

CHAPTER ONE

INTRODUCTION TO FINANCIAL MANAGEMENT

► **The Nature and Scope of Financial Management**

The term 'nature' as applied to financial management refers to its relationship with the closely related fields of economics and accounting, its functions, scope and objectives.

Finance is the application of economic principles and concepts to business decision making and problem solving.

♥ **The three broad categories of finance are:**

- ❖ **Financial management:** deals with the management of finance of firms. It is an applied economics concerned with the allocation of a company's scarce financial resources among competing choices and basically concerned with acquisition, financing and management of asset with the wealth maximization goal in mind.
- ❖ **Investment Analysis:** the study of the analysis and management of financial securities and is mainly concerned with the evaluation of securities from the perspective of investors and the construction and management of portfolios of securities.
- ❖ **Money and Capital market:** - the study of markets where securities issued are frequently sold and bought and financial intermediaries.



FINANCE AND RELATED DISCIPLINES

Financial management, an integral part of overall management, is not totally independent area. It draws heavily on related disciplines and fields of study, such as economics, accounting, marketing, production and quantitative methods.

A. FINANCE AND ECONOMICS

The financial manager should understand macroeconomics since firms operate in macroeconomic environment. Specifically financial manager should:

- Recognize and understand how monetary policies affect the cost of funds and the availability of funds.
- Be versed in fiscal policy and how it affects the economy
- Be aware of the various financial institutions/ financing outlets.
- Understand the consequences of various level of economic activity and changes in economic policy for his/her decision environment and so on.

The concepts and theories of microeconomics are relevant for financial management since they provide with the determination of optimal operating strategies. **Such relevant concepts and theories involve:**

- ✓ Supply and demand relationship and profit maximization strategies
- ✓ Issues related to mix of productive factors. 'Optimal' sales level and product pricing strategies,
- ✓ Measurement and utility preference, risk and determination of value,
- ✓ Rationale of depreciating assets
- ✓ The principle of marginal analysis.

B. FINANCE AND ACCOUNTING

Generally speaking an accountant is responsible for developing financial reports and measures that assist its managers in assessing the past performance and future direction of the firm and in meeting certain legal obligations, such as payment of taxes. The financial manager refers to accounting data when making future resource allocation decisions, concerning long-term investment, when managing current investment in working capital and when making a number of other financial decisions.

But there are key differences between accounting and finance:

- The treatment of funds and

➤ The purpose

The measurement of the funds (income and expenses) in accounting is based on the accrual principle. For instance, revenue is recognized at the point of sale and not when collected. Similarly, expenses are recognized when they are incurred rather than when they actually paid. The viewpoint of finance relating to the funds of the firm is based on cash flows.

The revenues are recognized only when actually received in cash and expenses are recognized on actual payment. Finance and accounting also differ in their purposes. The purpose of accounting is collection and presentation of financial data. The financial manager uses such data for financial decision making.

THE FUNCTIONS OF FINANCIAL MANAGEMENT

1. INVESTMENT DECISIONS

- These decisions are referred also as capital budgeting decisions.
- It generally answers the question that what assets should the firm own.

Investment decision or capital budgeting involves the decision of allocation of capital or commitment of funds to long-term assets that would yield benefits in the future.

Two important aspects of investment decision are;

- a) The evaluation of the prospective profitability of new investments and
- b) The measurement of cut-off rate against that prospective return of new investment could be compared

Future benefits of investments are difficult to measure and cannot be predicted with certainty. Because of the uncertain future, investment decisions involve risk. Investment proposals should, therefore, be evaluated in terms of both Expected Return and Risk.

Besides the decision to commit funds in new investment proposals, capital budgeting also involves decision of recommitting funds when an asset becomes less productive or non – productive.

There is a broad agreement that the correct cut-off rate is the required rate of return or the opportunity cost of capital. However, there are problems in computing the opportunity cost of capital in practice from the available data and information. A decision maker should be aware of these problems.

2. FINANCING DECISIONS

- It is a decision as to when, where and how to acquire funds to meet the firm's investment needs.
- The central issue here is to determine the proportion of equity and debt.

It's the second important function to be performed.

The mix of debt and equity is known as the firm's capital structure. So the finance manager must strive to obtain the best financing mix or optimum capital structure. The firm's capital structure is considered to be optimum when the market value of share is maximized.

The use of debt affects the return and risk for shareholders, it may increase the return on equity funds but it always increases risk. A proper balance will have to strike between return and risk.

3. DIVIDEND DECISIONS

The financial manager must decide whether the firm should:

- Distribute all profits, or
- Retain them, or
- Distribute a portion and retain the balance.

Like the debt policy, the dividend policy should be determined in terms of its impact on the shareholders value. The optimum dividend policy is one that maximizes the market value of the firm's shares.

Such dividend policy decisions should also consider the questions of:

- ✓ Dividend stability
- ✓ Bonus shares and
- ✓ Cash dividends in practice

Most profitable companies pay cash dividends regularly. Periodically, additional shares, called bonus shares or (stock dividend) are also issued to the existing shareholders in addition to the cash dividend.

4. ASSET MANAGEMENT DECISIONS

After the assets are acquired, they need to be managed effectively. The financial manager is charged with the varying degree of operating responsibility over the existing assets.

5. LIQUIDITY DECISIONS

Current assets management that affects a firm's liquidity is yet another important finance function, in addition to the management of long-term assets. Current assets should be managed efficiently for safeguarding the firm against the dangers of liquidity and insolvency.

Investment in current assets affects the firm's

- Profitability
- Liquidity and
- Risk

A conflict exists between profitability and liquidity while managing current assets. If a firm does not invest sufficient funds in current asset, it may become illiquid. But it would lose its profitability, since idle current asset would not earn anything. Thus, proper trade-off must be achieved between profitability and liquidity.

In order to ensure that neither insufficient nor unnecessary fund is invested in current assets, sound techniques of managing current assets should be developed. It would thus be clear that financial decisions directly concern the firm's decision to acquire or dispose of assets and require commitment and recommitment of funds on a continuous basis.

The Goal of a Business Firm

- A goal is a well-known objective the firm strives in all its action to achieve, and then efficient financial management requires the existence of some objective so as to decide efficiently in light of these standards.
- Possible goals: Survive, Avoid financial distress and bankruptcy, Beat competition, Maximize sales or market share, Minimize cost, Maximize profit, Maintain steady earning growth...etc.
- Most of the goals mentioned above are vague however to use them as a guideline for decision-making.

Would profit maximization serve as a goal of the firm?

- ☑ Let us investigate the profit maximization as a goal of the firm. It fails with respect to the following operational infeasibilities:

A. **The concept is vague:** The first thing is to agree on the term. It is vague because the definition of the term profit is ambiguous.

- Does it mean an absolute figure expressed in dollar or a rate of profitability or does it mean short-term or long-term profits?
- Does it refer to profit after tax or before tax?
- Total profit or profit per share or
- Is it a percentage dollar a firm can have or an increased amount simply by issuing a stock and investing on Treasury bill? Some propose a relatively better that is to maximize the earning per share. Yet it falls short of the under mention elements

B. **The time dimension of financial decision is ignored.**

- This means the profit maximization objective does not make a distinction between returns received in different time periods.
- It gives no considerations to the time value of money, and it values benefits received today and benefit received after a period as the same.

C. **The risk dimension of financial decision is ignored.**

Would wealth maximization serve as a goal of the firm?

- It is long agreed that every individual wants to maximize his utility or satisfaction.
- And the closest single substitute for it is wealth maximization.
- Here the goal has to be quantifiable and operational.
- Operational mean it has to be explicitly tied to the variables on which the firm has some control through its operation.

► **The objective of shareholders wealth maximization has a number of distinct advantages:**

- i. The objective explicitly considers the timing and risk of the benefit expected to be received from stock ownership.

ii. It is conceptually possible to determine whether a particular financial decision is consistent with these objectives.

iii. It is impersonal objective.

♥ For these reasons, the shareholders wealth maximization objective is the primary objective in financial management.

This is also known as **value maximization** or **net present worth maximization**. This removes the technical limitations, which characterize the earlier profit maximization criterion. Its operational features satisfy all the three requirements of a suitable operational objective of financial course of action namely, exactness, quality of benefits and time value of money.

The value of an asset or a course of action can be judged in terms of the value of the benefits it produces less the cost of undertaking it. To estimate the benefit associated with a financial course of action, the wealth maximization criterion uses the concept of cash flows generated by the decision rather than accounting profit, which is the basis of the measurement of benefits in the case of profit maximization criterion. Cash flow is a precise concept with a definite connotation. Measuring benefits in terms of cash flow avoids the ambiguity associated with accounting profits.

To incorporate the time value of money and quality dimensions of benefits, adjustments should be made in the cash flow pattern, first, to incorporate risk, and secondly, to make an allowance for differences in the timing of benefits. The value of a stream of cash flows with value maximization criterion is calculated by discounting its element back to the present at a capitalization rate that reflects both time and risk. In applying the value maximization criterion, the term value is used in terms of worth to the owners that is ordinary shareholders.

The discount rate that is employed is, therefore, the rate that reflects the time and risk preference of the owners or suppliers of capital. As a measure of quality (risk) and timing, it is expressed in decimal notation. A large discount rate is the result of higher risk and longer time period. As a decision criterion, this approach involves a comparison of value to cost. An action that has a discounted value- reflecting both time and risk- that exceeds its cost can be said to create value. Such actions should be undertaken. Conversely, actions, with less value than cost, reduce wealth and should be rejected. It would also be noted that the focus of financial management is on the value to the owners of suppliers of equity capital.

√ There are two ways in which the ownership of common stocks can change a person's wealth:

- (a) dividends can be paid to the stockholder and;
- (b) the market price of the stocks can change.

√ During any period of time, the change in a person's wealth due to ownership of common stock may be calculated as follows:

- i. Multiply the dividend per share paid during the period by the number of shares owned.
- ii. Multiply the change in the stock's price during the period by the number of shares owned.
- iii. Add the dividends and the change in the market value computed to obtain the change in the shareholders wealth during the period.

In order to maximize the wealth of its owners, a corporation must seek to provide the largest attainable combination of dividends per share and stock price appreciation.

AGENCY PROBLEM AND CONTROL OF THE CORPORATION

Financial managers most of the time acts in the best interest of the stockholders by taking actions that increase the value of the stock, however, in large corporations ownership can be spread over a huge number of stockholders. This dispersion of ownership means that the management effectively controls the firm. In this case, will management necessarily act in the best interests of the stockholders? Put another way, might not management pursue its own goals at the stockholders' expense?

❖ Agency Relationships

The relationship between stockholders and management is called an **agency relationship**. Such a relationship exists whenever someone (the principal) hires another (the agent) to represent his/her interests. In such relationship there is a possibility of conflict of interest between the principal and the agent. Such a conflict is called an **agency problem**. For example, you might hire someone (an agent) to sell a car that you own and that you are agree to pay that person a flat fee when he or she sells the car. The agent's incentive in this case is to make the sale, not necessarily to get you the

best price. If you paid a commission of, say, 10% of the sales price instead of a flat fee, then this problem might not exist. This example illustrates that the way in which an agent is compensated is one factor that affects agency problems.

❖ Management Goals

Management and stockholders interest might differ. For instance, consider a new investment that is expected to favorably affect the share value but which is of a risky venture. The owners of the firm might wish to take the investment because the stock value will rise, but management may not because there is the possibility that things will turn out badly and management jobs will be lost.

If management does not take the investment, then the stockholders may lose a valuable opportunity. This is one example of an agency cost. **An agency cost is the costs of the conflict of interest between stockholders and management.**

Managers would tend to maximize the amount of resources over which they have control or, more generally, corporate power or wealth. This goal could lead to an overemphasis on corporate size or growth. For example, cases in which management is accused of overpaying to buy up another company just to increase the size of the business or to demonstrate corporate power are most common.

Obviously, if overpayment does take place, such a purchase does not benefit the stockholders of the purchasing company. Therefore, management may tend to overemphasize organizational survival to protect job security. Also, management may dislike outside interference, so independence and corporate self-sufficiency may be important goals.

Do Managers Act in the Stockholders' Interests?

Whether managers will, in fact, act in the best interests of the stockholders depends on *two factors*:

First, how closely is management goals aligned with stockholder goals? This question relates to the way managers are compensated.

Second, can management be replaced if they do not pursue stockholder goals? This issue relates to control of the firm.

There are a number of reasons to think that, even in the largest firms, management has a significant incentive to act in the interests of stockholders:

1. Managerial Compensation

Management will frequently have a significant economic incentive to increase share value for two reasons. *First*, managerial compensation, particularly at the top, is usually tied to financial performance in general and oftentimes to share value in particular.

The *second* incentive managers have relates to job prospects. Better performers within the firm will tend to get promoted. More generally, those managers who are successful in pursuing stockholder goals will be in greater demand in the labor market and thus command higher salaries.

2. Control of the Firm

Control of the firm ultimately rests with stockholders. They elect the BOD, who in turn, hire and fire management.

NB. The available theory and evidence are consistent with the view that stockholders control the firm and that stockholder wealth maximization is the relevant goal of the corporation. Even so, there will be times when management goals are pursued at the expense of the stockholders, at least temporarily.

FINANCIAL MARKETS AND INTERMEDIARIES

The primary advantages of the corporate form of organization are that ownership can be transferred more quickly and easily than with other forms and that money can be raised more readily. Both of these advantages are significantly enhanced by the existence of financial markets.

A financial market, like any market, is just a way of bringing buyers and sellers together. Financial markets differ from other markets in detail. The most important differences concern the types of securities that are traded, how trading is conducted, and who the buyers and sellers are.

► **Financial markets can be characterized as to:**

1. Whether the assets are being issued for the first time or have previously entered the market and
2. The maturity dates of the assets.

⇒ **Primary and Secondary Financial Markets**

A primary financial market is a market whereby new financial assets are issued. Whereas Secondary financial market is a market whereby previously issued financial instruments are offered for resale.



Money and Capital Markets

When a financial asset has a relatively short maturity, it is said to appear and be sold in the money markets, whereas, financial assets with longer or indefinite lifetimes are said to appear in the capital markets. In financial markets, it is financial assets that are bought and sold. Financial asset is a claim against the income and assets of its issuer. They are assets to the holder of the claim but they are also liabilities or equity items to the issuer. Debt and equity securities are considered as financial assets.

The process of transferring funds from savers to ultimate users through a third party is called **intermediation**. The third party is said to be financial intermediaries, which are often called financial institutions. These are commercial banks, insurance companies, pension funds, cooperatives, and others.

CHAPTER TWO

FINANCIAL ANALYSIS

► Objectives of Financial Analysis

The three fundamental accounting statements are the Income Statement, the Balance Sheet, and the Cash Flows statement. The analysis of these statements combined with the preparation and analysis of related financial statements is called financial statement analysis. The focus of financial analysis is on key figures in the financial statements and the significant relationships that exist between them. The analysis of financial statements is a process of evaluating the relationship between component parts of financial statements to obtain a better understanding of the firm's performance and financial position. This type of analysis allows managers, investors, and creditors, as well as potential investors and creditors, to reach conclusions about the recent and current financial status of a corporation. What is perhaps more important, financial statement analysis is used in forming expectations about a corporation's future financial performance.

☑ Types of Financial Analysis

There are three major types of financial statement analysis. These are:

1. Common-Size Statement Analysis
2. Trend Analysis
3. Ratio Analysis

➤ 1. Common Size Statement Analysis

The first step in executing an analysis of financial statements is to carefully read the statements and their accompanying notes. Then compare them to those of other, similar, companies. It is almost, however, impossible to directly compare the financial statements for two companies because of their differences in size and other factors. To start making comparisons, one obvious thing that we should do is to somehow standardize the financial statements. One very common and useful way of doing this is to work with percentages instead of total dollars. A useful way of standardizing financial statements is to express each item on the balance sheet as a percentage of assets and to express each item on the income statement as a percentage of sales. The resulting financial statements are called Common-Size Statements.

One way, though not the only way, to construct a common-size balance sheet is to express each item as a percentage of total assets. And also, a useful way of standardizing the income statement is to express each item as a percentage of sales. In this form, financial statements are relatively easy to read and compare.

➤ 2. Trend Analysis: Common-Base Year Financial Statement Analysis

If we were given a balance sheet of say for the last five years for some company and asked to investigate trends in the firm's pattern of operations, it will be somehow better to standardize the financial statements by choosing a base year and expressing each item relative to the base amount. A standardized financial statement presenting all items relative a certain base-year amount is called Common-Base Year Statement. In this case, the resulting series or trend is very easy to plot, and it is then very easy to compare two or more different companies.

➤ 3. Ratio Analysis

Another way of avoiding the problems involved in comparing companies of different sizes is to calculate and compare financial ratios. Such ratios are ways of comparing and investigating the relationships between different pieces of financial information. Ratio analysis is defined as the systematic use of ratio to interpret the financial statements so that the strength and weakness of a firm as well as its historical performance and current financial condition can be determined. The rationale of ratio analysis lies in the fact that it makes related information comparable. A single figure by itself has no meaning but when expressed in terms of a related figure, it yields significant inferences.

MAJOR TYPES OF RATIO ANALYSIS

Financial ratios are traditionally grouped into the following categories:

1. **Short-term Solvency or Liquidity ratios**-measure the firm's ability to pay its bills (current liabilities) over the short run without undo stress.

2. **Asset Management** or **Asset Turnover** or **Activity ratios**-measure how efficiently or intensively a firm uses its assets.
3. **Long-term Solvency**, or **Debt or Financial Leverage ratios**-measures the firm's long run ability to meet its obligations and the extent to which a firm finances itself with debt as opposed to equity sources.
4. **Profitability ratios**-measure the firm's ability to earn a positive rate of return for its owners.

➤ **1. Short-Term Solvency or Liquidity Ratios**

These ratios are intended to provide information about a firm's liquidity and so they focus on current assets and current liabilities. These ratios assume that current assets are the principal source of cash for meeting current liabilities. For obvious reasons, liquidity ratios are particularly interesting to short-term creditors. One advantage of looking at current assets and liabilities is that their book values and market values are likely to be similar.

Illustration

P-Corporation

Balance Sheet

	December 31, 1995 & 1996	
	1995	1996
Assets		
Current Assets:		
Cash	\$84m	\$98m
A/R	165	188
Inventory	<u>393</u>	<u>422</u>
Total	<u>\$642</u>	<u>\$708</u>
Fixed Assets:		
Net Plant & Equip.	<u>\$2,731</u>	<u>\$2,880</u>
Total Assets	<u>\$3,373</u>	<u>\$3,588</u>
Liabilities & Owner's Equity		
Current liabilities:		
A/P	\$312	\$344
N/P	<u>231</u>	<u>196</u>
Total	<u>\$543</u>	<u>\$540</u>
Long term debt	<u>\$531</u>	<u>\$457</u>
Owners' equity:		
Common stock &		
Paid-in surplus	\$500	\$550
Retained earnings	<u>1,799</u>	<u>2,041</u>
Total	<u>\$2,299</u>	<u>\$2,591</u>
Total Liab. & Equity	<u>\$3,373</u>	<u>\$3,588</u>

P-Corporation

Income Statement

For the year ended December 31, 1996

Sales	\$2,311m
CGS	1,344
Depreciation	<u>276</u>
EBIT	\$ 691
Interest paid	<u>141</u>
Taxable income	\$ 550
Taxes (34%)	<u>187</u>
Net income	<u>363</u>
Dividends	\$121
Addition to Retained earnings	242

A) Current Ratio:

One of the best-known and most widely used ratios is the Current Ratio. The current ratio is defined as:

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

$$\text{For P-Corporation, the 1996 current ratio} = \frac{\$708\text{m}}{\$540\text{m}} = 1.31 \text{ times}$$

Because current assets and liabilities are, in principle, converted to cash over the following 12 months, the current ratio is a measure of short-term liquidity. The unit of measurement is either dollars or times. So, we could say P-Corp. has \$1.31 in current assets for every \$1 in current liabilities, or we could say that P-Corp. has its current liabilities covered 1.31 times over.

To a creditor, particularly a short-term creditor such as a supplier, the higher the current ratio is the better and most often requires a current ratio to remain at or above 2.0. To the firm a high current ratio indicates liquidity that is the firm has less difficulty in paying its current liabilities, but it also may indicate an inefficient use of cash and other short-term assets.

Absent some extraordinary circumstances, we would expect to see a current ratio of at least 1, because a current ratio of less than 1 would mean that net working capital (CA - CL) is negative. This would be unusual in a healthy firm, at least for most types of businesses.

Question:

1. Suppose a firm pays off some of its suppliers and short-term creditors, what will happen to the current ratio?
2. Suppose a firm buys some inventory, what will happen to the current ratio?
3. What will happen to the current ratio if a firm sells some merchandise?

B) The Quick (or Acid-Test) Ratio

This ratio serves the same general purpose as the current ratio but excludes inventory from current assets. This is done because inventory is the least liquid current asset. Besides, relatively large inventories are often a sign of short-term trouble. The firm may have over estimated sales and over bought or over produced as a result. In this case, the firm may have a substantial portion of its liquidity tied up in slow-moving inventory. Thus, the quick ratio measures a firm's ability to pay its current liabilities by converting its most liquid assets into cash.

$$\text{The Quick Ratio} = \frac{\text{Current Assets} - \text{Inventory}}{\text{Current Liabilities}}$$

$$\text{For P-Corp., this ratio in 1996 was} = \frac{\$708\text{m} - \$422\text{m}}{\$540\text{m}} = 0.53\text{times}$$

If a firm seeks to pay its current liabilities by using its quick assets (current assets minus inventories), then its quick assets must equal or exceed its current liabilities. Thus, its quick ratio must be 1.0 or more. This is the reasoning behind the quick ratio standard of 1.0 that many analysts use as the dividing line between sufficient and insufficient liquidity.

➤ 2. Asset Management, or Asset Turnover, or Activity Ratios

The measures in this section are sometimes called asset utilization ratios. They are intended to describe how efficiently or intensively a firm uses its assets to generate sales. Efficiency is equated with rapid turnover. In other words, this means the efficiency with which the assets are used would be reflected in the speed and rapidity with which assets are converted into sales. Some activity ratios concentrate on individual assets such as inventory or account receivable and others look at overall corporate activity.

A) Inventory Turnover and Day's Sales in Inventory

Inventory turnover measures the number of times per year that a corporation sells, or turns over, its inventory.

$$\text{Inventory Turnover} = \frac{\text{Cost of Goods Sold}}{\text{Inventory}}$$

$$\text{For P-Corporation the inventory turn over} = \frac{\$1,344\text{m}}{\$422\text{m}} = 3.2 \text{ times}$$

This means that P-Corp. sold off or turned over the entire inventory on average 3.2 times in a year. As long as we are not running out of stock and thereby forgoing sales, the higher this ratio is, the more efficiently we are managing inventory. It might make more sense to use the average inventory in calculating turnover. Basically, however, it depends on the purpose of the calculation. If we are interested in how long it will take us to sell our current inventory, then using the ending figure is

probably better. If we are worried about the past, in which case averages are appropriate. If we know that we turned our inventory over 3.2 times during the year, then we can figure out how long it took us to turn it over on average. The result is the average days' sales in inventory:

$$\begin{aligned} \text{Days' sales in inventory} &= \frac{365 \text{ days}}{\text{Inventory turnover}} = \frac{\text{Inventory}}{\text{Cost of Goods Sold}} \times 365 \text{ days} \\ &= \frac{365 \text{ days}}{3.2} = 114 \text{ days} \end{aligned}$$

This tells us that, roughly speaking, inventory sits 114 days on average before it is sold. Alternatively, assuming we have used the most recent inventory and cost figures, it will take about 114 days to work off our current inventory.

B) Receivables Turnover and Days' Sales in Receivables

Receivable turnover measures the number of times per year that a corporation collects, or turns over, its receivables that are resulted from credit sales. Inventory turnover measures give some indication of how fast we can sell product while receivable turnover look at how fast we collect on those credit sales.

$$\text{Receivable turnover} = \frac{\text{Credit Sales}}{\text{Account receivables}}$$

$$\text{For P-Corp., receivable turnover} = \frac{\$2,311\text{m}}{\$188\text{m}} = 12.3 \text{ times}$$

Loosely speaking, this receivable turnover means P-Corp. collected its outstanding credit accounts and re loaned the money 12.3 times during the year. This ratio makes more sense if we convert it to days, so the days' sales in receivables are:

$$\begin{aligned} \text{Days' Sales in Receivables} &= \frac{365 \text{ days}}{\text{Receivable turnover}} = \frac{\text{Accounts receivable}}{\text{Credit Sales}} \times 365 \text{ days} \\ &= A/R \times \frac{365 \text{ days}}{\text{Credit Sales}} = \frac{\text{Accounts Receivable}}{\text{Average credit sales per day}} \\ &= \frac{365}{12.3} = 30 \text{ days} \end{aligned}$$

Therefore, on average, P-Corp. collects on its credit sales in 30 days. This ratio is very frequently called the average collection period (ACP). It measures the average number of days it takes for a firm to collect its accounts receivable. If we are using the most recent figures, we could also say that we have 30 days' worth of sales currently uncollected.

C) Asset Turnover Ratios

$$1. \text{ Fixed Asset Turnover} = \frac{\text{Sales}}{\text{Net Fixed Assets}}; \text{ For P-Corp, } \frac{\$2,311\text{m}}{\$2,880} = 0.80 \text{ times}$$

For every dollar in fixed assets, P-Corp generated \$0.80 in sales

2. **Total Asset turnover**- measures a corporation's ability to pay the interest on its debt. It is a measure of overall corporate activity. The total asset turnover can be used to measure the level of sales generated by a corporation against its production capacity.

$$\text{❖ Total Asset Turnover} = \frac{\text{Sales}}{\text{Total Assets}}; \text{ For P-Corp, } \frac{\$2,311\text{m}}{\$3,588\text{m}} = 0.64 \text{ times}$$

☑ For every dollar in assets, P-Corp generates \$0.64 in sales.

➤ 3. Long-term Solvency, or Debt or Financial Leverage Ratios

Long-term solvency ratios are intended to address the firm's long-term ability to meet its obligations. Two types of ratios are grouped under this heading. One type centers on the liabilities and stockholders' equity section of the balance sheet and measures the extent to which a corporation finances itself with debt as opposed to equity sources.

The second type attempts to measure the corporation's ability to generate a level of income sufficient to meet its debt obligations.

A) **Total Debt Ratio**-measure the percentage of total funds provided by debt.

- ❖ Subtracting this percentage from 1.0 gives the percentage of total funds provided by equity sources.

$$\text{Total debt ratio} = \frac{\text{T. Assets} - \text{T. Owners' Equity}}{\text{Total Assets}}; \text{ For P-Corp, } \frac{\$3,588 - \$2,591}{\$3,588} = 0.28$$

This means that P-Corp uses 28% debt, which means it has \$0.28 in debt for every \$1 in assets. Therefore, there is \$0.72 in owners' equity.

There are two variations to this ratio:-

$$\text{Debt-Equity Ratio} = \frac{\text{Total Debt}}{\text{Total Equity}}; \text{ For P-Corp, } \frac{\$997}{\$2,591} = 0.38 \text{ times}$$

$$\text{Equity Multiplier} = \frac{\text{Total Asset}}{\text{Total Equity}}; \text{ For P-Corp, } \frac{\$3,588}{\$2,591} = 1.38 \text{ times}$$

$$\text{Equity multiplier} = 1 + \text{debt equity ratio}$$

B) Long Term Debt Ratio: -measures the extent to which long term financing source is provided by creditors.

$$\text{Long-term debt to equity ratio} = \frac{\text{Long-term debt}}{\text{Stockholders' equity}}$$

Frequently, financial analysts are more concerned with the firm's long-term debt than its short-term debt, because the short-term debt will constantly be changing. Also, a firm's A/P may be more of a reflection of trade practice rather than debt management policy.

$$\text{Long-term debt ratio} = \frac{\text{Long-term debt}}{\text{Long-term debt} + \text{Total equity}}$$

These ratios are important for many financial analysts. They are used to measure the firm's optimal capital structure that maximizes the stockholders equity.

These ratios have many applications. For example, as many financial analysts are of the opinion that each corporation has its own optimal capital structure – measured by using debt ratios- that will make the greatest contribution to maximizing stockholder wealth. In addition, these ratios are often used as a measure of financial risk; that is, as debt becomes an increasing percentage of a corporation's financing sources, the probability of corporate insolvency increases due to its inability to meet debt obligations.

C) Times Interest Earned-measures a corporation's ability to pay the interest on its debt. It measures how well a company has its interest obligations covered, and it is often called the interest coverage ratio. A decreasing value of the times interest earned ratio is sometimes used as additional measure of financial risk.

$$\text{Times Interest Earned} = \frac{\text{EBIT}}{\text{Interest}}; \text{ For P-Corp, } \frac{\$691\text{m}}{\$141\text{m}} = 4.9 \text{ times}$$

For P-Corp., the interest bill is covered 4.9 times over the interest payments required on its borrowed funds.

➤ 4. Profitability Ratios

Profitability ratios provide an overall evaluation of the performance of a corporation and its management. These ratios are intended to measure how efficiently the firm uses its assets and how efficiently the firm manages its operations. These ratios measure the returns generated by the firm from several different aspects:

- (1) on a per share basis,
- (2) on per dollar-of-sales basis,
- (3) on per dollar-of-asset basis, and
- (4) on per dollar-of-stockholders' equity basis.

A) Earnings Per Share (EPS)

EPS expresses the profit per common share earned by a corporation during a period of time. It is the single most frequently analyzed and quoted financial ratio.

$$\text{EPS} = \frac{\text{EAT} - \text{Preferred stock dividends}}{\text{Number of common shares outstanding}}$$

Assuming that P-Corp. has 33 million outstanding shares, its $\text{EPS} = \frac{\$363\text{m}}{33\text{m}} = \$11$

B) Dividend Per Share (DPS)

DPS represents the dollar amount of cash dividends a corporation paid on each share of its common stock outstanding over a period of time.

$$\text{DPS} = \frac{\text{Common stock cash dividends}}{\text{Number of common shares outstanding}}; \text{ For P-Corp, } \frac{\$121\text{m}}{33\text{m}} = \$3.67$$

C) Profit Margin

Profit margin/Net profit margin measures corporate profitability on a per dollar-of-sales basis.

$$\text{Profit Margin} = \frac{\text{EAT}}{\text{Net Sales}}; \text{ For P-Corp., } \frac{\$363}{\$2,311} = 15.7\%$$

This tells that P-Corp generates a profit of \$0.157 dollar for every dollar in sales. All other things equal, a relatively high profit margin is desirable. Profit margin ratio results from the interaction during the accounting period of three factors:

- (1) sales volume,
- (2) pricing strategy, and
- (3) cost structure. For example, lowering sales price will increase volume of units sold, but will normally cause profit margins to shrink.

D) Return on Investment (ROI) or Return on Asset (ROA)

ROI/ROA is a measure of profit per dollar of invested funds

$$\text{ROI/ROA} = \frac{\text{EAT}}{\text{TA}}; \text{ For P-Corp., } \frac{\$363}{\$3,588} = 10.12\%$$

P-Corp. earned 10.12 cents of profit for each dollar of assets.

The ROI/ROA ratio essentially relates size to profits. If a corporation increases in size (as measured by total assets) but does not increase its earnings after taxes proportionally, then its ROI/ROA will decrease.

$$\text{ROI/ROA} = \text{Profit margin} \times \text{Asset turnover}$$

$$\triangleright \text{ROI/ROA} = 15.71\% \times 64.41\% = 10.12\%$$

The profit margin measures profitability per sales dollar, and total asset turnover is an activity ratio also based on unit sales. Thus, corporate ROI/ROA can be understood as occurring from a combination of profit margin and activity.

This expanded form of the ROI ratio can also be used to point out that simply increasing net sales will not increase the ROI because net sales cancel out in the calculation.

What is needed is to increase either the rate of profitability or the rate of asset turnover, or both. This demonstrates that the advantage using the expanded ROI equation lies not only in the ability to separate profitability from activity, but also in the fact that the analytical focus is centered on the rates per dollar of sales as opposed to the level of sales.

E) Return on Stockholders' Equity or Return on Net Worth

ROE measures corporate profitability per dollar of equity capital. Because benefiting shareholders is our goal, ROE is, in an accounting sense, the true bottom-line measure of performance.

$$\text{ROE} = \frac{\text{EAT}}{\text{Stockholders' Equity}}$$

$$\triangleright \text{ROE} = 363 / 2561 = 14\%$$

USE AND LIMITATIONS OF RATION ANALYSIS

- Ratio analysis is used by three main groups of users:
 - Managers, who employ ratios to help analyze, control and thus improve their firm's operations.
 - Credit analysts, including bank loan officers and bond rating analysts, who analyze ratios to help ascertain a company's ability to pay its debts.
 - Stock analysts, who are interested in a company's efficiency risk and growth prospects.
- Although ratio analysis provides useful information to these users so that they make sound economic decision, it does have limitations that necessitate care and judgment. These are:
 - Many large firms operate different division in different industries, and for such companies it is difficult to develop a meaningful set of industry averages. Therefore, ratio analysis is more useful for small, narrowly focused, firms than for large, multidivisional ones.
 - Most firms want to be better than average, so merely meeting (attaining) average performance is not necessarily good. As a target for high level of performance, it is best to focus on industry leaders' ration. Bench marking helps in this regard.

- Inflation may have badly distorted firms' balance sheet recorded values are often substantially different from true values.
- Seasonal factors can also distort a ratio analysis.
- Firms can employ “ window dressing” techniques to make their financial statements look good.
- Different accounting practices can distort comparisons. For example inventory valuation and depreciation method used can affect financial statements and thus distort comparisons among firms.
- It is difficult to recognize about whether a particular ratio is good or bad. For example a high current ratio may indicate a strong liquidity position, which is good or excessive cash, which is bad.
- A firm may have some ratios that look “ good” and others that look “ bad” making difficult to tell whether the company is on balance strong or weak.

CHAPTER-III

TIME VALUE OF MONEY AND VALUATION OF FINANCIAL ASSETS

4.1 Time Value of Money

Ignoring the effects of inflation, a dollar today is worth more than a dollar to be received a year from now. In other words, we would all prefer to receive a specific amount of money now rather than some future date. This preference rests on the time value of money. The term interest is used to describe the price charged for using money over time. When payments for the time value of money are made or accrued, interest expense is incurred. When payments for time value of money are received or accrued, interest revenue is realized. Business decisions often involve receiving cash or other assets now in exchange for a promise to make payments after one or more periods.

Time value of money refers to the fact that a dollar in hand today is worth more than a dollar promised at some time in the future. One reason for this is that you could invest the money received today and earn interest while you waited; so a dollar today would grow to more than a dollar later. The trade off between money now and money later thus depends on, among other things, the rate you can earn by investing. This is the interest on your money which is the price paid for the use of money over time.

❖ Future Value and Compounding

Future value refers to the amount of money an investment will grow to over some period of time at some given interest rate. It is the cash value of an investment at some time in the future. There are two ways of depositing payments into an interest bearing account. These are Single Payments and a Series of Payments.

Compounding Single Payments:

When given money is deposited in an interest-bearing account and is allowed to earn interest for a length of time, the resulting dollar value of the deposit account is called the **compound amount**. The original deposit is referred to as the **principal**. This process of leaving your money and any accumulated interest in an investment for more than one period, thereby reinvesting the interest, is called **compounding**. Compounding the interest means earning **interest on interest** so we call the result compound interest. With **simple interest**, the interest is not reinvested, so interest is earned each period only on the principal.

The basic equation: - four variables are involved when dealing with compound amount single payment problems. These variables are;

P_0 = principal at time zero

i = the annual rate of interest

t = the number of years over which the principal earns compound interest

A_t = the compound amount after t years

⇒ **The compound amount A_t which results from depositing P_0 dollars in an account that earns i percent over ' t ' years is given as;**

$$A_1 = P_0 (1 + i)$$

End of 1st period

$$A_2 = [P_o (1 + i)] (1 + i) = P (1 + i)^2$$

End of 2nd period

$$A_3 = [P_o (1 + i)^2] (1 + i) = P (1 + i)^3$$

End of 3rd period

$$A_t = [P_o (1 + i)^{t-1}] (1 + i) = P (1 + i)^t$$

End of nth period

Thus, the general formula is:

$$A_t = p_o (1 + i)^t$$

$$A_t = P_o (FVIF_{i,n})$$

Or, using table:

Where, $[FVIF] = (1 + i)^t$ Future Value Interest Factor

Example-1

Find the value of \$10,000 earning 5% interest per year after **two** years using:

- Simple interest
- Compound interest

Example-2

If on the day her daughter was born, Mary deposited \$10,000 in Saving Account that guarantees to accumulate interest quarterly at 10% a year. What will be the amount in the Savings Account on her daughter's 18th birthday?

Example- 3

Ato Abera deposited \$ 10,000 in a fund that will earn interest at 8% compounded quarterly for the first four years, and 10% interest compounded semi annually for the next 6 years. How much will Abera have in the fund at the end of 10 years?

- ❖ The basic single payment equation can also be used to find interest rates, as well as the number of years that will be needed for the compound amount to equal the desired value. In general, if the values of any three of the variables are known we can find the fourth by solving the equation for the unknown variable.

4.2 SOLVING THE OTHER UNKNOWN VARIABLES

A) Computing Interest Rate

Example 1:

You borrowed \$1,584 and must repay \$2,000 in exactly 4 years from today. Interest is compounded annually. What is the interest rate of the loan?

B) Computing Number of Periods:

Example 2:

If you can buy a security with a 5 percent interest rate at a price of \$78.35 today, how long will it take for your investment to return \$100?

4.3 COMPOUNDING PERIODS

Up to this point, we have used years as the only time period (compounding period). Actually, all the previous examples could have been quarters, months, or days.

➤ Illustration:

Case1

Find the value of \$10,000 earning 5% interest per year after two years.

Case2

Find the value of \$10,000 earning 5% interest per quarter after two quarters.

⇒ Both cases have same answer:

$$\$10,000 \times (1.05)^2 = \mathbf{\$11,025}$$

However:

In the first case **n** refers to years and **i** refers to interest rate per year.

In the second case **n** refers to quarters and **i** to interest rate per quarter.

➤ Example:

What will \$1,000 be worth at the end of one year when the annual interest rate is 12% when interest is compounded?

- Annually
- Quarterly
- Monthly
- Daily

An annuity is a series of equal payments made at fixed intervals for a specified number of periods. If the payments occur at the end of each period, as they typically do, the annuity is an ordinary annuity. If the payments occur at the beginning of each period, it is called an annuity due. Monthly mortgage payments and semiannual bond interest payments are examples of annuity.

❖ Conditions for Annuity:

1. Payment should be constant(equal)
2. Time between payments should be constant
3. Interest rate has to be constant
4. Interest should be compounded at the end of each period

⇒ Ordinary Annuity

In general, the future value factor for an ordinary annuity is given by:

$$FV_t = C + C(1+r) + C(1+r)^2 + \dots + C(1+r)^{t-1}$$

And proceeding from the above equation, we obtain the general formula for the future value of an ordinary annuity.

$$FV_t = C \left(\frac{(1+r)^t - 1}{r} \right) \quad \text{OR} \quad R \left(\frac{(1+i)^n - 1}{i} \right)$$

Where;

FV_t = future value at time t

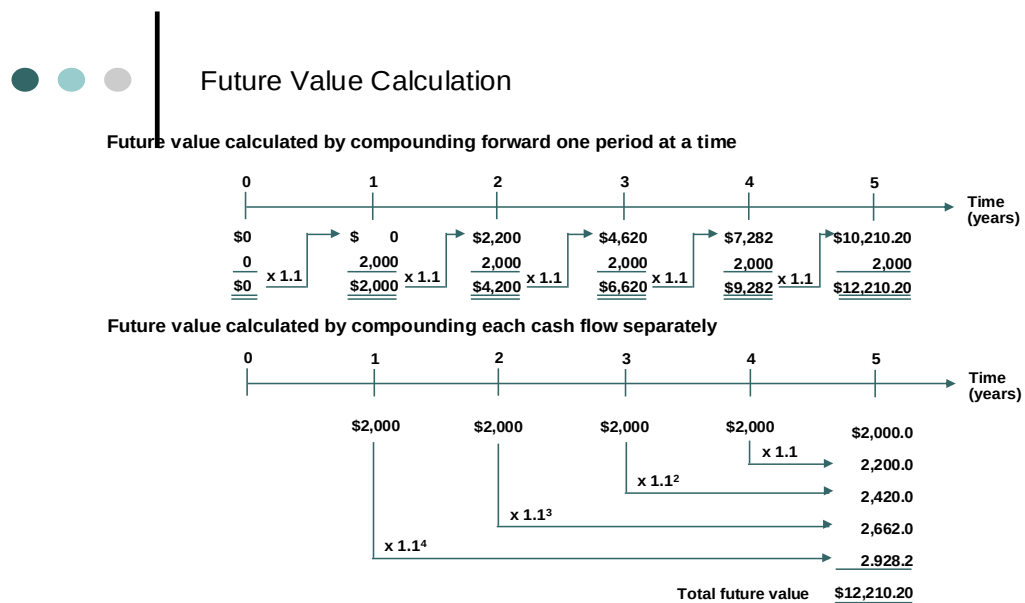
r = the interest rate

t = the number of period the annuity payments will be made

C = the amount of annuity cash flow

Example 1

If you deposit \$2,000 at the end of every year for five years in account that pays 10% interest per annum. What would be your balance immediately after making the last



payment?

- ♠ There is also annuity table that assumes annuity payments of 1 dollar and computes compounded amounts of the annuity for combinations of payments and interest rates.
- ❖ When the values of any three variables are given, the value of the fourth variable can be determined by algebraic manipulation of the future value annuity formula.

Example 2

Batu Company wants to accumulate \$600,000 on Dec. 31 Year 5 to retire a long-term note payable. It intends to make five equal annual deposits in the fund that will earn interest at 6% compounded annually. The first deposit is made on Dec. 31, Yr. 1. Compute the amount of the periodic deposits that the company must make and prepare a fund accumulation table.

Year	Annual Deposit	Interest at 6%	Increase in fund bal.	Fund Balance
1	\$106,438	-	\$106,438	\$106,438
2	106,438	\$6,386	112,824	219,262
3	106,438	13,156	119,594	338,856
4	106,438	20,331	126,769	465,625
5	106,438	27,937	134,375	600,000

4.5 PRESENT VALUE AND DISCOUNTING

Up to now we dealt with future values or compound amounts of single payments and annuities. Of equal importance to business and finance is the problem of determining the time value at time zero of a future payments or a series of payments.

The present value of a future payments or series of payments is the dollar value at year zero of the future payment or payments adjusted for the time value of money. Discounting is the term given to the set of techniques used to compute present values. Present values can be calculated for future single payments or future annuities.

❖ The basic equation for computing present value of a single payment is:

$$P_o = A_t [1 / (1+i)^t]$$

Where;

A_t = the payment that occurs t years from now

i = the interest rate

t = the number of period the annuity payments will be made

P_o = the present value of the future payment, discounted at r percent interest rate per year over t periods.

The expression, $1 / (1+i)^t$, is called the present value interest factor and there is a table that calculate this factor at r rate for t periods.

Therefore,

$$P_o = A_t (PVIF_{i,t}).$$

Where, $PVIF_{i,t}$ is the present value interest factor.

Calculating the present value of a future cash flow to determine its worth today is commonly called discounted cash flow analysis.

Example 1: How much do I need to invest at 8% per year, in order to have \$10,000 in _____?

- a) One year
- b) Two years
- c) Ten years

♠ As with the future value calculations, simple algebraic manipulation allows the above equation to be solved for any one variable when the other three variables are known.

Example 2:

Ali wants to deposit cash in a Saving Account at the beginning of year 1 so that he will have \$50,000 at the end of Year 6. How much must Ali deposit at the beginning of Year 1 if interest rate is 6% compounded semi-annually for the first three years and 8% compounded quarterly for the next three years.

♠ **NOTE**

✓ The higher the rate of interest, the larger the future amount

- ✓ The higher the rate of interest, the smaller the present value
- ✓ The longer the time period n the smaller is the present value of any future amount.

4.6 DISCOUNTING ANNUITIES

Some of the most frequent applications of the time value of money involve computing present values for annuities.

Determining loan repayment schedules, computing bond prices, and evaluating leasing alternatives are typical examples. Because the cash flows of an annuity are all the same, we can come up with a very useful variation on the basic present value equation. It turns out that the present value of an annuity of c dollars per period for t periods when the rate of return or interest rate r is given by:

$$P_0 = C(1+r)^{-1} + C(1+r)^{-2} + \dots + C(1+r)^{-t}$$

Proceeding from the above equation, we obtain the general formula for the present value of an ordinary annuity.

$$P = C \left(\frac{1 - (1+r)^{-t}}{r} \right) \quad \text{OR} \quad R \left(\frac{1 - (1+i)^{-n}}{i} \right)$$

Where;

P_0 = Present value

r = the interest rate

t = the number of period the annuity payments will be made

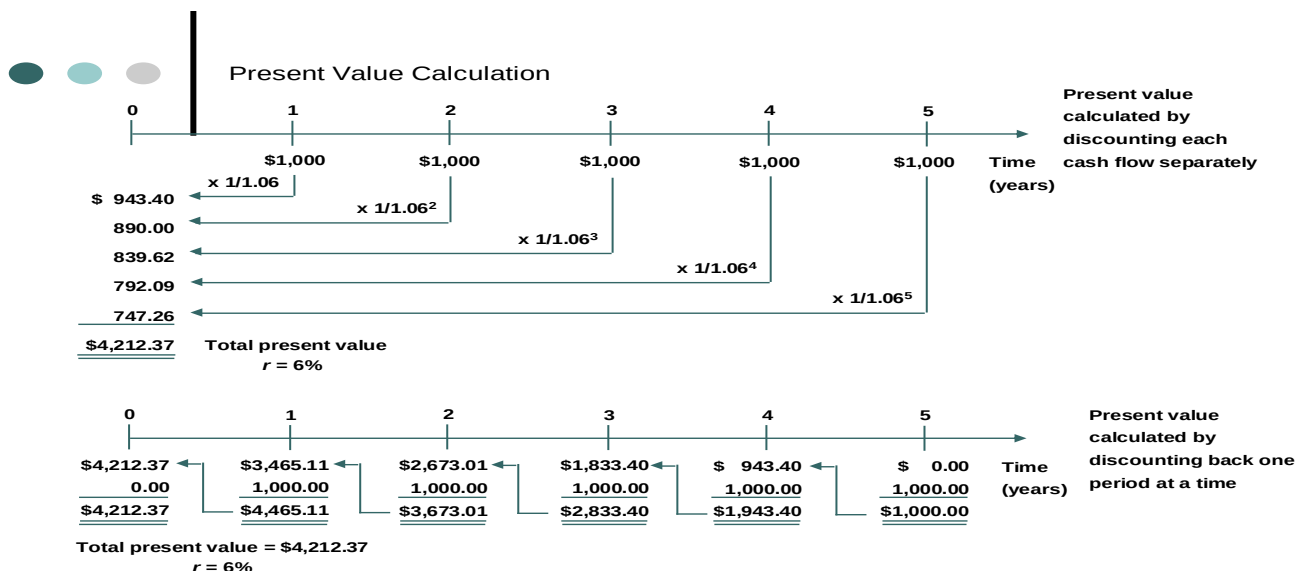
C = the amount of annuity cash flow

There is also a table for this present value interest factor annuity.

Annuity present value = $C * [(1 - \text{present value factor})/r]$

Example 1: What is the present value of a 5-year annuity, if the annual interest is 6%, and the annual payment is \$1,000?

Solution



4.7 SOLVING THE OTHER UNKNOWN VARIABLES

➤ Computing Interest Rate

Example 1 You borrow \$60,000 and repay in 8 equal annual installments of \$12,935 with the first payment made exactly 1 year later. To the nearest percent, what rate of interest are you paying on your loan?

Solution

In order to solve this problem we use a **trial and error method** (linear interpolation.)

Given

$r = ?$ $PV = \$60,000$ $C = \$12,935$ $t = 8 \text{ years}$

Steps

Select an interest rate arbitrarily, (say 12%)

Using the interest rate determine PV

$$PV = 12,935 \left(\frac{1 - (1 + 0.12)^{-8}}{0.12} \right) = 64,256.42$$

St. Mary's University, Department of Accounting

The above Pv is greater than the given one, therefore the interest rate should be greater than 12%. Thus, try 15%

$$PV = 12,935 \left(\frac{1 - (1 + 0.15)^{-8}}{0.15} \right) = 58,043.5$$

✓ **This PV is smaller than the given one; therefore the interest rate should be between 12% and 15%**

- I. Determine the difference between the Present value at 12% & 15%: (64,256.42 – 58,043.5 = 6,212.92)
- II. Determine the difference between the given value (60,000) and the value with the lower *r*: (64,256.42 – 60,000 = 4,256.42)
- III. Determine the percentage distance across the discount range rates, 12-15 percent, i.e. divide the value from *step II* by the value in *step I*: (4,256.42 ÷ 6,212.92 = 0.6851)
- IV. Multiply the percent by the interval width of 3 percent (15%-12%): (0.6851 X 3% = 2%)
- V. Add the value in step IV to the interest rate with the lower end of the interval: (12% + 2% = **14 %**)

Or Try with 13% 15%

$$13\% : 12,935 \left(\frac{1 - (1 + 0.13)^{-8}}{0.13} \right) = 62,072.09$$

$$15\% : \text{-----} = \frac{58,043.50}{4,028.59}$$

$$\begin{array}{r} \diamond 62,072.09 \\ -60,000.00 \\ \hline 2,072.09 \end{array}$$

$$\diamond \frac{2,072.09}{4,028.59} \times 2\% = 0.01$$

$$\Rightarrow 13\% + 0.01 = \underline{\underline{14\%}}$$

➤ **Annuity Due**

To calculate the present or future value of an annuity due, we first calculate the value ordinary annuity using the previous formulas and multiply the answer by (1+r). The relationship between the value of an annuity due and ordinary annuity is just:

$$\blacksquare \text{ Annuity Due Value} = \text{Ordinary Annuity Value} \times (1+r)$$

➤ **Perpetuity**

An annuity that goes on indefinitely is called **perpetuity**. The payments of perpetuity constitute **an infinite series**.

Perpetuity is an annuity that has an indefinitely long life. A less formal approach is to describe perpetuity as an annuity that will not quit. Any perpetuity can be discounted by dividing the value of one payment by the required rate of return.

Perpetuities occur in certain types of valuation problems. In addition, long lived annuities can sometimes be treated as perpetuities in order to obtain good, first approximations of their present values; this is because the present value of an annuity approaches the present value of the corresponding perpetuity as the number of payments in the annuity increases.

✓ **The present value of perpetuity is:**

$$PV (\text{Perpetuity}) = \frac{\text{Payment}}{\text{Interest rate}} = \frac{C}{r}$$

For example, if the interest rate were 12 percent, a perpetuity of \$1,000 a year would have a present value of \$1,000/0.12 = **\$8,333.33**.

Example 2

Grace Corporation needs \$200,000 on March 31, Year 5. This amount is to be accumulated by making 16 equal deposits in a fund at the end of each quarter, starting March 31, Year 1 and ending on Dec. 31, Year 4. The fund will earn interest at 8% compounded quarterly. Compute the periodic rents.

❖ Problems involving Unequal Cash Flows

Whenever a series of cash flows or payments does not take an annuity form, it is described as unequal cash flow or a mixed stream of cash flows. This type of cash flow pattern also includes those situations where some years may be devoid of payments. To compound or discount unequal cash flows, we can just compound or discount each cash flow individually and add them up.

CHAPTER 4

RISK, RETURN AND FINANCIAL ASSET PORTFOLIOS

RETURN: if you buy an asset of any sort, your gain (or loss) from that investment is called the return on your investment. This return will usually have two components: *income component* and *capital gain or capital loss on the investment*.

The rate of return can be calculated with the following formula:

$$r_t = \frac{P_t - P_{t-1} + D}{P_{t-1}}$$

Where: r_t = required rate of return

P_t = Price of asset at time t

P_{t-1} = Price of asset at time t-1

D = dividend paid

Example,

End of year	Price of asset	Dividend
1	birr 21	0
2	19	1
3	18	1
4	21	1.05
5	24	1.05
6	26	1.10

Required: calculate rate of return?

Year	P_t	P_{t-1}	D	r_t
1	21	-	0	-
2	19	21	1	$19-21+1/21 = -0.0476$
3	18	19	1	$18-19+1/19 = 0$
4	21	18	1.05	$21-18+1.05/18 = 0.225$
5	24	21	1.05	$24-21+1.05/21 = 0.1929$
6	26	24	1.10	$26-24+1.10/24 = 0.1292$

Mean: The mean of rate of return is calculated as follows:

$$Mean = \frac{\sum r}{n}$$

Example: The mean for the above example is=

$$= 0.0999$$

$$= 10\%$$

The expected value of a return: is the most likely return on a given asset

$$\hat{r} = \sum_{i=1}^n r_i \times Pr_i$$

Where: r_i = return for the i th outcome

Pr_i = probability of occurrence of the i th outcome

n = number of outcomes considered

$\hat{r}$ = the expected value of a return

STANDARD DEVIATION: The most common statistical indicator of an asset's risk is the standard deviation. It measures the dispersion around the expected value. The expression for the standard deviation of returns, σ_r , is given as:

$$\sigma_r = \sqrt{\sum_{i=1}^n (r_i - \hat{r})^2 \times Pr_i}$$

Example: Expected values of returns for assets A and B

Asset A;

Possible outcomes	Probability (1)	Return (%) (2)=(1)X(2)	Weighted value (3)
Pessimistic	0.25	13	3.25
Most likely	0.50	15	7.50
Optimistic	0.25	17	4.25
Expected return			= 15

Asset B;

Possible outcomes	Probability (1)	Return (%) (2)=(1)X(2)	Weighted value (3)
Pessimistic	0.25	7	1.75
Most likely	0.50	15	7.50
Optimistic	0.25	23	5.75
Expected return			= 15

Example: Standard deviation of the returns for Assets A and B: Asset A;

i	r_i	$\hat{r}$	$r_i - \hat{r}$	$(r_i - \hat{r})^2$	Pr_i	$(r_i - \hat{r})^2 \times Pr_i$
1	13	15	-2	4	0.25	1
2	15	15	0	0	0.50	0
3	17	15	2	4	0.25	1
$\sum (r_i - \hat{r})^2 \times Pr_i$						= 2
Therefore;						$\sigma_{rA} = 1.41\%$

Asset B;

i	r_i	$\hat{r}$	$r_i - \hat{r}$	$(r_i - \hat{r})^2$	Pr_i	$(r_i - \hat{r})^2 \times Pr_i$
1	7	15	-8	64	0.25	16
2	15	15	0	0	0.50	0
3	23	15	8	64	0.25	16
$\sum (r_i - \hat{r})^2 \times Pr_i$						= 32

Therefore, $\sigma_{rB} = 5.66\%$

In general: the higher the standard deviation, the greater the risk.

The higher risk of asset B is clearly reflected in its higher standard deviations.

VARIANCE: shows how far the actual return deviates from the average in a typical year. It is the average squared difference between the actual return and the average return.

COEFFICIENT OF VARIATION

It is a measure of relative dispersion used in comparing the risk of assets with differing expected returns.

$$Cv = \frac{\sigma}{\hat{r}}$$

Where: σ = is standard deviation

$\hat{r}$ = is expected value of return.

Example:

Coefficient of variation for asset A is 1.41/15=**0.094**
Coefficient of variation for asset B is 5.66/15=**0.377**

Asset B has the higher coefficient of variation and is therefore more risky than asset A. ***The higher the coefficient of variation is, the greater the risk.***

Note: since both assets have the same expected return, the coefficient of variation has not provided any more information than the standard deviations. *The real utility of the coefficient of variation is in comparing assets that have different expected returns.*

Example:

	<u>Asset X</u>	<u>Asset Y</u>
Expected return	12%	20%
Standard deviation	9%	10%
Coefficient of variation	9/12= 0.75	10/20= 0.5

If the firm were to compare the assets only with standard deviations, it would prefer asset X, since asset X has a lower standard deviation than asset Y. However, using coefficient of variations, risk is lower in asset Y than asset X. Therefore, the use of the coefficient of variation to compare asset's risk is **effective** because it also considers the relative size, or expected return of the assets.

COVARIANCE: statistical representation of the degree to which the returns on two assets move together over time; calculated as the sum of the product of each asset's deviation from its expected value over time divided by the number of time periods. The covariance of asset A and B can be computed as follows:

$$\rho_{AB} = \frac{\sum (r_A - \hat{r}_A)(r_B - \hat{r}_B)}{n}$$

CORRELATIONS: Correlation is a statistical measure of the relationship, if any, between series of numbers representing data of any kind. If two series move in the same direction, they are positively correlated. If the series move in opposite directions, they are negatively correlated. Correlation is a statistical representation of the degree to which returns on two securities vary together over time, with a maximum value of +1 (perfect positive correlation) and a minimum value of -1 (perfect negative correlation)

Correlation coefficient: a measure of the degree of correlation between two series.

$$\text{Coefficient correlation or } \rho = \frac{\text{Co variance}}{(Sd)(Sd)}$$

Perfectly negatively correlated: describes two negatively correlated series that have a correlation coefficient of -1

Uncorrelated: describes two series that lack any relationship or interaction and therefore have a correlation coefficient close to zero.

Example:

For positively correlated; cyclical business, i.e. having high sales when the economy is expanding and low sales during recession

For negatively correlated; Counter cyclical business: having low sales during economic expansion and high sales during recession

RISK PREFERENCE: The three basic preference behaviors are

Risk averse: the attitude toward risk in which an increased return would be required for an increase in risk.

Risk indifferent: the attitude toward risk in which no change in return would be required for an increase in risk.

Risk seeking: the attitude toward risk in which a decreased return would be accepted for an increase in risk

Risk and time: The variability of the returns and the risk increases with the passage of time.

RISK OF A PORTFOLIO: The risk of any single proposed asset investment should not be views independent of other assets. New investments must be considered in light of their impact on the risk and return of the portfolio of assets. The financial manager's goal for the firm is to create **efficient portfolio**. *Efficient portfolio is a portfolio that maximizes return for a given level of risk or minimizes risk for a given level of return.* The statistical concept of correlation is useful in the process of diversification that is used to develop an efficient portfolio.

A Portfolio is a collection of securities held by a single investor, whether an individual or institution. The main incentive for forming portfolios is **diversification**, which is the allocation of investable funds to a variety of sources.

A **perfect market** is a market without any impediments to trading, such as transaction costs or costly information. The assumptions are:

Securities markets operate with **no transaction costs**

All investors have **free access** to the complete body of **information** about everything relevant to the pricing of securities.

All investors **appraise this information in a similar way**; that is, they have **homogeneous expectations**

Investors are interested only in the **risk and expected return** characteristics of securities. **They seek securities with higher expected returns and try to avoid risk.**

All investors in the marketplace have the **same one period time horizon**.

The concept of dominance: When an investor has investment opportunities in which this risk/return trade off is not confronted, one investment opportunity "dominates" the other. In

One security offers greater expected return, but the same risk, than another security

One security offers the same expected return, but lower risk, than another security

One security offers greater expected return, but lower risk, than another security

Portfolio return and standard deviation: The return on a portfolio is calculated as a weighted average of the returns on the individual assets.

$$\hat{r}_p = (w_1 \times \hat{r}_1) + (w_2 \times \hat{r}_2) + \dots + (w_n \times \hat{r}_n)$$

Where;

$\hat{r}_p$ = is portfolio return

w_n = the proportion of the portfolio total value

$\hat{r}_n$ = the return on asset

Example: A portfolio is to be constructed by investing birr 100,000 in three financial assets. The birr amounts committed to each asset, the return value are as follows:

Asset	Birr investment	Return
A	20,000	9%
B	30,000	11%
C	50,000	14%
Total	100,000	

REQUIRED: Calculate the expected return for portfolio?

The proportion (W) of each asset can be obtained as follows: Asset A (w_1) = 20000/100000=0.2 and similarly you can calculate for asset B and C. The proportion for asset B and C is 0.3 and 0.5, respectively.

$$\begin{aligned}\hat{r}_p &= (w_1 \times \hat{r}_1) + (w_2 \times \hat{r}_2) + \dots + (w_n \times \hat{r}_n) \\ &= 0.2(9\%) + 0.3(11\%) + 0.5(14\%) \\ &= \underline{\underline{12.1\%}}\end{aligned}$$

Exercise 1: If security A has an expected return of 10% and security B has an expected return of 15%, how should you weight your holdings to get an expected return of 12%?

Solution; The sum of investment in security A and B must be 100%, therefore, we can write as

$$A + B = 1 \dots \dots \dots \text{Equation 1}$$

With the formula of expected return on portfolio

$$0.1A + 0.15B = 0.12 \dots \dots \dots \text{Equation 2}$$

Solve the two equations simultaneously;

The proportion security A and B is **60%** and **40 %**

Example:

Year	Return	
	Asset A	Asset B
1	14%	7%
2	9%	12%
3	12%	6%
4	4%	10%
5	11%	5%

Required: Compute

Variance and standard of asset A

Variance of asset B

Covariance of asset A and B

Coefficient of correlation between asset A and B

Solution:

Year	r_A	r_B	$(r_A - \hat{r}_A)$	$(r_B - \hat{r}_B)$	$(r_A - \hat{r}_A)(r_B - \hat{r}_B)$	$(r_A - \hat{r}_A)^2$	$(r_B - \hat{r}_B)^2$
1	0.14	0.07	$(0.14 - 0.1) = 0.04$	$(0.07 - 0.08) = -0.01$	-0.0004	0.0016	0.0001
2	0.09	0.12	$(0.09 - 0.1) = -0.01$	$(0.12 - 0.08) = 0.04$	-0.0004	0.0001	0.0016
3	0.12	0.06	$(0.11 - 0.1) = 0.01$	$(0.06 - 0.08) = -0.02$	-0.0004	0.0001	0.0004
4	0.04	0.1	$(0.04 - 0.1) = -0.06$	$(0.05 - 0.08) = -0.03$	-0.0012	0.0036	0.0004
5	0.11	0.05	$(0.12 - 0.1) = 0.02$	$(0.10 - 0.08) = 0.02$	-0.0004	0.0004	0.0009
SUM					-0.0028	0.006	0.003

1) The variance of asset A is

$$\sigma^2_A = \frac{(r_A - \hat{r}_A)^2}{n}$$

$$\sigma^2_A = \frac{0.0058}{5}$$

$$= \underline{\underline{0.0012}}$$

2) The variance of asset B is

$$\sigma^2_B = \frac{(r_B - \hat{r}_B)^2}{n}$$

$$\sigma^2_B = \frac{0.0034}{5}$$

$$= \underline{\underline{0.0007}}$$

3) The covariance of asset A and B is

$$\sigma_{AB} = \frac{\sum (r_A - \hat{r}_A)(r_B - \hat{r}_B)}{n}$$

$$= -0.0028/5$$

$$= \underline{\underline{-0.0005}}$$

Note: A positive covariance indicates that the values of two variables tend to increase and decrease together. A negative covariance indicates that the two variables tend to move in opposite directions.

4) The coefficient correlation of asset A and B are computed as follows:

Coefficient correlation =

$$= \underline{\underline{-0.54}}$$

Exercise: ABC Corporation owns a portfolio which consists of two common stocks: stock M and stock E. The amount invested in each stock is birr 120,000 and birr 280,000, respectively. The rates of returns on each stock in three economic conditions are given below.

Economic condition	Probability	Return on stock M	Return on stock E
Recession	0.2	7%	6%
Stagnant	0.5	9%	10%

Expanding	0.3	12%	15%
-----------	-----	-----	-----

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- Required:**
- 1) Calculate expected rate of return on stock M and E?
 - 2) The portfolio returns of stocks M and E?

Solution:

The expected return;

$$\text{For stock M} = 0.2(7\%) + 0.5(9\%) + 0.3(12\%)$$

$$= \underline{\underline{9.5\%}}$$

$$\text{For stock E} = 0.2(6\%) + 0.5(10\%) + 0.3(15\%)$$

$$= \underline{\underline{10.7\%}}$$

The portfolio returns of stock M and E

Stock	Amount invested	Proportion	Return
M	120,000	0.3	9.5
E	280,000	0.7	10.7

Therefore, the portfolio return is;

$$= 0.3(9.5\%) + 0.7(10.7\%)$$

$$= \underline{\underline{10.34\%}}$$

The risk for a two-security portfolio, measured by the standard deviation of portfolio returns, is computed as follows;

$$\sigma_p = \sqrt{w_A^2 \times \sigma_A^2 + w_B^2 \times \sigma_B^2 + 2w_A w_B \rho_{AB} \sigma_A \sigma_B}$$

Where;

w_A and w_B are the proportion of the components of asset A and asset B

σ_A and σ_B are standard deviations of the components of asset A and B

ρ_{AB} is the correlation coefficient between the returns of component assets A and B

Example: you are trading in a market that has only two securities available. Security A has an expected return of 8 % and a standard deviation of 40 %. Security B has an expected return of 20% and a standard deviation of 120%.

If you place 40 % of your money in A and the remaining 60% in B, what is your expected return?

If the correlation between the returns of securities A and B is 0.8, what is the variance and the standard deviation of the portfolio?

Solution:

The expected return on any portfolio depends on the percentage invested in each stock and the expected return of the stock:

$$\text{Expected return} = 0.4(8\%) + 0.6(20\%)$$

$$= \underline{\underline{15.2\%}}$$

The problem provides almost all of the information necessary to solve the formula for the variance of a portfolio of imperfectly correlated assets:

You must remember that the variance of a security's return is the square of the standard deviation so:

$$\sigma_A^2 = (0.4)^2 = \underline{\underline{0.16}} \text{ and}$$

$$\sigma_B^2 = (1.2)^2 = \underline{\underline{1.44}}$$

 $w_1 = 40\%$ and

 $w_2 = 60\%$

Therefore, Variance of portfolio = $(0.4)^2(0.16) + (0.6)^2(1.44) + 2(0.4)(0.6)(0.4)(1.2)(0.8)$
 $= 0.0256 + 0.5184 + 0.1843$
 $= \underline{0.7283}$

Standard deviation = square root of variance
 $= (0.7283)^{1/2}$
 $= 0.853$
 $= \underline{85.3\%}$

DIVERSIFICATION AND RISK REDUCTION

Increasing the number of financial assets in a portfolio is referred to as *diversification*. The portion of a portfolio's risk that can be reduced or eliminated by diversification is called diversifiable risk (Unsystematic risk). It is unique to a particular firm and/or the industry in which it operates. The goods and services provided by the industry, action of competitors, the quality of the firm management, operating leverage, capital structure, financial leverage, and marketing strategies are some of the factors that combine to produce unsystematic risk.

The portion of a portfolio's risk that cannot be eliminated by diversification is called non-diversifiable risk (Systematic risk). It represents portion of total portion risk caused by factors that affect the prices of all securities.

Example: national economic and political development, business cycle, inflation, unemployment, fiscal and monetary policy.

A portfolio that contains a large number of securities exhibits only systematic risk. An investor's expected rate of return holding a portfolio of risky financial assets is thus based on the expected rate of return and the systematic risk contained in the portfolio and not on the risk-return characteristics of individual assets.

THE BETA COEFFICIENT:

It is the slope of the security characteristic line, which shows the volatility of a security's returns relative to that of the market portfolio. It is index of systematic risk. This index measures the amount of systematic risk contained in individual securities and portfolio relative to *financial markets*. This index also is used to determine the rate of return that an investor expects from individual securities and portfolios. Systematic risk is often referred to as market risk. Beta coefficient can be obtained for actively traded stocks from published sources such as value line investment survey. The beta coefficient for the market is considered to be equal to 1.0; all other betas are viewed in relation to this value. Asset betas make take on values that are either positive or negative, but positive beta is the norm. One important point for beta is beta tend to change in particular ways over time.

Beta and their interpretation

Asset's Beta	Interpretation
Positive	Move in same direction as market
Zero	Unaffected by market movement
Negative	Move in opposite direction to market

Beta =

$$\beta_i = \frac{\rho_{im} \sigma_i \sigma_m}{\sigma_m^2}$$

Example: the following presents estimates of market returns and hypothetical security A.

Year	Market risk (r_m)	Return of asset A (r_A)
1	0.0830	0.115
2	0.2216	0.24
3	0.0089	0.0975
4	0.0306	-0.0652
5	0.1275	0.1123
6	0.2057	0.1879
7	0.13	0.1443
8	-0.007	0.1234

Required: compute;

Variance of the market and asset A

Covariance of asset A and market

Beta coefficient

Solution:

Year	(r_m)	(r_A)	$(r_A - \hat{r}_A)$	$(r_m - \hat{r}_m)$	$(r_m - \hat{r}_m)^2$	$(r_A - \hat{r}_A) (r_m - \hat{r}_m)$
1	0.0830	0.115	-0.0044	-0.0170	0.0003	0.0001
2	0.2216	0.24	0.1206	0.1216	0.0148	0.0147
3	0.0089	0.0975	-0.0219	-0.0911	0.0083	0.0020
4	0.0306	-0.0652	-0.1846	-0.0694	0.0048	0.0128
5	0.1275	0.1123	-0.0071	0.0275	0.0008	-0.0002
6	0.2057	0.1879	0.0685	0.1057	0.0112	0.0072
7	0.13	0.1443	0.0249	0.0300	0.0009	0.0007
8	-0.007	0.1234	0.0040	-0.1070	0.0114	-0.0004
Σ	<u>0.8003</u>	<u>0.9552</u>			<u>0.0525</u>	<u>0.0369</u>

Mean $(r_A) =$

$=$

$= \underline{\underline{0.1194}}$

Mean $(r_m) =$

$=$

$= \underline{\underline{0.10}}$

Variance of market $(\sigma_m^2) =$

$=$

$= \underline{\underline{0.0066}}$

Covariance $(\rho_{Am}) =$

$= \underline{\underline{0.0046}}$

Beta $(\beta_{AM}) =$

$=$

Note: a beta of 1.0 means that a security contains the same degree of systematic risk as found in the market. In actual practice, all corporate beta coefficients have a value that is greater than zero and less than 3.0

PORTFOLIO BETAS: The beta of a portfolio can be easily estimated by using the beta of the individual assets it includes. Let w_i , the proportion of the portfolio's total birr value represented by assets and β_i , the beta of asset i , the portfolio beta, β_p using β_i and w_i as defined as:

$$\beta_p =$$

Where, w_i is the proportion of security

β_i is the beta value of each security

It states that the weighted average of the financial asset beta contained in portfolio.

Example: four financial assets are purchased with birr 50,000. The percentage composition of the portfolio and its corresponding betas are:

Financial assets	Birr investment	X_i	β_i
A	20,000	40%	1.3
B	15,000	30%	1.1
C	10,000	20%	1.0
D	5,000	10%	0.8

Required: 1) compute the portfolio beta (β_p)?

2) Suppose that asset A is sold for birr 30,000 and the proceeds are invested as asset E with a beta of 1.4, compute the new portfolio beta?

Solution; 1) Portfolio beta (β_p) = $\sum w_i \beta_i = w_1 \times \beta_1 + w_2 \times \beta_2 + w_3 \times \beta_3$
 $= 0.4(1.3) + 0.3(1.1) + 0.2(1.0) + 0.1(0.8)$
=1.13

Financial assets	Birr investment	X_i	β_i
B	15,000	25%	1.1
C	10,000	17%	1.0
D	5,000	8%	0.8
E	30,000	50%	1.4
Total	60,000	100%	

$$\beta_p = 0.25(1.1) + 0.17(1.0) + 0.08(0.8) + 0.5(1.4)$$

$$**=1.21**$$

RISK AND RETURN: THE CAPITAL ASSET PRICING MODEL (CAPM)

The most important aspect of risk is the overall risk of the firm as viewed by investors in the market place. Overall risk significantly affects investment opportunities and the owner's wealth. The basic theory that links together risk and return for all assets is called the William Sharp's Capital Asset Pricing Model (CAPM). **Types of risks;**

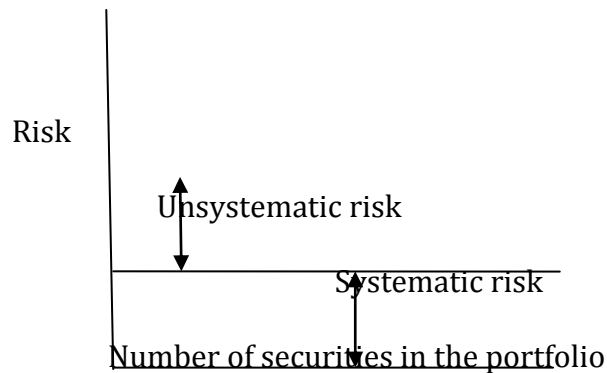
Diversifiable risk (unsystematic risk): is the portion of an asset's risk that is attributable to firm specific, random causes, can be minimized through diversification. It is unique risk or asset specific risk.

Non diversifiable risk (systematic risk): is the relevant portion of an asset's risk attributable to market factors that affect all firms, can not be eliminated through diversification. It is also said to be market risk.

Example; war, inflation, international incidents and political events

Total risk: is the combination of a security's non diversifiable and diversifiable risk.

Total security risk= Non diversifiable + Diversifiable risk



Any investor can create a portfolio of assets that will eliminate all diversifiable risk, the only relevant risk is non diversifiable risk. Therefore, any investor must concern only with non diversifiable risk.

William Sharp CAPM Model

$$K_i = R_f + [\beta_i (k_m - R_f)]$$

Where;

K_i is required return of asset i

R_f is risk free rate of return

β_i is beta coefficient

K_m is market return; the return on the market portfolio of assets.

The required return on an asset, K_i , is an increasing function of beta, β_i , which measures non diversifiable risk. In other words, the higher the risk, the higher the required return, and the lower the risk, the lower the required return. The model can divide in to two parts:

the risk fee rate, R_f and

the risk premium, $\beta_i(k_m - R_f)$

The $(k_m - R_f)$ portion of the risk premium is called the market risk premium, since it represents the premium the investor must receive for taking the average amount of risk associated with holding the market portfolio of assets.

Example: ABC Corporation wishes to determine the required return of an asset Z that has a beta β_Z if 1.5. The risk free rate of return is 7 %, the return on the market portfolio of assets is 11%.

Required: Determine;

Required return of asset Z

The market risk premium

Solution.

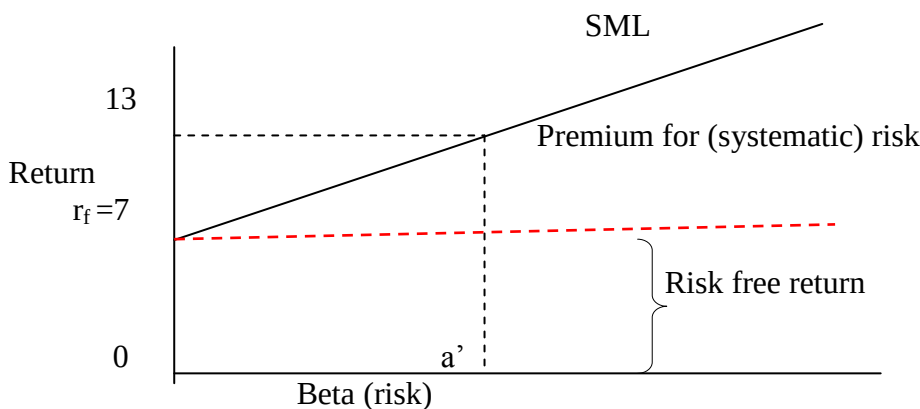
$$\begin{aligned}
 K_z &= R_f + [\beta_i (k_m - R_f)] \\
 &= 7 + [1.5 (11 - 7)] \\
 &= 7 + 6 \\
 &= \underline{13}
 \end{aligned}$$

$$\begin{aligned}
 \text{Market risk premium} &= k_m - R_f \\
 &= 11 - 7 \\
 &= \underline{4\%}
 \end{aligned}$$

$$\begin{aligned}
 \text{Risk premium} &= \beta_i (k_m - R_f) \\
 &= 1.5(11 - 7) \\
 &= \underline{6\%}
 \end{aligned}$$

The security Market line (SML)

When the capital asset pricing model (CAPM) is depicted graphically, it is called the security market line (SML). The SML reflects for each level of non diversifiable risk (beta) the required return in the market place.



Chapter-5

COST OF CAPITAL

Firms will make investments today expecting a set of cash inflows in the future. To finance (undertake) such projects firms will raise funds from internal and external sources. In doing so they will incur costs and such costs are known as cost of capital. Cost of capital refers to the weighted average costs of different components of financing used by the firm to fund its financial requirements. Since it is the cost of funds used by the firm, it can be also defined as the rate of return that a company must offer its securities in order to maintain its market value.

Cost of capital of a firm can also be defined as the minimum rate of return expected by its investors. The cost of capital for a firm may be defined as the cost of obtaining funds, i.e., it is the weighed average cost of various sources of finance used by a firm. The capital used by a firm may be in the form of debt, preferred stock capital, retained earnings and common stock capital. The concept of cost of capital is very important in the financial management. A decision to invest in a particular project depends up on the cost of capital of the firm or the cut-off rate, which is the minimum rate of return expected by the investors. In fact, cost of capital is the minimum rate of return expected by its investors, which will maintain the market of shares at the present level. Hence, to achieve the objective of wealth maximization, a firm must earn a rate of return more than its cost of capital. Thus, we can say that cost of capital is the minimum rate of return which a firm, must and, is expected to earn on its investment so as to maintain the market value of its shares.

➤ Components of financing

Those financing that will be included in the computation of cost of capital are those that are assumed to be relatively permanent. These include:-

- Portion of short - term interest bearing debt that is considered to permanent,
- All long-term debt,
- Preferred stock and,
- Common equity(common stock and retained earnings)

Short-term non-interest bearing liabilities which arise spontaneously with the firm's normal operation will not be included in the computation of cost of capital. These liabilities include accruals, accounts payable and accrued taxes.

➤ Importance of computing the cost of capital:

Financial managers must know the cost of capital of a firm for the following reasons:

- i) Maximizing the value of a firm requires that the costs of all inputs, including capital, be minimized and to minimize the cost of capital we must first know (estimate) it.
- ii) Capital budgeting (long term investment) decisions require the cost of capital.
- iii) It is also helpful in establishing the firms' optimal capital structure.
- iv) Other decisions like leasing, bond refunding and working capital management require an estimate of working capital.

I) SPECIFIC COST OF CAPITAL

5.1 THE COST OF DEBT

The cost of debt measures the current cost to the firm of borrowing funds to finance projects, including the costs that firms pay to raise funds through debt. These are interest and transaction costs such as bond printing costs. It is measured by the interest rate or yield paid to bond holders. In other words before tax cost of debt is equal to the yield to maturity on bond issue.

$$\text{Yield to maturity (YTM)} = I + \frac{m-v}{n}$$

$$\frac{m+v}{2} \quad \text{Or}$$

$$\frac{I + (m - v)}{n}$$

$$0.4m + 0.6v$$

Where: I = annual interest payments in dollars

M = par value of the bond

v = market value (net proceeds) from sale of a bond

n = number of years to maturity

Since firms are concerned primarily on the cash flows are available for their use and as interest payments are tax deductible, the relevant cost of debt is the after tax cost. The after-tax cost of debt, YTM (1-T), is the net cost of debt, which is used to calculate the weighted average cost of capital.

After tax cost of debt = Before tax cost of debt (1- tax rate)

Usually the cost of debt is lower than the cost of common stock and preferred stock because:

- It is tax deductible
- The required rate of return by debt holders is lower since investment in debt is of lower risk.

Example 1: X Co. issues a \$ 1,000, 8%, 20 year bond whose proceeds are \$940. The tax rate is 40%. What is the before tax and after tax cost of these bonds?

Solution:

$$\text{Before tax cost} = \text{YTM} = \frac{80 + \frac{100 - 940}{n}}{0.4m + 0.6v}$$

Given - Interest = $8\% \times 1000 = \$80$
M (par value) = 1000
V (net proceeds) = 940
n = 20 years

$$\text{Before tax} = \frac{80 + \frac{100 - 940}{20}}{0.4(100) + 0.6(940)} = \underline{\underline{8.56\%}}$$

After tax cost of debt = Before tax (1-tax rate)
= 8.56 (1-40 %%)
= **5.14%**

Example 2: If ABC Corporation can borrow at an interest rate of 10 percent, and if it belongs to a tax rate of 40 percent, then it's after tax-cost of debt will be 6 percent:

Solution: $K_d (1-T) = 10\% (1-40\%) = 10\% (1-0.4) = 10\% (0.6) = \underline{\underline{6.0\%}}$

The reason for using the after-tax cost of debt in calculating the weighted average cost of capital is as follows. The value of the firm's stock, which we want to maximize, depends on after-tax cash flows. Because interest is a deductible expense, it produces that savings that reduce the net cost of debt, making the after-tax cost of debt less than the before-tax cost of debt.

The after-tax cost of debt is the after-tax rate or return that must be earned on the debt-financed assets of the firm. It also provides us with a point of reference in comparing the cost of debt to the costs of other sources of capital (preferred and common stock, retained earnings), all of which are normally calculated on after-tax basis.

You should note that the 6 percent after-tax cost of debt in this example represents the interest rate on new debt, not that on already outstanding debt; in other words, our primary concern with the cost of capital is to use it for capital budgeting decisions like, would a new machine earn a return

greater than the cost of the capital needed to acquire the machine? The rate at which the firm has borrowed in the past is irrelevant for this kind of decisions.

5.1 THE COST OF PREFERRED STOCK

Preferred stock is a source of long-term capital for a firm. When a corporation sells preferred stock, it expects to pay dividends to investors in return for their money capital. The dividend payments are the cost of preferred stock to the firm.

Preferred stock is both similar and dissimilar to debt. Like a debt, preferred stock entitles investors to a fixed, periodic payment called Preferred stock dividend. Unlike a debt, preferred stock carries no maturity date. Thus, investors often consider preferred stock to be a perpetual annuity, whose periodic dividends extend indefinitely into the future. Preferred stock dividends, although contractually fixed, are not risk-free: in claim priority they are lower than interest payments but higher than common stock dividends. In general, then, preferred stock is more risky to investors than are bonds, but less risky than is common stock.

The cost of preferred stock is the required rate of return (that you have discussed under valuation) adjusted to floatation (transaction costs) such as printing costs, brokers tee etc. This means the costs of preferred stock constitutes the periodic dividend payment and the floatation costs incurred in selling the stock. Hence the cost of preferred stock is:

Where:

K_P = Cost of preferred stock
 D_P = Dividend payment
 P_P = Price of the preferred stock
 F = Floatation costs (selling costs)

Notes: 1. the formula assumes that the dividend payment (D_P) is constant and the preferred stock has no special features like call ability and convertibility.

2. The cost of preferred stock has no downward tax adjustment because preferred dividend payments are not tax deductible.

Example 3: Y Corporation issues preferred stock at a price of Br 100 and incurred floatation costs of Br 4. The annual dividend payments are Br 10.50. The cost of this preferred stock is:

Solution

$$\begin{aligned}
 K_P &= \frac{D_P}{P_P - F} \\
 &= \frac{10.50}{100 - 4} = \underline{\underline{10.94\%}}
 \end{aligned}$$

Note that this cost of preferred stock is not adjusted for taxes because the preferred dividend used in the formula is already an after tax figure – preferred stock dividends being paid after taxes. Thus, the explicit cost of preferred stock is greater than that of debt.

5.3 THE COST OF EQUITY

The cost of equity is the rate of return that investors require to make an equity investment. It contains two components: retained earnings and common stock. The costs of these two components are the same except for the floatation costs incurred on issuing common stock.

5.3.1 The Cost of Retained earnings

The cost of debt and preferred stock are based on the returns investors require on these securities. Similarly the cost of retained earnings, K_{re} , is the rate of return stockholders require on equity capital the firm obtains by retaining earnings. After bondholders (creditors) and preferred stock holders are paid, the remaining income belongs to common stock holders. This remaining income can be distributed as dividend or retained and reinvested by the firm. When the income is reinvested, an opportunity cost is incurred; the stockholders could have received those earnings as dividend and then invested it. Thus, the firm should earn on its retained earnings at least as much as its stockholders themselves could earn on alternative investments of equivalent risk. This is the investors required rate of return (K_S), which is also the cost of the retained earnings.

▼ **There are three approaches to determine K_S .**

1. Dividend growth model (discounted cash flow model).
2. Capital asset pricing model (CAPM)
3. The Bond yield - plus - risk premium.

▶ **In this handout only the first method will be discussed.**

The reason we must assign a cost of capital to retained earnings involves the opportunity cost principle. The firm's after-tax earnings literally belong to its stockholders. Bondholders are compensated by interest payments and preferred stockholders by preferred dividends. All earnings remaining after interest and preferred dividends belongs to the common stockholders, and these earnings serve to compensate stockholders for the use of their capital. Management may payout earnings in the form of common dividends or else retains earnings and re-invests them in the business. If management decides to retain earnings, there is an opportunity cost involved – stockholders could have received the earnings as dividends and invested this money in other stocks, in bonds, in real estate or in any other investment areas. Thus, the firm should earn on its retained earnings at least as much as the stockholders themselves could earn on alternative investments, of comparable risk.

What rate of return can stockholders expect to earn an equivalent-risk investment for the amount of retained earnings? Whereas debt and preferred stocks are contractual obligations that have easily determined costs, it is difficult to measure the required rate of return expected by the stockholders – which is also the cost of retained earnings, K_{re} . There are different approaches of estimating the cost of retained earnings. Among these approaches, the dividend-yield-plus-growth rate, or discounted cash flow approach is used in this teaching material. Under this approach, the cost of retained earnings can be estimated from the relationship of the stock's current market price to the stream of future dividends the firm expects to pay stockholders.

Dividend growth model: - This is a model in which the value of the stock is estimated to be the present value of the dividends on the stock growing at a constant rate i.e.

$$P_0 = \frac{D_1}{(1 + k_s)^1} + \frac{D_2}{(1 + k_s)^2} + \frac{D_3}{(1 + k_s)^3} + \dots + \frac{D_\infty}{(1 + k_s)^\infty}$$

The above equation can be approximated using the growing perpetuity formula as:

$$P_0 = \frac{D_1}{k_s - g}, \quad k_s > g$$

Where P_0 = price of the stock today

k_s = required rate of return, cost of the equity in our discussion

g = growth rate.

⇒ From the above equation we can compute k_s once we know the price of the stock and estimated D_1 at an expected constant growth rate.

$$k_s = \frac{D_1}{P_0} + g$$

Based on the above formula k_s is equal to the expected dividend yield at the end of the first year plus a constant growth rate (g). The growth rate basically applies to dividends, however it is also assumed to apply to earnings and stock price over the long term.

Example 4: “C” Co.’s shares are being sold for \$ 40 per share to day. The company has just dividend of \$4 per share, it is also expected to grow at the annual rate of 6% percent. What is the cost of equity for this stock?

Solution

$$\begin{aligned} k_s &= \frac{D_1}{P_0} + g \\ k_s &= \frac{D_0(1 + g)}{P_0} + g \text{ where } D_0 \text{ is the recently paid dividend.} \\ &= \frac{4(1 + 6\%)}{40} + 6\% = \underline{\underline{16.6\%}} \end{aligned}$$

5.3.2 Cost of Common Stock, or External Equity, K_e

The cost of new common equity, K_e , or external equity, is higher than the cost of retained earnings, K_{re} , because of flotation costs involved in issuing new common stock.

Flotation costs include:

- (1) Commissions paid to those selling the common stocks for the firm,
- (2) Printing expenses,
- (3) Advertising costs,
- (4) Registration fees for government agencies and
- (5) Any reduction (discount) from the current market price of the same type of existing common stocks introduced.

♣ Because flotation costs reduce the firm's net receipts from the sale of the new offering, the actual benefit of the new common stock to the firm is less than their sales value. Taking flotation costs into considerations, what rate of return must be earned on funds raised

If we know the prevailing common stock price, P_0 , and the expected dividends D_t , we can solve for the cost of new common stock, K_e . Determining P_0 is no problem for publicly traded firms in very well established markets like the New York Stock Exchange market because the price of the stock in such markets is reported daily in the newspapers. However, determining the stream of future common stock dividends expected by investors is not so simple.

⇒ There are many possible assumptions in determining the expected common stock dividends, but let us restrict our assumptions to two:

(1) A constant annual dividend and

(2) The dividend stream growing at constant annual growth rate. Accordingly:

⇒ The cost of new common stock which promises to pay dividends that grows at a constant annual growth rate is found by applying the following formula:

$$K_e = \frac{D_1}{P_0 (1-F)} + g$$

Whereas, the cost of new common stock that promises to pay a constant annual dividend every year (i.e., the dividend paid last year and that will be expected to be paid this year, next to this year and so is same) can be found by the following formula:

$$K_e = \frac{D_1}{P_0 (1-F)}$$

Here,

✓ D_1 is the expected common stock dividend for this year,

✓ P_0 is prevailing common stock price, and

✓ F is the percentage flotation cost incurred in selling the new stock issue.

So, $P_0 (1-F)$ is the net price per share received by the firm, which issues the new common stock. If F is provided in birr per share, the net proceeds of issuing common stock per share will be current market price of common stock per share less flotation cost per share (i.e., net proceed = $P_0 - F$).

Example 5: Assume that ABC corporation is currently issuing its new common stock at Br. 22 per share and this year's expected common stock dividend, Br. 1.10 per share, is assumed to grow at a constant 10 percent rate (g) in all-future years. Assume that ABC Corporation has flotation costs of 10 percent. Compute the cost of new common stock for ABC Corporation.

Solution:

$$\begin{aligned} K_e &= \frac{D_1}{P_0 (1-F)} + g \\ &= \frac{\text{Br. } 1.10}{\text{Br. } 22 (1-0.10)} + 10\% \\ &= \frac{\text{Br. } 1.10}{19.8} + 10\% = \underline{\underline{15.55\%}} \end{aligned}$$

- ◆ Investors require a return of $K_e = 15.5\%$ on the new common stock. Specifically, if the firm earns 15.5 percent on funds obtained by issuing new stock, then earnings per share will remain at the previously expected level, the firm's expected dividend can be maintained, and, as a result, the price per share will not decline.

If the firm earns less than 15.5 percent, then earnings, dividends and growth will fall below expectations, causing the stock price to decline. If the firm earns more than 15.5 percent, the stock price will rise.

- ♣ Because of flotation costs, dollars or birr raised by selling new common stock must "work harder" than dollars or birr raised by retained earnings. Moreover, since no flotation costs are involved, retained earnings have a lower cost than issuing new common stock. Therefore, firms should utilize retained earnings to the extent possible to avoid the costs of issuing new common stock. However, if a firm has more good investment opportunities than can be financed with retained earnings and debt, it may find necessary to issue new common stock.

The retained earnings breakpoint represents the total amount of financing that can be raised before the firm is forced to sell new common stock.

This breakpoint can be calculated as follows:

$$\text{Retained earnings Breakpoint} = \frac{\text{Addition to retained earnings}}{\text{Retained earnings fraction}}$$

⇒ For example, ABC Corporation's addition to the retained earnings from its profit for coming year is expected to be Br. 68 million and its capital structure consists of 45 percent debt, 2 percent preferred stock, and 53 percent equity (all equity comes from retained earnings). Therefore, its retained earnings breakpoint is Br. 68/0.53 = Br. 128.3 million. If ABC requires a capital exactly Br. 128 million, then 0.45 (Br. 128) = Br. 57.74 million would be financed with debt, 0.02 (Br. 128) = Br. 2.57 million with preferred stock, and 0.53 (Br. 128) = Br. 68 million with equity raised from retained earnings. If ABC's capital budget exceeded the Br. 128 million "breakpoint," the amount of equity required would exceed the amount of available retained earnings, so the company would have to obtain equity by issuing new, high-cost common stock.

It is important to recognize that this breakpoint is only suggestive. For example, rather than issuing new common stock, the company could use more debt (hence, less equity), or it could increase its additional retained earnings by reducing its dividend payout ratio. Both actions would increase the retained earnings breakeven point. In any event, firms that have a large number of good investment opportunities generally maximize their retained earnings by paying out a smaller percentage of income as dividends than firms with fewer good investment opportunities.

5.3.3 Cost of Preferred Stock with Flotation Cost (New)

Flotation costs adjustments can also be made for preferred stock and debt. For preferred stock, the flotation- adjusted cost is the preferred dividend, D_p , divided by the net issuing price, P_n , which is the price the firm receives on preferred stock after deducting flotation costs. Therefore, if flotation cost is significant enough, the cost of issuing new preferred stock will be computed as follows:

$$K_p = \frac{D_p}{P_p (1-F)} = \frac{D_p}{P_n}$$

Example 6:

If ABC Corporation issues its new preferred stock at Br. 100 per share (P_p), and that pays a Br. 9 dividend per share per year (D_p) at 10 percent flotation cost (F), the cost of preferred stock will then be _____

$$\begin{aligned} K_p &= \frac{D_p}{P_o (1-F)} \\ &= \frac{\text{Br. } 9}{\text{Br. } 100 (1-0.10)} \\ &= \frac{\text{Br. } 9}{\text{Br. } 90} \\ &= \frac{\text{Br. } 9}{\text{Br. } 100 (0.9)} \\ &= \text{Br. } 9 \end{aligned}$$

Thus, the cost of preferred stock when the flotation cost exists is 10 percent for ABC Corporation. From this figure, one can understand that flotation cost increases the cost of preferred stock (i.e., $K_p = 9\%$ increased to $K_p = 10\%$).

- ♥ Similarly, if debt is issued to the public and flotation costs are incurred, the after-tax cost of debt is found by calculating the after-tax yield to maturity, where the issue price is the bond's par value less the flotation expense.

More specifically, the before-tax cost of debt is calculated first as follows:

$$YTM = I + \frac{M - V(1-F)}{\frac{n}{2}}$$

Where:

YTM = the firm's approximate cost of debt before -tax adjusted for flotation cost

I	=	the annual interest payment
M	=	the maturity value of the bond
V	=	the current price of the bond
n	=	the remaining years in the life of the bond
F	=	Flotation cost as a percentages of bond price (Po)

Then, the after-tax cost of debt will be computed as follows:

After – tax cost of debt = $YTM(1-T)$

Example 7: Assume that XYZ Corporation issued a bond with following characteristics:

Annual interest payment (I)	=	Br. 70
Bond life (years to maturity) (n)	=	15
Corporate tax rate (T)	=	40%
Maturity value of the bond (M)	=	Br. 1000
Current price of the bond (V)	=	Br. 771.82
Flotation cost (F)	=	3%

What is the cost of debt before-tax adjusted for flotation cost?

Solution

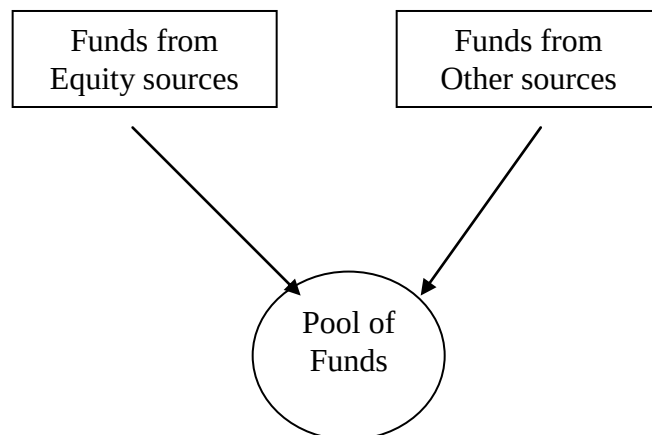
Using the above example, the cost of debt before-tax adjusted for flotation cost is calculated as follows:

$$\begin{aligned} YTM &= \frac{\text{Br. } 70 + \frac{\text{Br. } 1000 - \text{Br. } 771.82(1-0.03)}{15}}{2} \\ &= \frac{1000 - \text{Br. } 771.82(1-0.03)}{2} \\ &= \frac{\$70 + 1000 - \text{Br. } 748.6654}{15} \\ &= \frac{1000 - \text{Br. } 748.6654}{2} \\ &= \frac{70 + \text{Br. } 16.75564}{2} \end{aligned}$$

✓ Thus the flotation cost adjusted, after-tax cost of debt is 5.9 percent for XYZ Corporation.

II) The Weighted Average Cost of Capital (WACC)

- In the analysis so far carried out, each source of finance has been examined in isolation. However, the practical business situation is that there is a continuous rising of funds from various sources.
- These funds are used, partly in existing operations and partly to finance new projects. There is not normally any separation between funds from different sources and their application to specific projects.



- ♥ In order to provide a measure for evaluating these projects, the cost of the pool of funds is required. This is usually referred to as the combined or weighted average cost of capital (WACC).
- ♥ The general approach is to calculate the cost of each source of finance, then to weight these according to their importance in the financing mix.

5.4 Procedure for calculating the WACC:

So far you have seen how to compute the cost of specific capital. Now you will learn techniques for determining the overall cost of capital. The overall cost of capital for a firm is the average of cost of each specific capital, weighted by each specific capital's proportion in capital structure. A firm has an optimal capital structure defined as mix of debt, preferred stock, common stock and retained earnings that cause its stock price to be maximized. Therefore, a value-maximizing firm will establish a target (optimal) capital structure and then raise new capital in a manner that will keep the actual capital structure on target over time.

✓ To Calculate weights for source of capital:

- a) Estimate the cost of each source of capital
- b) Multiply proportion of total of each source of capital by the cost of that source of capital
- c) Sum the results of step 3 to give the WAAC.

▶ When to use the weighted average cost of capital:

The weighted average cost of capital is calculated based on the firm's current costs (market values) of equity and debt. In using it to appraise projects we are implicitly making the following assumptions.

- a) The historic proportions of debt and equity are not to be changed: The cost of equity and debt based on current market information reflects the firm's current gearing ratio. If the firm substantially changes the long-run proportions in which funds are raised then the cost of equity and debt are likely to change with a resultant change in the combined cost of capital.

- b) The operating risk of the firm will not be changed: The firm's current cost of equity and debt also reflect its current area of operations. For example light risk electronics companies are likely to have higher costs of funds than, say, low risk food manufacturers.
- If a food manufacturing company were to diversify into electronics its costs of finance would change. Current estimates of the cost of capital are therefore only suitable for appraising investments of similar operating risk.
- c) The finance is not project specific:- In some circumstances it is unwise to use the average cost of a pool of funds. Suppose a government offered a multinational company an interest free loan to encourage it to invest in a particular country. In this situation it would be unwise to put the cheap loan into the pool of funds and spread its benefit over all projects as it is associated with only one specific project. In these circumstances we would need to credit the benefits of the cheap finance to the project.
- d) The proportions of Additional Financial Requirements (AFR) should be kept as it is.

5.5 Book Value Weights

Example 8

Suppose a corporation has *book value* of each type of capital in the capital structure as follows:

<u>Source of capital</u>	<u>Book value</u>	<u>Specific cost</u>
Bonds (1000 par, 9.5% coupon)	15,000,000	6%
Preferred stock (200,000 shares at birr 25par)	5,000,000	10%
Common stock (1,000,000 shares at birr 20 par)	20,000,000	13.5%
Retained earnings	10,000,000	13%
Total	<u>50,000,000</u>	

Required: Compute the WACC for the corporation if the corporation obtains new capital in book value proportions.

Solutions:

<u>Source of capital</u>	<u>Book value weight</u>	<u>Specific cost</u>	<u>Weighted cost</u>
Bonds	0.3	0.06	0.018
Preferred stock	0.1	0.10	0.010
Common stock	0.4	0.135	0.054
Retained earnings	0.2	0.13	<u>0.026</u>
Weighted average cost of capital (ko)			0.108= <u>10.8%</u>

5.6 Market Value Weights

Market value weights measure the actual proportion of each type of permanent capital in the firm structure at current market prices. The resulting cost of capital reflects the rates of return currently required by investor rather than the historical rates embodied in the firm's balance sheet.

Example 9

Take the above example and the following current market prices.

Bonds issued at 98% of par value (i.e 98% x1000=980)

Preferred stock issued at birr 25 per share

Common stock issued at birr 45 per share

Required: compute the WACC for the corporation if the corporation obtains new capital in market values.

Solution:

<u>Source</u>	<u>Number of shares</u>	<u>Market price</u>	<u>Market value</u>
Bonds	15,000	980	14,700,000
Preferred stock	200,000	25	5,000,000
Common stock	1,000,000	45	<u>45,000,000</u>
Total			64,700,000

Note: retained earnings do not have a separate market value because their value is included in the common stock. Thus, to compute WACC, the common stocks market value of birr 45,000,000 should divide between common stock and retained earnings in proportion to the sum of their book values.

<u>Sources</u>	<u>Book values</u>
Common stock	20,000,000
Retained earnings	10,000,000
The ratio of common stock: Retained earnings	
20,000,000: 10,000,000	

2:1

Therefore, common stock = $\frac{2}{3} \times 45,000,000 = 30,000,000$

<u>Source</u>	<u>Market value</u>	<u>weight</u>	<u>cost of capital</u>	<u>weighted cost</u>
Bonds	14,700,000	0.227	0.06	0.0136
Preferred stock	5,000,000	0.007	0.1	0.0077
Common stock	30,000,000	0.464	0.135	0.6260
Retained earnings	15,000,000	0.232	0.13	<u>0.0301</u>
WACC				=0.114

Therefore, $K_o = 11.4\%$

Example 10

Williams Lake Ltd is considering a major expansion. The company needs to know what the cost of capital is for this capital budgeting decision. The company provided the following information to you:

- 1) Tax rate is 40%
- 2) The right side of the Balance Sheet, excluding current liabilities, appears as follows:

Long Term Debt	\$8,000,000
Preferred Shares	\$6,000,000
Common Shares	\$7,000,000
Retained Earnings'	\$5,000,000
- 3) The existing long term debt carries a 7% coupon rate with semi annual payments. There are 10 years remaining. The current effective annual yield, based on semi annual compounding, is 6.09%.
- 4) There are 60,000 preferred Shares outstanding (par value \$100.) The annual dividend is 4.5% and the current yield is 5%.
- 5) Dividends on the common stock are currently \$.30 on shares totaling 1,000,000. The stock is presently trading at \$9 dollars per share. The company has a Beta of 1.1, a risk free return of 3% and required rate of return on a market portfolio of 11%.
- 6) Flotation costs are 2% after tax on debt and preferred shares and 3% before tax on new common equity.

Required: Determine Williams Lake Ltd' s Weighed Average Cost of Capital using market values.

Solution

For each component of Debt, Preferred Shares and Common Shares, it is necessary to determine 2 things:

- a) The cost of capital.
- b) The weight, based on market value

The WACC table at the bottom summarizes the cost and weight for each component.

Debt: Cost of Capital. Yield = 6.09%. Therefore = $((6.09\% \times (1 - 40\%)) / (1 - 2\%)) = 3.729\%$
(*debt is calculated after tax since the interest is tax deductible)

(^flotation cost)

Market Value-Current effective annual yield of 6.09%

Converts to 3% semi annually

Conversion formula is:

$((1 + i) \text{ to the power of } 0.5) - 1$. Therefore, $((1 + .0609) .5) - 1$
 $i = 3\%$

10 years = 20 semi annual compounding periods

Using tables, the interest is $8,000,000 \times 7\% \times 5 \times (FVA, 3\%, 20n) = 4,165,700$

Principal is $8,000,000 \times (PV, 3\%, 20n) = 4,429,600$

Market Value of Debt = 8,595,300

Preferred: Cost of Capital (given) $5 / (1-.02) = 5.10\%$

*Market Value $(60,000 \times 4.5\% \times \$100) / 5\% = 5,400,000$

*(the value of a preferred share is determined by Do / i . If a share has (say) a dividend of \$2.00 and the required rate of return is (say) 8%, the share is worth $\$2.00 / 8\% = \$25.00$)

Common: Cost of Capital = Use Capita Asset Pricing Model.

$3\% + 1.1 (11\% - 3\%) = 11.8\%$. $11.8\% / (1-((1-.40) ^{.03})) = 11.8\% / .982 = 12.02\%$

(^note that the floatation costs are given on a before tax basis.

Therefore, must be converted to after tax.)

Market Value $\$9$ per share $\times 1,000,000$ shares = 9,000,000

WACC calculation:	<u>Market Value</u>	<u>Weight</u>	<u>Cost</u>	<u>WAACC (below)</u>
Debt	8,595,300	.3738	.03729	.0139
Preferred	5,400,000	.2348	.051	.0120
Common	<u>9,000,000</u>	.3914	.1202	<u>.0470</u>
	22,995,300			<u>.0729</u>

Weights: $8,595,300 / 22,995,300 = .3738$

$5,400,000 / 22,995,300 = .2348$

$9,000,000 / 22,995,300 = .3914$

Cost of Capital is 7.29%

The target capital structure of debt, preferred stock, common stock and retained earnings, along with the specific costs of capital, are used to calculate the firm' s weighted average cost of capital, WACC. The weights or proportions of debt, preferred stock, retained earnings and common stock could be based either on the accounting values shown on the firm' s balance sheet (book values) or on the market values of the different securities. Theoretically, the weights should be based on market values, but if a firm' s book value weights are reasonably close to its market value weights, book value weights can be used as an alternative for market value weights.

Example 11

To illustrate, suppose ABC Corporation has a target capital structure calling for 45 percent debt, 2 percent preferred stock, and 23 percent retained earnings and 30 percent common stock. Its before-tax cost of debt, K_d , is 10 percent; its after-tax cost of debt = $K_d (1-T) = 10\% (1-0.4) = 6.0\%$; its cost of preferred stock, k_p , is 9% percent; its cost of new common stock, k_e , is 15.5 percent; its cost of retained earnings, K_{re} , is 15 percent; its tax rate is 40 percent. **Calculate ABC' s weighted average cost of capital.**

$$\begin{aligned}
 \text{WACC} &= W_d K_d (1-T) + W_p K_p + W_{re} K_{re} + W_e K_e \\
 &= 0.45 (10\%) (1-0.4) + 0.02 (9\%) + 0.23 (15\%) + \\
 &\quad 0.30 (15.5\%) \\
 &= 0.027 + 0.0018 + 0.0345 + 0.0465 \\
 &= \underline{\underline{10.98\%}}
 \end{aligned}$$

◆ Factors that Affect the Weighted Average Cost of Capital

The cost of capital is affected by a number of factors. Some are beyond a firm' s control, but others are influenced by its financing and investment decisions.

► Factors the Firm cannot control

The two most important factors that are beyond a firm' s direct control are the level of interest rates and tax rates.

- **The Level of Interest rates** – If interest rates in the economy rise, the cost of debt increases because firms will have to pay bondholders more to obtain debt capital.

► **Tax Rates** – Tax rates, which are largely beyond the control of an individual firm have an important effect on the cost of capital. Tax rates are used in the calculation of the component cost of debt. Since interest expense on debt is tax-deductible the firms' effective cost of debt decreases.

► **Factors the firm can Control**

A firm can directly affect its cost capital through its capital structure policy, its dividend policy and its investment policy.

CHAPTER – SIX CAPITAL BUDGETING

➤ **Meaning and Nature of Capital Budgeting**

Capital Budgeting is the process of making investment decisions in capital expenditures. A **capital expenditure** may be defined as an expenditure the benefits of which are expected to be

received over period of time exceeding one year. The main characteristic of a capital expenditure is that the expenditure is incurred at one point of time whereas benefits of the expenditure are realized at different points of time in the future. In simple language we may say that a capital expenditure is expenditure incurred for acquiring or improving the fixed assets, the benefits of which are expected to be received over a number of years in future. The following are some of the examples of capital expenditure.

1. Cost of acquisition of permanent assets such as building, plant and machinery, goodwill, etc
2. Cost of addition, expansion, improvement or alteration in the fixed assets.
3. Cost of replacement of permanent assets
4. Research and development project cost, etc

Capital expenditure involves non-flexible long-term commitment of funds. Thus capital expenditure decisions are also called as **Long Term Investment Decisions**. **Capital budgeting** involves the planning and control of capital expenditure. It is the process of deciding whether or not to commit resources to a particular long-term project whose benefits are to be realized over a period of time, longer than one year. **Capital budgeting** is also known as Investment Decision Making, Capital Expenditure Decision, Planning Capital Expenditure and Analysis of Capital Expenditure. According to T. Horngreen, “**Capital Budgeting** is long term planning for making and financing proposed capital outlays.”

At each point of time a business firm has a number of proposals regarding various projects in which it can invest funds. But the funds available with the firm are always limited and it is not possible to invest funds in all the proposals at a time. Hence, it is very essential to select from amongst the various completing proposals, those which give the highest benefits. The crux of the capital budgeting is the allocation of available resources to various proposals. There are many considerations, economic as well as non-economic, which influence the capital budgeting decisions. The crucial factor that influences the capital budgeting decision is the profitability of the prospective investment. Yet the risk involved in the proposal cannot be ignored because profitability and risk are directly relate, i.e. the higher the profitability, the greater the risk and vice-versa. There are many methods of evaluating profitability of capital investment proposals. Te various commonly used methods are as follows:

I) TRADITIONS METHODS:

1. Pay Back Period Method
2. Average Rate of Return Method

II) TIME ADJUSTED METHOD OR DISCOUNTED METHODS:

1. Net present value method
2. Internal rate of return method
3. Profitability index method

1. PAY- BACK PERIOD METHOD

The 'pay back' sometimes called as **pay out** or **pay off** period method represents the period in which the total investment in permanent assets pays back itself., This method is based on the principle that every capital expenditure pays itself back with in a certain period out of the additional earnings generated form the capital assets. Thus, it measures the period of time of the original cost of a project to be recovered form the additional earnings of the project itself. Under this method, various investments are ranked according to the length of their pay back period in such a manner that the investment with a shorter pay back pied is preferred to the one which has longer pay back period.

The pay-balk period can be ascertained in the following manner:

- (a) Calculate annual net earnings (profits) before depreciation and after taxes: these are called **Annul Cash Inflows**.
- (b) Divide the initial outlay (cost of the project) by the annual cash inflow, where the project generate constant annual ash inflows:

Pay-back Period

$$= \frac{\text{Cash Outlay of the project or Original cost of the Asset}}{\text{Annual Cash inflows}}$$

back period can be found by adding up the cash inflows until the total is equal the initial cash outlay of project or original cost of the asset.

Example 1 A project cost \$100, 000 and yields an annual uniform cash inflow of \$ 20, 000 for 8 year. Calculate its pay-back period.

Solution

The pay-back period of the projects; is as follows:

$$\begin{aligned} \text{Pay back period} &= \frac{\text{Initial outlay of the project}}{\text{Annual cash inflow}} \\ &= \frac{100,000}{20,000} = 5 \text{ years} \end{aligned}$$

Example 2: Determine the pay- back period for a project which requires a cash outlay of \$ 10, 000 and generates non uniform cash inflows of \$ 2, 000, \$ 4, 000, \$ 3, 000 \$ 2, 000 in the first, second, third and fourth year respectively.

Solution:

Total cash Outlay = \$ 10, 000

Total Cash inflow for the first 3 years

$$= 2,000 + 4,000 + 3,000 = \$ 9,000$$

Up to the third year the total cost is not recovered but the total cash inflows for the four years are \$ 9, 000 + 2, 000 = \$ 11, 000 i.e. 1000 more than the cost of the project. So the pay back period is some where between 3 and 4 years. Assuming that the cash inflows occur evenly throughout the year. The required to recover \$ 1, 000 will be $1000./2000 \times 12 = 6$ months.

Hence pay back period is 3 years and 6 months.

Example 3: A Project cost \$ 500, 000 and yields annually a profit of \$ 80, 000 after depreciation @ 12% p.a but before tax of 50%. Calculate the pay back period.

Solution:

	\$
Profit before tax	80, 000
Less tax @ 50%	<u>40, 000</u>
Profit after tax	40, 000
Add back depreciation @ 12% on \$ 500, 000	60, 000
Profit before depreciation but after tax or Annual Cash inflow	100, 000

$$\text{Pay back period} = \frac{\text{Cost of the Project}}{\text{Annual Cash inflow}}$$

$$= \frac{500,000}{100,000} = 5 \text{ years}$$

Example 4: There are two projects X and Y. Each project requires an investment of \$ 20, 000. You are required to rank these projects according to the pay back method from the following information:

➤ (Net profit before depreciation and after tax)

<u>Year</u>	<u>Project-X</u>	<u>Project-Y</u>
1st	1, 000	2, 000
2nd	2, 000	4, 000
3rd	4, 000	6,000
4th	5, 000	8, 000
5th	8,000	-

Solution:

The pay-back period for project X is 5 years, as

$$(\$ 1,000 + 2,000 + 4,000 + 5,000 + 8,000) = \$ 20,000$$

While the pay-back period for project Y is 4 years, as

$$(\$ 2,000 + 4000 + 6,000 + 8,000) = \$ 20,000$$

Hence project Y should be preferred or ranked first

2. ACCOUNTING RATE OF RETURN

St. Mary's University, Department of Accounting

This method takes into account the earnings expected from the investment over their whole life. It is known as Accounting Rate of Return method for the reason under this method, the accounting concept of profit (net profit after tax and depreciation) is used rather than cash inflows. According to this method, various projects with the higher rate of return is selected as compared to the one with lower rate of return. This method can also be used to make decision as to accepting or rejecting a proposal. The expected return is determined and the project which has a higher rate of return than the minimum rate specified by the firm called the cut off rate is accepted and the one which gives a lower expected rate of return than the minimum rate is rejected.

➤ **The return on investment method can be used in several ways as follows:**

Average Rate of Return method: Under this method average profit after tax and depreciation is calculated and then it is divided by the total capital outlay or total investment in the project. In other words, it establishes the relationship between average annual profits to total investments.

Thus,

Average Rate of Return

$$= \frac{\text{Total profits (after dep. \& taxes)}}{\text{Net investment in the project * No. of years of profits}} \times 100$$
$$\frac{\text{Average Annual profits}}{\text{Net investment in the project}} \times 100$$

Example 5: A project requires an investment of \$ 500, 000 and has a scrap value of \$ 20, 000 after five years. It is expected to yield profits after depreciation and taxes during the five years amounting to \$ 40, 000, \$60, 000, \$ 70, 000, & 50, 000 and \$ 20, 000. Calculate the average rate of return on the investment.

Solution:

Total profit = \$ 40, 000 + 60, 000 + 70, 000 + 50, 000 + 20, 000

= \$ 2 40, 000

Average profit = $\frac{\$ 240, 000}{5} = 48, 000$

5

Net investment in the project = 500, 000 - 20, 000 (Scrap Value)

= \$ 480, 000

Average Rate of Return

= $\frac{\text{Average Annual profit}}{\text{Net investment in the project}} \times 100$

= $\frac{48, 000}{480, 000} \times 100 = 10\%$

(II) TIME- ADJUSTED OR DISCOUNTED CASH FLOW METHODS:

The traditional methods of capital budgeting i.e. pay-back method as well as accounting rate of return method, suffer from the serious limitations by giving equal weight to present and future flow of incomes. These methods do not take in to consideration the time value of money, the fact that a dollar earned today has more value than a dollar earned after five years. The **Time-Adjusted** or **Discounted Cash Flow Methods** take in to account the profitability and also the time value of money. These methods also called **Modern Methods of Capital Budgeting** are becoming increasingly popular day by day.

➤ **Following are the discounted cash flow methods:**

1. NET PRESENT VALUE METHODS

The net present value method is a modern method of evaluating investment proposals. This method takes into consideration the time value of money and attempts to calculate the return on investments by introducing the factor of time element. The net present values of all inflows of cash occurring during the entire life of the project is determined separately for each year by discounting these

flows by the firm's cost of capital or pre-determined rate. The following are the necessary steps to be followed for adopting the net present value method of evaluating investment proposals:

(i) First of all determine an appropriate rate of interest that should be selected as the minimum required rate of return called 'cut off rate or discount rate'. The rate should be a minimum rate of return below which the investor considers that it does not pay him to invest. The discount rate should be either the actual rate of interest in the market on long-term loans or ; it should reflect the opportunity cost of capital of the investor.

(ii) Compute the present value of total investment outlay, i.e., cash outflows at the determined discount rate. If the total investment is to be made in the initial year, the present value shall be the same as the cost of investment.

(iii) Compute the present values of total investment proceeds, i.e., cash inflows, (profit before depreciation and after tax) at the above determined discount rate.

(iv) Calculate the net present value of each project by subtracting the present value of cash inflows from the present value of cash outflows for each project.

(v) If the net present value is positive or zero. I.e., when present value of cash inflows either exceeds or is equal to the present values of cash outflows, the proposal may be accepted. But in case the present value of inflows is less than the present value of cash outflows, the proposal should be rejected.

(vi) To select between mutually exclusive projects, projects should be ranked in order of net present values; i.e. the first preference should be given to the project having the maximum positive net present value. However as n become large, the calculation of $(1+r)^n$ becomes difficult. Present value can also be found by the use of present value tables.

Illustration 1: From the following information calculate the net present value of the two projects and suggest which of the two projects should be accepted assuming a discount rate of 10%.

	Project X	Project Y
Initial Investment	\$ 20, 000	\$ 30, 000
Estimated Life	5 years	5 years
Scrap Value	\$ 1, 000	\$ 2, 000

The profits before depreciation and after taxes (cash flows) are as follows:

	Year 1	Year 2	Year 3	Year 4	Year 5
Project X	\$ 5, 000	\$ 10, 000	\$ 10, 000	\$ 3, 000	\$ 2, 000
Project Y	\$ 20, 000	\$ 10, 000	\$ 5,000	\$ 3,000	\$ 2, 000

SOLUTION

⇒ **Project X**

Year	C.F \$	P.V of \$ @10% (D.R) Using Pv. Tables	P. V of Net C.F \$
1.	5, 000	0.909	4,545
2.	10, 000	0.826	8,260
3.	10, 000	0.751	7, 510
4.	3, 000	0.683	2, 049
5.	2, 000	0.621	1, 242
5. (S.V)	1, 000	0.621	621
			<u>24,227</u>

Present Value of all cash inflows = **24, 227**

Less present Value of initial investment (B/c all the Inv't is to be made in the first year only the P.V is the same as the cost of the initial investment) = 20, 000

→ Project Y

Year	C.F \$	P.V of \$ @10% (D.R) Using Pv. Tables	P. V of Net C.F \$
1.	20, 000	0.909	18, 180
2.	10, 000	0.826	8, 260
3.	5, 000	0.751	3, 755
4.	3, 000	0.683	2, 049
5.	2, 000	0.621	1, 242
5. (S.V)	2, 000	0.621	<u>1, 242</u>
			<u>34, 728</u>
Total present Value of cash inflows			= \$ 34, 728
Less present value of initial investment			= \$ <u>30, 000</u>
Net Present value			= <u>4, 728</u>

❖ We find that net present value of project Y is higher than the net present value of project X and hence it is suggested that project Y should be selected.

Illustration 2: No project is acceptable unless the yield is 10%. Cash inflows of certain project along with cash outflows are given below:

Years	Out flows	In flows
0	\$ 150, 000	-
1	30, 000	20, 000
2		30, 000
3		60, 000
4		80, 000
5		30, 000

✓ The salvage value at the end of the 5th year is \$ 40, 000.

♠ Calculate net present value.

SOLUTION

CALCULATION OF P. V OF OUTFLOWS			
Year	Outflow	P.V @ 10% D.R	P.V
0	\$ 150, 000	1	\$ 150, 000
1	\$ 30, 000	0.909	\$ <u>27, 270</u>
			<u>177, 270</u>

CALCULATION OF P. V OF INFLOWS			
Year	Inflows \$	P.V @ 10% D.R	P.V \$
1	20, 000	0.909	18, 180
2	30, 000	0.826	24, 780
3	60, 000	0.751	45, 060
4	80, 000	0.683	54, 640
5	30, 000	0.620	18, 600
5 (S.V)	40, 000	0.620	<u>24, 800</u>
			<u>186, 060</u>

Total present Value of cash inflows	186,060
Less present value of initial outflows	<u>177,270</u>
Net Present value	<u>8,790</u>

Disadvantages of the Net Present Value Method

⇒ The Net Present value method suffers from the following limitations:

(1) As compared to the traditional methods, the net present value method is more difficult to understand and operate.

- (2) It may not give good results while comparing projects with unequal limes as the project having higher net present value but realized in a longer life span may not be as desirable as a project having something lesser net present value achieved in a much shorter span of life of the asset.
- (3) In the same way as above, it may not give good results while comparing projects with unequal investment of funds.
- (4) It is not easy to determine an appropriate discount rate.

2) INTERNAL RATE OF RETURN METHOD

The Internal Rate of Return method is also a modern technique of capital budgeting that takes in to account the time value of money. It is also known as “ **Time Adjusted Rate of Return**’ **Discounted Cash Flow**’ ‘ **Discounted Rate of Return**, ‘ **Yield Method**, ‘ and ‘**Trial And Error Yield Method**’.

In the net present value method the net present value is determined by discounting the future cash flows of a project at a predetermined or specified rate called the **Cut-Off Rate**. But under the Internal Rate of Return Method, the cash flows of a project are discounted at a suitable rate by **Hit and Trial Method**, which equates the net present value so calculated to the amount of the investment. Under this method, since the discount rate is determined internally, this method is called as the **Internal Rate of Return Method**. The internal rate of return can be defined as that rate of discount at which the present value of cash -an inflow is equal to the present value of cash outflows. It can be determined with the help of the following mathematical formula:

$$C = \frac{A_1}{(1+r)} + \frac{A_2}{(1+r)^2} + \frac{A_3}{(1+r)^3} + \dots + \frac{A_n}{(1+r)^n}$$

✓ Where, C = Initial outlay at time zero

A1, A2, and An = Future net cash flows at different periods.

r = Rate of discount of internal rate of return.

The internal rate of return can also be determined with the help of present value tables. The following steps are required to practice the internal rate of return method.

- (1) Determine the future net cash flows during the entire economic life of the project. The cash inflows are estimated for further profits before depreciation but after taxes.
- (2) Determine the rate of discount at which the value of cash inflows is equal to the present value of cash out flows. This may be determined as explained after step (4)
- (3) Accept the proposal if the internal rate of return is higher than or equal to the minimum required rate of return, i.e. the cost of capital or cut off rate and reject the proposal if the internal rate of return is lower than the cost of cut-off rate.
- (4) In case of alternative proposals select the proposal with the highest rate of return as long as the rates are higher than the cost of capital or cut-off-rate.