payback period of the project.

Solution:

Payback Period $= \dfrac{Initial\ Investment}{Annual\ Cash\ flow}$

Payback Period $= \dfrac{200,000,000}{45,000,000} = 4.44$ years

Example 2

Lagos Limited is to undertake a project requiring N1, 000,000 outlay. The project generates N200,000 annually.

Required: what is the payback period?

Solution:

Payback Period $= \dfrac{Initial\ Investment}{Cash\ flow}$ i.e $\dfrac{1,000,000}{200,000 Cash\ flow}$

$= 5$years

3.3   Decision Rules

A.   Independent project

1.   Accept if the project has a PBP that equal to or less than that set by the management.

2.   Reject if the project has a PB that is greater than the time set by the management.

B.   Mutually Exclusive Project

1.   Select the project with the least PBP.

2.   Ensure that the project selected has a PBP that is equal to or less than that set by the management.

3.4   Advantages of Payback period
1.   It is simple to calculate.
2.   It can be a measure of risk inherent in a project since cash flows that occurs later in a projects life are considered more uncertain, payback period provides an indication of how certain the project cash inflow are.
3.   For companies facing liquidity problems it provides a good ranking of projects that would return money early.
4.   Unlike ARR, it uses cash flows instead of accounting profit, cash profit or inflows is superior to accounting profit.
5.   It serves as a first screening process i.e. as a simple initial screening process for new projects.

3.5   Disadvantages of PBP
1.   Unless discounted cash flows are used, it is ignored the time value of money.
2.   It does not take into account the cash flows that occur after the payback period.
3.   It may lead to excessive investment in short term projects.
4.   It is unable to distinguish between projects with the same payback period.

4.0   **CONCLUSION**
Payback period as one of the budgeting techniques is one of the best traditional methods of assessing project and it has been going a long way in selecting a good projects among bad ones.

5.0   **SUMMARY**
Payback period always serve as the first screening process for new project. Based on the decision rule, one can easily determine which projects to choose after calculation and it has a lot of advantages that makes it outstanding among other budgeting techniques.

6.0   **TUTOR MARKED ASSIGNMENT**
Flourish Plc is to undertake a project requiring an investment of N200,000 on necessary plant and machinery. The project is to last for 5 years at the end of which the plant and machinery will have net book value or scrap value of N40,000 – profit after depreciation are as follows.

Yrs	Cashflows
1	50,000
2	45,000
3	40,000
4	30,000
5	20,000

You are required to calculate the payback period.

7.0   REFERENCES/FURTHER READINGS

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UNIT 2.   ACCOUNTING RATE OF RETURN (ARR) (Non-Discounting Technique)

CONTENTS

1.0   Introduction
2.0   Objectives
3.0   Main Content
        3.1   Meaning of Accounting Rate of Returns
        3.2   Workings on Accounting Rate of Returns
        3.3   General Decision Rules
        3.4   Advantages of Accounting Rate of Returns
        3.5   Disadvantages of Accounting Rate of Returns

4.0   Conclusion
5.0   Summary
6.0   Tutor-Marked Assignment
7.0   References/Further Readings

1.0   **INTRODUCTION**
This Capital Investment Appraisal technique compares the profit that can be earned by the concerned project to the amount of initial investment capital that would be required for the project. Projects that can earn a higher rate of return is naturally preferred over ones with low rate of return. ARR is a non-discount capital investment appraisal technique in that it does not take into consideration the time value of money involved.

2.0   **OBJECTIVES**
At the end of this unit, you should be able to:
 1.   Define and calculate the ARR technique.
 2.   Make decision regarding the answers and observation especially when there are mutually exclusive projects.
 3.   Understand the advantages and disadvantages of ARR

3.0 THE MAIN CONTENT

3.1 Meaning of ARR: Accounting Rate of Returns (ARR) measures the average annual net earnings throughout the estimated life of the project. It is an investment's average net income divided by its book value.

3.2   Workings

Accounting Rate of Return is calculated using the following formulas:

$$ARR = \frac{Average\ Accounting\ Profit}{Average\ Investment} \times \frac{100}{1}$$

OR

$$ARR = \frac{Average\ Accounting\ Profit}{Investment} \times \frac{100}{1}$$

N/B: The formula can be used depending on the question but if asked to get the ARR without specifying the one to use, it is advisable to use the first formula. ARR uses profit not cash flow, you have convert it to profit by subtracting the depreciation.

3.3   General Decision Rule

Accept the project only if it's ARR is equal or greater than the required Accounting rate of return. In case of mutually exclusive project, accept the one with highest ARR.

Example 1:

An initial investment of N130,000 is expected to generate annual cash flow of N32,000 for 6 years. Depreciation is allowed on the straight line basis. It is estimated that the project will generate scrap value of N10,500 at the end of 6 years. Calculate its accounting rate of return assuming that there are no other expenses on the project.

Solution:

$$Annual\ Depreciation = \frac{Initial\ Inv. - Scrap\ V}{useful\ Life}$$

$$= \frac{130,000 - 10,500}{6} = N19,917$$

Accounting Income =   N32,000 - 19,917 = N12,083

N/B: We were given cashflow instead of profit so we subtracted depreciation to get profit.

Then Average Investment

$$= \frac{130,000 + 10,500}{2} = N70,250$$

$$ARR = \frac{12,083}{70,250} \times \frac{100}{1} = 17.2\%.$$

Example 2:

EdoDelta Plc is to undertake a project requiring an investment of N100, 000 on necessary plant and machinery. The project is to last for 5 years at the rate of which the plant and machinery will have net book value of N20, 000. Profit before depreciation are as follows:

Yrs	Cashflows
1	40,000
2	44,000
3	48,000
4	52,000

5   58,000

You are required to calculate the ARR of the project.

Solution:

Annual Depreciation $= \dfrac{Initial\ Outlay - Scrap\ V.}{useful\ Life\ in\ Year}$

$\dfrac{100,000 - 20,000}{5} =$ N16, 000

Average Investment $= \dfrac{Initial\ Outlay + \ Useful\ Life}{2}$

$\dfrac{100,000 + 20,000}{2} = \dfrac{120,000}{2}$

$= 60,000$

Average Profit

Yr	Profit	Depreciation	Net Profit
1	40,000	16,000	240,000
2	44,000	16,000	28,000
3	48,000	16,000	32,000
4	52,000	16,000	36,000
5	58,000	16,000	42,000
			162,000

Average Profit $= \dfrac{162,000}{5} = 32,400$

ARR $= \dfrac{32,400 \times 100}{60,000} = 54\%$

Example 3

If **Nwata Ventures** has a project with the Initial Outlay ₦20, 000, annual profit of N5, 000 for 6 years what is the ARR

Solution:

Average Investment $= \dfrac{20,000 + 0}{2} = $ **10,000**

Average Profit $= 5,000$

ARR $= \dfrac{5,000}{10,000} \times \dfrac{100}{1} = $ **5%.**

Example 4

A project has a cost of N53, 500 and its expected cash inflows are N11, 500 per annum for 6 years. If the cost of capital is 5%, what is the ARR?

Average Investment $= \dfrac{N55,500 + 0}{2} = $ **26,750**

Average Profit $= $ N11,500

ARR $= \dfrac{11,500}{26,750} \times \dfrac{100}{1} = $ **43%**

Example 5

Consider the following two projects

	Project A	**Project B**
Cost	150,000	150,000
Residual value	0	0
Estimated Profit after Depreciation.		
Yr 1	35,000	100,000
Yr 2	50,000	80,000

Yr 3		60,000	60,000
Yr 4		70,000	40,000
Yr 5		80,000	30,000

What project is ARR?

Solution:

Since we were given direct profit.

Average profit for Project A $= \dfrac{295,000}{5} = $ **59,000**

Average profit for Project B $= \dfrac{310,000}{5} = $ **62,000**

Average Investment for Project A $= \dfrac{150,000 + 0}{2} = $ **75,000**

Average Investment for Project B $= \dfrac{150,000 + 0}{2} = $ **75,000**

There ARR for profit A $= \dfrac{59,000}{75,000} \times \dfrac{100}{1} = $ **78.67%**

The ARR for Profit B $= \dfrac{62,000}{75,000} \times \dfrac{100}{1} = $ **82.67%**

Decision

Chose Project B because it has higher retarded using ARR

3.4 Advantages of ARR

- Like Payback Period, this method of investment appraisal is easy to calculate.
- It recognizes the profitability factor of investment.
- Unlike the Payback Period, it considered the profit over the entire life of the project.
- It uses readily available accounting data.
- It could be used to compare performance for many companies.

3.5 Disadvantages of ARR

- It ignores the time value of money.
- It can be calculated in different ways. Thus there is problem of consistency.
- It uses accounting income instead of cash flow information.
- It ignores risk and management attitude towards risk
- There are no rules for setting the minimum acceptable ARR by the management.

4.0 CONCLUSION

Having seen the way, ARR works based on the calculations and decision using the answers and observation one can categorically say that the objective of this unit has been achieved.

5.0 SUMMARY

Accounting Rate of Return as one of the basic method of budget appraisal is very necessary because it gives a straight forward answer and it makes use of the entire profit throughout the project life and the decision using the technique is very easy to make.

6.0 TUTOR MARKED ASSIGNMENT

From the example 5 given in the contest above, assume that the scrap value is N10,000 for project A and N15,000 for project B and the profit given was before depreciation.
Recalculate the ARR and choose between the two projects.

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UNIT 3   THE NET PRESENT VALUE (NPV) (Discounting
Technique)

CONTENTS

1.0   INTRODUCTION

Discounted Cash Flow (DCF)

Against the backdrop that the traditional techniques ignore the timing of
cash flow, a new approach known as the discounted cash flow has been
developed.   This approach uses cash flows rather than accounting
profits. According to Lucey, (1988), accounting profits are invariably
calculated for stewardship purposes and are period-oriented (usually
monthly, quarterly or annually) thus necessitating accrual accounting
with its attendant conventions and assumptions.   Therefore, for
investment appraisal purposes, a project-oriented approach using cash
flow is to be preferred since it disallows depreciation as an expense and
also recognises the timing of cash flows.

2.0   OBJECTIVES

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

- define Net Present Value (NPV)
- apply the formula for simple NPV
- describe the investment criteria under NPV.

3.0   MAIN CONTENT

3.1   Assumptions Underlying the Basic Discounted Cash Flow Appraisal

According to Lucey (1988), certain assumptions are made initially so that the underlying principles can be more easily understood.

These are as follows:

- uncertainty does not exist
- inflation does not exist
- the appropriate discount rate to use is known
- a perfect capital market exists, that is unlimited funds can be raised at the market rate of interest.

Later, each of the above assumptions will be isolated and handled accordingly.

3.2   Advantages of NPV
- Net present value account for time value of money which makes it a sounder approach than other investment appraisal techniques which do not discount future cash flows such as Payback Period and Accounting Rate of Return.
- Net Present Value is even better than some other discounted cash flow techniques such as IRR, in situations where IRR and NPV gives conflicting decision, NPV decision should be preferred.
- It gives a clear accept/reject recommendation.
- It makes use of all the cash flow over the project life span unlike Payback Period.
- NPV gives absolute measures of profit ability which immediately reflects in the shareholder's wealth.
- NPV of projects is additive, it can be summed up.

3.3   Disadvantages of NPV
- It may be difficult to calculate.
- Net present Value does not take into account the size of the project.

N/B: NPV uses cash flows in the calculation i.e. profit before depreciation so if the net profit is given i.e profit after depreciation, we must add back depreciation to make it cash flows.

3.2   Net Present Value (NPV)

Net Present Value (NPV) is defined as the difference between the present value of cash inflows and those of the cash outflows all discounted at the cost of capital.

According to Okafor (1983), the net present worth of a project is the present value of the discounted net proceeds anticipated throughout the economic life of the project.   The cash outflows and inflows are discounted using the same rate of discount.   The algebraic sum of the discounted stream of cash flows is the Net Present Value (NPV).

That is

$$NPV = \sum_{t=0}^{n} \frac{FC_t}{(1+K)^t}$$

where

NPV = net present value
CF_t = net cash flow at time t
K = discount rate

For most conventional investments, the net cash outflow would occur at the initial period, that is, at t = 0. In such cases, the equation becomes:

$$\sum_{t=0}^{n} \frac{CF_i}{(1+K)^i} CF_0$$

NPV

The present value of one ratio today, is of course ₦1.   Therefore, CF_0, would be equal to the initial cost of the project.

Decision Rule

The general criteria under the NPV appraisal techniques are the followings.

- INVEST: if NPV > 0. That is, invest if the NPV is positive.
- DON'T INVEST: if NPV < 0. That is, do not invest if the NPV is negative.
- Remain indifferent: if NPV = 0. That is, you may or may not invest if the NPV = 0.

According to Okafor (1983), choosing among alternatives and mutually exclusive projects, the decision rule is to rank them according to their relative net present worth. The project with the highest NPV is presumed to be the most preferable.

Illustration 1

NOUN Fresh LTD. is trying to decide which type of machine tool to buy, of the two types available. Type A costs ₦10, 000,000 and the net annual income from the first three years of its life will be ₦3,000,000, ₦4,000,000 and ₦5,000,000 respectively. At the end of this period, it will be worthless except for scrap value of ₦1,000,000. To buy a type A tool, the company would need to borrow from a Finance Group at 9%. Type B will last for three years too, but will give a constant net annual cash flow of ₦3,000,000. It costs ₦6,000,000 but credit can be obtained from its manufacturer at 6% interest. It has no ultimate scrap value. Which investment would be the more profitable? Give reason for your answer.

Solution

NOUN Fresh LTD

Type A Year	Cash flow ₦'000	Discount Factor (9%) ₦'000	Net Present Value ₦'000
0	(10,000)	1.000	(10,000)
1	3,000	0.917	2,751
2	4,000	0.842	3,368
3	6,000	0.772	4,632
	NPV		₦751

N.B: 6,000 = 5,000 cash flow + 1,000 scrap value.

Type B	Cash flow	Discount Factor (6%)	Net Present Value
Year	₦'000	₦'000	₦'000
0	(6,000)	1.000	(6,000)
1	3,000	0.943	2,829
2	3,000	0.890	2,670
3	3,000	0.840	2,520
	NPV		₦2,019

Alternatively, for project B, since the cash inflows form an annuity, we then use annuity factor. For n = 3, r = 6%, the annuity factor is:

$$\underline{1 - (1.06)^{-3}} \quad = \quad 2.673$$

0.06

The NPV = 3000 x 2.673 – 6000 = 2019.

Thus, we can see that type B has a far higher NPV and this will be the better investment.

Illustration 2

Wisdom Plc is proposing to purchase a new machine for ₦20, 000,000 which will have a life span of 6 years. The cash inflows estimated to be generated by the machine are as follows: Year 1 = ₦12,400,000; Year 2 = ₦6,000,000; Year 3 = ₦7,100,000; Year 4 = ₦2,203,000 and Year 5 = ₦2,774,000 and removed in year 6 an estimated net cash outflow of ₦1,477,000.

The company's cost of capital is 15%. Should investment be proceeded with?

Solution

Wisdom Plc

Year	Cash flow ₦'000	15% Discount ₦'000	Net PV at 15% ₦'000
0	(20,000)	1.000	(20,000)
1	12,400	0.870	10,788
2	6,000	0.756	4,536
3	7,100	0.658	4,672
4	2,203	0.572	1,260
5	2,774	0.497	1,379
6	-1,477	0.432	-638
Net Profit Value (NPV)		=	+ 1,997

The NPV is positive, hence 'go' for the project.

3.3   Illustration of Net Present Value (Annuity)

Dangote Group of Companies leases land and erects building on it, financing the construction from term loans. The buildings are rented out by the company which can borrow and invest money at 15 percent per annum.

As the company's financial controller, you have been approached to advise it on how best to use a site it leased 25 years ago for 80 years, from **Chibok North East** Local Government for an initial premium of

N50, 000,000 and annual ground rent of N6, 000,000. When the lease expires, the building will revert to the local government. The following options are available to the company on the use of the site in question.

a.	The site could be out-leased for the remaining years at an annual rent of N40, 000,000.
b.	A house could be constructed quickly on the site with the following estimated costs and income.

Building and other capital expenditure		N500, 000,000
Annual management and maintenance fee		N150, 000,000
Annual rental income (till the lease expires)	N250, 000,000

c.	Blocks of flats could be constructed on the site. However, this would entail a long development period and rents would not be collected till after 5 years. The estimated costs and income for this option are given as follows.

Building and other capital expenses = N250, 000,000 per year (amounting to N1, 250,000.00) Annual management and maintenance costs of N200, 000,000.00 and annual rental income of N550, 000,000.00 (for the 50 years after completion)

Solution

This is an interesting question that brings out some cost/management concepts clearly. The concepts are the followings.

a.	The initial premium of N50, 000.00. This cost is already incurred hence it is both sunk and irrelevant. Accordingly, we shall disregard it in our analysis.
b.	The annual ground rent of N6, 000.00. This cost is yet to be incurred. Hence, it is a relevant cost. However, since it must necessarily be incurred regardless of the option embarked upon, it becomes a common cost. Accordingly, including or excluding it in our analysis shall not affect our decision. We shall exclude it.
c.	The net cash inflows in each case form an annuity. Hence, we shall use annuity table (present value) instead of ordinary present value table.
d.	Relevant period.

The land was rented 25 years ago for 80 years. The relevant period therefore is from today (the 25th year) to the 80th year. That is, 55 years.

Therefore, the annuity factor at 15 percent for 55 years is calculated thus.

The formula is $\quad = \quad \dfrac{1-(I+r)^{-n}}{r}$

where n = the number of periods
        r = the interest rate

Substituting

$$\dfrac{1-(1.15)^{-55}}{0.15} \quad = \quad \underline{6.6636}$$

Option C however takes the form of a deferred annuity since the building would take 5 years to complete and cash inflows can only take place as from the 6th year. This we can represent on a number line thus:

<----3.3522 --------------->5<-------3.3114------>55
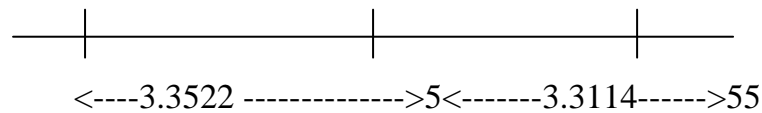
- a5   0.15   =   3.3522 and
- a55 0.15   =   6.6636
- difference =   <u>3.3114</u>

Therefore, the annuity factor for the deferred annuity is 3.3114. Anchored on foregoing comments, we then proffer our solution thus:

Option A: Out- lease the site for remaining years
          Since the yearly income is ₦40, 000,000 for 55 years, the present value is ₦40, 000,000 x 6.6636 = ₦266, 544,000.00.

Option B: Quick construction of a house at the site. This is purely theoretical, as house cannot be so quickly built.

Assuming that it is possible to quickly construct a house, then the cost of the house ₦500, 000,000 took place in year zero.

Also, since the annual management and maintenance fee is ₦150,000,000 and the annual rental income is ₦250,000,000, the net annual cash inflow is ₦100,000,000 (i.e. ₦250,000,000 – ₦150,000,000). Therefore, the NPV is ₦100, 000,000 x 6.6636 – ₦500, 000,000 = ₦166, 360,000.

Option C: Construction of a block of flats.
          Since the construction would last for 5 years @ ₦250, 000,000 per annum, the present value of the cost of the block of flats is:

$$\text{\#}250, 000,000 \text{ x } 3.3522 = \text{\#}838,050,000$$

Also, given that annual management and maintenance costs ₦200,000,000 and annual rental income of ₦550,000,000 shall commence after 5 years, the annual net cash inflows of ₦350,000,000 (₦550,000,000 – ₦200,000,000) form a deferred annuity whose present value is

$$\text{\#}350, 000,000 \text{ x } 3.3114 = \text{\#}1,158,990,000$$

This leaves us with an NPV of ₦320, 940,000 (That is ₦1, 158,990,000 – ₦838, 050,000).

Summary

Option A: NPV = ₦266, 544,000
Option B: NPV = ₦166, 360,000
Option C: NPV = ₦320, 940,000

Therefore, since option C has the highest NPV, that option is the most preferable and hence recommended.

N.B: We most logically assumed the 25th year as our focal date.

4.0 CONCLUSION

In this unit, you have learnt about the most fundamental methods for appraisal capital projects – the Net Present Value (NPV). This approach must be understood and applied most religiously.

5.0   SUMMARY

In this unit, you are acquainted with the Net Present Value (NPV) method of capital investment approach. You are now familiar with the basic definition, its advantages and disadvantages as well as the formula. You have also learnt about the computational technique and the investment criteria.

6.0   TUTOR-MARKED ASSIGNMENT

Flourish Plc is to start up a project worth N8m and having the following cash flows:

Yrs	Cashflows (₦)
1	5,000,000
2	6,000,000
3	8,000,000

If the discount rate is 25% calculate the NPV if the scrap value at the end of 3 years is ₦100,000.

Peculiar Nig. Ltd. invested ₦10m in a project that gives it ₦1m per annum for 40 years. If the cost of capital is 10 per cent per annum, compute the Net Present Value.

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UNIT 4   THE INTERNAL RATE OF RETURN
(Discounting Technique)

CONTENTS

1.0   INTRODUCTION

In our previous sections, you are conversant with the various investments appraisal techniques. While the payback period tried to answer the question of how long it would take for the cost of the investment to be recovered, the Net Present Value (NPV) on the other hand centred on wealth maximization.

Yet, there is another method that sets a hurdle rate, internally, before investment can take place. This is called the Internal Rate of Return (IRR). This is the focus of this unit.

2.0   OBJECTIVES

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

- define Internal Rate of Return (IRR)

- state IRR formula and how to derive unknown values within a range
- outline the investment criteria under the IRR
- state the merits and the demerits of IRR.

3.0   MAIN CONTENT

3.1   Internal Rate of Return (IRR)

According to Okafor (1983), the IRR criterion follows the basic principles of the NPV method. Unlike the NPV method, the IRR does not use an exogenously determined (exogenously to the project being considered) discount rate. Rather, the principle is to find a rate of discount that will match the discounted value of cash inflows and outflows. The rate of discount, which achieves that equality, is the internal rate of return.
Put differently, the internal rate of return is the rate at which NPV is zero; the rate, at which the present value of the cash inflows is equal to those of the outflows, and the hurdle rate or the break-even rate.

According to Lucey (1988), alternative names for the IRR include DCF yield, marginal efficiency of capital, trial and error method, discounted yield and the actuarial rate of return.

According to Okafor (1983) and Van Home (1986), the IRR is derived mathematically by solving the following equation for r:

$$\sum_{t=0}^{n} \frac{CF_t}{(I = r)^t} = 0$$

For conventional projects, the equation becomes:

$$\sum_{t=0}^{n} \frac{CF_t}{(I = r)^t} = CF_0$$

3.2   Investment Criteria under the IRR Approach

Under the IRR, the investment criteria are as follows.
- Invest if IRR > cost of capital. That is invest if the internal rate of return is more than the cost of capital.
- Do not invest if the IRR < cost of capital. That is, do not invest if the internal rate of return is less than the cost of capital.
- Remain indifferent if IRR = cost of capital.

3.3   Advantages of IRR

1. It shows the return on the original money invested.
2. IRR rates are presented in form of familiar figures that can easily be interpreted by the user of the data.
3. IRR though peculiar to a given project avoids disputes that characterize the choice of the appropriate cost of capital to use when appraising project.

3.4 Disadvantages of IRR
1. It is difficult to compute and interpret.
2. It most times bring conflicting answers with NPV of which NPV will be used for decision making therefore making IRR more irrelevant.
3.

Workings

Illustration 1

Refer to illustration 2 under Module 2 unit 6. Compute the Internal Rate of Return (IRR).

Solution

Trial and Error: Let us try 20% since 15% gives NPV of ₦1, 997,000

Year	Cash flow ₦'000	20% Discount ₦'000	Net Present ₦'000
0	-20,000	1,000	-20,000
1	12,400	0.833	10,329
2	6,000	0.694	4.164
3	7,100	0.579	4,111
4	2,203	0.402	1,061
5	2,774	0.402	1,061
6	-1,477	.0335	-495
			285

Let us try 22%

Year	Cash flow ₦'000	20% Discount ₦'000	Net Present ₦'000
0	-20,000	1,000	-20,000
1	12,400	0.820	10,168
2	6,000	0.672	4.032
3	7,100	0.551	3,912
4	2,203	0.451	994
5	2,774	0.370	1,026
6	-1,477	0.303	-447
			-315

Since IRR lies between positive and negative numbers, it should lie between + 286 and –315.

Hence, using the formula to calculate the IRR, we have:

$$IRR = x + \left|\frac{a}{a+b}\right|(y-x)$$

where x   =   the lower rate of interest used
- Y   =   the higher rate of interest used
- a   =   the absolute NPV at X%
- b   =   the absolute NPV at Y%
- II   =   modulus i.e. assume every figure to be positive.
- IRR   =   Internal Rate of Return

Using the above formula, we have:

20% + [285/ (285 + 315)] x (22 – 20)

$\qquad\qquad$ =   20 + (285 x 2)/600

$\qquad\qquad$ =   20 + 0.95

$\therefore$ IRR   =   20.95%

This is the highest cost of capital, which could be used on the project. As a check, calculate the NPV with 20.95% as your cost of capital.

Proof: $\qquad\qquad$ **Femi Nig. Ltd.**

Year	Cash flows ₦	DF @ 20.95%	PV ₦
0	(20,000)	1.000	(20,000)
1	12,400	0.827	10,255
2	6,000	0.684	4,104
3	7,100	0.565	4,012
4	2,203	0.467	1,029
5	2,774	0.386	1,071
6	(1,477)	0.319	(471)
			0

Illustration 2

Haruna Nigeria Ltd.

An investment is being considered for which the net cash flows have been estimated as follows:

Year 0	Year 1	Year 2	Year 3	Year 4
₦	₦	₦	₦	₦
-9,500	3,000	4,700	4,800	3,200

What is the NPV if the discount rate is 20%? Is the project acceptable? Calculate the IRR.

Solution

From the table, at r = 20%

The discount factors are 0.833, 0.694, 0.579 and 0.482

∴ NPV   =   -9500 + (0.833 x 3000) + (0.694 x 4700) + (0.597 x

4800) + (0.482 x 3,200) = + ₦582.

Since, the NPV is positive, the project is acceptable. To calculate the IRR, we try higher rate say 25%. The NPV if r = 25% is calculated thus:

Year	Cashflow ₦'000	20% Discount ₦'000	Net Present ₦'000
0	-9500	1,000	-9,500
1	3,000	0.8000	2,400
2	4,700	0.6400	3,008
3	4,800	0.5120	2,458
4	3,200	0.4096	1,311

That gives NPV = -323.

The IRR can be calculated as follows:

$$IRR = 20\% + 5\% \underline{(582)} = \underline{23.22\%}$$
$$905$$
a   b   c   d

where:

- is a discount rate, which gives a positive NPV? In this example, 20% gives ₦-582.
- is the difference between (a) and the rate, which gives a negative NPV? In this example, 25% - 20% = 5%.
- is the positive NPV at the discount rate chosen in (a)? In this example, it is 582?
- is the total range of NPV at the rates chosen? In this example, + 582 to − 323 = 905?
  (Lucey, 1988)

Illustration 3

Justice Chukwuyem has been looking for a suitable investment which will give a target internal rate of return of 17 to 20%. An investment adviser has offered the company a project, the details of which are given below.

Pineapple Squash Bottling Project

Initial investment involves purchase of machinery for ₦1, 800,000 and installation expenses of ₦310, 000. The plant can produce ₦100,000 cartons of pineapple squash per annum, during the first two years, rising to125,000 cartons per annum, for the next three years. Cost of production of each carton, excluding depreciation costs is ₦21 and the selling price will be ₦27. The plant will be scrapped at the end of the 5th year and is expected to have negligible scrap value.

You are required to calculate the actual internal rate of return of the above project. You may ignore the effect of taxation.
Solution

Present Value factor = $(1 + r)^n$

where r is the rate; and
n is the number of year.

Solution

i. Pineapple Squash Bottling Project

Year	Cash flow ₦	PV Factor 17%	Present Value	PV Factor 20%	Present Value
0	(211,000)	1.000	(211,000)	1.000	(211,000)

1	60,000	0.855	51,300	0.833	49,980
2	60,000	0.731	43,860	0.694	41,640
3	75,000	0.624	46,800	0.579	36,150
4	75,000	0.534	40,050	0.482	36,150
5	75,000	0.456	34,200	0.402	30,150
Net present value			5,210		(9,655)

Cash flow – years 1 and 2 (₦27 – 21) x ₦10, 000 = ₦60, 000

Cash flow – years 3, 4, and 5 (₦27 – 21) x ₦12, 5000 = ₦75,000

N/B: This is a neat way of determining the cash inflows.

Actual Rate of Return $= a + \dfrac{c}{c+d}$ (b – a)

Where a = the low discount rate
   b = the high discount rate
   c = the low rate of present value
   d = the high rate of net present value

$17 + \dfrac{5210}{5210+9655}$ (20 – 17)

= 17 + $\dfrac{5210 \times 3}{14865}$

   = 17 + 1.05   =   18%

3.5 Short cut to IRR computation

You learnt that the computation of IRR involved a lot of trial and error except when you are using computers. Therefore, any discussion that could considerably reduce the quantum of trial and error shall be a welcome development.

Accordingly, we shall be concern with developing short cuts to trial and error approach.

Since the calculation of IRR is based on trial and error, any technique to minimize the extent of the trial and error would be highly appreciated. The following steps would be helpful.

Step 1:   Sum up the cash inflows
Step 2:   Find the average of the cash inflows. Let this be x
Step 3:   Given that the cash outflow occurred in year zero and taking year zero as the focal date, we then establish an equation of values,

Thus x and i = CFO

Where x = the average of cash inflows

And i = annuity factor for a given value of n and i

CFO = cash outflow in year 0.

Step 4:   From the annuity table (present value) read up the nearest
            (most approximate) rate in which annuity factor at the
            given value   of n is very close to the quotient
Step 5:   The rate obtained in Step 4 above becomes the base rate.
Step 6:   Compute the NPV using the rate as the discount rate.
Step 7:   If the NPV derived from above is positive, a higher rate of
            discount is tried and if negative, a lower rate is tried.
Step 8:   Upon arriving at two rates, one having a positive NPV and
            the other a negative NPV, resort to interpolation viz:

$$IRR = x + \left| \frac{a}{a+b} \right| (y - x)$$

where IRR = internal rate of return

        x = the lower rate
        a = NPV at x
        y = the higher rate
        b = NPV at y
        II = modulus sign (meaning assume every figure to be positive).

Illustration

Anulika Nig. Ltd. is considering investing in a project which cash flows
were as follows:

| Year 0 | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 |
₦'000	₦'000	₦'000	₦'000	₦'000	₦'000
-144	+15	+25	+35	+45	+ 60

Given that the cost of capital is at 10% per annum, should Anulika Nig.
Ltd. invest in it or not – using the IRR approach?

Solution

To minimize the extent of the trial and error, the above eight steps are then sequentially followed in the following way.

Step 1:   Sum up the cash inflows ₦ (15,000 + 25,000 + 3,500 + 45,000 + 60,000) = ₦180, 000

Step 2:   Find the average of the cash inflows: the average is ₦180, 000 ÷ 5 = ₦36, 000

Step 3:   Given that the outflow occurred in year zero and taking year zero as the focal date, we then establish an equation of values, thus:

X an i = CFO

Substituting

36,000 as 5 i = 144,000
∴a 5 i = 4.00

Step 4:   From the annuity table (present value) read up the nearest (most approximate) rate which annuity factor at the given value of n is very close to the quotient, CFO: X

Substituting

144,000: 36,000 = 4.00

From the annuity table (present value) given that n = 5 and a5 i = 4.00 The nearest values of i are 7% (4.100) and 8% (3.993).

Step 5:   The rate obtained in Step 4 above becomes the base rate. In this case 8%

Step 6:   Compute the NPV using the base rate at the discount rate.

Year	Cash flow ₦'000	DCF @ 8% ₦'000	Present Value ₦'000
0	-144	1,000	-144.00
1	15	0.926	13.89
2	25	0.857	21.43
3	35	0.794	27.79
4	45	0.735	33.08
5	60	0.681	40.86
		NPV =	-6.95

Step 7: If the NPV derived in Step 6 above is positive, a higher rate of discount is tried and if negative, a lower rate is tried.

Accordingly, let's try lower rate say 6%

Year	Cash flow N'000	DCF @ 8% N'000	Present Value N'000
0	-144	1,000	-144.00
1	15	0.943	14.15
2	25	0.890	22.25
3	35	0.839	29.37
4	45	0.792	35.64
5	60	0.747	44.82
		NPV =	-2.23

Step 8: Upon arriving at the two rates, one having a positive NPV and the other a negative NPV, resort to interpolation viz:

$$IRR = x + \left| \frac{a}{a+b} \right| (y - x)$$

where IRR = internal rate of return
   x = the lower rate
   a = NPV at x
   y = the higher rate
   b = NPV at y
   II = modulus

Substituting:

$$IRR = 6 + \frac{2.23}{2.23 + 6.95} (8 - 6)$$

$$= 6 + \frac{2.23 \times 2}{9.18}$$

$$= 6 + 0.4858$$

$$= 6.486$$

As a check, let's now compute the NPV given that the discount rate = 6.486%.

Year	Cash flow N'000	DCF @ 6.486% N'000	Present Value N'000
0	-144	1,000	-144.00
1	15	0.9391	14.0865
2	25	0.8819	22.0475
3	35	0.8282	28.987

4	45	0.7777	34.999
5	60	0.7304	43.824
		NPV =	-0.056*

- For all practical purposes, the NPV at IRR should be zero. However, occasionally, one could record a negligible negative or positive NPV (-0.056 in this case) due to rounding up of error.

4.0   CONCLUSION

This method called Internal Rate of Return is also very important. Even with the possibility of multiple rates, it is still very important.

5.0   SUMMARY

In this unit, you have learnt the various definitions of Internal Rate of Return (IRR). You are now aware of computational techniques and the investment criteria. You have also learnt the short cut approach to solving IRR Problems.

6.0   TUTOR-MARKED ASSIGNMENT

1. Calculate the projects IRR if the initial outlay is N80,000 and the cash flow are as follows:

Yrs	CF (₦)
Yr1	10,000
Yr2	12,000
Yr3	40,000
Yr4	25,000
Yr5	15,000

If the expected scrap value is 5,000 at the end of five years and the discount factor is 15%.

7.0   REFERENCES/FURTHER READING

Horngren, C. T., Datar, S. & Foster, (1997). *Cost Accounting: A Managerial Emphasis*. New Delhi: Prentice Hall.

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UNIT 5 THE PROFITABILITY INDEX(Discounting Technique)

CONTENTS

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2.0   Objectives
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1.0   INTRODUCTION

As scientific as the Net Present Value (NPV) approach to investment appraisal may appear to be, it has one major limitation– it fails to consider the quantum of capital that generated the NPV. This is a major weakness since ordinarily; a higher capital base will generate a higher NPV. Logically, therefore, a relative NPV or better still, an NPV per unit of capital base would give a better evaluation results. This is where the Profitability Index (PI) comes from.

2.0   OBJECTIVES

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

- explain the meaning of profitability index (PI)
- state the formulae for PI
- apply the formulae for PI
- outline the merits and the demerits of PI
- compare the IRR method with the NPV method.

3.0   MAIN CONTENT

3.1   Profitability Index or Excess Present Value Index (EPV I)

There are two possible formulae to calculate this index.

a. According to Okafor (1983), the profitability index (PI) of a project is the ratio of the sum of the present values of all its cash inflows to the sum of the present values of its cash outflows, i.e.

$$PIi = \frac{Pvi}{Ci}$$

Where

PIi = profitability index of project I
Pvi = sum of present value of cash inflows from project I
Ci = sum of present value of cash outflows of project I.

b. According to Lucey (1988), the EPVI is merely a variant of the basic NPV method and is the ratio of the NPV of a project to the initial investment.

i.e. $$EPVI = \frac{NPV}{Initial\ Investment}$$

Thus, the index is a measure of relative and not absolute profitability. Because of this, it suffers from the same general criticisms when used for ranking purposes as the IRR.

Decision rule

The decision rules for the profitability index are as follows.

- Accept only projects that have profitability index of more than 1 (one)
- Reject projects that have profitability index of less than one
- Remain indifferent if the index is zero.

For the excess present value index, the decision rules are as follows.

- Accept only projects which EPVI is positive
- Reject projects which EPVI is negative
- Remain indifferent if the EPVI is zero.

ILLUSTRATION 1

Nwagod Company Ltd is considering five different investment opportunities. The company's cost of capital is 12 percent. Data on these opportunities under consideration are given below.

Project	Investment N'000	PV at 12% N'000	NPV N'000	IRR N'000	Profitability Index N'000
a.	35,000	39,325	4,325	16	1.12
b.	20,000	22,930	2930	15	1.15
c.	25,000	27,453	2,453	14	1.10
d.	10,000	10,854	854	18	1.09
e.	9,000	8,749	(251)	11	0.97

i.   Rank the five projects in descending order of preference, according to:

- NPV (Net Present Value)
- IRR (Internal Rate of Return)
- Profitability Index.

Which ranking would you prefer?
Based on your answer in part 2, which projects would you select if ₦55, 000,000 is the limit to be spent?

Solution

i. **Nwagod Company Ltd**

Order of Preference	NPV	IRR	Profitability Index
a.	1	2	2
b.	2	3	1
c.	3	4	3
d.	4	1	4
e.	5	5	5

ii.   The profitability index approach is generally considered the most dependable method of ranking projects competing for limited funds. It is an index of relative attractiveness, measured in terms of how much you get out for each naira invested.

i.   Based on the answer in part 2, projects (a) should be selected, where combine NPV would be ₦7, 255 (₦2,930 + ₦4,325) with the limited budget of ₦55,000,000.

4.0   CONCLUSION

In this unit, you have learnt that Net Present Value (NPV) has one major weakness when one is faced with two or more projects – it fails to take into consideration the quantum of capital outlay that generated the NPV. This is a weakness because huge capital outlays are likely to have huge NPV relative to small capital outlay. This is where the Profitability Index (PI) comes in hence; PI is defined as NPV per unit of capital.

5.0   SUMMARY

In this unit, you have looked at the basic definition of profitability index. You also looked at the computational techniques and the investment criteria.

6.0   TUTOR-MARKED ASSIGNMENT

United Development Corporation has ₦2.5million naira available for investment in projects. The following projects are under consideration.

Project No	Initial ₦	Annual ₦	Life
1.	800,000	230,000	6 years
2.	600,000	190,000	6 years
3.	700,000	210,000	6 years
4.	900,000	240,000	6 years
5.	300,000	92,000	6 years
6.	950,000	300,000	6 years

The corporation expects a minimum rate of return of 18%. Projects Nos. 2 and 5 are complementary to each other. They have to be accepted together or rejected together. Projects Nos. 2 and 5 are mutually exclusive due to their nature.

You are required to:

i.   calculate profitability of all the six projects (6 marks)

ii.   advise the corporation on selection of projects to maximise profitability, bearing in mind that only ₦2.5 million capital is available (6 marks)

Note: Present value of annuity of ₦1 for the next 6 years at 18% is ₦3.497 (ICAN, Nov. 1999, Q3).

7.0   REFERENCES/FURTHER READING

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