Principles

OF

FINANCIAL

MANAGEMENT

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Brief Edition

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CHAPTER ONE
INTRODUCTION TO FINANCIAL MANAGEMENT

Chapter Outline:

1. **Definition of Finance.**
2. **Financial Activities/Decisions and the Role of the Financial Manager.**
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[1] DEFINITION OF FINANCE

- Finance can be defined as the science and art of managing money/ allocating funds/capital over time. It is the study of how individuals and businesses evaluate investments and how to raise funds to finance them.
- Finance, also, is related to how individuals and businesses make choices between current spending or receiving money at the present time versus sometime in the future.
- Finance function can exercise at the individual level and at a business level:

  - **At the individual level**, finance is concerned with individual activities or decision-making process related to how an individual manages his/her money. That is, how much of earnings / income will spend now (current spending), how much funds will be put aside (saved, that is; postponed spending), and how such savings will be invested (in the form of financial or / and real investments (assets)).

  - **At the business level**, finance is related to activities or decision-making process involving mainly:

- planning and managing long term investment (which called capital budgeting),
- managing long term sources of funds (that is the mix between debt and equity) a firm utilized to finance its operations (which called capital structure), and
- managing the firm's working capital in the form of short-term investment (that is, current assets) and short-term sources of funds (that is, current liabilities) and safeguarding that the firm in good liquidity position to maintain its day-to-day operations.

- Finance is concerned with **the decision-making process, financial institutions financial markets, and financial instrument**s involved in the transfer of savings **from** savers (saving or surplus sectors: different economic sectors of the economy such as; individuals, businesses, and government) with excess cash **to** borrowers (deficit sectors: different economic sectors of the economy such as; individuals, businesses, and government) who have less cash than they need so, they have financial requirements or needs). Such flow of funds is the main responsibility of the financial system (as explained in the next chapter).

Financial Management and Financial Services

- **Financial Management**: It is concerned with the tasks/duties/activities of the financial manager working in a business. On the other hand, it is also concerned with how to manage capital and how to make financial decisions within a business.
- **Financial Services**: It is the area of finance concerned with the design and delivery of financial advice and financial products for different economic sectors of the economy such as individuals, businesses, and government.

The organizational level of the finance function

The organizational level of the finance function and its importance depends on the size of the firm in addition to other factors.

- ***In small firms/companies***, the finance function, may performed by the company owner, or its president or the accounting department.
- ***In large firms/ companies***, the finance function typically develops into a separate department or sector and headed by Vice President of Finance or any other title like Chief Financial officer (CFO) who reports directly to the president of the firm (CEO) . In such case, the Chief Financial officer

(CFO) is managing all the firm's financial activities through two main offices of the firm:

A. **Treasurer**: which is responsible for the financial affairs/activities such as cash management, credit management, capital expenditure, raising funds, financial planning, management of foreign currencies, and
B. **Controller**: which is responsible for the accounting affairs/activities such as taxes, preparing financial statements, cost control…

[2] FINANCIAL ACTIVITIES/DECISIONS AND THE ROLE OF THE FINANCIAL MANAGER

Financial managers actively manage the financial affairs/activities of all types of businesses whether private or public, large, or small, profit-seeking, or non-profit seeking firms. They are responsible for the financial health of a firm; they perform such varied tasks/activities such as:

- Developing strategic and tactical financial plans,
- Participating in formulating corporate strategy and implementing the financial strategy,
- Looking for the most efficient short /long sources of funds,
- Making strategic investment decisions (long term investment decisions),

- Making strategic financing decisions (long term financing decisions),
- Analysing and evaluating continuously the financial position of the firm,
- Managing working capital, which includes management of the firm's current (short term) assets and liabilities and ensuring that the firm has sufficient resources to maintain its day-to-day operations,
- Managing risk,
- Managing pension fund,
- Managing foreign exchange affairs.

Such financial activities and related decisions can classify in the form of financial decisions according to the following **two** views or perspectives:

[1] The *first view or perspective* of the classifications of financial activities/decisions states that: the primary activities of the financial manager, in addition to ongoing involvement in financial analysis and planning…, are making **investment decisions** and making **financing decisions**.

- In turn, **investment decisions** can be classified in two groups: **short-term investment decisions** (that is managing current assets) and **long-term**

investment decisions (that is, managing long term assets).

In general, investment decisions are totally related to the left-hand side of the balance sheet. Through making investment decisions, the financial managers exercise the following financial activities:

- Determine both the optimal mix and the type of assets found on the firm's balance sheet.
- Determine the best opportunities to invest a firm's funds to create an elevated level of expected return, thus maximizing the wealth of shareholders (the business's owners).

  - Also, **financing decisions** can be classified in two groups: **short-term financing decisions** (managing current liabilities or short- term sources of funds) and **long-term financing decisions** (managing long-term liabilities and stockholders' equity that is, long-term sources of funds or capital structure).

In general, financing decisions are totally related to the right-hand side of the balance sheet. Through making financing decisions the financial managers exercise the following financial activities:

- Determine the optimal mix of short-term and long-term financing: that is the appropriate mix of sources of funds.
- Determining which individual short-term sources are best at a certain point in time.
- Determining which individual long-term sources are best at a certain point in time.
- Determine the appropriate mix of long-term financing to maximize the value of the firm (capital structure decisions).
- Determine the financial requirements (additional financing needs).

This view can be represented in the following figure (figure 1/1) which is simple presentation of the financial position (balance sheet), were.

Total Assets = Total Liabilities + Stockholders' Equity

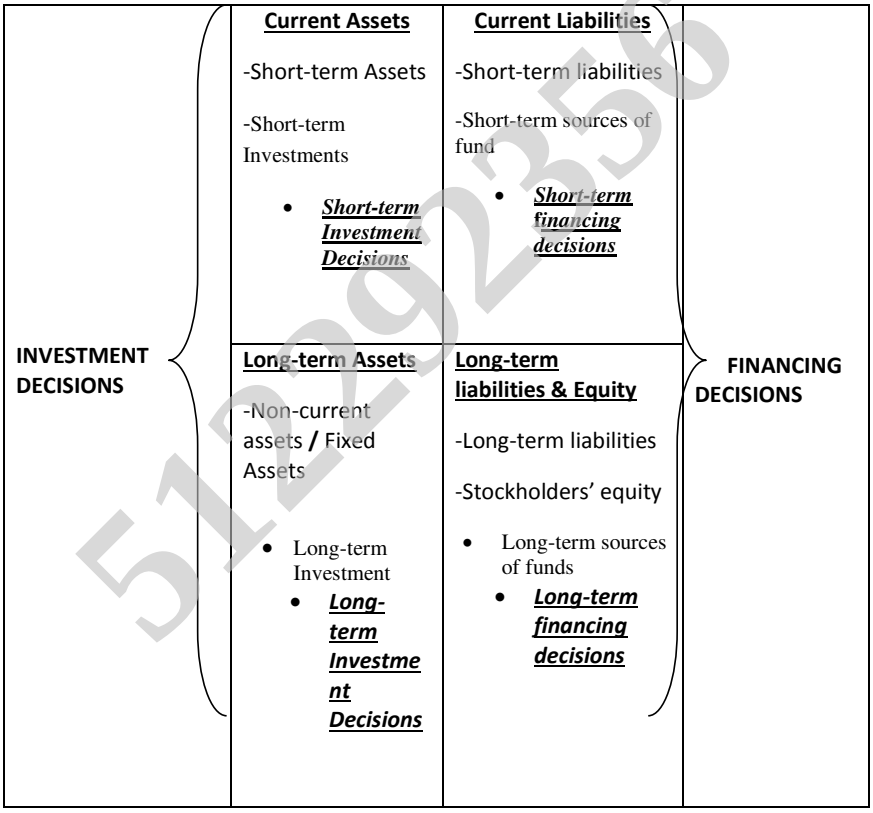
That is:

Long term assets + Current Assets = Current Liabilities +Long Term Liabilities + Stockholders' Equity

So: Stockholders' Equity = Total Assets - Total Liabilities.

Figure 1/1

The financial position (balance sheet)



[2] The second view or perspective of the classifications of financial decisions states that: the primary activities of the financial manager, in addition to ongoing involvement in financial analysis and planning, are **making Operating/Tactical financial decisions and making strategic financial decisions**.

- Operating/tactical financial decisions, are those related to working capital decisions, including:
  - Short-term investment decisions or operating investment decisions (managing current assets/short-term investments).
  - Short-term financing decisions operating financing decisions (managing current liabilities/short-term sources of funds).
- Strategic financial decisions, are those which include:
  - Long-term investment decisions or strategic investment decisions (related to long term assets/long-term investments).
  - Long-term financing decisions or strategic financing decisions (related to long-term liabilities and stockholders' equity/long-term sources of funds).

From the above discussions, financial activities/decisions can classify in terms of two viewpoints, as follows:

The First Viewpoint or perspective	
Investment decisions	**Financing decisions**
- Short-term investment decisions related to current assets. - Long-term investment decisions related to long-term assets.	-Short-term financing decisions related to current liabilities. - Long-term financing decisions related to long-term liabilities and stockholders' equity.

The Second Viewpoint or perspective	
Operating/tactical financial decisions	**Strategic financial decisions**
Working capital decisions: - Short-term investment decisions or operating investment decisions related to current assets. - Short-term financing decisions operating financing decisions related to current liabilities.	- Long-term investment decisions or strategic investment decisions related to long-term assets. - Long-term financing decisions or strategic financing decisions related to long-term liabilities and stockholders' equity.

Table 1.1

[3] THE GOAL OF THE FIRM

As mentioned before, the financial activities which are performed by firm's management can be grouped under three essential functions within a firm:

- Making investment decisions (capital budgeting decisions that is; which investments, if any, to accept?)

- Making financing decisions (capital structure decisions that is; how to finance these investments, what mix of debt to equity should be selected (chosen)?)
- Managing sufficient resources for the firm's day-to-day operations (working capital management)

A goal or goals are needed to guide business decisions. There are several goals or objectives that can be selected, each of them would have some strengths and some weaknesses.

The most known goals are **Profit Maximization** and **shareholder's wealth maximization**. The difference between them can briefly explained as follows:

3.1 Profit Maximization

According to this goal, management only looks for maximizing profits. But the question here is: what kind of profits need to maximize; earnings before interest and taxes (EBIT), net income (NI), or earnings per Share (EPS)... In brief, according to this goal, there is collective agreement to maximize the Earnings per Share (EPS) through applying the following criterion:

Criterion: Select activities that increase Earnings per Share (EPS)

However, this goal has several shortcomings (Disadvantages) such as:

- It is based on accounting numbers and principles; hence profits can vary significantly depending on accounting policies and methods employed by the firm.
- It does not take **risk** into consideration; two firms may report identical profit figures, but one firm's return is more volatile (riskier) than the other.
- It does not take the **time value** of money into consideration; (any unit of currency today does not worth the same unit of currency in the future
- It does not take the future value prospects into consideration; two firms may report identical profits, but one firm is more highly valued due to its higher relative future value potential.

3.2 Shareholder Wealth Maximization

According to this goal, management only looks for maximizing shareholder's (owners of the firm) wealth applying the following criterion:

Criterion: ***Select activities that increase the wealth of shareholders (owners).***

Shareholder wealth maximization (owners of the firm) can be accomplished through the increase of stock market

price. The stock price is equal to the **present value** of all expected future **cash flows** shareholders expected to receive.

The main advantages shareholder wealth maximization (owners of the firm) goal is:

- It is based on the cash flow concept; through calculating the relevant cash flow of any alternative. Hence avoiding the impact of accounting policies and methods employed by the firm.
- It does take **risk** into consideration associated with the return.
- It does take the **time value** of money into consideration.
- It does take the future value prospects into consideration.

So, according to this criterion if the alternative increases the stock price it should accepted by management, if it will decrease the stock market price it should rejected by management. Why? Because finance is concerned with expected future cash flows, hence the forecasting of the amounts and the timing of such expected future cash flows, and the risks associated with them, is amongst the biggest challenges the financial managers face. Cash flows with high variability are risky.

Consequently, financial managers must take **two factors** into consideration when they evaluate each alternative or course of action which are; ***return*** *(*measured on a cash flow basis and its timing*)* and the degree of ***risk***

associated with this return. In general, the risk included in **the discount rate** converted future cash flows into its present value equivalents.

Since shareholders are **residual claimants** (that is, they take what left over after all other stakeholders such as government, bondholders, creditors… get their financial claims satisfied first), thus the shareholders of the firm bear the highest degree of risk.

Financial managers must apply **Marginal Cost/Benefit analysis**, which is an economic principle, which states that financial decisions should be made, and actions taken only when the added benefits exceed the added costs (these concepts are discussed in the following chapters).

A simple comparison between these two objectives or goals can summarize as following:

Wealth Profit Maximization Verses Shareholder Maximization

Profit Maximization	Shareholders Wealth Maximization
Profit is based upon accrual accounting principles	Financial decision making based on cash flows principal
Profit measurement depends on accounting policies and techniques	Measurement depends upon present value of future cash flows

adopted by company	
Conservatism/Carefulness	Realism (timing and risk of cash flows are explicitly taken into consideration)

Table 1.2

So, in brief

The goal of the firm should be shareholder's(owners) wealth maximization does not profit maximization.

Stakeholder/Corporate Wealth Maximization and social responsibility

Stakeholders are groups such as government, employees, customers, suppliers, creditors, owners, and others who have a direct economic link to the firm.

Recently, companies have been taking into consideration all stakeholders and trying to avoid actions that might adversely affect some stakeholders. A firm with a stakeholder focuses on the purpose of avoiding actions that would prove harmful to stakeholders. The goal is not to maximize stakeholder well-being but to preserve it.

This thought can be viewed as an emphasis on the firm's **"social responsibility"** a conservation of stakeholder wealth than its maximization. Currently, most firms take stakeholder interests into account, but a difference in emphasis remains.

Ethical and Agency Considerations in Corporate finance

Ethical issue refers to the way the management of a firm is acting in an ethical manner or morally correct. Such issue is so important for the firm success and staying in the market. Recent famous examples of financial scandals at companies are Enron and WorldCom.

Agency problem refers to the conflict of interest between shareholders and the managers of the firm. Such conflict arises because of the separation between management and ownership of the firm. The managers function as the agents of the owner or owners of the firm. When the managers have less than 100% ownership in the firm, they may act actively for their own benefits rather than the owner' interest.

[4] THE MAIN PRINCIPLES OF FINANCE

The main principles behind the financial topics discussed in this chapter and the following ones are (Titman et.al, 2011):

Principle number one: Money has time value.

No unit of currency today is worth the same unit of currency in the future. For example, An Egyptian pound (or any unit of currency in the world) received today worth more than an Egyptian pound that will be received in the future. On the other hand, an Egyptian pound (or any unit of currency in the world) received in the future is worth less than an Egyptian pound received today. (This concept discussed in Ch. 4)

Principle number two: There is a risk-return tradeoff.

Individuals would not take on additional risk unless they expect to be compensated with additional return**.** This principle is based on the concept that individuals are risk averse. (This concept discussed in Ch. 5)

Principle number three: Cash flows are the source of value.

Profit is an accounting concept designed to measure a firm's performance over a period. Cash flow is the amount of cash that has been taken in or out of the firm over the same period.

Principle number four: Market prices reflect information.

- Investors react to the latest information through buying and selling securities. The efficiency of the market states that the prices of securities fully and fairly reflect all relevant

available information. Market efficiency therefore refers to both the speed and quality (direction and magnitude) of the price adjustment to the latest information. It is determined by the speed with which investors reply and the way that prices respond to the latest information. In other words, only the latest information causes prices to change. (This concept discussed in Ch. 3).

CHAPTER TWO
FINANCIAL ENVIRONMENT

Chapter Outline:

1- **Introduction**
2- **The Egyptian Financial System**
3- **The Role of the Financial Markets and Financial institutions in the Flow of funds process.**

[1] INTRODUCTION

A financial system (within the scope of finance) is a system that allows the exchange of funds between savers (saving sectors) and borrowers (deficit sectors).

Financial systems operate at global, national, and firm-specific levels. The term "system" in "Financial System" indicates a group of complex and intricately linked financial institutions, financial processes, financial markets, and financial instruments within an economy.

[2] THE EGYPTIAN FINANCIAL SYSTEM

The Egyptian financial system is composed of two main sectors:

the *first sector* is the **banking financial sector (in brief: banking sector)** which includes all banks preforming banking activities operating in the Egyptian market.

the *second sector* is the **non-banking financial sector (in brief: non-banking sector)**, which includes all non-banking financial institutions preforming non-banking financial activities in the Egyptian market such as capital market, insurance, mortgage financing, financial leasing, factoring, pension funds, microfinance activities and securitization activities.

In other words, the formal financial system in Egypt is comprised of "banking" and "non-banking" financial sectors, a

brief review about each sector will be presented in the following section.

2.1 THE EGYPTIAN BANKING SECTOR.

A bank is a financial intermediary that offers loans, accepts deposits, and offers other payment services. Nowadays banks also offer a wide range of additional services.

In other words, a bank is a financial intermediary that accepts deposits and channels those deposits into lending activities, either directly or through capital markets. A bank connects customers with capital deficits (deficit economic sectors) to customers with capital surpluses (surplus economic sectors).

Banking financial sector in Egypt is governed and controlled by the Central Bank of Egypt (CBE). Banks currently operate under the supervision of the (CBE) and are governed by the *Law of the Central Bank;* (Law No. 88 of the year 2003, amended by Law No. 162 of the year 2004 and Law No. 93 of the year 2005). Under this Law, the role of the (CBE), as the regulatory body, is supervising the entire Egyptian banking financial sector.

The Banking Law mandates the CBE to work on realizing price stability and banking system soundness within the context of the general economic policy of the State.

2.2 THE EGYPTIAN NON-BANKING FINANCIAL SECTOR

The Egyptian non-banking financial sector is governed and controlled by the **Egyptian Financial Regulatory Authority (FRA)**, a public Authority, having a legal status, established in accordance with *law 10 of the year 2009*.

FRA supervises and regulates all non-banking financial markets and instruments, including capital markets, future exchanges, insurance activities, mortgage finance, financial leasing, factoring, securitization, and microfinance...

FRA is keen on the integrity and stability of non-banking financial markets, and as it is interested in developing these markets and striking balance among its dealers, and as it is concerned with issuing Laws that grant market's efficiency and transparency, FRA has issued legislations and regulatory decisions related to non-banking financial laws which regulate the work of FRA and entities under its supervision pursuant to *law No. 10 of 2009.*

FRA Roles and Functions

The roles and functions of FRA can be summarized as follows:

- License non-banking financial activities
- Inspect licensed entities engaged in non-banking financial activities.
- Regulating the dissemination of information related to non-banking financial markets.
- Ensure transparency and competitiveness in non-banking financial services through proper regulation of non-banking financial markets.
- Protect non-banking market investors' rights.
- Take necessary measures to limit market manipulation and fraud.
- Supervise training of market participants
- Cooperate and coordinate with other non-banking regulatory bodies abroad, thus developing and increasing efficiency of means and methods of supervision in non-banking financial markets and instruments domains.
- Communicate, cooperate, and coordinate with societies and organizations which regulate the work of financial supervision authorities across the globe, thus empowering the Authority to assume its competences according to the best international practices.

Components of the Egyptian non-banking financial sector

The Egyptian Non-banking financial sector is composed of several activates including:

- Capital Market,
- Insurance,
- Mortgage finance,
- Financial leasing,

- Factoring,
- Pension funds,
- Microfinance, and
- Government insurance funds
- ……

[3] The Role of the Financial Markets and Financial Institutions in the Flow of funds process.

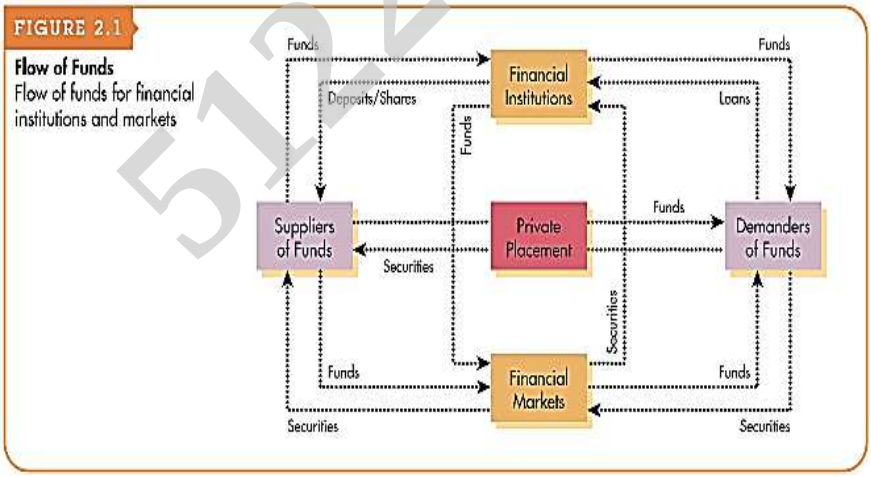
Firms that have financial needs (financial requirements) can get them from external sources through three ways:

1- Financial institutions

2- Financial markets

3- Private placements

The following figure shows, in comprehensive view, flow of funds for financial institutions and financial markets:



Source: (Gilman et al, 2015).

3.1 Financial Institutions.

- Financial institutions are intermediaries that channel the savings of economic sectors (individuals, businesses, and governments) into loans or investments and providing other financial services.
- Financial institutions facilitate smooth working of the financial system by making investors and borrowers meet. They mobilize the savings of investors either directly or indirectly via financial markets, by making use of different financial instruments as well as in the process using the services of several financial services providers.
- The key suppliers and demanders of funds are individuals or families' sector, businesses sector, and government sector.
- In general, individuals or families are net suppliers of funds, while businesses and governments are net demanders of funds.

3.2 FINANCIAL MARKETS.

- Financial markets can be defined as forums in which suppliers of funds and demanders of loanable funds can transact business directly. It is the place where financial assets are created or transferred.

- The products which are traded in a financial market are financial assets, securities, or other types of financial instruments. There is a wide range of securities in the markets since the needs of investors and credit seekers are different. Equity shares, debentures, and bonds are examples.
- Financial markets bring together providers of funds and companies seeking to raise capital.
- Capital rising can be done through:
  - **A private placement**: A direct offering involves the sale of a new security (stocks or bonds) directly to a local or foreign investor or a local or foreign group of investors.
  - **A Public offering**: involves the sale of a new security (stocks or bonds) to the public (not an exclusive offering). Most firms, however, raise money through a public offering of securities.

3.2.1 Classifications of Financial Markets

There are several classifications of financial markets. The most popular classifications of financial markets are: 1/ money market and capital market classifications, and 2/ primary market and secondary market classifications.

I. Money Market & Capital Market classifications

- **Money Market**

It is a market for financial transactions in short term marketable securities. Such marketable securities have maturity less than one year. The money market is created by a financial relationship between suppliers and demanders of short-term loanable funds.

- Most money market transactions are made in marketable securities which are short-term debt instruments, such as U.S. Treasury bills, Egyptian Treasury bills, commercial paper, and negotiable certificates of deposit (as the case in USA) issued by government, business, and financial institutions, respectively.
- Money market transactions can be executed directly or through an intermediary.
- Marketable securities are considered by investors to be among the least risky and - at the same time - the most liquid available investments.

- **Capital Market**

It is a market for financial transactions in long-term securities. Such long-term securities have maturity for more than one year. The capital market is a market that

enables suppliers and demanders of long-term loanable funds to make transactions.

- The key capital market securities are bonds (long-term debt) and both common and preferred stock (equity, or ownership).
- Bonds are long-term debt instruments used by businesses and government to raise large sums of money, from a diverse group of lenders.
- Common stock is units of ownership interest or equity in a corporation.
- Preferred stock is a special form of ownership that has features of both a bond and common stock.

The Role of Capital Markets

- From a firm's perspective, the role of capital markets is to be a liquid market where firms can interact with investors to obtain valuable external financing resources.
- From investors' perspectives, the role of capital markets is to be an efficient market that allocates funds to their most productive uses.

II. Primary Market and Secondary Market Classifications.

- **The Primary Market (Issuing Market)**

The Primary Market (issuing market) is a market for financial transactions in new/initially issued securities (new issues), that is securities issued for the first time whether they are short term securities or long-term securities, whether subsequently traded in the money or capital market; securities are first issued through the primary market.

- The primary market facilitates the issuance of new shares and bonds by companies about to be listed (IPOs) and listed companies (seasoned offerings).
- The primary market is the only financial market in which a corporation or government is directly involved in and receives the proceeds from the transaction.

- **The Secondary Market (Trading Market)**

Secondary markets or trading markets are financial markets in which used / pre- issued securities (not new issues) are traded.

- Once issued, securities are then traded on the secondary markets such as the New York Stock Exchange, Egyptian Exchange...
- In general, Stock Exchanges are broker markets on which the two sides of a transaction, the buyer and seller, are brought together to trade securities.

- Trading in securities takes place on centralized trading floors in such stock exchanges. In Egyptian Exchange it called (*Almaksoura*).

Role of Stock Exchanges

- Regulation of admissions and listed companies,
- Authorization of market participants such as brokers and other participants.
- Supervision of trading.
- Provide an environment in which prices are formed efficiently and without distortion (price discovery process)
- Settlement of transactions
- Dissemination of information e.g., trading data, prices, and company announcements
- Suspending and cancelling listings where necessary.

Advantages of listing on a Stock Exchange

- It creates "transparency" of share price which is a useful public information to investors.
- It facilitates share "transferability" which creates liquidity for investors.
- It participates in lowering the cost of capital, lowering perceived risk, leading to lowering the required rate of return by the investors.

- It creates a "public profile" for the listed company which is higher than this of private one.
- It facilitates the process of credit rating for listed companies and increases the creditworthiness of these companies.
- It facilitates the process of takeovers and mergers between companies.

Disadvantages of listing on stock exchange

- Higher flotation costs and expensive membership fees.
- Higher regulatory costs, compliance costs and exchange fees.
- Investors' expectations put pressure to produce short-term gains.
- Control: make substantial shares available to the public.
- Public investigation: attention from financial press and media.

…

In general, the key functions of financial markets are:

1. Assist in creation and allocation of credit and liquidity.
2. Serve as intermediaries for mobilization of savings.
3. Help achieve balanced economic growth.
4. Offer financial convenience.

….

[4] MARKET EFFICIENCY & ITS IMPLICATIONS.

4.1 EFFICIENT MARKET HYPOTHESIS (EMH)

- EMH states that the prices of securities fully and fairly reflect all relevant available information. Market efficiency therefore refers to both the speed and quality (direction and magnitude) of the price adjustment to the latest information. In other words, only the latest information causes prices to change.
- Market efficiency does not mean prices do not move from their true economic value. However, under EMH, we would expect deviations to be random.
- There are three distinct levels or forms of market efficiency, which are:
    - Weak form efficiency,
    - Semi-strong form efficiency and
    - Strong form efficiency.

Weak Form Efficiency

- Capital markets are said to be weak form efficient if current share prices reflect all historical information such as past share price movements. This means that it is not possible to make abnormal returns using technical

analysis or trading rules as the future cannot be predicted in this way.

- Empirical evidence strongly supports the view that capital markets are weak form efficient.

Semi-Strong Form Efficiency

- Capital markets are said to be semi-strong form efficient if current share prices fully reflect all historical information and all relevant publicly available information. Share prices react quickly and accurately to include any new and relevant publicly available information.
- Abnormal returns cannot be made in a semi-strong form efficient market by studying publicly available company information or by using fundamental analysis.
- Empirical studies tend to support this proposition that capital markets are semi-strong form efficient.

Strong Form Market Efficiency

- Share prices reflect all relevant information including that which is privately held. No one can make abnormal

returns from share dealing, even investors who act on 'insider information.'

- Capital markets do not meet all the criteria for strong form efficiency since some investors do make abnormal returns through insider dealing as evidenced by prosecutions in countries for this offence.
- Capital markets are believed to be inefficient at this level of definition.

Implications of EMH to Investors

- For most people, public information cannot be used to earn abnormal returns.
- Investors need to press for a greater volume of timely information.
- The perception of a fair game market could be improved by more constraints and restrictions placed on insider dealers.

Implications of EMH for Companies

- Creative accounting will not mislead the market. The board of directors of the company should focus on making good business decisions which would increase the wealth of shareholders or the owner's wealth as the market interprets these decisions correctly and the share

price will adjust accordingly. The timing of security issues does not have to be perfected.

CHAPTER THREE
FINANCIAL RATIOS ANALYSIS & FINANCIAL PLANNING

Chapter outline:

1. **Introduction**
2. **Main Users of the Financial Ratios.**
3. **Types of Ratio Comparisons**
4. **Main Concerns about Using Ratio Analysis.**
5. **Financial ratios.**
6. **DuPont system of analysis.**
7. **The Firm's Cash Flows and Financial Planning.**

[1] Introduction of Stockholders Reports.

The annual stockholders' report, which publicly owned corporations must provide to stockholder's, documents and presents the firm's financial activities of the past year.

It includes the letter to stockholders as well as various subjective and realistic information. It also includes key five financial statements which are:

- The income statement,
- The financial position statement (the balance sheet),
- The statement of changes in shareholder's equity,
- The statement of cash flows,
- Comprehensive income statements.

Financial statements of companies that have operations whose cash flows are denominated in one or more foreign currencies must be translated into Egyptian pound. In Egypt, the financial statements for joint stock companies must be prepared according to Egyptian Financial Accounting Standards.

The Five Key Financial Statements:

- The income statement provides a financial summary of a company's operating results during a specified period (on a quarterly basis).
- The financial position statement (the balance sheet) presents a summary of a firm's financial position at a given point in

time. The statement balances the firm's assets (what it owns) against its financing, which can be either debt (what it owes) or equity (what is provided by owners).

- The statement of changes in shareholder's equity reconciles the net income earned during a given year, and any cash dividends paid, with the change in retained earnings between the beginning and the end of that year and other changes in shareholder's items.
- The statement of cash flows provides a summary of the firm's operating, investment, and financing cash flows and reconciles them with changes in its cash and marketable securities during the period.

  This statement not only provides insight into a company's investment, financing, and operating activities, but also ties together the income statement and previous and current balance sheets.
- The comprehensive income statement is a statement of all income and expenses recognized during a specified period. The statement includes revenue, finance costs, tax expenses, discontinued operations, profit share and profit/loss.

[2] MAIN USERS OF FINANCIAL RATIOS

Ratio analysis involves methods of calculating and interpreting financial ratios to analyze and monitor the firm's performance.

- Current and prospective shareholders are interested in the firm's current and future level of risk and return, which directly affect the share price.
- Creditors are interested in the short-term liquidity of the company and its ability to make interest and principal payments.
- Company's management is concerned with all aspects of the firm's financial situation, and it attempts to produce financial ratios that will be considered favorable by both owners and creditors.

[3] TYPES OF RATIO COMPARISONS

There are several ways to perform financial analyses such as:

- Cross-sectional analysis is the comparison of different firms' financial ratios at the same point in time; this involves comparing the firm's ratios to those of other firms in its industry or to industry averages.
- Time-series analysis is the evaluation of the firm's financial performance over time using financial ratio analysis.

Comparison of current to past performance, using ratios, enables analysts to assess the firm's progress. Developing trends can be seen by using multiyear comparisons.

Benchmarking is a type of cross-sectional analysis in which the firm's ratio values are compared to those of a key competitor or group of competitors that it wishes to imitate. Comparison to industry averages is also popular.

- Time – series / Crosse section analyses

  The most informative approach to ratio analysis combines cross-sectional and time-series analyses.

[4] Main Concerns about Using Ratio Analysis

1- Ratios that reveal large deviations from the norm merely indicate the possibility of having a problem.
2- A single ratio does not provide sufficient information to judge the overall performance of the firm.
3- The ratios being compared should be calculated using financial statements dated at the same point in time during the year.
4- It is preferable to use audited financial statements.
5- The financial data being compared should have been developed in the same way.
6- Results can be distorted by inflation.

[5] Financial Ratios

The following are financial statements of National Food co. for the year 2022 and for the previous year 2021. These represent the company's financial data which are used for

explaining the most common used ratios under the following classifications:

- Liquidity ratios
- Activity ratios,
- Debt ratios
- Profitability ratios, and
- Market Ratios.

National food Company Income Statement (In thousand)

Item	2022	2021
Sales	12296	10268
Cost of goods	8352	6844
Gross profit	3944	3424
Operating Expenses		
Selling Exp.,	400	432
General & Adm., Exp.,	776	748
Lease Exp.,	140	140
Dep., Exp.,	956	892
Total Operating Expenses	2272	2212
Operating Profit (EBIT)	1672	1212
Interest Expenses	372	364
Net Profit Before Tax	1300	848
Less Taxes	376	256
Net Profit After Tax (NI)	924	592

National food Company Financial position (In thousand)

Item	2022	2021
Fixed Assets (Non-Current Assets)		
Land & Building	**8288**	**7612**
Machinery & Equipment	**7464**	**6772**
Furniture & Fixture	**1432**	**1264**
Vehicles	**1100**	**1256**
Others	**392**	**384**
Total Gross Fixed Assets	**18676**	**17288**
Less: Accumulated Deprecation	**9180**	**8224**
Net Fixed Assets	**9496**	**9064**
Current Assets		
Cash	**1452**	**1152**
Marketable Securities	**272**	**204**
Accounts Receivable	**2012**	**1460**
Inventory	**1156**	**1200**
Total Current Assets	**4832**	**4016**
TOTAL ASSETS	**14388**	**13080**
Current Liabilities		

Item	2022	2021
Accounts /Payable	1528	1080
Notes/ Payable	316	396
Accruals	636	456
Total Current Liabilities (C.L)	2480	1932
Long-Term Debts	4092	3868
Common Stock (EGP2.5 par)	764	760
Paid in Capital more than par on C.S	1712	1672
Retained Earnings	5340	4848
Total Stockholders' Equity	7816	7280
Total Liabilities & Stockholders' Equity	14388	13080

Notes:

1- Common stock dividends for the year 2022 were LE300,000, and for the year 2021 LE200,000.
2- Outstanding number of common stock shares was 1,500,000 shares for year 2022 and 1,200,000 shares for year 2021.
3- The market price per share at the end of year was 2022 LE 6.25

National food Company Statement of Cash Flow,

year ended December 31, 2022 (In thousand)

Cash Flow from Operating Activities	
Net Profit After Tax	**924**
Depreciation	**956**
Increase in A/R	**(552)**
Decrease in Inventory	**44**
Increase in A/P	**448**
Increase in Accruals	**180**
Cash provided by operating Activities	**2000**
Cash Flow from Investment Activities	
Increase in Gross Fixed Assets	**(1388)**
Change in Equity Investment	**Zero**
Cash Provided by Investment Activities	**(1388)**
Cash Flow from Financing Activities	
Decrease in N/P	**(80)**
Increase in Long-Term Debts	**224**
Change in Stockholders' Equity	**44**
Dividends Paid	**(432)**
Cash Provided by Financing Activities	**(244)**
Net increase in Cash & Marketable Securities	**368**
Cash Provided by Financing Activities	**(120)**

5.1 Liquidity Ratios:

5.1.1 Current ratio

$$Current\ ratio = \frac{current\ assets}{current\ liabilities}$$

The current ratio for National Food Company in 2022 is:

4,832,000/2,480,000 = 1.95 Times

5.1.2 Quick ratio

$$Quick\ ratio = \frac{(current\ assets - Inventory)}{current\ liabilities}$$

The quick ratio for National Food Company in 2022 is:

4,832,000 – 1,156,000 /2,480,000 = 1.48 Times

5.2 ACTIVITY RATIOS:

5.2.1 Inventory turnover

$$Inventory\ turnover = \frac{Cost\ of\ goods\ sold}{Inventory}$$

Applying this ratio to National Food Company in 2022 yield

8,352,000/1,156, 000= 7.22 times

5.2.2 Average Age of Inventory

$$Average\ age\ of\ inventory = \frac{365}{inventory\ turnover}$$

For National Food Company, the average age of inventory in 2022 is:

365/7.22=50.52

5.2.3 Average collection period

$$\textbf{Average collection period} = \frac{\textbf{Accounts receivable}}{\textbf{Average sales per day}}$$

$$\textbf{Average collection period} = \frac{\textbf{Accounts receivable}}{(\textbf{sales}/\textbf{365})}$$

The average collection period for National Food Company in 2022is:

2,012,000/ (12,296,000/365) = 59.7 Days

5.2.4 Average payment period

$$\textbf{Average payment period} = \frac{\textbf{Accounts payable}}{\textbf{Average purchases per day}}$$

Or

$$\textbf{Average payment period} = \frac{\textbf{Accounts payable}}{(\textbf{purchases} \div \textbf{365})}$$

If we assume that National Food Company's purchases equaled 70

Percent of its cost of goods sold in 2022, its average payment.

Period is: 1,528,000/16,017 = 95.4 days

5.2.5 Total Assets turnover

$$\textbf{Total assets turnover} = \frac{\textbf{Sales}}{\textbf{total assets}}$$

The value of National Food Company's total asset turnover in 2022

is: 12,296, 000/ 14,388, 000 = 0.85

(Remember that total assets = long term assets + current assets)

5.3 DEBT / LEVERAGE RATIOS:

5.3.1 Debt ratio

$$\textbf{Debt ratio} = \frac{\textbf{Total liabilities}}{\textbf{Total assets}}$$

The debt ratio for National Food Company in 2018 is.

6,572, 000/14,388, 000 = 0.457 = 45.7%

(Remember that total liabilities = long term liabilities + current

liabilities)

5.3.2 Equity multiplier

Equity multiplier (EM)= $\frac{\textbf{Total assets}}{\textbf{common stock equity}}$

The Equity multiplier (EM)for National Food Company in 2022 is.

14,388, 000/7,816.000 = 1.84 times

5.3. 3 Times interest earned ratio.

$$\textbf{\textit{Times interest earned ratio}} = \frac{\textbf{\textit{EBIT}}}{\textbf{\textit{Interest}}}$$

Applying this ratio to National Food Company yields the following 2022 value: = 1,672, 000/372,000 = 4.49 times

5.3.4 Fixed-Payment Coverage Ratio (FPCR)

$$\textbf{\textit{FPCR}} = \frac{\textbf{\textit{EBIT}} + \textbf{\textit{Lease payments}}}{\textbf{\textit{Interest}} + \textbf{\textit{leasepayments}} + \left[(\textbf{\textit{principal payments}} + \textbf{\textit{pref. stock Dic.}}) \times [\mathbf{1} \div (\mathbf{1} - \textbf{\textit{T}})\right.}$$

Applying the formula to National Food Company's 2022 data yields: 1,672,000 + 140,000/372,000 + 140,000 +0 = 3.54 times compared with 2.68 for year 2017

5.4 PROFITABILITY RATIOS:

- **Common size analysis of Income statement**

The following table represents the common size analysis applied to National Food Company's 2022 income statement.

Out of common size analysis of National Food Company's 2018 income statement, we can calculate three important margin ratios, they are.

- Gross profit margin,

- Operating profit margin,

- Net profit margin.

National food Company Common Size Income Statement

(% of sales)

Item	2022	2021	Evaluation 2021- 2022
Sales	100%	100%	Same
Cost of goods	67.9%	66.7%	Worse
Gross profit margin	32.1%	33.3%	Worse
Operating Expenses			
Selling Exp.	3.3%	4.2%	Better
General & Admin. Exp.	6.8%	6.7%	Better
Lease Exp.	1.1%	1.3%	Better
Dep. Exp.	7.3%	9.3%	Better
Total Operating Expenses	18.5%	21.5%	Better
Operating Profit margin	13.6%	11.8%	Better
Interest Expenses	3%	3.5%	Better
Net Profit Before Tax	10.6%	8.3%	Better
Less Taxes	3.1%	2.5%	Worse
Net Profit After Tax (Earnings Available to C.S Holders)	7.5%	5.8%	Better

The following ratios represent all profitability Ratios which can be calculated out of the income statement and the financial position of the company:

5.4.1 Gross profit margin

$$G.P\ Margin = \frac{Gross\ profits}{Sales}$$

National food Company's gross profit margin for 2022 is: 32.1%

5.4.2 Operating profit margin

$$Operating\ profit\ Margin = \frac{Operating\ profits}{Sales}$$

National food Company's operating profit margin for 2022 is:

1,672,000 / 12,296, 000 = 13.6%

5.4.3 Net profit margin

$$Net\ profit\ Margin = \frac{Earnings\ available\ for\ commonn\ stockholders}{Sales}$$

National food Company's net profit margin for 2022 is:

924,000/12,296,000 = 0.072 =7.5%

5.4.4 Return on total assets (ROA)

$$Return\ on\ total\ assets\ (ROA) = \frac{Earnings\ available\ for\ commonn\ stockholders}{Total\ assets}$$

National food Company's return on total assets in 2022 is:

924, 000 / 14,388, 000 = 0.0642 = 6.42%

5.4.5 Return on Equity (ROE)

$$\textbf{Return on total Equity } (\textbf{ROE}) = \frac{\textbf{Earnings available for commonn stockholders}}{\textbf{Common stock equity}}$$

This ratio for National Food Company in 2022 is:

924, 000 / 7,816, 000 = 0.1182 = 11.82%

5.5 MARKET RATIOS:

5.5.1 Price/ Earnings (P/E) Ratio

$$\textbf{Price Earnings } (\textbf{P.E}) \textbf{Ratio} = \frac{\textbf{Market price per share of common stock}}{\textbf{Earnings per share}}$$

Were,

$$\textbf{Earnings per share}(\textbf{EPS}) = \frac{\textbf{Earnings available for common stockholders}}{\textbf{No. of outstandingcommon stock}}$$

National food Company's earnings per share (EPS) in 2022 are:

924, 000/1,500,000= LE 0.616

If National Food Company's common stock at the end of 2022 was selling at LE 6.25, using the EPS of LE 0.616, the P/E ratio at year-end 2022 is.

6.25/0.616 = 10.146 times

5.5.2 Price /Book Value (P/BV) ratio

$$\textbf{Price / book value ratio} = \frac{\textbf{market price per share}}{\textbf{book value per share}}$$

Were,

$$\textbf{Book value per share } (\textbf{BV}) = \frac{\textbf{common stock equity}}{\textbf{No. of outstanding common stock}}$$

Substituting the appropriate values for National Food Company from its 2022 balance sheet, we get:

Book Value per Share of Common Stock 2022

= 7,816,000/1,500,000

= LE 5.21

Substituting National Food Company's end of 2022 common stock price of LE 6.25 and its LE 5.21 book value per share of common stock (calculated above) into the P/BV ratio formula, we get:

6.25/5.21 = 1.199 times

5.5.3 Dividends Yield Ratio.

A measure of valuation as the annual dividend per share divided by the stock price per share.

$$\textbf{Dividends Yield Ratio} = \frac{\textbf{Annual dividends per share}}{\textbf{stock price}}$$

$$\textbf{Dividends per share } (\textbf{DPS}) = \frac{\textbf{Dividends paid during the period}}{\textbf{No. of outstanding C.S}}$$

DPS 2018 = LE300,000/1,500,000 = LE0.20/share

Dividends Yield 2018 = LE0.20/EGP 6.25 = 3.2%

[6] DuPont System of Analysis.

- The DuPont system of analysis is used to break down the firm's financial statements and to assess its financial condition.
- It merges the income statement and balance sheet into two summary measures of profitability.
- The DuPont system first brings together the net profit margin, which measures the firm's profitability from sales, with its total asset turnover, which indicates how efficiently the firm has used its assets to generate sales.

ROA = Net profit margin × Total asset turnover

Substituting the appropriate formulas into the equation and

$$\text{ROA} = \frac{\text{Earnings available for common stockholders}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total assets}} = \frac{\text{Earnings available for common stockholders}}{\text{Total assets}}$$

simplifying results in the formula given earlier.

When the 2022 values of the net profit margin and total asset turnover for National Food Company, calculated earlier, are substituted into the DuPont formula, the result is:

ROA= (LE924,000/LE12,296,000) X
(LE12,296,000/LE14,388,000)

$$ROA = 7.515\% \times 0.854 = 6.42\%$$

- **Modified DuPont Formula**

The modified DuPont Formula relates the firm's return on total assets (ROA) to its return on common equity (ROE). The latter is calculated by multiplying the return on total assets (ROA) by the Equity multiplier (which is financial leverage multiplier (EM), which is the ratio of total assets to common stock equity:

$$\mathbf{ROE = ROA \times EM}$$

Were

$$EM = \frac{Total\ assets}{common\ stock\ equity}$$

Substituting the appropriate formulas into the equation

$$\text{ROE} = \frac{\text{Earnings available for common stockholders}}{\text{Total assets}} \times \frac{\text{Total assets}}{\text{Common stock equity}} = \frac{\text{Earnings available for common stockholders}}{\text{Common stock equity}}$$

and simplifying results in the formula given earlier,

Substituting the values for National food Company's ROA of 6.1 percent, calculated earlier, and National food's FLM of 1.84 into the modified DuPont formula yields:

ROE = (924,000/14,388,000) X (14,388,000/7.816,000)

ROE = 6.42% × 1.84 = 11.82%

Note that.

ROE = Net profit margin × Total asset turnover × EM

[7] THE FIRM'S CASH FLOW AND FINANCIAL PLANNING

7.1 FIRM'S CASH FLOW.

Cash flow (as opposed to accounting "profits") is the primary focus of the financial manager. A crucial factor affecting cash flow is depreciation.

From an accounting perspective, cash flow is summarized in a firm's statement of cash flows.

From a financial perspective, firms often concentrate on both operating cash flow, which is used in managerial decision-making, and free cash flow, which is closely monitored by participants in the capital market.

Financial managers are much more concerned with cash flows rather than profits. To adjust the income statement to show cash flows from operations, all non-cash charges should be added back to net profit after taxes. By lowering taxable income, depreciation, and other non-cash

expenses, this would create a tax shield and enhance cash flow.

The statement of cash flows summarizes the firm's cash flow over a given period. The statement of cash flows is divided into three sections:

- Cash flow from operating activities.
- Cash flow from investment activities.
- Cash flow from financing activities.

The statement of cash flows ties the balance sheet at the beginning of the period with the balance sheet at the end of the period after considering the performance of the firm during such a period through the income statement.

Free Cash Flow (FCF)

The free cash flow of the firm is the amount of cash flow available to debt and equity holders after meeting all operating needs and paying for its Net Fixed Asset Investments (NFAI) and Net Current Asset Investments (NCAI).

$$\mathbf{FCF = OCF - NFAI - NCAI}$$

Were

OCF = Operating Cash Flow

= Net Operating Profits after Taxes (NOPAT)+Deprecation.

= Earnings before Interest & Taxes (EBIT) x (1-T) + Deprecation**.**

NFAI = Net fixed asset investment (NFAI)

= Change in Net Fixed Assets + Deprecation.

NCAI = Net Current Asset Investments

= Change in current assets (CA) – Change in accounts

payable (A/P) and Accruals

7.2 Financial Planning Process.

The process of financial planning begins with long-term, or strategic financial plans that in turn guide the formulation of short-term, or operating plans and budgets.

- **Long-Term (Strategic) Financial Plans**
  - Long-term (strategic) financial plans lay out a company's planned financial actions and the anticipated impact of those actions over periods ranging from 2 to 10 years.
  - Firms that are subject to high degrees of operating uncertainty, short production cycles, or both, tend to use shorter planning horizons.

- These plans are one component of a company's integrated strategic plan (along with production and marketing plans) that guides a company toward achievement of its goals.
- Long-term financial plans consider several financial activities including long term investment and financing activities.

- **Short-Term (Operating) Financial Plans**
  - Short-term (operating) financial plans specify short-term financial actions and the anticipated impact of those actions.
  - Key inputs include the sales forecast and other operating and financial data.
  - Key outputs include operating budgets, the cash budget, and pro forma financial statements.
  - Two key aspects of financial planning are cash planning and profit planning:
  - **Cash planning** involves the preparation of the firm's cash budget.
  - **Profit planning** involves the preparation of pro forma statements.

7.3 CASH PLANNING: CASH BUDGET

- The cash budget or cash forecast is a statement of the firm's planned inflows and outflows of cash that is used to estimate its short-term cash requirements.
- Typically, the cash budget is designed to cover a period of one year, divided into smaller time intervals.
- The more seasonal and uncertain a firm's cash flows, the greater the number of intervals.
- A sales forecast is a prediction of the sales activity during a given period, based on external and/or internal data.
- The sales forecast is then used as a basis for estimating the monthly cash flows that will result from projected sales and from outlays related to production, inventory, and sales.
- The sales forecast may be based on an analysis of external data, internal data, or a combination of the two.

Coping with Uncertainty in the Cash Budget

- One way to cope with cash budgeting uncertainty is to prepare several cash budgets based on several forecasted scenarios (e.g., pessimistic, optimistic).

- From this range of cash flows, the financial manager can determine the financing amount necessary to cover the most adverse situation.
- This method will also provide a sense of the degree of riskiness of each alternative.

7.4 PROFIT PLANNING: PRO FORMA STATEMENTS

Pro forma financial statements are projected, or forecast, income statements and balance sheets pro forma, or projected financial statements help managers evaluate new ventures or new strategic initiatives.

A carefully designed spreadsheet allows managers to quickly produce alternative statements for different business scenarios or strategies.

The inputs required to develop pro forma statements using the most common approaches include:

- Financial statements from the preceding year
- The sales forecast for the coming year
- Key assumptions about several factors

- **Preparing the Pro Forma Income Statement**

A simple method for developing a pro forma income statement is the **percent-of-sales method**. According to this method, sales need to be forecasted and then express

the different items of the income statement as percentages of projected sales.

Clearly, some of the firm's expenses will increase with the level of sales while others will not. The use of past cost and expense ratios tends to understate profits when sales are increasing. (Likewise, it tends to overstate profits when sales are decreasing).

The best way to generate a more realistic pro forma income statement is to segment the firm's expenses into fixed and variable components.

- **Preparing the Pro Forma Balance Sheet**

The most popular approach for preparing the pro forma balance sheet **is the judgmental approach.** This approach is a simplified approach under which the firm estimates the values of certain balance sheet accounts and uses its external financing as a balancing, or "plug," figure.

CHAPTER FOUR

TIME VALUE OF MONEY

Chapter outline:

1. **Time value of money concept.**
2. **Future value of money.**
3. **Present value of money.**

1.Time value of money concept

Time value of money (TVM) is the premise that an investor prefers to receive payment of fixed amount of money today rather than an equal amount in future.

The time value of money (TVM) is the concept that money you have now is worth more than the identical sum in the future due to its potential earning capacity. This core principle of finance holds that provided money can earn interest, any amount of money is worth more the sooner it is received.

The time value of money (TVM) draws from the idea that rational investors prefer to receive money today rather than the same amount of money in the future because of money's potential to grow in value over a given period. For example, money deposited into a savings account earns a certain interest rate and is therefore said to be compounding in value.

Assume you have the option to choose between receiving LE1000 now versus LE1000 in two years. It is reasonable to assume most people would choose the first option. Despite the equal value at the time of disbursement, receiving the LE1000 today has more value and utility to the beneficiary than receiving it in the future due to the opportunity costs associated with the wait. Such opportunity costs could include the potential gain on interest were that money received today and held in a savings

account for two years or maybe investing this money and take benefit of this investment.

Calculation time value of money based on:

- Future value (FV) of money
- Present value (PV) of money

2 Calculation of Future value of money

We get future value (FV) for amount of money invested now at a given rate of interest (r or i or any symbol) and this value will be at time = n. To get the future value of money we have two cases:

2.1 Single amount payment: which can be calculated using:

2.1.1 formula

2.1.2 financial tables

2.2 Annuity payment: which can be calculated using:

2.2.1 formula

2.2.2 financial tables

2.1 Calculating Single amount future value

2.1.1 Calculating Single amount future value using formula:

Single amount future value can be calculated using the following *formula*:

$$FV_n = PV * (1 + r)^n \quad (1)$$

Where:

FV_n = future value at the end of period n

PV = initial principal, or present value

r = annual rate of interest paid.

n = number of periods (typically years) that the money is left to be received.

Example:

Ahmed places LE1000 in a savings account paying 6% interest compounded annually. He wants to know how much money will be in the account at the end of 5 years.

Substituting PV = LE1000, r = 6%, and n = 5 into the above equation no. (1) gives the amount at the end of year 5.

FV_{5Y} = LE1000 * (1 + 0.06) ^{5} = LE1000 * (1.3382) = LE1338.2

2.1.2 Calculating Single amount future value using financial tables:

Single amount future value can be calculated using financial tables as following:

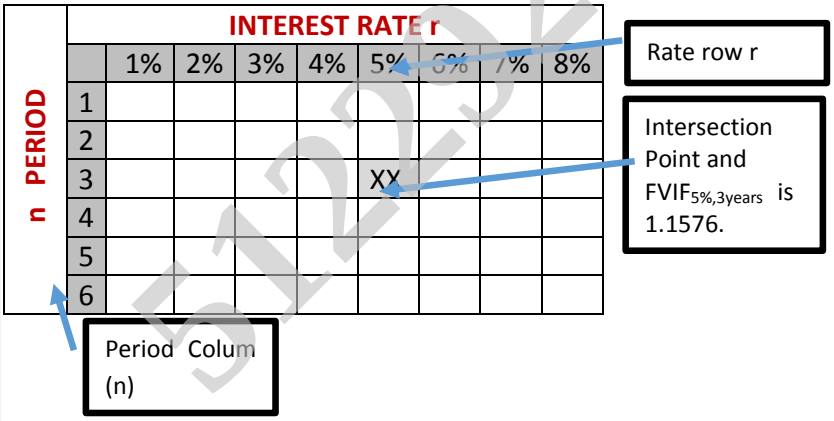
$$FV_n = PV * (FVIF_{r,n}) \ldots \quad (2)$$

Where: The future value interest factor (FVIF) for an initial principal of LE1 compounded at r% for *n* periods is referred to as FVIF *r, n*. That is.

$$FVIF_{r,\ n} = (1 + r)^{n} \quad \ldots.$$

(3)

Using the financial table, A-1 you can find the future value interest factor for one Doller or Egyptian pound, or any currency unit compounded at r% or k% or any sambal for n periods (**FVIF** $_{r,\ n)}$. It is the intersection of the annual interest rate, r, and the appropriate period, n. For example, assume that n=3 years and r or k is 5%, $FVIF_{5\%,3years}$ can be found as following



In the preceding example, assume that Ahmed placed LE1000 in his savings account at 6% interest compounded annually and wishes to find out how much will be in the account at the end of 5 years.

The future value interest factor (FVIF) one Egyptian pound, FVIF 6%,5yrs, found in Table A–1, is 1.3382. Applying equation no. (2) we find out that: LE1000 x 1.338 = LE1338.2

Therefore, the future value of Ahmed's deposit at the end of year 5 will be LE1338.2.

2.2 Calculating Annuity payment future value

2.2.1 Annuity payment future value by using formula:

Annuity payment future value can be Calculated by using the following formula:

$$FV_n = CF * \left[\frac{(1+r)^n - 1}{r}\right] \quad (4)$$

Example:

Ahmed wishes to determine how much money he will have at the end of 5 years if he chooses to deposit LE1000 annually, at the end of each of the next 5 years, into a savings account paying 6% annual interest.

Appling the above equation (no. 4) to solve this example.

$$FV_5 y = LE1000 * \left[\frac{(1+0.06)^5 - 1}{0.06}\right] = LE5637.1$$

Realize that we can reach the same amount if we calculate the future value of each LE1000 at the end of each year and sum up these values as follows.

FV of LE1000 at the end of y1=1000 * $(1.06)^4$ = LE1262.5

FV of LE1000 at the end of y2=1000 * $(1.06)^3$ = LE1191.0

FV of LE1000 at the end of y3=1000 * $(1.06)^2$ = LE1123.6

FV of LE1000 at the end of y4=1000 * $(1.06)^1$ = LE1060.0

FV of LE1000 at the end of y5=1000 * $(1.06)^0$ = LE1000.0

LE5637.1

2.2.2 Annuity payment future value by using financial tables: Annuity payment future value can be Calculated by using the following formula:

$$FV_n = PV * (FVIFA_{r,\ n}) \quad \ldots (5)$$

Where the formula for the future value interest factor for an ordinary annuity when interest is compounded annually at r percent for n periods, FVIFA r, n,

$$FVIFA_{r,\ n} = \left[\frac{(1+r)^n - 1}{r}\right] \quad \ldots (6)$$

In the preceding example the future value interest factor for an ordinary 5year annuity at 6% $FVIFA_{6\%,5yrs}$, found in Table A–2, is 5.6371.

Using Equation no.5, the LE1000 compounded annually at 6% for 5 years is LE5637.1; (that is LE1000 X 5.6371).

3. Calculation of Present value of money

We get present value (PV) for money that will be received in the future at a given rate of interest and this value will be at time = 0. To get the Present value of money we have two cases:

3.1 Single amount payment: it can be calculated using.

3.1.1 formula

3.1.2 financial tables

3.2 Annuity payment: it can be calculated using:

3.2.1 formula

3.2.2 financial tables

3.1 Single amount present value:

3.1.1 Calculating present value of single amount (PV) using formula:

The present value of a single amount can be calculated using the following equation.

$$\boldsymbol{PV = \frac{FV}{(1+r)^n}}$$

(7)

were

PV, present value of some future amount,

FV, amount to be received in future.

n, periods

r, discount rate

Example:

Assumed that Ahmed wishes to find the present value of LE1000 that will be received 5 years from now. Ahmed's discount rate is 6%.

Substituting FV = LE1000, n = 5 years, and r = 0.06 into Equation no. (7):

PV = LE1000 / $(1 + 0.06)^5$ = LE1000 /1.3382 = LE747.2725.

3.1.2 Calculating present value of single amount (PV) using financial tables:

The present value of a single amount can be calculated using the following equation.

$$PV = FV * (PVIF\ r, n) \quad (8)$$

Where: The present value interest factor for the present value of LE1 discounted at r percent for n periods is referred to as PVIF.

$$PVIF\ r,n = \frac{1}{(1+r)^n}$$

(9)

Assumed that Ahmed wishes to find the present value of LE1000 to be received 5years from now, assuming a 6% discount rate. The present value interest factor for 6% and 5 years, PVIF6%,5 yrs., found in Table A–2, is 0.540.

Using Equation = LE1000 * 0.7473 = LE747.3

Note that PVIF $_{6\%,5}$ = 1 / $(1.06)^5$ = 1 / (1.3382) = 0.7473

3.2 Annuity payment present value:

3.2.1 Calculating annuity payment using formula:

The present value of annuity payment can be calculated using the following equation.

$$PV_n = CF * \left[1 - \frac{1}{(1+r)^n}\right] / r \qquad \textbf{(10)}$$

Example:

Assume further that Ahmed wants to determine the most it should pay to purchase a particular ordinary annuity. The annuity consists of cash flows of LE1000 at the end of each year for 5 years. Ahmed requires the annuity to provide a minimum return of 6%.

$$PV_0 = LE1000 * \frac{\left[1 - \frac{1}{(1+0.06)^5}\right]}{0.06}. = LE4212.4$$

3.2.2 Calculate annuity payment present value using financial tables:

Annuity payment present value can be calculated using the following formula.

$$PV_n = CF * (PVIFA_{r,n}) \qquad (11)$$

Where: The formula for the present value interest factor for an Egyptian pound ordinary annuity discounted at r percent for n periods, PVIFA r, n is

$$PVIFA\ r,n = \left[1 - \frac{1}{(1+r)^n}\right]/r \qquad (12)$$

Ahmed, as we have noted, wants to find the present value of a 5-year ordinary annuity of LE1000, assuming a 6% discount rate. The present value interest factor for an Egyptian pound ordinary annuity discounted at 6% for 5 years. $PVIFA_{8\%,5yrs}$, found in Table A–4, is 4.2124. If we use Equation no. (11): LE1000 * 4.2124 results in a present value of LE4212.4.

CHAPTER FIVE
RISK AND THE REQUIRED RATE OF RETURN

Chapter Outline:

1. **The Meaning of Risk, Return, and Risk Preferences.**
2. **Assessing and Measuring Risk and Return for a Single Asset.**
3. **Measuring Risk and Return for a Portfolio.**
4. **The Types of Risk and the Role of Beta in Measuring the Relevant Risk.**
5. **The Capital Asset Pricing Model (CAPM) and its Relationship to the Security Market Line (SML).**
6. **The Major Forces Causing Shifts in the Security Market Line (SML)**

[1] THE MEANING OF RISK, RETURN, AND RISK PREFERENCES

1/1 THE MEANING OF RISK, RETURN

- Risk is a measure of the variability of returns associated with a given investment (asset).
- Return is the total gain or loss experienced on an investment (asset) over a given period. It can be calculated by dividing the asset's cash distributions during the period, plus change in value (ending-of-period investment (asset) value mines its beginning-of-period value), by its beginning-of-period investment (asset) value.
- Return on any investment (Alternative) depends on general economic conditions (Expansion, Depression, etc.).
- The total rate of return earned on any investment (asset) over period t, r_t, can be calculated by applying the following expression (Gitman, 2009).

$$r_t = \frac{C_t + P_t - P_{t-1}}{P_{t-1}} \quad \text{.....equation 5.1}$$

That is,

Rate of Return = [Cash Flow Received+ (Value at Ending- Value at the beginning)] / Value at the beginning

Were

C_t = Cash Flow Received during the investment period.

P_t = Value at Ending of investment period.

P_{t-1}= Value at the beginning of investment period.

Example (1): At the beginning of the year, X stock traded for LE50.00 per share, and Y stock was valued at LE30.00. During the year, X stock paid no dividends, but Y stock paid LE1.20 dividends per share. At the end of the year, X stock was worth LEP60.00 and Y sold for LE25.00.

The annual rate of return, r, for each stock can be calculated as follows.

X stock: [0 + (60.00 – 50.00)] / 50.00 = **20%**

Y stock: [1.20 + (25.00 – 30.00)] / 30.00 = **–12.67%**

1/2 RISK PREFERENCES

Three categories of attitudes can be utilized to describe how investors respond to risk. These are:

- **Risk averse:** is the attitude toward risk in which investors would ask or require for an increased return to compensate them for taking higher risk.
- **Risk-neutral:** is the attitude toward risk in which investors choose the investment with the higher return regardless of its risk.

- **Risk-seeking** is the attitude toward risk in which investors prefer investments with greater risk even if they have lower expected returns.

  The following figure shows the three categories of risk preferences graphically:

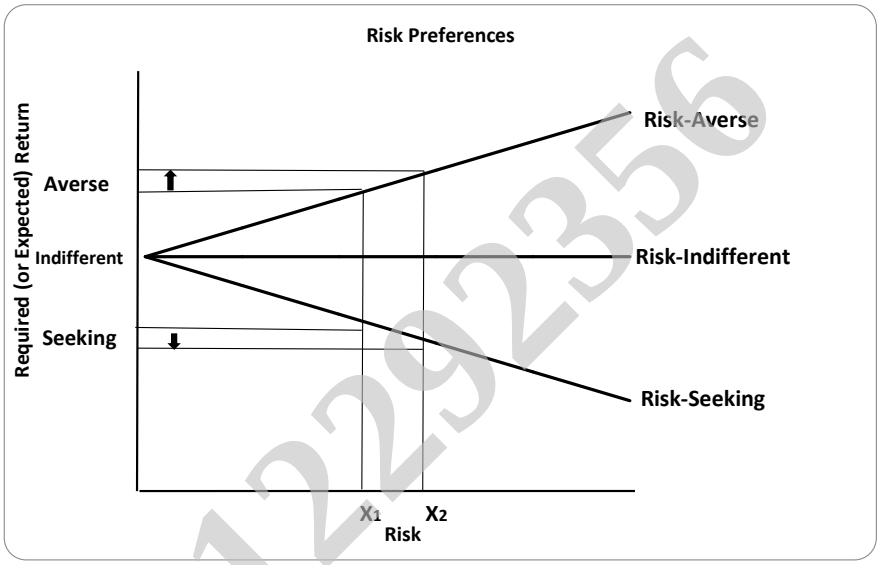


Figure 4.1

[2] ASSESSING AND MEASURING RISK AND RETURN FOR A SINGLE ASSET

2.1 ASSESSING RISK:

- **Scenario analysis** is the most common approach being used to asse risk. It uses several feasible alternative outcomes (scenarios) to obtain a sense of the variability or changeability among returns for an investment or asset.

- One common approach involves considering optimistic (best), most likely (expected), and pessimistic (worst) outcomes as well as the returns associated with each case for a given investment (asset). These three cases ca be expanded to be five cases as follows: high optimistic, low optimistic, most likely (expected), low pessimistic, and high pessimistic outcomes as well as the returns associated with each case for a given investment (asset).

- **Range** is a measure of the risk of an investment. It can be found by subtracting the return associated with the pessimistic (worst) scenario or outcome from the return associated with the optimistic (best) scenario or outcome. The higher the range the higher the risk and vice versa.

Example (2): Nancy Cosmetics Company wants to choose between two investments, (A) and (B). Each requires an initial outlay of LE100, 000 and each has an annual rate of return of 5% and 16% respectively. Management has estimated the returns associated with each investment at each economic condition. Asset (A) is less risky than asset (B). The risk-training decision maker would prefer asset (A) over asset (B), because (A) offers a lower range (risk) that is equal to 25% while the range for asset (b) was equal to 38%.

Item	Asset (A)	Asset (B)
Initial Investment	100,000	100,000
Annual Possible Rate of Return		
High Depression	-10%	30 %
Low Depression	0.5%	22%
Normal Conditions	5%	16%
Low Expansion	10%	0.5%
High Expansion	15%	-8%
Range	25%	38%

Table 5.1

2.2 MEASURING RISK: STANDARD DEVIATION, COEFFICIENT OF VARIATION

- **Standard deviation** (σ_r) is statistical indicator of an asset's risk; it measures the distribution around the expected value. The formula for the standard deviation of returns, σ_r, is.

$$\sigma_r = \sqrt{\sum_{j=1}^{n}(r_j - \bar{r})^2 \times Pr_j} \quad \text{...equation 5.2}$$

In practice, analysts rarely know the full range of investment outcomes and their probabilities. In such cases, we use the data organized in a time-series manner, where analysts use historical data to estimate the standard deviation. The formula that applies in this situation is:

$$\sigma_r = \sqrt{\frac{\sum_{j=1}^{n} (r_j - \bar{r})^2}{n-1}}$$ ..... equation 5.3

In general, the higher the standard deviation (S. D), the higher the risk

- **Expected return ($\bar{r}$)** is the average returns that an asset is expected to produce over time.

$$\bar{r} = \sum_{j=1}^{n} r_j \times Pr_j$$ .....equation 5.4

In case of using historical data or data organized in a time-series manner, the following equation can be applied (See the appendix of this chapter):

$$\bar{r} = \frac{\sum_{j=1}^{n} r_j}{n}$$ ..... equation 5.5

Were

r_j = return for the j^{th} outcome
Pr_j = probability of occurrence of the j^{th} outcome
n = number of outcomes considered

Considering example (2), past estimates of Nancy Cosmetics Company's indicate that the probabilities of each economic condition are as shown in the following table. The expected values of returns and standard deviations for assets A and B can be calculated as follows.

Expected Returns for asset A

Possible Outcomes	Probability (1)	Returns (2)	Weighted Value [(1) x (2)]
High Depression	0.2	-10%	-2.00%
Low Depression	0.2	0.5%	0.10%
Normal Conditions	0.2	5%	1.00%
Low Expansion	0.2	10%	2.00%
High Expansion	0.2	15%	3.00%
Total	1	Expected Return	4.10 %

Table 5.2

Expected Returns for asset B.

Possible Outcomes	Probability (1)	Returns (2)	Weighted Value [(1) x (2)]
High Depression	0.2	30 %	6.00%
Low Depression	0.2	22%	4.40%
Normal Conditions	0.2	16%	3.20%
Low Expansion	0.2	0.5%	0.10%
High Expansion	0.2	-8%	-1.60%
Total	1	Expected Return	12.10%

Table 5.3

Standard Deviation for asset A

Calculating Standard Deviation (S.D) For Asset (A)						
	r_A (1)	$\bar{r}$ (2)	$r_A - \bar{r}$ (3) = (1-2)	$(r_A - \bar{r})^2$ (4)	Pr (5)	$(r_A - \bar{r})^2$ x Pr (6) = 4 *5
High Depression	-10.0%	4.10%	-14.1%	1.99%	0.2	0.40%
Low Depression	0.5%	4.10%	-3.6%	0.13%	0.2	0.03%
Normal Conditions	5.0%	4.10%	0.9%	0.01%	0.2	0.00%
Low Expansion	10.0%	4.10%	5.9%	0.35%	0.2	0.07%
High Expansion	15.0%	4.10%	10.9%	1.19%	0.2	0.24%
Total	Variance					0.73%
S.D = √0.73%= 8.56%						

Table 5.4

Standard Deviations for asset B

Calculating Standard Deviation (S.D) For Asset (B)						
	r_B (1)	$\bar{r}$ (2)	$r_B - \bar{r}$ (3)	$(r_B - \bar{r})^2$ (4)	Pr (5)	$(r_B - \bar{r})^2$ x Pr (6) = 4*5
High Depression	30%	12.1%	17.9%	3.20%	0.2	0.64%
Low Depression	22%	12.1%	9.9%	0.98%	0.2	0.20%
Normal Conditions	16%	12.1%	3.9%	0.15%	0.2	0.03%
Low Expansion	0.5%	12.1%	-11.6%	1.35%	0.2	0.27%
High Expansion	-8%	12.1%	-20.1%	4.04%	0.2	0.81%
Total	Variance					1.94%
S.D = √1.94% = 13.94%						

Table 5.5

- **Coefficient of Variation (CV)**

The coefficient of variation, CV, is a measure of relative dispersion that is useful in comparing the risks of assets with differing expected returns.

- The coefficient of variation, CV, can be calculated using the following expression:

$$CV = \frac{\sigma_r}{\bar{r}} \quad \text{.....equation 5.6}$$

- A **higher** coefficient of variation means that an investment has **more volatility** relative to its expected return.

Example: Using the standard deviations and the expected returns for assets A and B to calculate the coefficients of variation yields the following:

CV_A **= 8.56% ÷ 4.10% = 2.09 = 209%**

CV_B **= 13.94% ÷ 12.10% = 1.15 = 115%**

This means that the risk associated with one percent of return of asset A is **2.09** and for asset B is **1.15**. Such results indicate that asset A is riskier than asset B.

Based on the coefficient of variation of asset A, and asset B, asset A is riskier than asset B. A wise investor then will choose asset B over asset A.

Note that: Coefficient of variation is a relative measure of risk while standard deviation is an absolute measure. That is why, after calculating standard deviation we need to rely

on the calculation of coefficient of variation to compare between investment alternatives.

[3] MEASURING RISK AND RETURN FOR A PORTFOLIO

New investments must be considered considering their impact on the risk and return of an investor's portfolio of assets and the financial manager's goal is to create an efficient portfolio, a portfolio that would achieve maximum return for a given level of risk. (Gitman et al, 2015)

3/1 PORTFOLIO'S RETURN:

- The return on a portfolio is a weighted average of the returns on the individual assets from which it is formed.

- It can be calculated as follows

$$r_p = (w_1 \times r_1) + (w_2 \times r_2) + \cdots + (w_n \times r_n) = \sum_{j=1}^{n} w_j \times r_j$$ equation 5.7

Were

W_j = proportion of the portfolio's total dollar value represented by asset j.
that is.
W_j= the amount invested in asset $_j$ divided by the total value of the portfolio.

r_j = return on asset $_j$

Following the preceding example of Nancy Cosmetics" Company, we can calculate the expected return of a portfolio consisting of assets A and B (assuming investing 50% of the

total outlay at each alterative) as follows:

$$r_p = (0.5 \times 4.10\%) + (0.5 \times 12.1\%) = 8.1\%$$

The following table shows different expected return of a portfolio consisting of two assets A and, B at each level of weight of the two assets as follows:

Different expected return of a portfolio consisting of two assets A and B at each level of weight.

asset a	asset b	Expected return
0%	100%	12.1%
10%	90%	11.3%
20%	80%	10.5%
30%	70%	9.7%
40%	60%	8.9%
50%	50%	8.1%
60%	40%	7.3%
70%	30%	6.5%
80%	20%	5.7%
90%	10%	4.9%
100%	0%	4.1%

Table 5.6

- **Factors affecting the expected rate of return of a portfolio:**

In general, there are only two factors affecting the rate of return of a portfolio as follows:

1) The number of assets in the portfolio and

2) The percentage of investment of each asset invested in this portfolio.

3/2 MEASURING THE RISK OF A PORTFOLIO: THE IMPACT OF CORRELATION, DIVERSIFICATION

- **Correlation** is a statistical measure of the relationship between any two series of numbers. So, it is better to distinguish between the following terms:

  - Positive correlation: describes two series that move in the same direction.
  - Negative correlation: describes two series that move in opposite directions.
  - Uncorrelated: describes two series that lack any interaction.

  Correlation Coefficient: is a measure of the degree of correlation between two series. It is important to distinguish between the following coefficient:

  - Perfect Positive Correlation: describes two positively correlated series that have a correlation coefficient of +1.
  - Perfect Negative Correlation: describes two negatively correlated series that have a correlation coefficient of –1.
  - Zero correlation: describes two series that have no interaction and therefore have a correlation coefficient close to zero.

- **Diversification**

- The rational way to decrease overall or total risk, (that is; the total variability of a portfolio's returns), is to diversify the investment portfolio through combining, or adding to it, assets that have the lowest possible correlation.
- Combining assets that have a low correlation with each other can decrease overall or total risk. Two assets with a perfectly negatively correlated provide the maximum diversification benefit and hence minimize the risk.

- **Portfolio Risk:**

- The standard deviation can be used to calculate the overall or total risk for a portfolio using covariance or correlation coefficient.
- The standard deviation of a two-asset portfolio **using covariance** can be calculated as follows:

$$\sigma_p = \sqrt{w_A^2\,\sigma_A^2 + w_B^2\,\sigma_B^2 + 2\,w_A\,w_B\,Cov_{A,B}}$$

Equation 5.8

where:

W_A = proportion of the portfolio's total dollar value represented by asset A

W_B = proportion of the portfolio's total dollar value represented by asset B

σ_A = asset A standard deviation

d_B = asset B standard deviation

Cov_a = covariance of asset A and asset B

- Also, the standard deviation of a two-asset portfolio can be calculated **using correlation coefficient** as follows:

$$\sigma_p = \sqrt{w_A^2\,\sigma_A^2 + w_B^2\,\sigma_B^2 + 2\,w_A\,w_B\,\rho_{A,B}\,\sigma_A\,\sigma_B}$$

Equation 5.9

Where:

W_A = proportion of the portfolio's total dollar value represented by asset A

W_B = proportion of the portfolio's total dollar value represented by asset B

σ_A = asset (A) standard deviation

σ_B = asset (B) standard deviation

$\rho_{A,B}$ = correlation coefficient between asset A and asset B

Note that the Covariance coefficient ($Cov_{A,B}$) is a statistical measure; it measures to what degree any two series of numbers co-vary with each other and it can be calculated as follows:

$$Cov_{A,B} = p_{A,B}\,\sigma_A\,\sigma_B$$ ..... equation 5.10

Were,

$$p_{A,B} = \frac{Cov_{A,B}}{\sigma_A\,\sigma_B}$$ ..... equation 5.11

Obviously, we can conclude that the **covariance** between two alternatives returns A, B depends on firstly: **the correlation coefficient** between the returns of those two alternative returns and, secondly: **the standard deviation** of each alternative.

*Note: the common equation which can be used to calculate Covariance as follows:

$$\text{Cov}\,(X, Y) = \frac{\sum(X_i - \bar{X})(Y_j - \bar{Y})}{n - 1}$$ equation 5.12

Where:

- X_i – the values of the X-variable
- Y_j – the values of the Y-variable
- $\bar{X}$ – the mean (average) of the X-variable
- $\bar{Y}$ – the mean (average) of the Y-variable
- n – the number of the data points

Back to example (2) we can calculate the standard deviation of a portfolio consisting of two assets (A and B) using covariance (eq 5.8) as follows:

-first; we can calculate covariance between the returns of asset (a) and asset (b) as shown in table 5.10 as follows.

	Asset A			Asset B			COV a, b
P_r 1	r_A 2	$\bar{r}_A$ 3	$r_A - \bar{r}_A$ 4=2-3	r_B 5	$\bar{r}_B$ 6	$r_B - \bar{r}_B$ 7	$(r_A - \bar{r}_A)(rB - \bar{r}_B)(P_r)$ 8 =1*4*7
0.2	-10.0%	4.10%	-14.1%	30.0%	12.10%	17.9%	-0.50%
0.2	0.5%	4.10%	-3.6%	22.0%	12.10%	9.9%	-0.07%
0.2	5.0%	4.10%	0.9%	16.0%	12.10%	3.9%	0.01%
0.2	10.0%	4.10%	5.9%	0.5%	12.10%	-11.6%	-0.14%
0.2	15.0%	4.10%	10.9%	-8.0%	12.10%	-20.1%	-0.44%
Total							-0.011441

Table 5.10

second; calculate the standard deviation using covariance as

$$\sigma_{A,B} = \sqrt{(0.5)^2(8.56\%)^2 + (0.5)^2(13.94\%)^2 + 2(0.5)(0.5)(-0.011441)} = 3.117\%$$

follows.

Also, we can calculate the standard deviation of a portfolio consisting of assets (A & B) using correlation coefficient $\rho_{A,B}$

(equation 5.9), but first we need to calculate the correlation coefficient $\rho_{A,B}$ (equation 5.11) as follows,

$$p_{A,B} = \frac{-0.011441}{8.56\% \times 13.94\%} = -0.9587 = -95.87\%$$

$$\sigma_{AB} = \sqrt{(0.5)^2(8.56\%)^2 + (0.5)^2(13.94\%)^2 + 2(0.5)(0.5)(-95.87\%)(8.56\%)(13.94\%)} = 3.117\%$$

Yet, we can summarize all the above calculations of example (2) in the following table (* note that we assumed equal wight of each asset in the portfolio, which is 50%):

	Asset (A)	Asset (B)	*$P_{a,b}$
expected return	4.10%	12.10%	8.10%
Variance (Var)	0.73%	1.94%	0.10%
Standard deviation (S.D)	8.56%	13.94%	3.117%
Correlation Coefficient $\rho_{a,b}$			-95.87%
Cove a, b			-0.011441

Table 5.11

We can conclude that the standard deviation of a portfolio consisting of asset A and asset B is not just the sum of assets A and B, standard deviation or even its weighted average.

As shown above, we found that the sum of the standard deviation of the two alternatives equal to (8.56%+13.94% =**22.5%**), and their weighted average equal to [(0.5*8.56%) +(0.5*13.94%)] =**11.25%** , both aren't equal to the standard

deviation of a portfolio of A and B which in this case equal to **3.117%**, this reduction is due to diversification, as the correlation coefficient between assets A and B returns is less than (+1) , that would cause the reduction in the standard deviation of the portfolio.

- **Factors affecting the risk of a portfolio:**

In general, there are only four factors affecting the risk of a portfolio as follows:

1) The number of assets in the portfolio,
2) The percentage invested in each asset in this portfolio,
3) The correlation between assets returns in the portfolio, and
4) The Covariance coefficient between assets returns in the portfolio.

The following is a simple discussion regarding the effect of the percentage of investment and the correlation between asset returns on the portfolio total risk.

- **The effect of the percentage of each asset invested on portfolio total risk.**

To illustrate the effect of the weight of each asset on the risk and return of the portfolio, we assumed - in the proceeding example (#2) - different weights for asset A and asset B. Table

5.11 indicates the expected return and standard deviation under such assumptions.

The expected return and standard deviation under several assumptions

Portfolio	Asset A %	Asset B %	Expected Return (a, b)	Standard Deviation (a, b)
A	0%	100%	12.1%	13.9%
B	10%	90%	11.3%	11.7%
C	20%	80%	10.5%	9.5%
D	30%	70%	9.7%	7.3%
E	40%	60%	8.9%	5.2%
F	50%	50%	8.1%	3.1%
G	60%	40%	7.3%	1.6%
H	70%	30%	6.5%	2.3%
I	80%	20%	5.7%	4.2%
J	90%	10%	4.9%	6.4%
K	100%	0%	4.1%	8.6%

Table 5.12

Figure 5.3 represents the combination of risk and return of a portfolio consisting of asset A and B whose data is listed in table 5.11 as follows.

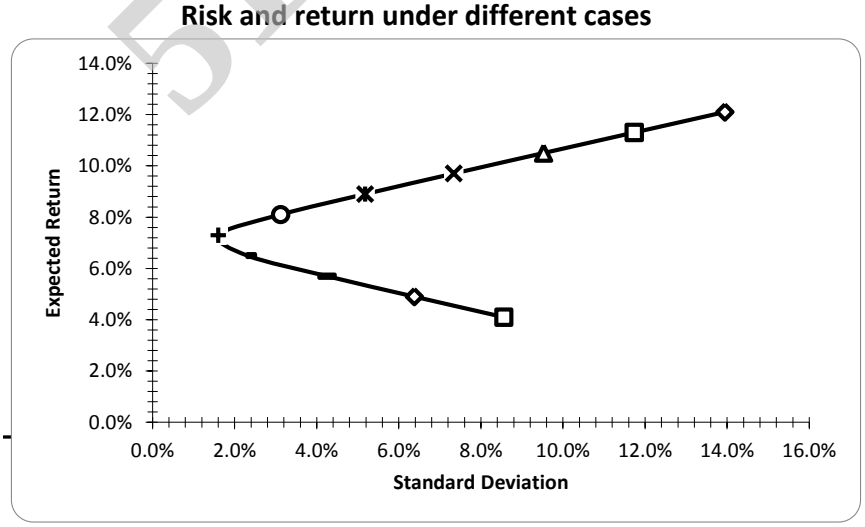


Figure 5.3

- **The effect of the correlation between asset returns on a portfolio.**

- To find the correlation coefficient between assets A and B, we can use equation 5.11 as noted earlier:

$$p_{A,B} = \frac{Cov_{A,B}}{\sigma_A \sigma_B}$$

- As mentioned earlier, correlation coefficient has a value range between (+1) and (-1).

- In the example no.2, we found that correlation coefficient ($\rho_{A, B)}$ was negative; (-95.87%), that is why, the covariance between the two assets was also negative (-0.011441).

However, to explain the effect of correlation on portfolio risk, we will assume the three levels of correlation coefficient between the returns of assets A and B:

1- perfect positive correlation (+1)

2- zero correlation (zero)

3- Perfect negative correlation (-1).

thus, we can find the effect of each case on the portfolio risk as follows:

Case one: portfolio Risk (standard deviation) in case of perfect negative correlation (-1):

Since,

$$Cov_{A,B} = p_{A,B}\,\sigma_A\,\sigma_B$$

Then,

$$Cov_{A,B} = (-1)(8.56\%)(13.94\%) = -1.19\%$$

So,

$$\sigma_{A,B} = \sqrt{(0.5)^2(8.56\%)^2 + (0.5)^2(13.94\%)^2 + 2(0.5)(0.5)(-1.19\%)} = 2.69\%$$

Obviously, we can observe the reduction in the portfolio risk from 3.117% to 2.69%. This clarifies the effect of perfect negative correlation on portfolio risk.

Case two: Portfolio Risk (standard deviation) in case of perfect positive correlation (+1):

As,

$$Cov_{A,B} = (+1)(8.56\%)(13.94\%) = 1.19\%$$

so,

$$\sigma_{A,B} = \sqrt{(0.5)^2(8.56\%)^2 + (0.5)^2(13.94\%)^2 + 2(0.5)(0.5)(1.19\%)} = 11.25\%$$

Obviously, we can observe the increasing value of the portfolio risk from 3.117% to 11.25%. This clarifies the effect of perfect positive correlation on portfolio risk.

Case three: Portfolio Risk (standard deviation) in case of zero correlation **(0):**

As,

$$Cov_{A,B} = (0)(8.56\%)(13.94\%) = 0\%$$

So,

$$\sigma_{A,B} = \sqrt{(0.5)^2(8.56\%)^2 + (0.5)^2(13.94\%)^2 + 2(0.5)(0.5)(0)} = 8.18\%$$

Clearly note that:

- The **risk** for two assets portfolio with **perfectly positive correlated** ranges between the risks of the two assets A and B (8.56% and 13.94%) and it cannot be reduced to less than the risk of the least risky asset; that is asset A (8.56%).

- The **risk** for two assets portfolio with **perfectly negatively correlated** is lower than the risk of the riskiest asset, which is asset B (13.94%), and it can be reduced less than the risk of the least risky asset; that is asset A (8.56%), and it can reach zero.
- The **risk** for two assets portfolio with **zero correlation** is lower than the risk of the riskiest asset, which is asset B (13.94%), *and it can be reduced to less than the risk of the least risky asset*; that is asset A (8.56%), and it cannot reach zero.
- In general, the lower the correlation between asset returns, the greater the risk reduction of the portfolio due to the diversification benefits and the lower the risk.
- Two assets with a perfectly negatively correlated provide the maximum diversification benefit and hence minimize the risk.

Yet, to find the optimal portfolio **(the best mix between asset A and asset B)** we must follow the following procedures:

1) Define all means of the portfolio to find all possible combinations of risk and return; that is **possible portfolios**.

2) Define a group of **efficient portfolios** (a portfolio that gives the maximum return at the same level of risk or the minimum risk at the same level of return)

3) Choose the **optimal portfolio**.

To illustrates the above concepts about the effect of correlation between the returns of two alternatives A and B of the proceeding example (2) to find efficient portfolios, assuming three degrees of correlation between the two assets and using equations 5.7 and 5.8. We can calculate expected returns and standard deviations for different portfolios changing the weight of investment in each asset as show in table 5.12 as follows:

correlation coefficient		$\rho_{A,B} = (+1)$		$\rho_{A,B} = (0)$		$\rho_{A,B} = (-1)$	
Asset A %	Asset B %	Return %	Risk %	Return %	Risk %	Return %	Risk %
100	0	4.10	8.56	4.10	8.56	4.10	8.56
75	25	6.10	9.90	6.10	7.30	6.10	2.93
62	38	7.14	10.60	7.14	7.50	7.14	0.0
50	50	8.10	11.25	8.10	8.18	8.10	2.69

25	75	10.10	12.6%	10.10	10.67	10.10	8.32
0	100	12.10	13.94	12.10	13.94	12.10	13.94

Table 5.13

- **Possible and efficient portfolios:**

Figure 5.4 illustrates the general form of the relationship between risk and return of a portfolio consisting of two assets A and B. As mentioned earlier, that correlation coefficient is always a value between (+1 and -1).

Line AB as shown in the graph represents all combinations of risk and return if the correlation coefficient is equal to (+1) which means perfect positive correlation between assets A and asset B.

The line ACB as shown in the graph represents all combinations of risk and return if the correlation coefficient is equal to (-1) which means perfect negative correlation between asset A and asset B.

However, note that the general form of the relationship between risk and return forms when the correlation coefficient between two assets is not perfect.

The curve AXB represents different combinations of risk and return that gives the lowest variability (standard deviation) at a stated level of return; that is what would be portfolios.

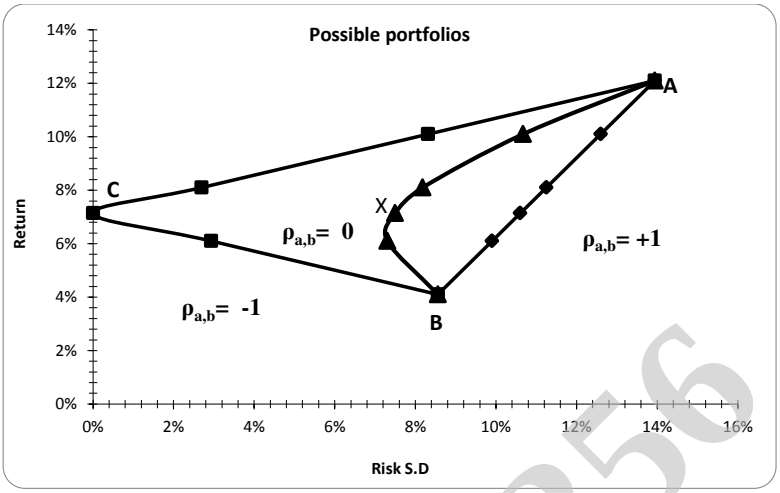


Figure 5.4

Risk averse investors would only choose portfolios laying on the curve AE as shown in figure 5.6 which is called **"Efficient frontier curve."** This curve represents the efficient portfolios because any point on this curve represents an efficient portfolio; that is a portfolio that gives a higher return with the same level of risk or a portfolio that gives the same level of return with a lower degree of risk, and any point under this curve is inefficient and any point above this curve is unattainable.

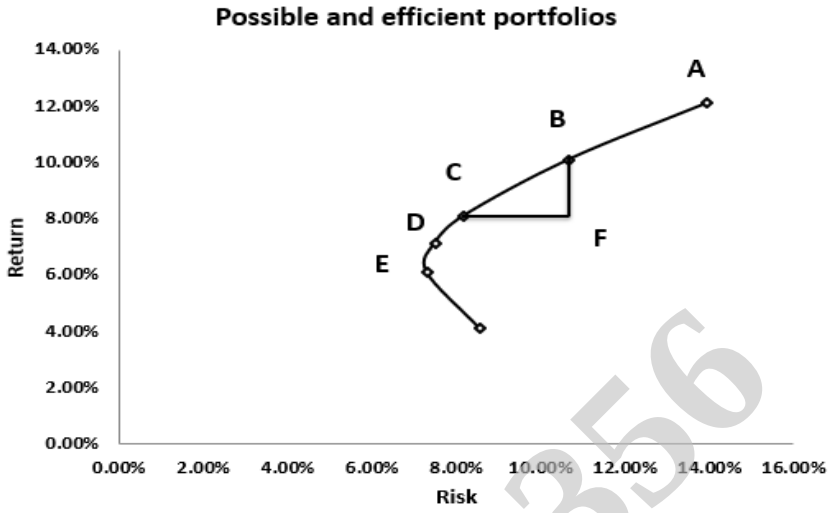


Figure 5.5

- As shown above in figure 5.5, point B gives a higher return than point **F** with the same level of risk. Also, point **C** gives the same level of return given by point **F** but, with a lower degree of risk.

[4] THE TYPES OF RISK AND ROLE OF BETA IN MEASURING THE RELEVANT RISK OF BOTH A SECURITY AND A PORTFOLIO

4/1 Types of Risk

Total risk (the overall risk which is measured by standard deviation) is the combination of a security's non-diversifiable risk and diversifiable risk. So:

Total risk = diversifiable risk (unsystematic risk) + non-diversifiable risk (systematic risk)

- **Diversifiable risk (unsystematic risk)** is the portion of an asset's risk that is attributable to **firm-specific factors**, (random causes such as lawsuits, regulatory actions), which can be eliminated through diversification.
- **Non-diversifiable risk (systematic risk)** is the relevant portion of an asset's risk attributable to **market factors**, (such as political events, inflation, economic situations) that affect all firms, which cannot be eliminated through diversification.

- As any investor can create a portfolio of assets that will eliminate all diversifiable risk, **the only relevant risk is non-diversifiable risk (systematic risk)**.

The following figure shows portfolio risk and risk reduction through diversification : (Gitman, et al, 2016)

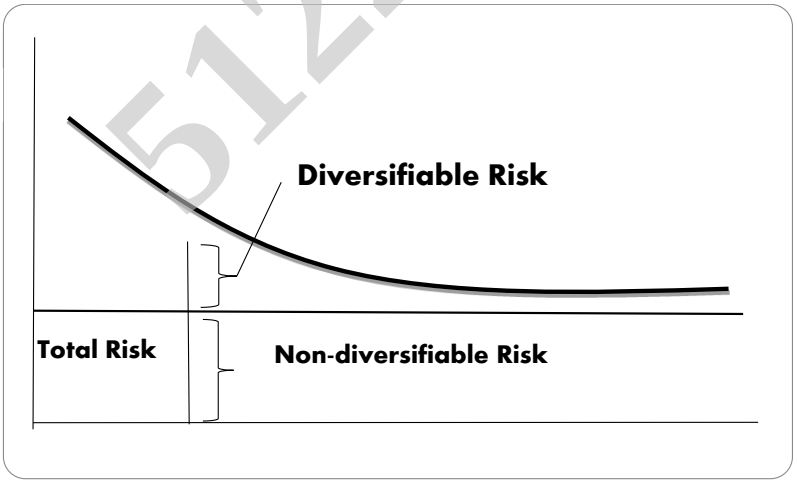


Figure 5.6

Source: (Gitman,et al ,2015)

[5] The capital asset pricing model (CAPM) and the security market line (SML) (Gitman,et al ,2015)

- The capital asset pricing model (CAPM) is the basic theory that links risk and return for all assets. It quantifies the relationship between risk and return.
- The capital asset pricing model (CAPM) measures how much additional return an investor should expect from taking a little extra risk.
- The beta coefficient (β) is a relative measure of non-diversifiable risk (systematic risk)
  - It is an index of the degree of movement of an asset's return in response to a change in the market return.
  - An asset's historical returns are used in finding the asset's beta coefficient.
  - The beta coefficient for the entire market equals 1.0. All other betas are viewed in relation to this market's beta.
- The market return is the return on the market portfolio of all traded securities.

The following table shows selected beta coefficients and their interpretations: (Gitman,et al ,2015)

Selected Beta Coefficients and their interpretations		
Beta	**Comment**	**Interpretation**
2	**Move in the same direction as the market**	**Twice responsive as the market**
1		**Same responsive as the market**
0.5		**half responsive as the market**
ZERO	**Unaffected by market movements**	
- 0.5	**Move in an opposite direction to the market**	**half responsive as the market**
- 1		**Same responsive as the market**
- 2		**Twice responsive as the market**

Table 5.14

The beta of a portfolio (β_p) can be estimated by using the betas of the individual assets that are included in the portfolio. Let $\mathbf{w_j}$ represent the proportion of the portfolio's total Egyptian value represented by asset j and let $\boldsymbol{\beta_j}$ equal the beta of asset j, we can use the following equation to find the portfolio beta, $\boldsymbol{\beta_p}$.

$$\beta_p = (w_1 \times b_1) + (w_2 \times b_2) + \cdots + (w_n \times b_n) = \sum_{j=1}^{n} w_j \times b_j$$

equation 5.13

Example: The following table shows betas and proportions of five assets consisting of portfolio A and betas and proportions of five assets consisting of portfolio B

	Portfolio A	Portfolio B

Asset	Proportion	Beta	proportion	Beta
1	0.25	1.50	0.20	0.85
2	0.15	1.00	0.20	1.10
3	0.20	1.35	0.25	0.80
4	0.15	1.25	0.15	0.90
5	0.25	1.40	0.20	1.15
Total	1		1	

Table 5.15

The betas for the two portfolios, $\boldsymbol{\beta}_{pA}$ and $\boldsymbol{\beta}_{pb}$, can be calculated as follows:

$$\text{Beta}_{PA} = (0.25 \times 1.5) + (0.15 \times 1.00) + (0.20 \times 1.35) + (0.15 \times 1.25) + (0.25 \times 1.4)$$
$$= 0.375 + 0.15 + 0.27 + 0.1875 + 0.35 = 1.3325$$

$$\text{Beta}_{PB} = (0.2 \times 0.85) + (0.2 \times 1.1) + (0.25 \times 0.8) + (0.15 \times 0.9) + (0.2 \times 1.15)$$
$$= 0.17 + 0.22 + 0.2 + 0.135 + 0.23 = 0.955$$

It appears from the previous calculations that portfolio (A) is riskier than portfolio (B) because its beta is 1.3325 which is higher than beta for portfolio B which is 0.955. Also, it is realized that portfolio (A) is riskier than the market because its beta is more than market's beta which is assumed to be =1 and portfolio (b) less risky than the market because its beta is less than market's beta.

- **Capital Asset Pricing model's (CAPM) Equation**

- Using the beta coefficient to measure non-diversifiable risk, the capital asset pricing model (CAPM) is given in the following equation:

$$r_j = R_f + [\beta_j \times (r_m - R_f)]$$ ...equation 5.14

Were

r_t	=	required return on asset j
R_f	=	risk-free rate of return, usually estimated from the return on Treasury bill 3 months.
β_j	=	beta coefficient.

- The capital asset pricing model can be used to calculate the required or the asked rate of return of a capital asset by investors.
- The required or the asked rate of return consists of two components:
  - Risk free rate of return (R_F)
  - Security risk premium, which consist of two variables:
    - Beta for the security β_j
    - Market risk premium $(r_m - R_f)$

Example: A Corporation wishes to determine the required return on asset Y, which has a beta of 1.5, R_f = 12%, and r_m = 16%.

$$R_Y = 12\% + [1.5 \times (16\% - 12\%)]$$

$$= 12\% + [1.5 \times (4\%)]$$

$$= 12\% + 6\% = 18\%$$

- Note that

Market risk premium: $(r_m - R_f)$ = (16% - 12%) = 4%, and

Security risk premium: $\beta_j \times (r_m - R_f)$ = 1.5(16% - 12%) =1.5 (4%) = 6%

- **The security market line** (SML)

- It is the representation of the capital asset pricing model (CAPM) as **a graph that** reflects the required return in the marketplace for each level of non-diversifiable risk (beta).
- In the graph, risk as measured by beta, β, is plotted on the X axis, and required returns, r, are plotted on the Y axis. :(Gitman et al., 2015)

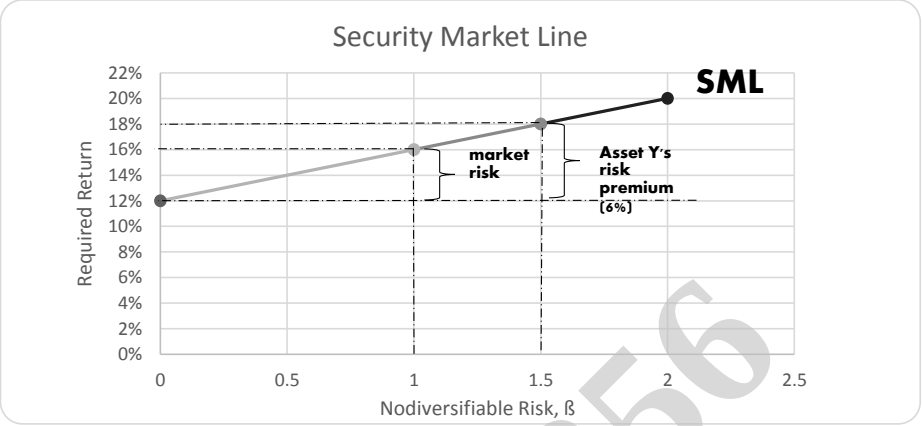


Figure 5.7

[6] THE MAJOR FORCES CAUSING SHIFTS IN THE SECURITY MARKET LINE (SML)

- The Security Market Line (SML) **is not stable over time**, and because of shifting in SML, the required rate of return will be changed.
- The main two major forces affecting the position and the slope of The Security Market Line (SML) are:
    - Inflationary expectations, and
    - Risk aversion

6/1 CHANGES IN INFLATIONARY EXPECTATIONS

- Changes in inflationary expectations result in parallel shifts in the Security Market Line (SML), in direct response to the magnitude and direction of the change.

- Assume that the inflation rate in the previous example is expected to increase by 3%, so the result of this the risk-free rate would increase by 3% and the market return would increase by the same percentage (3%). As the result of this the required rate of return would be changed as follows

$$R_Y = 15\% + [1.5 \times (19\% - 15\%)]$$
$$= 15\% + [1.5 \times (4\%)]$$
$$= 15\% + 6\%$$
$$= 21\ \%$$

- Assume that the inflation rate in the previous example is expected to decrease by 3%, so the result of this the risk-free rate would decrease by 3% and the market return would decrease by the same percentage (3%). As the result of this the required rate of return would be changed as follows:

$$R_Y = 9\% + [1.5 \times (13\% - 9\%)]$$
$$= 9\% + [1.5 \times (4\%)]$$
$$= 9\% + 6\% = 15\ \%$$

- Note that the only two variables that get affected by the changes in inflation rate are the risk-free rate and market rate; inflation has no effect on Beta coefficient of the asset. The following figure shows this effect.

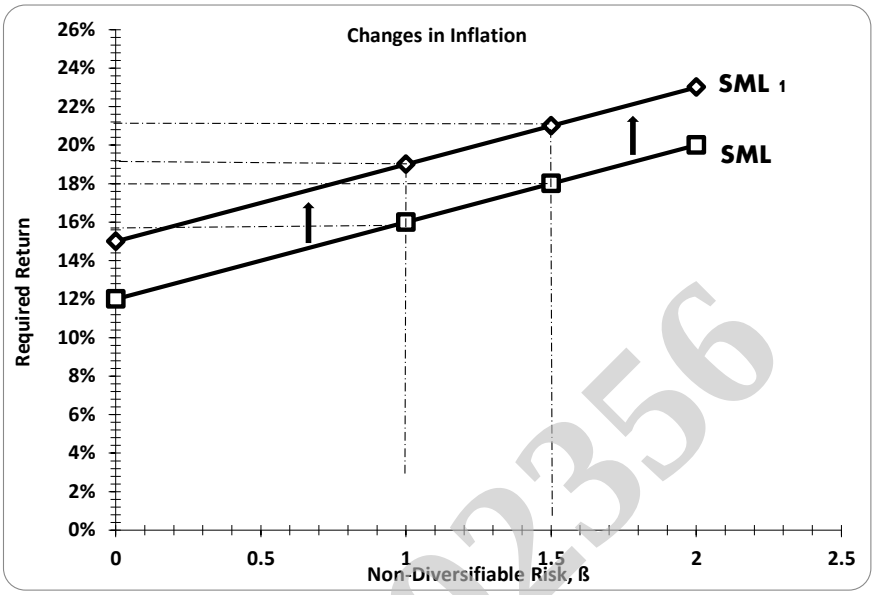


Figure 5.8

6/2 CHANGES IN RISK AVERSION

- Changes in risk aversion and shifts in the Security Market Line (SML), result from changing preferences of investors.
- Increasing risk aversion results in steepening the slope of SML.
- Decreasing risk aversion results in reducing the slope of SML.
- Assume that the investors are becoming more sensitive toward risk and because of this they would ask for more return so, in the previous example, the market return is

expected to increase by 2%, hence, as the result of this the market return would increase by the same percentage 2%, and the required rate of return would be changed as follows

$$r_z = 12\% + [1.5 \times (18\% - 12\%)]$$

$$= 12\% + [1.5 \times (6\%)]$$

$$= 12\% + 9\% = 21\%$$

- Assume that the investors are becoming less sensitive toward risk and because of this they would ask for lower return so, in the previous example, the market return is expected to decrease by 2%, hence, as the result of this the market return would decrease by the same percentage 2%, and the required rate of return would be changed as follows

$$r_z = 12\% + [1.5 \times (14\% - 12\%)]$$

$$= 12\% + [1.5 \times (2\%)]$$

$$= 12\% + 3\% = 15\%$$

- Note that the only variable that gets affected by the changes in risk aversion is the market rate; risk aversion has no effect on Beta coefficient of the asset, or the risk free (Rf) rate. The following figure shows this effect.

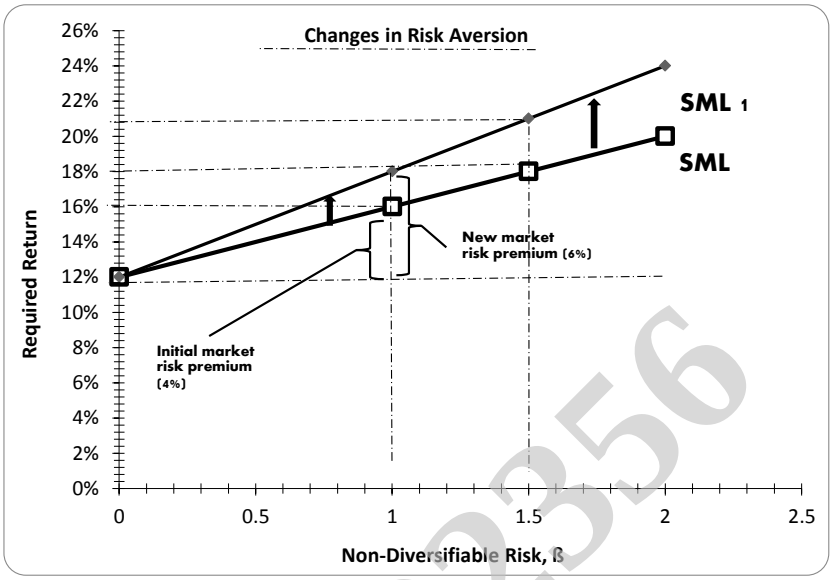


Figure 4.9

Important remarks to be considered about the CAPM.

- The CAPM relies on historical data which means that the betas may or may not actually reflect the future variability of returns. Therefore, the required returns specified by the model should be used only as rough approximations.

- The CAPM assumes that markets are efficient. Although the perfect world of efficient markets appears to be unrealistic in some markets.

Appendix:

In case we have a series of time (historical data):

We can use equation 5.7 to calculate portfolio return at each point of time, equation 5.5 to calculate the expected portfolio return for the overall series of time, equation 5.3 to calculate the standard deviation of the portfolio, and equation 5.6 to calculate the coefficient of variation of the portfolio as shown in example (1).

Example (1): The following are the expected returns for the next 5 years for asset X and asset Y. Assume that an equal percentage (w) invested in both assets (50% each). The Expected Value and standard deviation for a portfolio consisting of these two assets (X and Y) would be calculated as follows:

1- Expected Returns, Expected Value, S.D of returns for portfolio (X & Y)			
Year	Forecasted Returns		Portfolio Return
	Asset (X)	Asset (Y)	$Rp = (w_1 \times r_1) + (w_2 \times r_2)$
2016	4%	20%	Rp = (0.5 x 4%) + (0.5 x 20%) = 12%
2017	6%	18%	Rp = (0.5 x 6%) + (0.5 x 18%) = 12%
2018	8%	16%	Rp = (0.5 x 8%) + (0.5 x 16%) = 12%
2021	10%	14%	Rp = (0.5 x 10%) + (0.5 x 14%) = 12%
2022	12%	12%	Rp = (0.5 x 12%) + (0.5 x 12%) = 12%
1-Expected Value of Portfolio Returns Rp = (12%+12%+12%+12%+12%) / 5 = **12%**			

Calculating Standard Deviation (S.D) For portfolio X, Y				
	r_j	$\bar{r}$	$r_j - \bar{r}$	$(Rj - \bar{r})^2$

2016	**12.0%**	**12%**	**0.0%**	**0.00%**
2017	**12.0%**	**12%**	**0.0%**	**0.00%**
2018	**12.0%**	**12%**	**0.0%**	**0.00%**
2021	**12.0%**	**12%**	**0.0%**	**0.00%**
2022	**12.0%**	**12%**	**0.0%**	**0.00%**
Total				**0.00%**
S.D =	**√σ/n-1 =√0% / 5-1 = 0%**			

Example (2)*:* The following table shows the expected returns for three assets X, Y, and Z over **5 years** and the expected return and standard deviation of each asset. Also, this table shows the expected return and standard deviation of two portfolios.

- **portfolio (XY)** which consists of 50% of asset X and 50% of asset Y represents Perfect negative correlation with correlation coefficient 1, and
- **portfolio (XZ)** which consists of 50% of asset X and 50% of asset Z represents Perfect positive correlation with correlation coefficient +1.

Year	Assets			Portfolios	
	X	Y	Z	XY (50%, 50%)	XZ (50%, 50%)
2016	8%	16%	8%	12%	8%
2017	10%	14%	10%	12%	10%
2018	12%	12%	12%	12%	12%
2021	14%	10%	14%	12%	14%
2022	16%	8%	16%	12%	16%
Expected Value	12%	12%	12%	12%	12%
Deviation	3.16%	3.16%	3.16%	0.00%	3.16%

- The standard deviation of a two-asset portfolio can be calculated as follows:

$$\sigma_{P(x,y)} = \sqrt{\frac{(12\%-12\%)^2+(12\%-12\%)^2+(12\%-12\%)^2+(12\%-12\%)^2+(12\%-12\%)^2}{5-1}} = 0\%$$

$$\sigma_{P(x,z)} = \sqrt{\frac{(8\%-12\%)^2+(10\%-12\%)^2+(12\%-12\%)^2+(14\%-12\%)^2+(16\%-12\%)^2}{5-1}} = 3.16\%$$

So, the standard deviation of portfolio (x, y) whose correlation coefficient between the returns of the two assets is **-1**, can be calculated as following

$$\sigma_{xy} = \sqrt{(0.5)^2(3.16)^2+(0.5)^2(3.16)^2+2(0.5)(0.5)(-1)(3.16)(3.16)} = 0$$

And the standard deviation of portfolio (x, z) whose correlation coefficient between the returns of the two assets is **+1**, can be calculated as follows.

$$\sigma_{xy} = \sqrt{(0.5)^2(3.16)^2 + (0.5)^2(3.16)^2 + 2(0.5)(0.5)(+1)(3.16)(3.16)} = 3.16$$

Also, we can obtain the same results using (Cove **x**, **y** and Cove **x, z)** as follows.

$$\sigma_{xy} = \sqrt{(0.5)^2(3.16)^2 + (0.5)^2(3.16)^2 + 2(0.5)(0.5)(-9.99)} = 0$$

CHAPTER SIX
BOND VALUATION

Chapter Outline:

1. **Corporate Bonds foundation**
2. **Valuation Fundamentals.**
3. **The basic valuation model for bonds.**
4. **Bond Value Behavior.**
5. **Current yield and Yield to maturity (YTM).**

[1] INTRODUCTION TO CORPORATE BONDS FOUNDATIONS

- ***A bond*** is a long-term debt instrument indicating that a corporation has borrowed a certain amount of money and promises to repay it in the future under certain defined terms.
- The ***bond's coupon interest rate*** is the percentage of a bond's par value that will be paid annually or semiannually in two equal payments, as interest.
- The ***bond's par value, or face value***, is the amount borrowed at the issuing date by the corporation and owed to be paid to the bond holder on the maturity date.
- The most widely cited are:
  1. Current yield (CY)
  2. Yield to maturity (YTM)
  3. Yield to call (YTC)
  4. Yield to hold (YTH)

[2] VALUATION FUNDAMENTALS

- ***Valuation*** is concerned with the process that links risk and return to determine the value of an asset or investment.

The following equation represents the basic valuation model (DCF model) which is based on the concept of discounting the expected cash flows (returns) generated out of an asset or

investment at an appropriate (required or asked) discount rate to calculate the present value of its expected cash flows.

$$\boldsymbol{V = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \cdots + \frac{CF_n}{(1+r)^n}}$$ equation 6.1

- There are three key inputs to the valuation process:

1- **CF**= Cash flows (returns).

2- **n** =Timing of cash flows.

3- **r** = A measure of risk, which determines the required rate of return (the discount rate).

[3] BOND VALUATION FUNDAMENTALS

- Bonds are long-term debt instruments used by businesses and government to raise large sums of money, typically from a varied group of lenders (businesses, individuals, government...)
- Most bonds pay interest annually or semiannually at a stated coupon interest rate, have an initial maturity, and have a par value that must be repaid at maturity.
- In some cases, special kind of bonds is issued with no maturity date called "Perpetual bonds."
- The value of a bond is equal to the present value of the expected cash flows discounted at a rate that reflects its related risk (discount rate).
- The expected cash flows consist of the interest (or return) expected to be received out of the bond each period and

the principal amount which is expected to be received at maturity date.

- The required rate of return (Discount rate) can be calculated according to the level of risk related to that amount of return. That is why different discount rates can be used for valuation of each type of bond as a function of its degree of risk related to each one. For example, the discount rate that can be used to value a government bond may differ from discount rates used to value corporate bonds.

We are going to discuss in the following section the basic models to calculate the value of two types of bonds:

1- Perpetual bonds.

2- Maturity bonds.

1- PERPETUAL BONDS VALUATION:

The main characteristic of perpetual bonds is that they have a fixed amount of interest (return), and it has no maturity date. The cash flow of such types of bonds consists only of the periodical interest amounts. So, the value of this type of bond is equal to the present value of those expected cash flows discounted at a rate that reflects its related risk.

The following equation can be used to calculate the value of perpetual bonds:

$$\boldsymbol{Bo} = \frac{\boldsymbol{I}}{\boldsymbol{r_d}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{ equation 6.2}$$

were.

B_0: value of the bond at time zero
I: periodical interest paid.
r_d: discount rate or the required rate of return

Example:1

Assume that there is a 10 % coupon interest rate perpetual bond with a LE1000 par value that pays interest annually, find the value of bond under the following three assumptions of the required rate of return (discount rate)

1)8%, 2)10%, and 3)12%

Frist: the calculation of coupon interest

Note that the coupon interest under the three assumptions of discount rate is unchanged and can be calculated as follows.

Coupon interest = I = LE1000*10% = LE100

Second: The calculation of bond value under each assumption:

1) The value of the bond assuming the required rate of return: **r_d=8 %**: B0= (LE100 / 8%) = LE1250

2) The value of the bond assuming the required rate of return: **r_d=10** %: B0= (LE100 / 10%) = LE1000

3) The value of the bond assuming the required rate of return:

r_d=12 %: B_0= (LE100 / 12%) = LE833

2- Maturity bonds valuation:

Maturity bonds have a fixed amount of interest (return) commonly paid annually or semi-annually and it has a fixed maturity date (a specific maturity date). In such case, the value of this bond can be calculated using the following equation:

$$\mathbf{Bo} = \frac{\mathbf{I_1}}{(\mathbf{1}+r_d)^{\mathbf{1}}} + \frac{\mathbf{I_2}}{(\mathbf{1}+r_d)^{\mathbf{2}}} + \cdots + \frac{\mathbf{I_n}}{(\mathbf{1}+r_d)^{\mathbf{n}}} + \frac{\mathbf{M}}{(1+r_d)^{\mathbf{n}}}$$

Equation 6.3

where
B_0: value of the bond at time zero
I: annual Interest
r_d: discount rate or the required rate of return of a bond
M: Par value in Egyptian pound
n: number of years to maturity

Example:2

Assume that **xyz** company issued a 10 % coupon interest rate, 5-year bond with a LE1000 par value that pays interest annually, find the value of this company's bond when the required rate of return is

1) 8%, 2)10%, and 3)12%

Frist: the calculation of coupon interest:

Note that the coupon interest under the three assumptions of discount rate is unchanged and can be calculated as follows:

Coupon interest = I = LE1000*10% = LE100

Second: the calculation of bond value under each assumption:

1) The value of the bond assuming the required rate of return: **r_d=8 %:**

year	cash flow (1)	FV $(1+r_d)^t$ (2)	PV 3= (1/2)
1	LE100	$(1+8\%)^1 = 1.08$	LE92.59
2	100	$(1+8\%)^2 = 1.17$	85.73
3	100	$(1+8\%)^3 = 1.26$	79.38
4	100	$(1+8\%)^4 = 1.36$	73.50
5	100+1000= 1100	$(1+8\%)^5 = 1.47$	748.64
B_0			LE1079.85

table 6.1

* Another way to calculate the value of this bond by applying the following equation:

$$B_0 = \frac{100}{(1+8\%)^1} + \frac{100}{(1+8\%)^2} + \frac{100}{(1+8\%)^3} + \frac{100}{(1+8\%)^4}$$

$$+ \frac{\mathbf{100+1000}}{\mathbf{(1+8\%)^5}} = LE1079.85$$

*In addition to the above two ways, there is another way to calculate the value of this bond by applying the following equation:

$$B_0 = \frac{100}{(1+8\%)^1} + \frac{100}{(1+8\%)^2} + \frac{100}{(1+8\%)^3} + \frac{100}{(1+8\%)^4}$$

$$+ \frac{\mathbf{100}}{\mathbf{(1+8\%)^5}} + \frac{\mathbf{1000}}{\mathbf{(1+8\%)^5}} = LE1079.85$$

2) The value of the bond assuming the required rate of return**:** **r_d=10 %:**

year	cash flow (1)	FV (1+rd) t (2)	PV 3= (1/2)
1	LE100	(1+10%)1 = 1.1	LE90.91
2	100	(1+10%)2 = 1.21	82.64
3	100	(1+10%)3 =1.331	75.13
4	100	(1+10%)4 =1.464	68.30
5	100+1000= 1100	(1+10%)5 = 1.61	683.01
B_0			LE1000

Table 6.2

*Another way to calculate the value we can apply the following equation:

$$B_0 = \frac{100}{(1+10\%)^1} + \frac{100}{(1+10\%)^2} + \frac{100}{(1+10\%)^3} + \frac{100}{(1+10\%)^4} + \frac{\mathbf{100+1000}}{\mathbf{(1+10\%)^5}}$$

$$= LE1000$$

addition to the above two ways, there is another way to calculate the value we can apply the following equation:

$$B_0 = \frac{100}{(1+10\%)^1} + \frac{100}{(1+10\%)^2} + \frac{100}{(1+10\%)^3} + \frac{100}{(1+10\%)^4} +$$

$$\frac{\mathbf{100}}{(\mathbf{1}+\mathbf{10}\%)^{\mathbf{5}}} + \frac{\mathbf{1000}}{(\mathbf{1}+\mathbf{10}\%)^{\mathbf{5}}} = 1000\ EGP$$

3) The value of the bond assuming the required rate of return:

r_d=12 %:

year	cash flow (1)	FV (1+rd) t (2)	PV 3= (1/2)
1	LE100	(1+12%)1 = 1.12	LE89.29
2	100	(1+12%)2 = 1.25	79.72
3	100	(1+12%)3 = 1.40	71.18
4	100	(1+12%)4 = 1.57	63.55
5	100+1000= 1100	(1+12%)5 = 1.76	624.17
B_0			LE927.90

Table 6.3

*Another way to calculate the value we can apply the following equation:

$$B_0 = \frac{100}{(1+12\%)^1} + \frac{100}{(1+12\%)^2} + \frac{100}{(1+12\%)^3} + \frac{100}{(1+12\%)^4}$$

$$+\frac{\mathbf{100}+\mathbf{1000}}{(\mathbf{1}+\mathbf{12}\%)^{\mathbf{5}}} = LE927.9\ EGP$$

* In addition to the above two ways, there is another way to calculate the value we can apply the following equation:

$$B0 = \frac{100}{(1+12\%)^1} + \frac{100}{(1+12\%)^2} + \frac{100}{(1+12\%)^3} + \frac{100}{(1+12\%)^4}$$

$$+ \frac{\mathbf{100}}{\mathbf{(1+12\%)^5}} + \frac{\mathbf{1000}}{\mathbf{(1+12\%)^5}} = 927.9\ EGP$$

Note that the value of the bond at time zero is equal to the present value cash flow which is expected to be received out of this bond over a certain period. Such present value consists of two components:

1. The total present value of the amount of interest to be received each year during this period, and
2. The present value of the principle (par value) which will be received at the maturity date

So, there is another way to find the value of the bond using PVIF and PVIFA by applying the following equation which reflects the above dissection:

$$\mathbf{B_0 = I \times \left[\sum_{t=1}^{n} \frac{1}{(1+r_d)^t}\right] + M \times \left[\frac{1}{(1+r_d)^n}\right]} \text{ .....equation 6.4}$$

where:

B_0 = Value of the bond at time zero

I = annual interest paid

n = number of years to maturity

M= par value

r_d = required return on a bond

That is.

$$\mathbf{B_0 = I \times PVIFA}_{\mathbf{r_d,n}} \mathbf{+ M \times PVIF}_{\mathbf{r_d,n}} \quad \text{equation 6.5}$$

Solving the above example using this equation under the three cases of the required rate of return

1) The value of the bond assuming the required rate of return: **r_d=8 %:**

B_0= (LE100 * $PVIFA_{8\%,5\ years}$) + (LE1000 * $PVIF_{8\%,5\ years}$)

= (LE100 * 3.9927) + (LE1000 * 0.6806) = LE1079.87

2) The value of the bond assuming the required rate of return: r_d=10 %:

B_0= (LE100 * $PVIFA_{10\%,5\ years}$) + (LE1000 * $PVIF_{10\%,5\ years}$)

= (LE100 * 3.7908) + (LE1000 * 0.6209) = LE1000

3) The value of the bond assuming the required rate of return: **r_d=12 %:**

B_0= (LE100 * $PVIFA_{12\%,5\ years}$) + (1000 * $PVIF_{12\%,5\ years}$)

= (LE100 * 3.6048) + (LE1000 * 0.5674) = LE927.88

*note as discussed in Ch., 4 that:

$$\boldsymbol{PVIF}_{r_d,n} = \frac{1}{(1+r_d)^n} \textbf{ and } \boldsymbol{PVIFA}_{r_d,n} = \left[1 - \frac{1}{(1+r_d)^n}\right] / r_d$$

For Example, If the discount rate is 10 %:

1) The present value interest factor (PVIF) for one Egyptian pound discounted at a 10% rate ($PVIF_{10\%,5year}$) will equal to:

$$PVIF_{10\%,5year} = \frac{1}{(1+10\%)^5} = 0.6209$$

2) The present value interest factor for one Egyptian pound annuity (PVIFA) discounted at a 10% rate for 5 years will (PVIFA $_{10\%,5years}$) equal to:

$$PVIFA_{10\%,5years} = \frac{\left[1 - \frac{1}{(1+10\%)^5}\right]}{10\%} = 3.7908$$

Semiannual interest and bond value:

To calculate the value of bonds being interest semiannually, the following steps can be followed:

1) calculate the semiannual interest, by dividing annual amount of interest (I) by 2 (that is; I / 2).
2) converting the number of years to maturity (n) to 6-month period to maturity, by multiplying the number of years to maturity (n) by 2 (that is; n * 2).
3) converting the required annual rate of return (r_d) to semiannual required rate of return by dividing the required annual rate of return (r_d) by 2(that is; r_d / 2).
4) the following equation can be used:

$$\mathbf{B_0} = \frac{\mathbf{I}}{2} \times \left[\sum_{t=1}^{2n} \frac{1}{\left(1+\frac{r_d}{2}\right)^t}\right] + \mathbf{M} \times \left[\frac{1}{\left(1+\frac{r_d}{2}\right)^{2n}}\right] \qquad \text{equation 6.6}$$

***Example**:3*

Yummy company issued a 10 % coupon interest rate, 5-year bond with a LE1000 par value that pays interest semi-annually, find the value of yummy company's bond when the required rate of return is 10%.

Note that the semi-annually amount of interest = I / 2 = LE100 / 2 = LE50, so the bond value of yummy company can be calculated as follow:

$$B_0 = \frac{50}{(1+5\%)^1} + \frac{50}{(1+5\%)^2} + \frac{50}{(1+5\%)^3} + \frac{50}{(1+5\%)^4}$$
$$+ \frac{50}{(1+5\%)^5} + \frac{50}{(1+5\%)^6} + \frac{50}{(1+5\%)^7} + \frac{50}{(1+5\%)^8}$$
$$+ \frac{50}{(1+5\%)^9} + \frac{50}{(1+5\%)^{10}} + \frac{1000}{(1+5\%)^{10}}$$
$$= LE1000$$

Another way to calculate the bond value of yummy company is by applying equation no. 6.6 as follows.

$$B_0 = \frac{I}{2} \times PVIFA_{\frac{r_d}{2},2n} + M \times PVIF_{\frac{r_d}{2},2n} B_0 = \frac{100}{2} \times PVIFA_{\frac{10\%}{2},10}$$
$$+M \times PVIF_{\frac{10\%}{2},10}$$
$$= (\text{LE}50 * 7.7217) + (\text{LE}1000 * 0.6139) = \text{LE}1000$$

[4] The Behavior of Bond Values

4/1 The Relationship between Bond value and the Required Rate of Return

The following table summarized the bond values at different required rate of returns (8%,10%, and12%) as discussed in examples no.1 and 2:

Bond Values for various required returns (8%,10%, and12%), 5 years, LE1000 par value, paying annual interest)		
Required Return	**Bond Value**	**Status**
12%	**LE927.9**	**Discount**
10%	**LE1000**	**Par Value**

8%	LE1079.85	Premium

Table 6.4

Note from the above table that:

- The **higher** the required rate of return, the **lower** the bond value and the **lower** the required rate of return, the **higher** the bond value. So, we have **a negative relationship** between the required rate of return and the bond value, assuming all other factors remain constant.
- If the required rate of return is **equal to the bond coupon interest rate,** then the bond value will be **equal to the par value,** and we say that the bond is selling **at par**.
- If the required rate of return is **lower than the bond coupon interest rate** then the bond value will be **higher than the par value** and we say that the bond is selling **at premium**.
- If the required rate of return is **higher than the bond coupon interest rate** then the bond value will be **lower than the par value** and we say that the bond is selling **at a discount**.

2- THE RELATIONSHIP BETWEEN BOND VALUE AND TIME TO MATURITY:

- The **longer** the time to maturity, the **higher** the sensitivity the bond market value to a given change in the required rate of return. So that is **the longer the time to maturity, the higher the risk** (assuming everything constant) **the higher the required rate of return, the lower the value.**

- The **shorter** the time to maturity of a bond, the **lower** the sensitivity the bond market value to a given change in the required rate of return. So that **the shorter** the time to maturity, the **lower** interest rate risk (assuming everything constant) than long maturities.

The following table shows such a relationship. As it can be seen from this table the longer the time until maturity (from 5 years to 10 years) the higher the changes of bond values and the shorter the time to maturity date the closer the bond value (assuming everything constant) to its par value.

The relationship between bond value and maturity

The variation in bond values because of an increasing in maturity date at several required rate of return.				
Required Return	**Bond Value (N=5years)**	**Variation around par value**	**Bond Value (N=10 years)**	**Variation around par value**
12%	**LE927.90**	**927.90 - 1000 =- LE72.10**	**LE887.00**	**887.0 – 1000 =-LE113.00**
10%	**LE1000.00**	**1000 -1000=0**	**LE1000.00**	**1000-1000=0**
8%	**LE1079.85**	**1079.85-1000 =LE79.85**	**LE1134.20**	**1134.2-1000 =LE134.20**
RANGE		**1079.85 - 927.90 =LE151.95**		**134.20-887.0=LE247.2**

Table 6.5

[5] Current Yield (CY) and Yield to Maturity (YTM)

The most common yields are the current yield and the yield to maturity. The following is a brief dissection about these yields.

5/1 Current yield (CY)

It is a measure of a bond's cash return for a year; calculated by dividing the bond's annual interest payment by its market price.

Current yield (CY) = annual interest / bond's market price.

For example, if the market price for a bond LE1079.87(at premium), its par value LE1000 and paying 10% interest rate so, the current yield of this bond is 9.26 % (LE100 / LE1079.87).

Also, assumed that the market price for a bond LE1000 (at par) and paying 10% interest rate so, the current yield of this bond is 10.0 % (LE100 / LE1000).

Finally, assume that the market price for a bond LE927.88 (at discount) and paying 10% interest rate so, the current yield of this bond is 10.78 % (LE100 / LE927.88).

As you notice, when the market price of a bond is **higher** than its par value (selling at premium), the current yield is **lower** than the coupon interest rate, and when the market price of a bond is **equal** to its par value (selling at par), the current yield is **equal** to the coupon interest rate, finally, when the market price of a bond is **lower** than its par value (selling at discount), the current yield is **higher** than the coupon interest rate.

5/2 The yield to maturity (YTM)

It is the rate of return that investors earn if they buy a bond at a certain price and hold it until maturity date. (Assumes that the issuer performs all scheduled financial obligations (such as interest and principal payments) as promised.

The yield to maturity (YTM) can be calculating by using the basic bond valuation model, discussed before, and solve the equation for the required rate of return which will be in this case the YTM (**YTM = R_d**) and it would be the un- known variable in the equation since the bond's value is known.

Example:

Calculate the YTM for a bond under the following three situations of its market price if its par value LE1000, and its coupon interest rate 10%

1. the bond market price is LE1079.87,

2. the bond market price is LE1000,
3. the bond market price is LE927.88.

Applying equation, no;(6.4) or (using Excel), substitute the market price under each case instead of bond value (B_0) and solve it for the discount rate (the unknown factor in the equation which will be the YTM) that gets the present value for the expected return of the bond under each price equal to its market price under such situation. You end up calculating the yield to maturity (YTM) for each price situation as following:

1. When the bond market price is LE1079.87, the YTM is 8%.
2. When the bond market price is LE1000, the YTM is 10%.
3. the bond market price is LE927.88, the YTM is 12%.

Notice that:

- When the bond value **is equal to its par** value the yield to maturity on a bond will always equal the coupon interest rate.
- When the bond value **differs from par**, the yield to maturity will differ from the coupon interest rate.

CHAPTER SEVEN
STOCK VALUATION

Chapter Outline:

1. **Introduction: Differences between debt and equity capital.**
2. **Common stock valuation approaches**
   - **2/1 The discounted cash flow approaches**
     - **2/1/1 Dividend model**
     - **2/1/2 Free cash flow model**
   - **2/2 The multiplier approach**
3. **Decision making and common stock value.**

[1] Introduction: Differences between Debt and Equity capital.

- Debt includes all borrowing acquired by a firm, including bonds, and is repaid according to a fixed schedule of payments.
- Equity consists of funds provided by the firm's owners (investors or stockholders) that are repaid subject to the firm's performance.
- Debt financing is obtained from creditors and equity financing is obtained from investors who then become part owners of the firm.
- Creditors (lenders or debt holders) have a legal right to be repaid, whereas investors only have an expectation of being repaid.
- Key differences between debt and equity capital can be represented as follows:

Key Differences between Debt and Equity Capital		
Characteristics	Type of Capital	
	Debt	Equity
Voice in Management	NO	YES
Claims on Income & Assets	Senior to Equity	Subordinate to Debt
Maturity	Stated	None
Tax Treatment	Interest Deduction (In EGYPT to certain limits	No Deduction

Table 6.1

- **Voice Management**
  - Unlike creditors, stockholders (holders of equity) are the owners of the firm.
  - Stockholders have voting rights that certify them to select the director's firm and vote on special issues.
- **Claims on Income and Assets**
  - Stockholders (holders of equity) claims on income and assets are secondary to the claims of creditors.
  - Their claims on income cannot be paid until the claims of all creditors, including both interest and scheduled principal payments, have been satisfied.
- **Maturity**
  - Unlike debt, equity capital is a permanent form of financing.
  - Equity has no maturity date and never has to be repaid by the firm.
- **Tax Treatment**
  - Interest payments to debt holders are treated as tax-deductible expenses (to certain limits according to Egyptian tax low) by the issuing firm.
  - Dividend payments to a firm's stockholders are not tax-deductible.

- Common stockholders expect to be rewarded through periodic cash dividends and an increasing share value.
- Some of these investors decide which stocks to buy and sell based on a plan to maintain a well-diversified portfolio.
- Other investors have a more speculative motive for trading. They try to spot companies whose shares are undervalued, meaning that the true value of the shares is higher than the current market price. These investors buy shares that they believe to be undervalued and sell shares that they think are overvalued (i.e., the market price is higher than the true value).

[2] Common stock valuation Approaches

There are two approaches commonly used to calculate the value of common stock. These approaches are:

2/1) The discounted cash flow approach (DCF); which is based on discounting the expected dividends or the free cash flow. Therefore, there is two models within this approach:

2/1/1 Dividend model

2/1/2 Free cash flow model

2/2) The multipliers approach, which is based on calculating the price multipliers for certain accounting profit measurements such as the EPS, DPS. EBITDA, BV...

In this chapter some models under each approach were discussed.

2/1 DISCOUNTED CASH FLOW APPROACH (DCF)

2/1/1 Dividend model

The value of a common stock share is equal to the present value of all future cash flows (dividends) that it is expected to provide. (Gitman et al, 2013).

$$P_0 = \frac{D_1}{(1+r_s)^1} + \frac{D_2}{(1+r_s)^2} + \cdots \ldots \ldots \ldots \ldots \quad \text{equation 7.1}$$

Where:

- There are **three models** derived from the basic valuation dividend model according to the assumption about the growth rate of dividends. These models are.

  First model: Zero Growth Model,
  Second model: Constant-Growth Model and,
  Third model: Variable - Growth Model.

First model: **The Zero Growth Model**

The underlying assumption of this model is that the dividends will grow at a zero rate; that is constant dividends.

The following equation represents this model:

$$\boldsymbol{P_0 = \frac{D_1}{r_s}} \text{.....} \textit{equation 7.2}$$

The above equation shows that with zero growth, the value of a share of stock would equal the present value of perpetuity of D_1 Egyptian pound discounted at rate r_s.

Example: Assume that the dividend of G. Food Company, is expected to remain constant at LE3 per share indefinitely if required return of return on its stock is 16%, the stock's value is:

$$\boldsymbol{P_0 = \frac{3}{16\%} = EGP\ 18.75\ per\ share}$$

Note that LE18.75 is the present value for the expected cash flow forever under the above-mentioned assumptions.

Finally, zero growth model can be used to calculate the value of preferred stock since it has constant dividends.

Second model: **Constant-Growth Model (Gordon model)**

A common name for the constant-growth model is **Gordon model.** This model is widely mentioned in

dividend valuation. The underlying assumption of this model is that the dividends will grow at a constant rate (note that the growth rate is constant not the dividend per share).

The following equation represents this model:

$$\boldsymbol{P_0 = \frac{D_1}{r_s - g} = \frac{D0\ (1+g)}{r_s - g}}$$ ..... equation 7.3

Were

D1= next year dividends = D_0 (1+g)

rs = required rate of return

g = constant growth rate

Example: ABC Company paid the following per share dividends:

Year	Dividend per share
2022	**1.60**
2021	**1.30**
2018	**1.21**
2017	**1.14**
2016	**1.70**
2015	**1.00**

Using a financial calculator or a spreadsheet, we find that the historical annual growth rate of ABC Company dividends equals 10% and the required rate of return is

16%. So, the value of this share using the constant growth model can be calculated as follows.

$$P_0 = \frac{1.60(1+10)}{16\%-10\%} = \frac{1.696}{6\%} = \textbf{LE28.27}$$

Note that LE28.27 represents the present value for the expected cash flows forever under the above-mentioned assumptions.

Third model: **Variable - Growth Model**

- The zero- and constant-growth common stock models do not allow for any change in expected growth rates.
- The variable-growth model is a dividend valuation approach that allows for a change in the dividend growth rate.
- To determine the value of a share of stock in the case of variable growth, we use a four-step procedure. (Gitman et al, 2015).

Step 1: Find the value of the cash dividends at the end of each year, D_t, during the initial growth period, years 1 through N.

$$D_t = D_0 \times (1 + g_1)^t$$

Step 2: Find the present value of the dividends expected during the initial growth period.

$$P_0 = \frac{D_1}{(1+r_s)^1} + \frac{D_2}{(1+r_s)^2} + \cdots + \frac{D_n}{(1+r_s)^n}$$

Step 3: Find the value of the stock at the end of the initial growth period using the constant growth rate model, $P_N = (D_{N+1}) / (r_s - g_2)$, which is the present value of all dividends expected from year $N + 1$ to infinity, assuming a constant dividend growth rate, g_2, and convert such value to it is present value

$$\boldsymbol{P_0 = \frac{D_{N+1}}{r_s - g_2} / (1 + r_s)^n}$$

Step 4: Add the present value components found in Steps 2 and 3 to find the value of the stock, P_0.

That is.

P_0 = The sum of the Present value of dividends during initial growth period + Present value of price of stock at end of initial growth period

Example: The most recent annual (2022) dividend payment of BBB Industries, a rapidly growing beverage company, was LE1.60 per share. The firm's financial manager anticipates that these dividends will increase at a 10% annual rate, $\boldsymbol{g_1}$, over the next three years.

At the end of three years (the end of 2023), the firm's mature product line is expected to result in a slowing of the dividend growth rate to 5% per year, g_2, for the predictable future. The firm's required return, r_s, is 16%.

To calculate the value of the common stock share of this company, the following steps will be followed:

Steps #1 & 2: Calculation of the present value of BBB industries dividends for the initial growth period (2022-2023). The following table shows in detail such steps.

Year	End of the year	D0 =D2022	FVIF, n,10%	Dt	FVIF, n,16%	PV of dividends
		(1)	(2)	(3) = (1)x(2)	(4)	(5) = (3)/ (4)
1	2021	1.60	1.10	1.76	1.1600	1.5172
2	2022	1.60	1.20	1.92	1.3456	1.4269
3	2023	1.60	1.331	2.1296	1.5609	1.3643
Sum of PV of dividends						*LE* 4.3084

Table 7.2

Step # 3: Calculate the value of the stock at the end of the initial growth period (N = 2023) which can be found by first calculating $D_{N+1} = D_{2024}$.

$$D_{2024} = D_{2023} \times (1 + 0.05) = 2.1296 \times (1.05) = LE\ 2.236$$

- **Calculate** the value of the stock at the end of 2023 by using $D_{2024} = LE\ 2.236$, a 16% required return, and a 5% dividend growth rate, and applying the constant growth model as follows:

$$P_{2023} = \frac{2.1296 \times (1.05)}{(16\% - 5\%)} = \frac{2.2360}{(0.16 - 0.05)}$$
$$= LE20.328$$

- **Convert** the share value of LE20.328 at the end of 2023 into a present value (end of 2022)

$$P_{2020} = \frac{p_{2023}}{(1 + r_s)^3} = \frac{20.328}{(1 + 0.16)^3} = LE13.023$$

Step # 4: Calculate the share value of BBB industries by adding the PV of the initial dividend stream (found in Step 2) to the PV of the stock value at the end of the initial growth period (found in Step 3).

P_{2022} **= 4.308+ 13.023 =** ***LE*** **17.331 per share**

Note that the **17.331** EGP is the present value for the expected cash flows under the above-mentioned assumptions.

- The above procedures to calculate the value per common stock share under the assumptions of variable growth rate of dividends can be summarized in the following steps:

Step # 1: Calculate the value of the stock at the end of the initial growth period (N = 2023) which can be found by first calculating $D_{N+1} = D_{2024}$.

$$\boldsymbol{D_{2024} = D_{2023} \times (1 + 0.05) = 2.1296 \times (1.05) = LE2.2361}$$

Step # 2: Calculate the value of the stock at the end of 2023 by using $\boldsymbol{D_{2024} = LE2.2361}$, a 16% required return, and a 5% dividend growth rate, and applying the constant growth model as follows:

$$\boldsymbol{P_{2023}} = \frac{[1.60\ (1 + 0.10)^3] \times (1 + 0.05)}{16\% - 5\%} = \mathbf{LE20.832}$$

Note that the LE20.832 is the value of this share at the end of initial period.

Step # 3: Calculate the present value of expected dividends and the value at the end of the first period:

$$P_{2018} = \frac{1.60\ (1+0.10)}{(1+0.16)} + \frac{1.60\ (1+0.10)^2}{(1+0.16)^2} + \frac{1.60\ (1+0.10)^3}{(1+0.16)^3} + \frac{20.832}{(1+0.16)^3} =$$

EGP17.331

2/2/2 Free Cash Flow Valuation Model

- Free Cash Flow (FCF) is the amount of cash flow available to both debt holders and equity holders after meeting all operating needs and paying for its net fixed asset investments (NFAI) and net current asset investments (NCAI) as discussed in Ch. three.

SO,

FCF = OCF – NFAI – NCAI ……. equation 7.4

were.

OCF = Earnings before Interest and Taxes (EBIT) X (1-T) + Depreciation

NFAI = Change in Net Fixed Assets + Depreciation

NCAI = Change in Current Assets (CA) – Change in Accounts payable (A/P) and Accruals

- A free cash flow valuation model determines the value of an entire company as the present value of its expected free cash flows discounted at the firm's weighted average cost of capital (WACC).

- The firm's weighted average cost of capital (WACC) is its expected average future cost of funds over the long run (as discussed in ch.8).
- The following equation represents the free cash flow model:

$$\mathbf{V_C} = \frac{\mathbf{FCF_1}}{(1+\mathbf{r_a})^1} + \frac{\mathbf{FCF_2}}{(1+\mathbf{r_a})^2} + \cdots \ldots \ldots \ldots \ldots + \frac{\mathbf{FCF_\infty}}{(1+\mathbf{r_a})^\infty} \quad \text{equation 6.5}$$

Were

V_C = value of the entire company

FCF_t = free cash flow expected at the end of year t

r_a = the firm's weighted average cost of capital (WACC)

- Note that $\boldsymbol{V_C}$, is the market value of the entire company (that is, of all assets), so to find the value of common stock, $\boldsymbol{V_S}$, we must subtract the market value of all the firm's debt, $\boldsymbol{V_D}$, (and preferred stock if any) from $\boldsymbol{V_C}$.

That is to say: $\boldsymbol{V_C = V_S + V_D}$

Thus $\boldsymbol{V_S = V_C - V_D}$

Example: Given the following data about Nile Corporation for the free cash flow valuation model:

Nile corporation data for the free cash flow valuation model		
Free Cash Flow (LE)		**Additional Information**
Year	**FCF**	Growth rate of FCF, beyond 2025 to infinity, g_{FCF} =3%
2021	**1,100,000**	Weighted average cost of capital =9%
2022	**1,500,000**	Market value of all debt =LE 7,100,000
2023	**1,800,000**	Number of shares of common stock
2024	**1,840,000**	outstanding = 5,000,000 share
2025	**1,200,000**	

To calculate the value of the common stock share of this company, the following steps will be followed:

Step 1: Calculate the present value of the free cash flow occurring from the end of 2025 to infinity, measured at the beginning of 2026(that is the end of year 2025) using the constant - growth model.

$$\boldsymbol{Value\ of\ FCF_{2025-\infty}} = \frac{\boldsymbol{FCF_{2025}\times(1+g_{FCF})}}{\boldsymbol{cost\ of\ capital - g_{FCF}}}$$

$$= \frac{\mathbf{1{,}200{,}000\times(1+0.03)}}{\mathbf{0.09-0.03}} = \frac{\mathbf{1{,}236{,}000}}{\mathbf{0.06}} =$$

$\mathbf{20{,}600{,}000}$

Step 2: Add the present value of the FCF from the beginning of 2026 to infinity, which is measured at the end of 2025, (step # 1) to the 2025 FCF value to get the total FCF at the end of 2025.

Total FCF 2025 = LE1,200, 000 + LE20, 600,000 = LE21, 800,000

Step 3: Find the sum of the present values of the FCFs for 2021 through 2025 to determine the value of the entire company, V_C. This step is detailed in the following table:

Calculation of the value of the entire company for Nile corporation			
Year	**FCF**	**$(1+r)^t$**	**Present value of FCF**
	(1)	**(2)**	**(3) = (1) / (2)**
2021	**1,100,000**	**1.090**	**1,009174**
2022	**1,500,000**	**1.188**	**1,262,626**
2023	**1,800,000**	**1.295**	**1,389,961**
2024	**1,840,000**	**1.412**	**1,303,116**

2025	**21,800,000**	**1.539**	**14,165,042**
Value of the entire company (V_C)			**LE 19,129,919**

Table 7.3

Note that the same result which is reached from the above table can be reached using the following equation.

$$V_C = \frac{1{,}100{,}00}{(1+0.09)} + \frac{1{,}500{,}000}{(1+0.09)^2} + \frac{1{,}800{,}000}{(1+0.09)^3} + \frac{1{,}840{,}000}{(1+0.09)^4} + \frac{21{,}800{,}000}{(1+0.09)^5} = \mathbf{LE19{,}129{,}919}$$

Step 4: Calculate the value of the common stock:

VS = LE19,129,919 – LE7,100,000 = LE12,029,919

- The value of Nile common stock is therefore estimated to be LE12,029,919
- By dividing this total value of the common stock by the five million shares of common stock that the firm has outstanding, we get a common stock value of LE2.41 per share:

The value of common stock share = LE12,029,919/5,000,000 Share) = LE2.41.

2/2 Multiplier Approaches to Common Stock Valuation

In this section some other approaches to common stock valuation including the multipliers approach were discussed.

1. Book value per share valuation approach

- Book value per share (BVPS)

It is the amount per share of common stock that would be received if all the firm's assets were sold for their exact book (accounting) value and the proceeds remaining after paying all liabilities (including preferred stock) were divided among the common stockholders.

Example: At year-end 2022, M&M Company's balance sheet shows total assets of LG 6 million, total liabilities of LG 4 million, and 100,000 shares of common stock outstanding. Its book value per share therefore would be.

$$\textbf{\textit{Book value per share}} = \frac{(\textbf{\textit{total assets}} - \textbf{\textit{total liabilities}})}{\textbf{\textit{outstanding common stock shares}}}$$

$$= \frac{(6{,}000{,}000 - 4{,}000{,}000)}{100{,}000} = \textbf{\textit{LE20 per share}}$$

- Book value per share valuation approach of common stock valuation lacks sophistication and can be criticized based on its reliance on historical balance sheet data. It ignores the firm's expected earnings potential and lacks any true relationship to the firm's value in the marketplace.

2. Liquidation value per share valuation approach

- **Liquidation value per share**

It is the actual amount per share of common stock that would be received if all the firm's assets were sold for their market value, liabilities were paid, and any remaining money was divided among the common stockholders?

Example: M&M Company found upon investigation that it could obtain only LE5 million if it sold its assets today. The firm's liquidation value per share therefore would be:

$$\textbf{Book value per share} = \frac{(\textbf{total assets} - \textbf{total liabilities})}{\textbf{outstanding common stock shares}}$$

$$= \frac{(5{,}000{,}000 - 4{,}000{,}000)}{100{,}000} = LE10 \textbf{ per share}$$

- Liquidation value per share valuation approach is more realistic than book value because it is based on current market values of the firm's assets. However, it still fails to consider the earning power of those assets.

3. The price/earnings (P/E) ratio (EPS multiplayer) valuation approach.

- Price/Earnings ratio reflects the amount investors are willing to pay for each Egyptian pound of earnings.
- The price/earnings multiple approach is a popular technique used to estimate the value of the firm's common stock share.

- The value of the firm's common stock share can be calculated by multiplying the firm's expected earnings per share (EPS) by the average price/earnings (P/E) ratio for the industry. That is.

The firm's share value = the firm's expected earnings per share (EPS) x the average price/earnings (P/E) ratio for the industry.

Example: DDD Company is expected to earn LE3.50 per share next year (2021). Assuming an industry average P/E ratio of 8times, the firms per share value would be.

The firm share value = EGP3.50 × 8 = LE28 per share

The price/earnings multiple approach to valuation does have a theoretical explanation. It is, in effect, a form of the zero-growth model.

[3] Decision Making and Common Stock Value

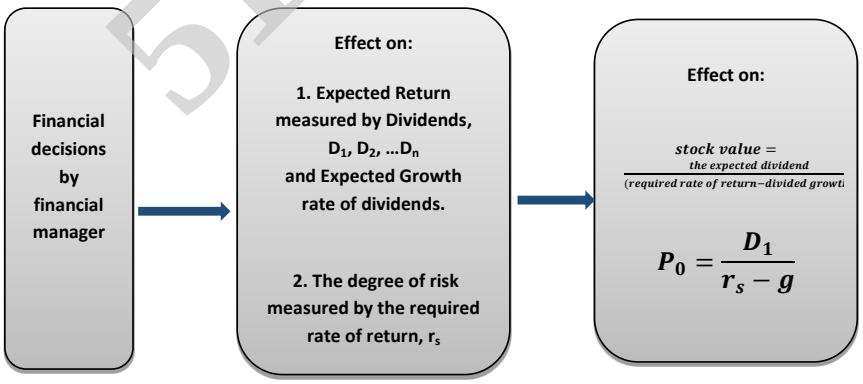


Figure 7.1

3.1 Decision Making and Common Stock Value: Changes in Expected Returns

- Assuming that economic conditions remain stable, any management action that would cause current and prospective stockholders to raise their dividend expectations should increase the firm's value.
- Therefore, any action of the financial manager that will increase the level of expected dividends without changing risk (the required return) should be undertaken, because it will positively affect the shareholders (owners) wealth.

Example: Assume that G. Food Company announced a major technological breakthrough that would revolutionize its industry. Current and prospective stockholders expect that although the dividend next year, D1, will remain at LE2.00, the expected rate of growth thereafter will increase from 7% to 9%. The required rate of return, r_s is 15%. So, the value of this stock

2.00 / (0.15 – 0.9) =LE33.33

3.2 Decision Making and Common Stock Value: Changes in Expected Risk

- Any measure of required return consists of two components: a risk-free rate and a risk premium. We expressed this relationship as in the previous chapter.
- Any action taken by the financial manager that increases the risk shareholders must bear will also increase the risk premium required by shareholders, and hence the required return.
- Additionally, the required return can be affected by changes in the risk-free rate, even if the risk premium remains constant

Example: Assume that G. Food Company financial manager estimates that, without changing expected dividends, certain action would cause the risk premium of the company to increase to 7%. If the risk-free rate remains at 9%, the newly required return on G. Food will be 16% (9% + 7%).

2.00 / (0.16-0.07) = LE22.22

Realized that because of increasing the risk premium by 7%, the required rate of return increased to 16%, and the value per share decreased from LE33.33 to LE22.22**.**

3.3 Decision Making Common Stock Value: Combined Effect

Example: If we assume that the two changes illustrated for G. Food Company in the preceding examples occur simultaneously, the key variable values would be D_1 = LE2.00, r_s = 0.16, and g = 0.09.

2.00 / (0.16 - 0.09) = LE 28.57

Realized that because of increasing the required rate of return to 16%, and increasing the growth rate to 9%, the value per share changed and decreased from LE 33.33 (the basic case) to LE28.57.

CHAPTER EIGHT
COST OF CAPITAL

Chapter outline:

1. **The basic concept of cost of capital and sources of capital.**
2. **Cost of long-term debt.**
3. **Cost of preferred stock.**
4. **Cost of common stock equity, the cost of retained earnings and the cost of new issues of common stock.**
5. **Weighted average cost of capital (WACC).**
6. **The weighted average cost of capital (WACC): weighting schemes.**

1. The basic concept of cost of capital and sources of capital

- The firm's cost of financing can be represented by the cost of capital.
- The cost of capital reflects the total of the firm's financing decisions.
- The cost of capital is the minimum rate of return that a project or investment must generate to increase the value of the firm.
- Financial managers are morally obligated to invest in only those investments or projects and their benefits expect to exceed the cost of capital.
- Most firms attempt to maintain an optimal capital stretcher, optimal mix of debt and equity financing.
- We need to look at the overall cost of capital rather than just the cost of any sole source of financing to capture all the relevant financing costs, assuming some desired mix of financing.
- If we rely on the cost of one sole source of financing to make investment decision, we will make a wrong decision, that is, we may be accepting an investment opportunity

should have been rejected, and reject an investment opportunity we would have been accepted,

- The main sources of long - term capital is (we ignored preferred stock on purpose because such stock rarely to be issued in EGYPT):

1. Long - term debt
2. Common stock equity
   2.1 Common stock
   2.2 Return earnings

A) According to (T) format of the financial position, these items will appear on the liabilities and equity side of the balance sheet as following:

Assets	Current liabilities
	- **Long – term debt**
	- **Shareholders equity**
	Common stock
	Retained earnings.

B) According to (List) format of the financial position, these items will appear on the second part under "Long - term liabilities and equity" as following:

Total investment Financed by
Long - term liabilities and equity
- Long - term debt
- Shareholder's equity

Common stock
Retained earnings

2. COST OF LONG-TERM DEBT

- The pretax cost of debt is the financing cost associated with new funds through long-term borrowing.
- Typically, the funds are raised through the sale of corporate bonds.
- Net proceeds are the funds received by the firm from the sale of a security (bond or common stock).
- Flotation costs are the total costs of issuing and selling a security include two components:
  - Underwriting costs: compensation earned by a financial intermediary for selling the security.
  - Administrative costs: issuer expenses such as legal, accounting, and printing. ("2 administrative costs issuer expenses such as legal - Course Hero")

Example: Dodo Corporation is considering selling LE10 million worth of 20-year, 9% coupon bonds with a par value of LE1,000. Because current market interest rates are greater than 9%, the firm must sell the bonds at LE980 (if the local law allows that). Flotation costs are 2% or 20 (calculated out of par value). The net proceeds to the firm for each bond are therefore LE960 (LE980 – LEP20).

To calculate the value of this bond we need first to calculate the before-tax cost of debt, r_d, which is simply the rate of return the firm must pay on new borrowing. The before-tax cost of debt can be calculated by applying any one of these three ways:

1- Using market quotations: observe the yield to maturity (YTM) on the firm's existing bonds or bonds of similar risk issued by other companies.

$$R_d = I / B_o$$

2- Calculating the cost by calculating the YTM generated by the bond cash flows.

3- Approximating the cost by applying the following equation:

$$r_d = \frac{I + [1000 - N_d]/n}{\frac{[N_d + 1000]}{2}} \quad \text{..... equation 8.1}$$

Were

I = annual interest in dollars

N_d = net proceeds from the sale of debt (bond)

n = number of years to the bond's maturity

We can apply the above equation to calculate the cost of debt before tax for Dodo Corporation as follows.

$$r_d = \frac{90+\frac{1000-960}{20}}{\frac{[960+1000]}{2}} = 0.09388 \text{ or } 9.3888\%$$

Second, calculate After-Tax Cost of Debt. The interest payments paid to bondholders or lenders are tax deductible for the firm (Till certain limit according to Egyptian tax low), so the interest expense on debt reduces the firm's taxable income and, therefore, the firm's tax liability.

- The after-tax cost of debt, r_i, can be found by multiplying the before-tax cost, r_d, by 1 minus the tax rate, T, as stated in the following equation:

  $r_i = r_d \times (1 - T)$ …….equation 8.2

- Dodo Corporation has a 20% tax rate. Using the 9.388% before-tax debt cost as calculated above, we find an after-tax cost of debt as follow:

  Cost of debt after tax = [9.388% × (1 – 0.20)] =7.51%.

- Typically, the cost of long-term debt for a given firm is less than the cost of preferred or common stock, partly because of the tax deductibility of interest ("Solved "Typically, the cost of long-term debt for a given - Chegg")

3. Cost of common stock equity, the cost of retained earnings and the cost of new issues of common stock

- The cost of common stock is the rate of return required on the stock by investors in the marketplace. ("Cost of Common Stock - Cash Inflows - Andrew Jacobson")
- There are two forms of common stock financing:

  1. Retained earnings
  2. New issues of common stock

- To calculate the cost of each one of these costs, it needs first to calculate the cost of common stock equity, r_s.

  "Cost of common stock equity, r_s, is the rate at which investors discount the expected dividends of the firm to determine its share value." ("Cost of Common Stock - Cash Inflows - Andrew Jacobson") It can be calculated using the constant - growth model or the capital asset pricing model as follows.

1) Using the constant-growth valuation (Gordon) model

This model - as mentioned before - assumes that the value of a share of stock equals the present value of all future dividends (assumed to grow at a constant rate) that it is expected to provide over an infinite time horizon.

$$\boldsymbol{P_0 = \frac{D_1}{r_s - g}}\text{...}\quad\text{.....equation 8.4}$$

Were

Po = value of common stock

D_1 = per-share dividend expected at the end of year 1

Example: TO-DO Corporation wishes to determine its cost of common stock equity, r_s. The market price, P_0, of its common stock is LE 50 per share. The firm expects to pay a dividend, D_1, of LE 4 at the end of the coming year and that dividends will be grown at a constant rate 6%:

Substituting D_1=LE 4, P_0=LE 50 and g = 6% into the previous equation yields the cost of common stock equity:

$r_s = (4/50) + 0.06 = 0.08 + 0.04 = 0.140$, or **14.0%**

2- Using the capital asset pricing model (CAPM)

CAPM MODEL - as it mentioned before - describes the relationship between the required return, r_s, and the non-diversifiable risk of the firm as measured by the beta coefficient, b.

$$\mathbf{r_s = R_F + [\beta \times (r_m - R_F)]} \ldots\ldots\ldots\ldots \text{equation 8.5}$$

Were

R_F = risk-free rate of return

r_m = market return; return on the market portfolio of assets

Example: TO-DO Corporation now wishes to calculate its cost of common stock equity, r_s, by using the capital asset pricing model. The firm's investment advisors and its own analysts indicate that the risk-free rate, RF, equals 8%; the firm's beta, β, equals 1.6; and the market return, rm, equals 12%.

- Substituting these values into the CAPM, the company estimates the cost of common stock equity, r_s, to be:

$r_s = 8.0\% + [1.6 \times (12.0\% - 8.0\%)] = 7.0\% + 6.0\% = 14.0\%.$

The following is a brief comparison between CAPM and the constant-growth valuation models regarding the estimation of common stock.

- The CAPM model differs from the constant-growth valuation model in that the CAPM model directly considers the firm's risk, as reflected by beta, in determining the required return or cost of common stock equity. While the constant-growth model does not look at risk, it ignores risk; it uses the market price, P_0, as a reflection of the expected risk–return preference of investors in the marketplace.
- Another difference is that when the constant-growth valuation model is used to find the cost of common stock equity, it can easily be adjusted for flotation costs to find the

cost of new common stock; the CAPM does not provide a simple adjustment mechanism.

- The difficulty in adjusting the cost of common stock equity calculated by using CAPM occurs because in its ordinary form the model does not include the market price, P_0, a variable needed to make such an adjustment
- The constant-growth valuation and CAPM techniques for finding the cost of common stock equity, r_s, are theoretically equivalent; in practice estimates from the two methods do not always agree.

Cost Retained Earnings

- The cost of retained earnings, r_r, is equal to the cost of common stock equity, r_s.

$$\mathbf{r_r = r_s}$$

- The cost of retained earnings for DO-DO Corporation was calculated in the preceding examples: It is equal to the cost of common stock equity. Thus, r_r equals 14.0%.

Cost of New Issues of Common Stock

- The cost of a new issue of common stock, r_n, is the cost of common stock, net of underpricing and associated flotation costs.

- New shares are underpriced if the stock is sold at a price below its current market price, P_0.
- We can use the constant-growth valuation model for the cost of existing common stock, r_s, as a starting point. If we let N_n represent the net proceeds from the sale of new common stock after subtracting underpricing and flotation costs, the cost of the new issue, r_n, can be expressed as follows:

$$r_n = [D_1 / N_n] + g \quad \text{.....8.6}$$

- The net proceeds from the sale of new common stock, N_n, will be less than the current market price, P_0.
- Therefore, the cost of new issues, r_n, will always be greater than the cost of existing issues, r_s, which is equal to the cost of retained earnings, r_r.
- The cost of new common stock is normally greater than any other long-term financing cost.
- To determine the cost of new common stock, r_n, DO-DO Corporation has estimated that on average, new shares can be sold for LE48. The LE2.00 -per-share underpricing is due to the current nature of the market. Also, the company estimated that the flotation costs per share are LE2.5. The total underpricing and flotation costs per share are therefore LE4.50 leaving the net proceeds equal LE45.5. Using this

information and assuming growth rate equal to 6%, a cost of new capital can be calculated as follows:

$r_n = 4 / 45.50 + 0.06 = 14.79\%$

5. Weighted Average Cost of Capital

The weighted average cost of capital (WACC), r_a, was found by weighting the cost of each specific type of capital by its proportion to the firm's capital structure. It reflects the expected average future cost of capital over the long run.

$$\mathbf{r_a = (w_i \times r_i) + (w_s \times r_{r \text{ or } n}) \ldots\ldots\ldots\ldots equation\ 8.7}$$

Were

w_i	=	proportion of long-term debt in capital structure
w_s	=	proportion of common stock equity in capital structure
w_i+w_s	=	1.0

-Three important points should be noted in the equation for r_a:

1- It is best to convert the weights into **decimal form** and leave the individual costs in percentage terms.

2- The weights **must be non-negative and sum to 1.0**. Simply stated, WACC must account for all financing costs within the firm's capital structure.

3- The firm's common stock equity weight, w_s, is multiplied **by either** the cost of retained earnings, r_r, or the cost of new common stock, r_n. Which cost is used depends on whether the firm's common stock equity will be financed using retained earnings, r_r, or new common stock, r_n?

In previous examples, we found the costs of the several types of capital for DO-DO Corporation to be as follows:

- Cost of debt, r_i = 7.51%-
- Cost of retained earnings, r_r = 14.0%
- Cost of new common stock, r_n = 14.79%

The company uses the following weights in calculating its weighted average cost of capital using the cost of retained earnings:

- Long-term debt = 40%
- Common stock equity = 60%

WACC = 0.40*7.51% + 0.60*14.0% = 3.0 +8.40%=11.404%

However, if the company uses the cost of new common stock r_n in calculating its weighted average cost of capital, so

WACC=0.40*7.51%+ 0.60*14.79%=3.004%+8.40%
=11.878%

6. WEIGHTED AVERAGE COST OF CAPITAL: WEIGHTING SCHEMES

Cost of capital can be calculated based on either the book value or the market value of the firm using either historical or target proportion.

Book Value versus Market Value

- **Book value weights** are weights that use accounting values to measure the proportion of each type of capital in the firm's financial structure.
- **Market value weights** are weights that use market values to measure the proportion of each type of capital in the firm's financial structure.

Historical versus Target

- **Historical weights** are either book or market value weights based on actual capital structure proportions.
- **Target weights** are either book or market value weights based on desired capital structure proportions**.**

CHAPTER NINE

LONG-TERM INVESTMENT DECISIONS: CAPITAL BUDGETING CASH FLOWS AND TECHNIQUES

Chapter outlines:

1- **Introduction**
2- **Introduction to Capital budgeting basic terminology**
3- **Capital budgeting cash flows.**
4- **Capital budgeting techniques.**
   - **4.1 Net Present Value as the main Method.**
   - **4.2 Other Methods for Capital Budgeting.**
     - **4.2.1 Profitability Index**
     - **4.2.3 Internal Rate of Return (IRR)**
     - **4.2.4 Modified Internal Rate of Return (MIRR)**
     - **4.2.5 Payback Period**
     - **4.2.6 Discounted Payback Period**
5- **Present Value Profiles.**
6- **Comparing Between the NPV and IRR Techniques**

[1] INTRODUCTION

- **Cost of capital** is the cost that the firm acquired to finance the required capital necessary for the firm's investments.

- This **capital** can be composed from variety of sources such as debts, preferred stocks, and common stocks, each of these sources has its certain cost and the total cost of all these sources is combined to calculate the firm weighted average cost of capital (WACC). Through this figure weighted average cost of capital WACC) rational investment decisions can be taken by financial managers.

- According to the **theory of finance**, investment decisions should be taken, and investment actions should be made only when **the marginal benefits of the investment decision exceed the marginal cost.**

- That is to say, financial managers should accept only those investment decisions whose added benefits exceed their added costs.

- **Marginal cost** represents the firm's weighted average cost of capital while the **marginal benefits** represent the benefits, or the return received on a certain investment project.

- **Cost of capital** is the figure that links together long-term (strategic) financing decisions and long term (strategic) investment decisions.

In this chapter the marginal benefit of an investment project will be calculated through different methods and then compared with the marginal cost; through this comparison wise investment decisions can be taken.

[2] OVERVIEW OF CAPITAL BUDGETING BASIC TERMINOLOGY.

- ***Capital*** **budgeting** is the process of evaluating and selecting long-term investments that are consistent with the firm's goal of maximizing owner wealth. This process consists of five steps: 1. Generation of long - term investment proposals,2. Review and analysis such proposal, 3. Decision making,4. Implementation of accepted proposal(s), and 5. Follow-up. (Gitman et al 2012). In this chapter we care only about the two and third steps.
- ***A*** **capital** ***expenditure*** is an outlay of funds by the firm that is expected to produce benefits over a period greater than one year.
- ***Operating expenditure*** is an outlay of funds by the firm resulting in benefits received within one year.
- ***Independent projects*** are projects whose cash flows are unrelated to (or independent of) one another; so, the

acceptance of one does not eliminate the others from further consideration and to be accepted or rejected.

- ***Mutually exclusive*** **projects** are projects that compete with one another, so that the acceptance of one eliminates from further consideration all other projects that perform a similar function

- ***Unlimited funds(budget)*** regarded as the financial situation in which a firm can accept all independent projects that provide an acceptable return.

- ***Limited funds (Capital rationing)*** is the financial situation in which a firm has only limited funds(budget) available for capital expenditures, and numerous projects compete for such funds.

- ***An accept–reject approach*** is the evaluation of capital expenditure proposals to determine whether they meet the firm's minimum acceptance criterion.

- ***A ranking approach*** is the ranking of capital expenditure projects based on some predetermined measure, such as the rate of return, net present value...

- ***Sunk costs*** are cash outlays that have already been made (past outlays) and therefore have no effect on the cash flows relevant to a current decision and they should not be included in a project's incremental cash flows.

- ***Opportunity costs*** are cash flows that could be realized from the best alternative use of an owned asset or funds).

[3] CAPITAL BUDGETING CASH FLOWS

To evaluate investment opportunities, financial managers must determine *the relevant cash flows*, the incremental cash associated with a proposed capital expenditure.

- ***Incremental cash flows*** are the additional cash flows-outflows or inflows-expected to result from a proposed capital expenditure.
- ***Relevant cash flows***

The cash flows of any project may include three basic cash flow components:

1- ***Initial investment***: which is the relevant cash outflow for a proposed project or asset at time zero.
2- ***Operating cash inflows***: which are the incremental after-tax cash inflows resulting from implementation of a project or asset during its life.
3- ***Terminal cash flow***: the after-tax non-operating cash flow occurring in the final year of a project. It is usually related to liquidation of a project or asset.

The calculation of the three components of relevant cash flows as following:

Initial *investment* =	initial investment for new asset - After tax cash inflows from liquidation old asset
Operating cash inflows =	Operating cash inflows from new asset - Operating cash inflows from old asset
Terminal cash flow =	After tax cash inflows from termination new asset - After tax cash inflows from termination old asset

- **Expansion versus Replacement Decisions**
  - *In the case of **expansion decisions***, the initial investment, operating cash inflows, and terminal cash flow are merely the after-tax cash outflow and inflows associated with the proposed project or asset.
  - *In the **replacement decisions*** are more complicated, the firm must identify the incremental cash outflow and inflows that would result from the proposed replacement.

[4] CAPITAL BUDGETING TECHNIQUES

- The capital budgeting techniques(methods) are discussed under the following classification.

4.1 Net Present Value as the main Method.

4.2 Other Methods for Capital Budgeting:

4.2.1 Profitability Index (PI)

4.2.2 Internal Rate of Return (IRR)

4.2.3 Modified Internal Rate of Return (MIRR)

4.2.4 Payback Period (PB)

4.2.5 Discounted Payback Period (DPB)

The following example is used to explain the calculation of each method.

Example: Star food Company is a large industry company that is recently considering two projects: Project (Y) requires an initial investment of LE**350,000,000**project (Z) an initial investment of LE**320,000,000**. The estimated cost of capital is 10%.

The cash flows for the two projects are presented in the following table.

Year	**Project Y** (in million LE)	**Project Z** (in million LE)
y_0	-350	-320
y1	180	190
y2	180	180
y3	180	170
y4	180	160
y5	180	140
y6	180	140

Table 9.1

4.1 NET PRESENT VALUE AS THE MAIN METHOD

- Net present value (NPV) is a sophisticated capital budgeting method(technique); which can be found by subtracting the

initial investment of the project or asset from the present value of its cash inflows discounted at a required rate of return (discount rate) equal to the firm's cost of capital.

- Net present value (NPV) method measures the amount of wealth created by the investment proposal or proposed asset with positive net present value.
- Net present value (NPV) does tell the management by how much the value of the firm would increase if the firm implemented an investment proposal or asset with positive net present value.
- Note investment proposals or assets with riskier cash flows should have higher required rate of return or discount rates than investment proposals or assets with less risky cash flows.
- The investment proposal

NPV = Sum of the Present Value of Expected Cash Inflows over n period – Initial investment at y_0

$$\mathbf{NPV} = \frac{\mathbf{CF_1}}{(\mathbf{1+r})^{\mathbf{1}}} + \frac{\mathbf{CF_2}}{(\mathbf{1+r})^{\mathbf{2}}} + \cdots + \frac{\mathbf{CF_n}}{(\mathbf{1+r})^{\mathbf{n}}} - \mathbf{Initial\ investment}$$

Equation 9.1 a

That is,

$$\boldsymbol{NPV} = \sum_{\boldsymbol{t=1}}^{\boldsymbol{n}} \frac{\boldsymbol{CF_t}}{(\boldsymbol{1+r})^{\boldsymbol{t}}} - \boldsymbol{CF_0}$$ Equation 9.1 b

4.1.1 Decision criteria:

- If the NPV is ***greater than* zero (NPV > 0)**, *accept* the project.
- If the NPV is ***less than zero* (NPV < 0)**, *reject* the project.

If the NPV is greater than zero, it does mean that the firm will achieve a return greater than its required rate of return equal to its cost of capital.

In such a case the market value of the firm should increase, and thereafter the wealth of its stockholders (owners) by an amount equal to the NPV.

Note that if the net present value of the project is greater than zero, it means that the rate of return it generates would be greater than the cost of required rate of return (WACC)

4.1.2 Calculating the NPV

The *NPV* of project (Y) and project (X) of the above example: can be calculated as following:

NPV = Sum of P.V of expected cash inflows – Initial investment

$$NPV(\mathrm{Y}) = \left[\frac{180}{(1+0.10)^1} + \frac{180}{(1+0.10)^2} + \frac{180}{(1+0.10)^3} + \frac{180}{(1+0.10)^4} + \frac{180}{(1+0.10)^5} + \frac{180}{(1+0.10)^6}\right] - 350$$

$$\boldsymbol{NPV(Y)} = \left[\frac{180}{1.1000} + \frac{180}{1.2100} + \frac{180}{1.3310} + \frac{180}{1.4641} + \frac{180}{1.6105} + \frac{180}{1.7716}\right] - 350$$

= 783.947 – 350 = LE433.947

Note that in case of an annuity cash inflow we can use the following procedure (go back to ch.4):

$$\mathrm{NPV}_{(\mathrm{Y})} = [180 * \mathrm{PVIFA}_{10\%, 6}] - 350$$

$$= [180 * 4.3553] - 350$$

= 783.947 – 350 = LE433.947

$$NPV(\mathrm{Z}) = \left[\frac{190}{(1+0.10)^1} + \frac{180}{(1+0.10)^2} + \frac{170}{(1+0.10)^3} + \frac{160}{(1+0.10)^4} + \frac{140}{(1+0.10)^5} + \frac{140}{(1+0.10)^6}\right] - 320$$

$$NPV(\text{Z}) = \left[\frac{190}{1.1000} + \frac{180}{1.2100} + \frac{170}{1.3310} + \frac{160}{1.4641} + \frac{140}{1.6105} + \frac{140}{1.7716}\right] - 320$$

= {[172.727] + [148.760] + [127.723] + [109.282] +

[86.928 + [79,026]} –320

= 724.448 – 320 = LE404.449

- According to the NPV decision rule these both projects are accepted since their NPV greater than zero, however we found that NPV of project (Y) higher than the NPV of project (Z) but both projects passed the first test which is ***"Accept–Reject Test".***

  - Comparing the two projects' NPVs, **we would prefer project (Y) over project (Z) because NPV_Y = LE433.94 > NPV_Z = LE404.449.**

- Note in the case that the company has unlimited budget, and these two projects are independent the company has the choice to implement the two projects, but if this company has limited budget or these two projects are mutually *exclusive* ones the company should select the project which have the higher NPV which in this case project (y).

4.1.3 Advantages and Disadvantages of Net Present Value (NPV) Method

The following table summarizes the advantages and disadvantages of Net Present Value (NPV) Method.

Advantages and Disadvantages of Net Present Value (NPV) Method

Capital Budgeting Method	Definition	Criteria	Advantages	Disadvantages
NPV	Present value of expected cash inflows minus initial investment	Accept projects that have positive NPV	-Theoretically correct in that it gives us a perfect information about by how much the value of the firm will increase if we accept the project - It is built on the concept of discounting cash flow method, by the means that it does take into consideration the time value of money, cash flow function as a measure of return, and the risk of such return	Not familiar to managers and investors without business education background.

Table 9.2

4.2 OTHER METHODS FOR CAPITAL BUDGETING

Despite that the NPV investment method is more acceptable theoretically method and makes sense in theory, but in practice financial managers are using several other methods to evaluate investment proposals. Such methods include the profitability index (PI), internal rate of return (IRR), modified internal rate of return (MIRR), payback period (PB), and discounted payback period (DPB).

4.2.1 PROFITABILITY INDEX (PI)

- For a project that has an initial cash outflow followed by cash inflows, the profitability index (PI)can be used. The profitability index can be seen as the cost-benefit ratio. Its equal to the present value of expected cash inflows divided by the initial cash outflow:

$$PI = \frac{PV\ of\ expected\ cash\ flows}{Initial\ Investment} \quad \text{..... equation 9.2 a}$$

That is,

$$PI = \frac{\sum_{t=1}^{n} \frac{CF_t}{(1+r)^t}}{CF_0} \quad \text{..... equation 9.2 b}$$

4.2.1.1 Decision criteria:

- If the PI is ***greater than 1, (PI >1)***, accept the project.
- If the PI is ***less than 1, (PI <1),*** reject the project.

- When firms evaluate investment opportunities using the PI, the decision rule they follow is to invest in the

project when the index is greater than 1.0 and reject the project when the index is less than 1.0.

- A profitability index greater than one means that the present value of expected cash flows of the investment proposal exceeds its initial cost, and the investment should be accepted, and the opposite is true, that is if the present value of expected cash flows of the investment proposal below its initial cost the investment should be rejected.
- Also, firms are using the profitability index (PI), in ranking investment opportunities under capital rationing situations by ranking them from higher PI to lower PI.
- Note that the profitability index (PI) method is closely related to the net present value (NPV) method since both methods use the same inputs: initial investment cash outlay and the present value of the expected cash inflows. Where NPV is the deference of the two variables and Pi is the ratio of them.

4.2.1.2 Calculating (PI).

- Based on the present value of cash inflows for projects (Y) and (Z) for the above example, the PI for each of project can be calculating as following:

  PI_Y = 783.947 / 320 = 2.24

  PI_Z = 724,449 / 350 = 2.26

- By considering these two projects, both projects are accepted since their PI greater than 1; however, we found that PI of project (Z) is 2.26 which is higher than 1 and the PI of project (Y) is 2.24 which is higher than 1, so both projects passed the first test which is ***"Accept–Reject Test"*.**

4.2.1.3 Advantages and Disadvantages of Profitability Index (PI) method

The following table summarizes the advantages and disadvantages of the Profitability Index (PI) method**.**

Advantages and Disadvantages of Profitability Index (PI) method

Capital Budgeting Profitability Index (PI)	Definition	Criteria	Advantages	Disadvantages
Profitability Index (PI)	Present value of expected cash inflows divided by the initial investment	Accept projects that have (PI) higher than 1 (note that the NPV in this case will be higher than zero	-Theoretically correct in that it gives us perfect information about the increase in value that the project is expected to produce. - It is built on the concept of discounting cash flow method, by the means that it does take into consideration the time value of money, cash flow function as a measure of return, and the risk of such return	Not familiar to managers as the NPV and do not provide any additional information.

Table 9.3

4.2.3 INTERNAL RATE OF RETURN (IRR)

-The Internal Rate of Return (IRR) is **the discount rate that equates the NPV of an investment opportunity with 0** (that is the present value of cash inflows equals the initial investment).

- The Internal Rate of Return (IRR) is like the yield to maturity (YTM) on bond discussed in previous chapter (ch.6).

-The Internal Rate of Return (IRR) is **the rate of return that the firm will earn if it invests in the project and receives the given cash inflows.**

$$\mathbf{0} = \sum_{t=1}^{n} \frac{\boldsymbol{CF_t}}{(\mathbf{1} + \boldsymbol{IRR})^t} - \boldsymbol{CF_0}$$

equation 9.3 a

Or

$$\sum_{t=1}^{n} \frac{\boldsymbol{CF_t}}{(\mathbf{1} + \boldsymbol{IRR})^t} = \boldsymbol{CF_0}$$

equation 9.3 b

4.2.3.1 Decision criteria:

- If the Internal Rate of Return (IRR) ***is greater than the cost of capital***, accept the project.
- If the Internal Rate of Return (IRR) is ***less than the cost of capital***, reject the project.

These decision criteria guarantee that the firm will earn at least its required return (cost of capital). Such an outcome should increase the market value of the firm and, therefore, the wealth of its owners.

4.2.3.2 Calculating the IRR

- To find the IRR you can use the preprogrammed function in a financial calculator or Excel or any other statistical package.
- Comparing the IRRs of projects (Y) and (X) for Star food Company with 10% cost of capital, we can see that both projects are acceptable because their internal rate of returns are greater than the assumed rate of cost of capital which is 10%, that is.

  IRR_Y = 46.15% > 10.0% cost of capital

  IRR_X = 49.87% > 10.0% cost of capital

- By considering these two projects, both projects are accepted since their IRRs greater than the cost of capital; however, we found that IRR of project (X) higher than the IRR of project (Y), but both projects passed the first test which is ***"Accept–Reject Test".***
- So, according to the IRR method by comparing the two projects' IRRs, we would prefer project (X) over

project (Y) because IRR_X = **49.87%** > IRR_Y = **46.15%.**

- It is interesting to note in the above example that the NPV method suggests that project **(Y)**, which has an NPV of LE**433.947,** is preferable to project **(Z)**, which has an NPV of LE**404.449,** while the IRR method suggests that project **(Z)**, which has an IRR of **49.87%,** is preferable to project **(Y)**, which has an IRR of **46.15%**
- Such conflicts are not unusual. There is no guarantee that NPV and IRR will rank projects in the same order. However, both methods should reach the same conclusion about the acceptability or non-acceptability of projects.

4.2.3.3 Advantages and Disadvantages of Internal Rate of Return (IRR) method.

The following table summarized the Advantages and disadvantages of Internal Rate of Return (IRR):

Advantages and Disadvantages of Internal Rate of Return (IRR) method

Capital Budgeting Technique	Definition	Criteria	Advantages	Disadvantages
IRR	The discount rate that equates NPV with zero	Accept the project if the internal rate of return IRR is greater than the cost of capital (required rate of return)	Provide a rate of return metric which is most preferable for all financial managers. It is built on the concept of discounting cash flow method, by the means that it does take into consideration the time value of money, cash flow function as a measure of return, and the risk of such return	Cannot always be calculated especially if the project associated with non-conventional cash flow pattern (multiple IRRs)

TABLE 9.4

4.2.4 MODIFIED INTERNAL RATE OF RETURN (MIRR)

The modified Internal Rate of Return (MIRR) assumes that cash flows generated out of the project are reinvested at the firm's cost of capital.

4.2.4.1 Calculating the MIRR

- First: brought cash flows forward to their future values at the firm's cost of capital.
- Second: calculate the terminal value by summing all the future value cash flows together.
- Finally, the terminal value is brought to the present value of the initial investment at the modified IRR rate.
- To find the MIRR you can use the preprogrammed function in a financial calculator or Excel or any other statistical package.

4.2.4.2 Decision criteria:

- If the MIRR is ***greater than the cost of capital***, accept the project.
- If the MIRR is ***less than the cost of capital***, reject the project.

These criteria guarantee that the firm will earn at least its cost of capital. Such an outcome should increase the market value of the firm and, therefore, the wealth of its owners.

- Comparing the MIRRs of projects (Y) and (B) to Star food Company's projects with 10% cost of capital, we can see that both projects are acceptable because.
  $MIRR_Y = 25.82\% > 10.0\%$ cost of capital

  $MIRR_Z = 26.05\% > 10.0\%$ cost of capital
- By considering these two projects, both projects are accepted since their MIRRs greater than the cost of capital; however, we found that MIRR of project (Z) higher than the MIRR of project (Y) but both projects passed the first test which is ***"Accept–Reject Test".***
- Comparing the two projects' MIRRs, we would prefer project (Z) over project (Y) because MIRR, Z = 26.05% >MIRR, Y = 25.82%.

Based on MIRR, and if the projects are mutually exclusive (only one project can be selected) then the firm should select project (z) as it has the highest MIRR).

Note that the main difference between both the IRR method and MIRR method is the underline assumption of the reinvestment rate of the intermediate cash flow, where the IRR method assumes that rate is the IRR for each project and for MIRR assumes that rate is the cost of capital of the firm.

4.2.4.3 Advantages and Disadvantages of Modified Internal Rate of Return (MIRR) method.

The following table summarized the advantages and disadvantages of Modified Internal Rate of Return (MIRR) method:

Advantages and Disadvantages of Modified Internal Rate of Return (MIRR) method

Capital Budgeting Technique	Definition	Criteria	Advantages	Disadvantages
Modified IRR (MIRR)	The discount rate that equates the NPV of the modified cash flow stream with zero	Accept the project if the MIRR is greater than the cost of capital (required rate of return)	-Always produce a single rate of return estimates. - It is built on the concept of discounting cash flow method, by the means that it does take into consideration the time value of money, cash flow function as a measure of return, and the risk of such return.	The rate of return produced by the MIRR is not unique.

Table 9.5

4.2.5 PAYBACK PERIOD

The payback method is the amount of time required for a firm to recover its initial investment in a project, as calculated from cash inflows.

4.2.5.1 Decision criteria:

- If the payback period is ***less than the maximum *acceptable payback*** period, accept the project.
- If the payback period is ***greater than the maximum *acceptable payback*** period, reject the project.

*Note that the length of the maximum acceptable payback period is determined by management.

4.2.5.2 Calculating the Payback Period

We can calculate the payback period for Star food Company's projects (Y) and (Z) using the above data while taking into consideration the cash flows structure of each project.

- For project (Y), which is an annuity cash inflow's structure, the payback period under this situation can be calculating using the following equation:

Payback Period = Initial Investment / Annual Cash Inflow

equation 9.4

Applying this equation to calculate the payback period for project (Y), we end up with a PB equal to **1.944** years or one year and almost 12 months.

PB Period = LE350 M EGP ÷LE180 = 1.944 or almost 2 years (that is 1 year + 0.944*12mouth per year)

- For project (Z) because it generates a mixed stream of cash inflows, the calculation of its payback period can be represented as follows:

Firm	Cash flows Project Z (MILLION LE)	Cumulative (MILLION LE)
Initial cash outlay	**-320**	**-320**
Y1	**190**	**-130**
Y2	**180**	**+50**
Y3	**170**	
Y4	**160**	
Y5	**140**	
Y6	**140**	

Table 9.6

- In year one, the firm will recover LE190 of its 320 m LE of the initial investment, left LE130 m uncovered.
- Within year two, the firm will cover what is left uncovered of the initial investment at the end of year one amount of LE130 m. Therefore, the payback period for project (Z) is 1 year and 9 months [(130/180) *12months = 0.722*12=8.67].

4.2.5.2 Advantages and Disadvantages of Pay Back (PB) Period method.

The following table summarized the advantages and disadvantages of Pay Back (PB) Period method:

Advantages and Disadvantages of Pay Back (PB) Period method.

Capital Budgeting Technique	Definition	Criteria	Advantages	Disadvantages
Pay Back Period	Amount of time required by the firm to collect its initial investment	Accept the project if the calculated payback period is less than or equal to the maximum acceptable payback period.	Easy to understand and calculate	Ignore time value of money, ignore risk, and ignore cash flow beyond the payback period.

Table 9.7

4.2.6 DISCOUNTED PAYBACK PERIOD

The discounted payback period (DPB) is the amount of time required for a firm to recover its initial investment in a project out from discounted expected cash inflows. In this case the time value for money is taken into consideration.

4.2.6.1 Decision criteria

- If the discounted payback period is ***less than the maximum acceptable discounted payback period,*** accept the project.
- If the discounted payback period is ***greater than the maximum acceptable discounted payback period***, reject the project.

By applying the concept of discounted cash flows in our example using a discount rate of 10% the discounted payback period for each asset can be calculated as follows:

Table 9.8

	CASH FLOWS (Y) EGP	DISCOUNTED CASH FLOWS (Y)	CUMULATIVE DISCOUNTED CASH FLOWS (Y)	CASH FLOWS (Z) EGP	DISCOUNTED CASH FLOWS (Z)	CUMULATIVE DISCOUNTED CASH FLOWS (Z)
Cash Out	-350	-350	-350	-320	-320	-320
Y1	180	163.64	-186.36	190	172.73	-147.27
Y2	180	148.76	-37.60	180	148.76	1.54
Y3	180	135.24	97.64	170		
Y4	180			160		
Y5	180			140		
Y6	180			140		

So, the payback period for project Y is therefore 2 years and 4 m, and the payback period for project Z is therefore almost 2 years.

4.2.6.2 Advantages and Disadvantages of Discounted Payback (DPB) Period method

The following table summarized the advantages and disadvantages of discounted Pay Back (DPB) Period method:

Advantages and Disadvantages of Discounted Pay Back (DPB) Period

Capital Budgeting Technique	Definition	Criteria	Advantages	Disadvantages
Discounted Payback Period Method	Amount of time required by the firm to collect the initial investment out of project discounted future cash flows.	Accept the project if the discounted project payback period is less than or equal the maximum acceptable discounted payback period.	-This technique takes into consideration time value of money by discounting future cash flows	More complicated to compute compared with the ordinary payback period.

Table 9.9

[5] NET PRESENT VALUE PROFILE

- Net present value profiles are graphs that show a project's NPVs for several discount rates.

  To explain the concept of net present value profile, consider the following two projects (A) and (B) where the

firm can choose only one of them. The cash flows of each project over 6 years (including initial year) as shown in the following table. The firm's cost of project is 10%. (Figures are in millions)

year	Project A	Project B
0	-180	-170
1	112	56
2	48	56
3	40	56
4	40	56
5	40	56

To prepare net present value profiles for firm's projects (A) and (B), first calculate net present value of the two projects at different discount rates (zero%, cost of capital, and the IRR of each project) then plot them on a graph as shown in the following table and graph:

NPV for projects A & B AT Several Discount Rates		
Discount Rate	Net Present Value	
	Project (A)	Project (B)
Zero %	100.00	110.00
10% (COST OF CAPITAL)	43.69	42.28
21.65% (IRR_Y)	zero	-------
19.32% (IRR_X)	--------	zero

Table 9.10

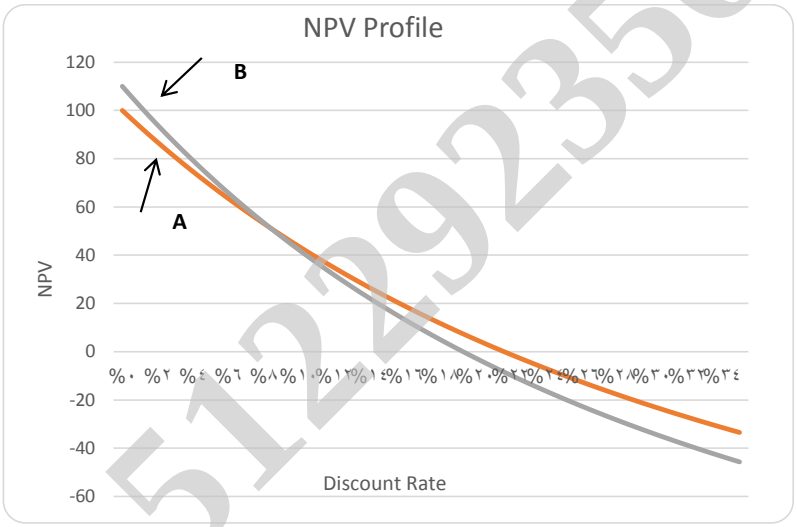


Figure 9.1

- The above figure indicates that for any discount rate **less than** approximately **9.00%** (where the NPV for the two projects is equal to LE48 m), the NPV for project (B) is greater than the NPV for project (A). **Beyond this point**,

the NPV for project (A) is greater than the NPV for project (B).

- Because the net present value profiles for projects (A) and (B) **cross at a positive NPV (LE48 m)**, the IRRs for the projects cause conflicting rankings whenever they are compared to NPVs calculated at discount rates **below 9%.**

[6] COMPARING BETWEEN THE NPV AND IRR TECHNIQUES

A) Conflicting Rankings

- Conflicting rankings are conflicts in the ranking given a project by NPV and IRR, resulting from:
  - A) differences in the size of cash flows, (that is the size of both initial investment cash flow and operation cash inflows).
  - B) differences in the timing of cash flows.
- One fundamental reason of conflicting rankings between NPV and IRR methods is the inherent assumption regarding ***the reinvestment of intermediate cash inflows-cash inflows*** received before the termination of the project.
- ***NPV method assumes*** that the intermediate cash flows are reinvested at a rate equal the cost of capital, while
- ***IRR method assumes*** that they are reinvested at the IRR of the project.

A) Differences in the Size of cash flows

- The scale problem occurs when two projects are quite different in terms of how much money is required to invest in each project.
- In these cases, the IRR and NPV methods may rank projects differently.
- The IRR approach (and the PI method) may favor small projects with high returns.
- The NPV approach favors the investment that makes the investor the most money.

B) Differences in the timing of cash flows.

- When ***much*** of the cash flows of a project ***arrives early*** in its life, the NPV of the project will not be sensitive to the required rate of return or the discount rate.
- On the other hand, the NPV of project with cash flows that ***arrive later*** will be sensitive to the required rate of return or the discount rate and it would fluctuate more as the required rate of return or the discount rate changes.
- The differences in the timing of cash flows between the two projects do not affect the ranking provided by the IRR method.

Which Approach is better?

- On a purely theoretical basis, NPV is the better approach because it does measure how much wealth a project creates (or destroys if the NPV is negative) for shareholders' wealth. The IRR method, for certain reasons, may cause a project to have multiple IRRs: that is more than one IRR resulting from a project with a nonconventional cash flow pattern; the maximum number of IRRs for a project is equal to the number of sign changes in its cash flows.
- From a practical basis, financial managers prefer to use the IRR approach just as often as the NPV method because of the preference for rates of return.

In general, the NPV and IRR methods enjoy wider use in larger firms, while the payback method being more common in smaller firms.

APPENDICES

APPENDIX 1

FUTURE VALUE FINANCIAL TABLES

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Table A-1 Future Value Interest Factors for One Dollar Compounded at k Percent for n Periods: $FVIF_{k,n} = (1 + k)^n$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	24%	25%	30%
1	1.0100	1.0200	1.0300	1.0400	1.0500	1.0600	1.0700	1.0800	1.0900	1.1000	1.1100	1.1200	1.1300	1.1400	1.1500	1.1600	1.2000	1.2400	1.2500	1.3000
2	1.0201	1.0404	1.0609	1.0816	1.1025	1.1236	1.1449	1.1664	1.1881	1.2100	1.2321	1.2544	1.2769	1.2996	1.3225	1.3456	1.4400	1.5376	1.5625	1.6900
3	1.0303	1.0612	1.0927	1.1249	1.1576	1.1910	1.2250	1.2597	1.2950	1.3310	1.3676	1.4049	1.4429	1.4815	1.5209	1.5609	1.7280	1.9066	1.9531	2.1970
4	1.0406	1.0824	1.1255	1.1699	1.2155	1.2625	1.3108	1.3605	1.4116	1.4641	1.5181	1.5735	1.6305	1.6890	1.7490	1.8106	2.0736	2.3642	2.4414	2.8561
5	1.0510	1.1041	1.1593	1.2167	1.2763	1.3382	1.4026	1.4693	1.5386	1.6105	1.6851	1.7623	1.8424	1.9254	2.0114	2.1003	2.4883	2.9316	3.0518	3.7129
6	1.0615	1.1262	1.1941	1.2653	1.3401	1.4185	1.5007	1.5869	1.6771	1.7716	1.8704	1.9738	2.0820	2.1950	2.3131	2.4364	2.9860	3.6352	3.8147	4.8268
7	1.0721	1.1487	1.2299	1.3159	1.4071	1.5036	1.6058	1.7138	1.8280	1.9487	2.0762	2.2107	2.3526	2.5023	2.6600	2.8262	3.5832	4.5077	4.7684	6.2749
8	1.0829	1.1717	1.2668	1.3686	1.4775	1.5938	1.7182	1.8509	1.9926	2.1436	2.3045	2.4760	2.6584	2.8526	3.0590	3.2784	4.2998	5.5895	5.9605	8.1573
9	1.0937	1.1951	1.3048	1.4233	1.5513	1.6895	1.8385	1.9990	2.1719	2.3579	2.5580	2.7731	3.0040	3.2519	3.5179	3.8030	5.1598	6.9310	7.4506	10.604
10	1.1046	1.2190	1.3439	1.4802	1.6289	1.7908	1.9672	2.1589	2.3674	2.5937	2.8394	3.1058	3.3946	3.7072	4.0456	4.4114	6.1917	8.5944	9.3132	13.786
11	1.1157	1.2434	1.3842	1.5395	1.7103	1.8983	2.1049	2.3316	2.5804	2.8531	3.1518	3.4785	3.8359	4.2262	4.6524	5.1173	7.4301	10.657	11.642	17.922
12	1.1268	1.2682	1.4258	1.6010	1.7959	2.0122	2.2522	2.5182	2.8127	3.1384	3.4985	3.8960	4.3345	4.8179	5.3503	5.9360	8.9161	13.215	14.552	23.298
13	1.1381	1.2936	1.4685	1.6651	1.8856	2.1329	2.4098	2.7196	3.0658	3.4523	3.8833	4.3635	4.8980	5.4924	6.1528	6.8858	10.699	16.386	18.190	30.288
14	1.1495	1.3195	1.5126	1.7317	1.9799	2.2609	2.5785	2.9372	3.3417	3.7975	4.3104	4.8871	5.5348	6.2613	7.0757	7.9875	12.839	20.319	22.737	39.374
15	1.1610	1.3459	1.5580	1.8009	2.0789	2.3966	2.7590	3.1722	3.6425	4.1772	4.7846	5.4736	6.2543	7.1379	8.1371	9.2655	15.407	25.196	28.422	51.186
16	1.1726	1.3728	1.6047	1.8730	2.1829	2.5404	2.9522	3.4259	3.9703	4.5950	5.3109	6.1304	7.0673	8.1372	9.3576	10.748	18.488	31.243	35.527	66.542
17	1.1843	1.4002	1.6528	1.9479	2.2920	2.6928	3.1588	3.7000	4.3276	5.0545	5.8951	6.8660	7.9861	9.2765	10.761	12.468	22.186	38.741	44.409	86.504
18	1.1961	1.4282	1.7024	2.0258	2.4066	2.8543	3.3799	3.9960	4.7171	5.5599	6.5436	7.6900	9.0243	10.575	12.375	14.463	26.623	48.039	55.511	112.455
19	1.2081	1.4568	1.7535	2.1068	2.5270	3.0256	3.6165	4.3157	5.1417	6.1159	7.2633	8.6128	10.197	12.056	14.232	16.777	31.948	59.568	69.389	146.192
20	1.2202	1.4859	1.8061	2.1911	2.6533	3.2071	3.8697	4.6610	5.6044	6.7275	8.0623	9.6463	11.523	13.743	16.367	19.461	38.338	73.864	86.736	190.050
21	1.2324	1.5157	1.8603	2.2788	2.7860	3.3996	4.1406	5.0338	6.1088	7.4002	8.9492	10.804	13.021	15.668	18.822	22.574	46.005	91.592	108.420	247.065
22	1.2447	1.5460	1.9161	2.3699	2.9253	3.6035	4.4304	5.4365	6.6586	8.1403	9.9336	12.100	14.714	17.861	21.645	26.186	55.206	113.574	135.525	321.184
23	1.2572	1.5769	1.9736	2.4647	3.0715	3.8197	4.7405	5.8715	7.2579	8.9543	11.026	13.552	16.627	20.362	24.891	30.376	66.247	140.831	169.407	417.539
24	1.2697	1.6084	2.0328	2.5633	3.2251	4.0489	5.0724	6.3412	7.9111	9.8497	12.239	15.179	18.788	23.212	28.625	35.236	79.497	174.631	211.758	542.801
25	1.2824	1.6406	2.0938	2.6658	3.3864	4.2919	5.4274	6.8485	8.6231	10.835	13.585	17.000	21.231	26.462	32.919	40.874	95.396	216.542	264.698	705.641
30	1.3478	1.8114	2.4273	3.2434	4.3219	5.7435	7.6123	10.063	13.268	17.449	22.892	29.960	39.116	50.950	66.212	85.850	237.376	634.820	807.794	*
35	1.4166	1.9999	2.8139	3.9461	5.5160	7.6861	10.677	14.785	20.414	28.102	38.575	52.800	72.069	98.100	133.176	180.314	590.668	*	*	*
36	1.4308	2.0399	2.8983	4.1039	5.7918	8.1473	11.424	15.968	22.251	30.913	42.818	59.136	81.437	111.834	153.152	209.164	708.802	*	*	*
40	1.4889	2.2080	3.2620	4.8010	7.0400	10.286	14.974	21.725	31.409	45.259	65.001	93.051	132.782	188.884	267.864	378.721	*	*	*	*
50	1.6446	2.6916	4.3839	7.1067	11.467	18.420	29.457	46.902	74.358	117.391	184.565	289.002	450.736	700.233	*	*	*	*	*	*

Table A-2 Future Value Interest Factors for a One-Dollar Annuity Compounded at *k* Percent for *n* Periods: $FVIFA_{k,n} = [(1 + k)^n - 1] / k$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	24%	25%	30%
1	1.0000	1.0200	1.0300	1.0400	1.0500	1.0600	1.0700	1.0800	1.0900	1.1000	1.1100	1.1200	1.1300	1.1400	1.1500	1.1600	1.2000	1.2400	1.2500	1.3000
2	2.0100	2.0200	2.0300	2.0400	2.0500	2.0600	2.0700	2.0800	2.0900	2.1000	2.1100	2.1200	2.1300	2.1400	2.1500	2.1600	2.2000	2.2400	2.2500	2.3000
3	3.0301	3.0604	3.0909	3.1216	3.1525	3.1836	3.2149	3.2464	3.2781	3.3100	3.3421	3.3744	3.4069	3.4396	3.4725	3.5056	3.6400	3.7776	3.8125	3.9900
4	4.0604	4.1216	4.1836	4.2465	4.3101	4.3746	4.4399	4.5061	4.5731	4.6410	4.7097	4.7793	4.8498	4.9211	4.9934	5.0665	5.3680	5.6842	5.7656	6.1870
5	5.1010	5.2040	5.3091	5.4163	5.5256	5.6371	5.7507	5.8666	5.9847	6.1051	6.2278	6.3528	6.4803	6.6101	6.7424	6.8771	7.4416	8.0484	8.2070	9.0431
6	6.1520	6.3081	6.4684	6.6330	6.8019	6.9753	7.1533	7.3359	7.5233	7.7156	7.9129	8.1152	8.3227	8.5355	8.7537	8.9775	9.9299	10.980	11.259	12.756
7	7.2135	7.4343	7.6625	7.8983	8.1420	8.3938	8.6540	8.9228	9.2004	9.4872	9.7833	10.089	10.405	10.730	11.067	11.414	12.916	14.615	15.073	17.583
8	8.2857	8.5830	8.8923	9.2142	9.5491	9.8975	10.260	10.637	11.028	11.436	11.859	12.300	12.757	13.233	13.727	14.240	16.499	19.123	19.842	23.858
9	9.3685	9.7546	10.159	10.583	11.027	11.491	11.978	12.488	13.021	13.579	14.164	14.776	15.416	16.085	16.786	17.519	20.799	24.712	25.802	32.015
10	10.462	10.950	11.464	12.006	12.578	13.181	13.816	14.487	15.193	15.937	16.722	17.549	18.420	19.337	20.304	21.321	25.959	31.643	33.253	42.619
11	11.567	12.169	12.808	13.486	14.207	14.972	15.784	16.645	17.560	18.531	19.561	20.655	21.814	23.045	24.349	25.733	32.150	40.238	42.566	56.405
12	12.683	13.412	14.192	15.026	15.917	16.870	17.888	18.977	20.141	21.384	22.713	24.133	25.650	27.271	29.002	30.850	39.581	50.895	54.208	74.327
13	13.809	14.680	15.618	16.627	17.713	18.882	20.141	21.495	22.953	24.523	26.212	28.029	29.985	32.089	34.352	36.786	48.497	64.110	68.760	97.625
14	14.947	15.974	17.086	18.292	19.599	21.015	22.550	24.215	26.019	27.975	30.095	32.393	34.883	37.581	40.505	43.672	59.196	80.496	86.949	127.913
15	16.097	17.293	18.599	20.024	21.579	23.276	25.129	27.152	29.361	31.772	34.405	37.280	40.417	43.842	47.580	51.660	72.035	100.815	109.687	167.286
16	17.258	18.639	20.157	21.825	23.657	25.673	27.888	30.324	33.003	35.950	39.190	42.753	46.672	50.980	55.717	60.925	87.442	126.011	138.109	218.472
17	18.430	20.012	21.762	23.698	25.840	28.213	30.840	33.750	36.974	40.545	44.501	48.884	53.739	59.118	65.075	71.673	105.931	157.253	173.636	285.014
18	19.615	21.412	23.414	25.645	28.132	30.906	33.999	37.450	41.301	45.599	50.396	55.750	61.725	68.394	75.836	84.141	128.117	195.994	218.045	371.518
19	20.811	22.841	25.117	27.671	30.539	33.760	37.379	41.446	46.018	51.159	56.939	63.440	70.749	78.969	88.212	98.603	154.740	244.033	273.556	483.973
20	22.019	24.297	26.870	29.778	33.066	36.786	40.995	45.762	51.160	57.275	64.203	72.052	80.947	91.025	102.444	115.380	186.688	303.601	342.945	630.165
21	23.239	25.783	28.676	31.969	35.719	39.993	44.865	50.423	56.765	64.002	72.265	81.699	92.470	104.768	118.810	134.841	225.026	377.465	429.681	820.215
22	24.472	27.299	30.537	34.248	38.505	43.392	49.006	55.457	62.873	71.403	81.214	92.503	105.491	120.436	137.632	157.415	271.031	469.056	538.101	*
23	25.716	28.845	32.453	36.618	41.430	46.996	53.436	60.893	69.532	79.543	91.148	104.603	120.205	138.297	159.276	183.601	326.237	582.630	673.626	*
24	26.973	30.422	34.426	39.083	44.502	50.816	58.177	66.765	76.790	88.497	102.174	118.155	136.831	158.659	184.168	213.978	392.484	723.461	843.033	*
25	28.243	32.030	36.459	41.646	47.727	54.865	63.249	73.106	84.701	98.347	114.413	133.334	155.620	181.871	212.793	249.214	471.981	898.092	*	*
30	34.785	40.568	47.575	56.085	66.439	79.058	94.461	113.283	136.308	164.494	199.021	241.333	293.199	356.787	434.745	530.312	*	*	*	*
35	41.660	49.994	60.462	73.652	90.320	111.435	138.237	172.317	215.711	271.024	341.590	431.663	546.681	693.573	881.170	*	*	*	*	*
36	43.077	51.994	63.276	77.598	95.836	119.121	148.913	187.102	236.125	299.127	380.164	484.463	618.749	791.673	*	*	*	*	*	*
40	48.886	60.402	75.401	95.026	120.800	154.762	199.635	259.057	337.882	442.593	581.826	767.091	*	*	*	*	*	*	*	*
50	64.463	84.579	112.797	152.667	209.348	290.336	406.529	573.770	815.084	*	*	*	*	*	*	*	*	*	*	*

APPENDIX 2

PRESENT VALUE FINANCIAL TABLES

Table A-3 Present Value Interest Factors for One Dollar Discounted at k Percent for n Periods: $PVIF_{k,n} = 1 / (1 + k)^n$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	24%	25%	30%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333	0.8065	0.8000	0.7692
2	0.9803	0.9612	0.9426	0.9246	0.9070	0.8900	0.8734	0.8573	0.8417	0.8264	0.8116	0.7972	0.7831	0.7695	0.7561	0.7432	0.6944	0.6504	0.6400	0.5917
3	0.9706	0.9423	0.9151	0.8890	0.8638	0.8396	0.8163	0.7938	0.7722	0.7513	0.7312	0.7118	0.6931	0.6750	0.6575	0.6407	0.5787	0.5245	0.5120	0.4552
4	0.9610	0.9238	0.8885	0.8548	0.8227	0.7921	0.7629	0.7350	0.7084	0.6830	0.6587	0.6355	0.6133	0.5921	0.5718	0.5523	0.4823	0.4230	0.4096	0.3501
5	0.9515	0.9057	0.8626	0.8219	0.7835	0.7473	0.7130	0.6806	0.6499	0.6209	0.5935	0.5674	0.5428	0.5194	0.4972	0.4761	0.4019	0.3411	0.3277	0.2693
6	0.9420	0.8880	0.8375	0.7903	0.7462	0.7050	0.6663	0.6302	0.5963	0.5645	0.5346	0.5066	0.4803	0.4556	0.4323	0.4104	0.3349	0.2751	0.2621	0.2072
7	0.9327	0.8706	0.8131	0.7599	0.7107	0.6651	0.6227	0.5835	0.5470	0.5132	0.4817	0.4523	0.4251	0.3996	0.3759	0.3538	0.2791	0.2218	0.2097	0.1594
8	0.9235	0.8535	0.7894	0.7307	0.6768	0.6274	0.5820	0.5403	0.5019	0.4665	0.4339	0.4039	0.3762	0.3506	0.3269	0.3050	0.2326	0.1789	0.1678	0.1226
9	0.9143	0.8368	0.7664	0.7026	0.6446	0.5919	0.5439	0.5002	0.4604	0.4241	0.3909	0.3606	0.3329	0.3075	0.2843	0.2630	0.1938	0.1443	0.1342	0.0943
10	0.9053	0.8203	0.7441	0.6756	0.6139	0.5584	0.5083	0.4632	0.4224	0.3855	0.3522	0.3220	0.2946	0.2697	0.2472	0.2267	0.1615	0.1164	0.1074	0.0725
11	0.8963	0.8043	0.7224	0.6496	0.5847	0.5268	0.4751	0.4289	0.3875	0.3505	0.3173	0.2875	0.2607	0.2366	0.2149	0.1954	0.1346	0.0938	0.0859	0.0558
12	0.8874	0.7885	0.7014	0.6246	0.5568	0.4970	0.4440	0.3971	0.3555	0.3186	0.2858	0.2567	0.2307	0.2076	0.1869	0.1685	0.1122	0.0757	0.0687	0.0429
13	0.8787	0.7730	0.6810	0.6006	0.5303	0.4688	0.4150	0.3677	0.3262	0.2897	0.2575	0.2292	0.2042	0.1821	0.1625	0.1452	0.0935	0.0610	0.0550	0.0330
14	0.8700	0.7579	0.6611	0.5775	0.5051	0.4423	0.3878	0.3405	0.2992	0.2633	0.2320	0.2046	0.1807	0.1597	0.1413	0.1252	0.0779	0.0492	0.0440	0.0254
15	0.8613	0.7430	0.6419	0.5553	0.4810	0.4173	0.3624	0.3152	0.2745	0.2394	0.2090	0.1827	0.1599	0.1401	0.1229	0.1079	0.0649	0.0397	0.0352	0.0195
16	0.8528	0.7284	0.6232	0.5339	0.4581	0.3936	0.3387	0.2919	0.2519	0.2176	0.1883	0.1631	0.1415	0.1229	0.1069	0.0930	0.0541	0.0320	0.0281	0.0150
17	0.8444	0.7142	0.6050	0.5134	0.4363	0.3714	0.3166	0.2703	0.2311	0.1978	0.1696	0.1456	0.1252	0.1078	0.0929	0.0802	0.0451	0.0258	0.0225	0.0116
18	0.8360	0.7002	0.5874	0.4936	0.4155	0.3503	0.2959	0.2502	0.2120	0.1799	0.1528	0.1300	0.1108	0.0946	0.0808	0.0691	0.0376	0.0208	0.0180	0.0089
19	0.8277	0.6864	0.5703	0.4746	0.3957	0.3305	0.2765	0.2317	0.1945	0.1635	0.1377	0.1161	0.0981	0.0829	0.0703	0.0596	0.0313	0.0168	0.0144	0.0068
20	0.8195	0.6730	0.5537	0.4564	0.3769	0.3118	0.2584	0.2145	0.1784	0.1486	0.1240	0.1037	0.0868	0.0728	0.0611	0.0514	0.0261	0.0135	0.0115	0.0053
21	0.8114	0.6598	0.5375	0.4388	0.3589	0.2942	0.2415	0.1987	0.1637	0.1351	0.1117	0.0926	0.0768	0.0638	0.0531	0.0443	0.0217	0.0109	0.0092	0.0040
22	0.8034	0.6468	0.5219	0.4220	0.3418	0.2775	0.2257	0.1839	0.1502	0.1228	0.1007	0.0826	0.0680	0.0560	0.0462	0.0382	0.0181	0.0088	0.0074	0.0031
23	0.7954	0.6342	0.5067	0.4057	0.3256	0.2618	0.2109	0.1703	0.1378	0.1117	0.0907	0.0738	0.0601	0.0491	0.0402	0.0329	0.0151	0.0071	0.0059	0.0024
24	0.7876	0.6217	0.4919	0.3901	0.3101	0.2470	0.1971	0.1577	0.1264	0.1015	0.0817	0.0659	0.0532	0.0431	0.0349	0.0284	0.0126	0.0057	0.0047	0.0018
25	0.7798	0.6095	0.4776	0.3751	0.2953	0.2330	0.1842	0.1460	0.1160	0.0923	0.0736	0.0588	0.0471	0.0378	0.0304	0.0245	0.0105	0.0046	0.0038	0.0014
30	0.7419	0.5521	0.4120	0.3083	0.2314	0.1741	0.1314	0.0994	0.0754	0.0573	0.0437	0.0334	0.0256	0.0196	0.0151	0.0116	0.0042	0.0016	0.0012	*
35	0.7059	0.5000	0.3554	0.2534	0.1813	0.1301	0.0937	0.0676	0.0490	0.0356	0.0259	0.0189	0.0139	0.0102	0.0075	0.0055	0.0017	0.0005	*	*
36	0.6989	0.4902	0.3450	0.2437	0.1727	0.1227	0.0875	0.0626	0.0449	0.0323	0.0234	0.0169	0.0123	0.0089	0.0065	0.0048	0.0014	*	*	*
40	0.6717	0.4529	0.3066	0.2083	0.1420	0.0972	0.0668	0.0460	0.0318	0.0221	0.0154	0.0107	0.0075	0.0053	0.0037	0.0026	0.0007	*	*	*
50	0.6080	0.3715	0.2281	0.1407	0.0872	0.0543	0.0339	0.0213	0.0134	0.0085	0.0054	0.0035	0.0022	0.0014	0.0009	0.0006	*	*	*	*

Table A-4 Present Value Interest Factors for a One-Dollar Annuity Discounted at *k* Percent for *n* Periods: PVIFA = $[1 - 1/(1 + k)^n] / k$

Period	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	20%	24%	25%	30%
1	0.9901	0.9804	0.9709	0.9615	0.9524	0.9434	0.9346	0.9259	0.9174	0.9091	0.9009	0.8929	0.8850	0.8772	0.8696	0.8621	0.8333	0.8065	0.8000	0.7692
2	1.9704	1.9416	1.9135	1.8861	1.8594	1.8334	1.8080	1.7833	1.7591	1.7355	1.7125	1.6901	1.6681	1.6467	1.6257	1.6052	1.5278	1.4568	1.4400	1.3609
3	2.9410	2.8839	2.8286	2.7751	2.7232	2.6730	2.6243	2.5771	2.5313	2.4869	2.4437	2.4018	2.3612	2.3216	2.2832	2.2459	2.1065	1.9813	1.9520	1.8161
4	3.9020	3.8077	3.7171	3.6299	3.5460	3.4651	3.3872	3.3121	3.2397	3.1699	3.1024	3.0373	2.9745	2.9137	2.8550	2.7982	2.5887	2.4043	2.3616	2.1662
5	4.8534	4.7135	4.5797	4.4518	4.3295	4.2124	4.1002	3.9927	3.8897	3.7908	3.6959	3.6048	3.5172	3.4331	3.3522	3.2743	2.9906	2.7454	2.6893	2.4356
6	5.7955	5.6014	5.4172	5.2421	5.0757	4.9173	4.7665	4.6229	4.4859	4.3553	4.2305	4.1114	3.9975	3.8887	3.7845	3.6847	3.3255	3.0205	2.9514	2.6427
7	6.7282	6.4720	6.2303	6.0021	5.7864	5.5824	5.3893	5.2064	5.0330	4.8684	4.7122	4.5638	4.4226	4.2883	4.1604	4.0386	3.6046	3.2423	3.1611	2.8021
8	7.6517	7.3255	7.0197	6.7327	6.4632	6.2098	5.9713	5.7466	5.5348	5.3349	5.1461	4.9676	4.7988	4.6389	4.4873	4.3436	3.8372	3.4212	3.3289	2.9247
9	8.5660	8.1622	7.7861	7.4353	7.1078	6.8017	6.5152	6.2469	5.9952	5.7590	5.5370	5.3282	5.1317	4.9464	4.7716	4.6065	4.0310	3.5655	3.4631	3.0190
10	9.4713	8.9826	8.5302	8.1109	7.7217	7.3601	7.0236	6.7101	6.4177	6.1446	5.8892	5.6502	5.4262	5.2161	5.0188	4.8332	4.1925	3.6819	3.5705	3.0915
11	10.368	9.7868	9.2526	8.7605	8.3064	7.8869	7.4987	7.1390	6.8052	6.4951	6.2065	5.9377	5.6869	5.4527	5.2337	5.0286	4.3271	3.7757	3.6564	3.1473
12	11.255	10.575	9.9540	9.3851	8.8633	8.3838	7.9427	7.5361	7.1607	6.8137	6.4924	6.1944	5.9176	5.6603	5.4206	5.1971	4.4392	3.8514	3.7251	3.1903
13	12.134	11.348	10.635	9.9856	9.3936	8.8527	8.3577	7.9038	7.4869	7.1034	6.7499	6.4235	6.1218	5.8424	5.5831	5.3423	4.5327	3.9124	3.7801	3.2233
14	13.004	12.106	11.296	10.563	9.8986	9.2950	8.7455	8.2442	7.7862	7.3667	6.9819	6.6282	6.3025	6.0021	5.7245	5.4675	4.6106	3.9616	3.8241	3.2487
15	13.865	12.849	11.938	11.118	10.380	9.7122	9.1079	8.5595	8.0607	7.6061	7.1909	6.8109	6.4624	6.1422	5.8474	5.5755	4.6755	4.0013	3.8593	3.2682
16	14.718	13.578	12.561	11.652	10.838	10.106	9.4466	8.8514	8.3126	7.8237	7.3792	6.9740	6.6039	6.2651	5.9542	5.6685	4.7296	4.0333	3.8874	3.2832
17	15.562	14.292	13.166	12.166	11.274	10.477	9.7632	9.1216	8.5436	8.0216	7.5488	7.1196	6.7291	6.3729	6.0472	5.7487	4.7746	4.0591	3.9099	3.2948
18	16.398	14.992	13.754	12.659	11.690	10.828	10.059	9.3719	8.7556	8.2014	7.7016	7.2497	6.8399	6.4674	6.1280	5.8178	4.8122	4.0799	3.9279	3.3037
19	17.226	15.678	14.324	13.134	12.085	11.158	10.336	9.6036	8.9501	8.3649	7.8393	7.3658	6.9380	6.5504	6.1982	5.8775	4.8435	4.0967	3.9424	3.3105
20	18.046	16.351	14.877	13.590	12.462	11.470	10.594	9.8181	9.1285	8.5136	7.9633	7.4694	7.0248	6.6231	6.2593	5.9288	4.8696	4.1103	3.9539	3.3158
21	18.857	17.011	15.415	14.029	12.821	11.764	10.836	10.017	9.2922	8.6487	8.0751	7.5620	7.1016	6.6870	6.3125	5.9731	4.8913	4.1212	3.9631	3.3198
22	19.660	17.658	15.937	14.451	13.163	12.042	11.061	10.201	9.4424	8.7715	8.1757	7.6446	7.1695	6.7429	6.3587	6.0113	4.9094	4.1300	3.9705	3.3230
23	20.456	18.292	16.444	14.857	13.489	12.303	11.272	10.371	9.5802	8.8832	8.2664	7.7184	7.2297	6.7921	6.3968	6.0442	4.9245	4.1371	3.9764	3.3254
24	21.243	18.914	16.936	15.247	13.799	12.550	11.469	10.529	9.7066	8.9847	8.3481	7.7843	7.2829	6.8351	6.4338	6.0726	4.9371	4.1428	3.9811	3.3272
25	22.023	19.523	17.413	15.622	14.094	12.783	11.654	10.675	9.8226	9.0770	8.4217	7.8431	7.3300	6.8729	6.4641	6.0971	4.9476	4.1474	3.9849	3.3286
30	25.808	22.396	19.600	17.292	15.372	13.765	12.409	11.258	10.274	9.4269	8.6938	8.0552	7.4957	7.0027	6.5660	6.1772	4.9789	4.1601	3.9950	3.3321
35	29.409	24.999	21.487	18.665	16.374	14.498	12.948	11.655	10.567	9.6442	8.8552	8.1755	7.5856	7.0700	6.6166	6.2153	4.9915	4.1644	3.9984	3.3330
36	30.108	25.489	21.832	18.908	16.547	14.621	13.035	11.717	10.612	9.6765	8.8786	8.1924	7.5979	7.0790	6.6231	6.2201	4.9929	4.1649	3.9987	3.3331
40	32.835	27.355	23.115	19.793	17.159	15.046	13.332	11.925	10.757	9.7791	8.9511	8.2438	7.6344	7.1050	6.6418	6.2335	4.9966	4.1659	3.9995	3.3332
50	39.196	31.424	25.730	21.482	18.256	15.762	13.801	12.233	10.962	9.9148	9.0417	8.3045	7.6752	7.1327	6.6605	6.2463	4.9995	4.1666	3.9999	3.3333

Faculty of Commerce & Business Administration

Vision

The Faculty of Commerce & Business Administration inspires to be

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Mission

The Faculty of Commerce & Business Administration seeks to achieve leadership & creativity in business science & related technology on the regional arena through the provision of high-quality academic services, distinguished applied research, world mobility & community development.

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- Creativity & Competence
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- Respect & integrity
- Responsibility & accountability
- Transparency
- Employee empowerment

Professor Dr., ABDEL MONEIM AHMED ELTOHAMY

Occupation: Full Professor of Finance and Investment Business Administration Department , Faculty of Commerce & Business Administration, Helwan University, Cairo, Egypt.

Qualifications Summary:

- **Ph.D.** Business Administration, Finance major, 1981
  Nebraska State University – Lincoln, USA
  Specializations: Finance., Banking and Investment,
  Financial Markets and Institutions,
  Management Theory,
  Organization Behavior Theory.
- **MBA**. Minnesota State University, Mankato, Minnesota, USA.
- **MBA.** Ain Shams University, Faculty of Commerce, Cairo, Egypt.
- **B.Sc.** Helwan University, Faculty of Commerce & Business Administration, Cairo, Egypt.

Professional Record – Summary:

- **Sept. 2001_to Sept. 2004: Chairperson of Business Administration Department.**
- **Feb 1999 - to Sept. 2000: Dean, College of Economics & Management, 6 Oct University**
- **Executive president of "Al Wataniya brokerage company S.A.E" Muscat – Oman.1997-1998**
- **Sept. 1992 – to date: Full Professor Finance**

PUBLICATIONS & SCIENTIFIC RESEARCH: (BOOKS)

- **Studies in Financial Markets and Stock Exchanges.**
- **Notes on Financial management and Investment.**
- **Notes on Fundamental Analysis**
- **Financial Management and investment.**
- **Management of Financial Institutions with Concentration on Commercial banks.**
- **Introduction to Financial Markets and Institutions.**
- **Basics of Investment.**
- **Management of Financial Markets and Institutions.**
- **…….**