

**M.Com/BBA**

# **FINANCIAL MANAGEMENT**

**Code: 8422/5040/8513**



**Department of Business Administration  
Faculty of Social Sciences & Humanities  
ALLAMA IQBAL OPEN UNIVERSITY ISLAMABAD**

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**Code#: 8422/8513/5040**

**Units: 1-9**



**Department of Business Administration**  
**Faculty of Social Sciences & Humanities**  
**Allama Iqbal Open University Islamabad**

# **COURSE TEAM**

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## **FOREWORD**

I welcome you to the course Financial Management which is a part of BBA and MBA programs. In today's globalized economy, proficient financial management is essential for companies striving to maintain competitiveness and achieve sustainable growth. This course thoroughly examines all facets of financial management, offering a comprehensive framework for understanding and addressing financial issues in various business contexts. The knowledge gained from this course is indispensable for students pursuing academic degrees in Business Administration, as it prepares them to navigate complex financial challenges with confidence and precision.

This course will help the students develop a fundamental understanding of financial principles and their application in business, fostering a sense of strategic thinking, fiscal responsibility, and informed decision-making. We hope that this study guide will be instrumental in helping the students comprehend the financial dimensions of business operations and prepare them for impactful leadership roles in the corporate sector.

We shall be grateful to the teachers, students, and readers for their comments and suggestions for further improvement. Your feedback is invaluable in ensuring that this study guide remains a relevant and effective resource for future generations of financial professionals.

**Prof. Dr Nasir Mehmood**  
**Vice Chancellor**

## **PREFACE**

Financial management plays a pivotal role in modern business, acting as a key driver of organizational success and sustainability. This book, Financial Management, provides a comprehensive overview of fundamental concepts, tools, and techniques essential for sound financial decision-making. Divided into nine well-structured units, it covers various topics, including the role and functions of financial management, corporate social responsibility (CSR), financial analysis, working capital management, capital budgeting, and the valuation of long-term securities. Additionally, it addresses advanced concepts such as risk-return trade-offs, portfolio diversification, and the cost of capital, offering a balanced approach to both theoretical and practical aspects of financial management.

This book combines theoretical knowledge with real-world applications through practical examples and problem-solving exercises. From understanding the time value of money and cash-flow forecasting to mastering working capital strategies and capital budgeting techniques, the book equips readers with the skills to address contemporary financial challenges effectively. I hope this resource is a valuable guide for developing financial literacy and achieving excellence in financial management.

**Prof. Dr. Abdul Aziz Sahir**  
**Dean F/o SS&H**

## **ACKNOWLEDGEMENT**

The successful completion of this study guide on Financial Management would not have been possible without numerous individuals' guidance, support, and dedication.

First and foremost, we would like to express our deepest gratitude to Prof. Dr. Nasir Mehmood, Vice Chancellor, for his visionary leadership and unwavering commitment to academic excellence, which provided the foundation for this work.

I am immensely thankful to Prof. Dr. Abdul Aziz Sahir, Dean of the Faculty of Social Sciences & Humanities, for his continuous support, encouragement, and valuable guidance throughout the development of this study guide.

I also extend our heartfelt appreciation to Dr. Muhammad Majid Mehmood Bagram, Chairman of the Department of Business Administration, for his insightful feedback and invaluable contributions that helped shape the content and structure of this guide.

Special thanks to Dr. Sajid Mohy ul Din, who has served as both the writer and reviewer for his exceptional dedication, expertise, and meticulous efforts in developing and refining the material. His work has been instrumental in ensuring the quality and relevance of the guide.

I am equally grateful to Dr. Mahad Jehangir, the reviewer, for his critical evaluation and constructive feedback, which have significantly enhanced the accuracy and clarity of the content.

Finally, I thank all individuals who have contributed directly or indirectly to completing this study guide. Their efforts and encouragement have been a source of motivation and support.

This study guide is intended to serve as a valuable resource for students in understanding the principles and practices of financial management. While every effort has been made to ensure the accuracy of the content, I welcome feedback and suggestions for improvement in future editions.

**Muhammad Ehsan Javaid**  
**Course Coordinator**

## **COURSE INTRODUCTION**

Financial management lies at the heart of every organization's journey toward success. This comprehensive study guide on financial management is designed to guide you through the multifaceted landscape of finance, from understanding the fundamental principles to mastering advanced concepts. We commence our exploration by delving into the fundamental aspects of financial management. In this unit, we discuss the role of financial management within organizations, defining its scope and purpose. We delve into the critical goals of a firm, which go beyond profitability to embrace sustainability and corporate social responsibility (CSR). These principles set the foundation for ethical and responsible financial decision-making.

Unit 2 equips you with essential tools for financial analysis and planning. We delve into financial statement analysis, dissecting balance sheets, income statements, and their ratios. You'll learn how to interpret financial data through trend analysis, common-size analysis, and index analysis, providing a comprehensive view of a company's financial health. Valuation is a cornerstone of financial management. In this unit, we demystify the concept of the time value of money, covering simple and compound interest, annuities, and more. You'll gain insights into bond valuation, preferred stock valuation, and common stock valuation. We also explore rates of return, ensuring you grasp the intricacies of investment valuation. Unit 4 delves into the dynamic relationship between risk and return. We define risk and return, employing probability distributions to measure risk. Understanding attitudes toward risk is crucial in financial decision-making, and we explore how diversification and the Capital Asset Pricing Model (CAPM) play a pivotal role in managing risk and maximizing returns. Working capital is the lifeblood of an organization, and in this unit, we take a deep dive into its management. You'll gain insights into financing current assets, optimizing short-term and long-term mixes, and aligning liability structures. Continuing our exploration of working capital management, this unit delves into accounts receivable and inventory management. We discussed credit and collection policies, the art of analyzing credit applicants, and strategies for efficient inventory management and control. Capital budgeting is a critical aspect of financial management. In this unit, we provide an overview of the capital budgeting process, emphasizing the estimation of after-tax incremental operating cash flows. You'll learn about various capital budgeting techniques and the consideration of risk and managerial options in decision-making. Our final unit examines the concept of cost of capital, highlighting required returns and the overall cost of capital for an organization. We delve into project-specific and group-specific required rates of return using the CAPM model, and we evaluate projects based on their total risk.

This study guide is your comprehensive guide to mastering financial management principles, practices, and strategies. We hope you find it valuable on your journey toward financial expertise and success in the dynamic world of finance.

**Muhammad Ehsan Javaid**  
**Course Coordinator**

## Course Objectives

Upon completing this course on *Financial Management*, students will be able to:

- Understand the scope, purpose, and ethical implications of financial management, including profitability, sustainability, and CSR.
- Perform financial analysis using tools like financial ratios, trend analysis, and common-size analysis.
- Apply valuation techniques for bonds, stocks, and investments, leveraging the time value of money principles.
- Analyze risk-return relationships and utilize diversification and CAPM to manage financial risks.
- Manage working capital effectively, including credit policies, inventory control, and financing strategies.
- Apply capital budgeting techniques to evaluate projects and assess risk in decision-making.
- Calculate the cost of capital and required returns using CAPM and evaluate projects based on total risk.
- Integrate financial management concepts to address real-world financial challenges and promote sustainable growth.

By achieving these objectives, students will gain a robust understanding of financial management principles and practices, preparing them for success in the dynamic world of finance.



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**Unit:1**

## **1 Introduction to Financial Management**

**Written by:**

**Muhammad Ehsan Javaid**

**Reviewed by:**

**Dr Mahad Jehangir**

## **Unit Content**

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**Introduction:**

Financial management is a vital function within any organization, encompassing the strategic planning, organization, and control of financial resources to achieve the firm's objectives and maximize shareholder value. This unit delves into the core aspects of financial management, including key decisions in investment, financing, and asset management, and emphasizes the overarching goal of wealth maximization. Additionally, it addresses agency problems that may arise between managers and shareholders and explores the essential functions performed by financial managers, such as financial planning, capital budgeting, financing decisions, working capital management, risk management, financial analysis and reporting, asset management, and dividend policy. Through this comprehensive framework, students will gain a thorough understanding of the principles and practices that drive effective financial management in today's complex and dynamic business environment.

**Objectives:**

- To provide a comprehensive understanding of the principles, concepts, and tools used in financial management.
- To examine the process of making investment decisions, including project evaluation, risk assessment, and capital budgeting techniques.
- To analyze the various sources of financing available to organizations, including debt and equity, and how to make optimal financing decisions.
- To assess strategies for managing assets efficiently, including working capital management, inventory control, and accounts receivable management.
- To explore the overarching goal of financial management, which is to maximize shareholder wealth, and the various approaches used to achieve this goal.
- To delve into the broader objectives that firms pursue beyond profit maximization, such as growth, sustainability, and social responsibility.
- To investigate how financial management contributes to value creation for shareholders and stakeholders, and the measurement of value through financial metrics.
- To understand the challenges and solutions related to agency problems in financial management, including conflicts of interest between shareholders and management.

- To examine the key functions of financial management, including financial planning, risk management, capital allocation, and financial reporting.

## **1.1 Financial Management**

Financial management revolves around the acquisition, financing, and effective management of assets, all aimed at achieving a specific objective. Consequently, the decision-making process in financial management can be divided into three key domains: investment decisions, financing decisions, and asset management decisions.

### **1.1.1 Investment Decision**

Investment decisions are crucial for value creation in a firm. It involves determining the total assets required by the firm, as depicted on the left side of the balance sheet. The financial manager must determine the size of the firm, represented by the dollar amount above the double lines on the left-hand side. Additionally, the composition of assets needs to be decided, such as the allocation of assets to cash or inventory. Disinvestment, which involves reducing, eliminating, or replacing assets that are no longer economically justified, is also an important consideration.

### **1.1.2 Financing Decision**

The financing decision focuses on the right-hand side of the balance sheet, involving the makeup of the firm's financing. Different industries and firms employ varying financing structures, with some relying heavily on debt while others have minimal debt. The impact of financing choices and their optimal mix is a key consideration. The dividend policy is also a part of the financing decision, as the dividend-payout ratio determines the amount of earnings retained in the firm. Balancing dividend payments with the opportunity cost of retained earnings is crucial for equity financing. Once the financing mix is determined, the financial manager must understand the mechanics of obtaining funds, such as securing short-term loans, entering into long-term lease agreements, or issuing bonds or stocks.

### **1.1.3 Asset Management Decision**

The asset management decision involves effectively managing the firm's assets to maximize returns. It encompasses aspects like working capital management, inventory management, and accounts receivable and payable management. The financial manager must ensure efficient resource allocation and utilization of assets to optimize profitability and cash flow.

### **1.1.4 Overall Goal**

The overarching goal of financial management is to maximize the firm's value for its shareholders. This requires making sound investment decisions, selecting an appropriate financing mix, and efficiently managing assets. By analyzing investment opportunities, determining financing sources, and effectively utilizing assets, financial managers work towards achieving sustainable profitability and growth.

#### **Shareholder Wealth Maximization**

Efficient financial management necessitates the establishment of a clear objective or goal, as decisions regarding financial efficiency are made regarding a standard. In this study guide, we assume that the goal of a firm is to maximize the wealth of its current owners. The market price per share of a firm's common stock, which reflects the firm's investment, financing, and asset management decisions, serves as an indicator of shareholder wealth. The success of a business decision is evaluated based on its ultimate impact on share price.

#### **Profit Maximization and Earning Per Share**

While profit maximization is often considered the appropriate objective for a firm, simply pursuing profit increases may not be ideal. For instance, a manager could increase profits by issuing stock and investing the proceeds in Treasury bills, which would decrease each owner's share of profits and earnings per share. Maximizing earnings per share is sometimes seen as an improved version of profit maximization, but it fails to consider the timing or duration of expected returns. It is essential to account for the time pattern of returns and the concept of the time value of money. Another limitation of maximizing earnings per share or traditional return measures is the lack of consideration for risk. Some investment projects are riskier than others, impacting the prospective stream of earnings per share. Financial risk, influenced by a company's capital structure, also contributes to overall investor risk. Additionally, the objective of maximizing earnings per share does not account for the impact of dividend policy on stock value. If the sole objective were to maximize earnings per share, a firm would never pay dividends, as retaining earnings and investing them at any positive rate of return would improve earnings per share. However, the payment of dividends can affect stock value, making the maximization of earnings per share an insufficient objective.

Considering the reasons stated above, maximizing earnings per share may not align with maximizing market price per share. The market price of a firm's stock reflects the collective judgment of market participants regarding the firm's value. It takes into account present and expected future earnings per share, the timing, duration, and risk associated with those earnings, dividend policy, and other factors influencing stock market price. The market price serves as an indicator of business performance, indicating how well management is fulfilling its responsibilities to shareholders.

Management is subject to ongoing evaluation, as dissatisfied shareholders have the option to sell their shares and invest elsewhere. Such actions, if taken by multiple dissatisfied shareholders, can lower the market price per share. Consequently, management must focus on creating value for shareholders by assessing alternative investment, financing, and asset management strategies in terms of their impact on shareholder value (share price). Furthermore, management should only pursue product-market strategies, such as expanding market share or enhancing customer satisfaction, if they contribute to increased shareholder value.

## **1.2 Agency Problems**

The existence of a separation between ownership and control in modern corporations gives rise to potential conflicts between owners (shareholders) and managers. This separation means that the objectives of management may differ from those of the shareholders. In large corporations, where ownership is widely dispersed, shareholders may not have the ability to express their objectives or exert control over management. Consequently, this separation of ownership and management creates a situation where management may prioritize its interests over those of the shareholders.

In this context, management can be viewed as agents acting on behalf of the owners (shareholders). Shareholders delegate decision-making authority to management, with the expectation that they will act in the best interests of the shareholders. Jensen and Meckling developed a comprehensive theory of the firm under agency arrangements, highlighting the importance of providing appropriate incentives and monitoring to ensure that agents (management) make optimal decisions aligned with shareholder interests. Incentives can include stock options, bonuses, and perks, which should be directly tied to the extent to which management decisions align with shareholder

interests. Monitoring activities involve bonding the agent, conducting systematic reviews of management perks, auditing financial statements, and placing limits on management decisions. However, these monitoring activities come with associated costs, which are an inevitable consequence of the separation of ownership and control. The lower the ownership percentage of managers, the higher the likelihood that their behavior may deviate from maximizing shareholder wealth, necessitating increased monitoring by external shareholders.

Some argue that the primary monitoring of managers does not come from owners alone, but rather from the managerial labor market. They contend that efficient capital markets provide signals about a company's securities value, thereby reflecting the performance of its managers. Managers with strong performance records are likely to have more employment opportunities elsewhere compared to managers with poor performance records. Therefore, if the managerial labor market is competitive both within and outside the firm, it can serve as a disciplinary mechanism for managers. In such a scenario, the signals conveyed by changes in the total market value of a firm's securities become crucial indicators.

### **1.3 Functions of Financial Management**

The functions of financial management encompass various activities and responsibilities that are essential for effective financial decision-making and management within an organization. The primary functions of financial management include:

#### **1.3.1 Financial Planning:**

Financial planning involves setting financial goals and objectives for the organization and developing strategies to achieve them. This includes forecasting future financial needs, estimating cash flows, and formulating budgeting plans.

#### **1.3.2 Capital Budgeting:**

Capital budgeting involves evaluating and selecting long-term investment opportunities that align with the organization's strategic objectives. It entails analyzing potential projects, estimating their financial viability, and making decisions on resource allocation.



### **1.3.3 Financing Decisions:**

Financing decisions involve determining the optimal capital structure for the organization by selecting appropriate sources of funds. This includes assessing and choosing between various financing options such as equity, debt, and retained earnings, while considering factors such as cost of capital, risk, and financial leverage.

### **1.3.4 Working Capital Management:**

Working capital management focuses on managing the organization's short-term assets and liabilities to ensure sufficient liquidity and operational efficiency. It involves activities such as cash flow management, inventory control, accounts receivable and payable management, and optimizing the level of working capital.

### **1.3.5 Risk Management:**

Risk management involves identifying and mitigating potential financial risks that could impact the organization's performance and stability. It includes strategies to manage market risks, credit risks, operational risks, and other uncertainties that may affect the organization's financial health.

### **1.3.6 Financial Analysis and Reporting:**

Financial analysis involves assessing the organization's financial performance, profitability, and liquidity by analyzing financial statements and key financial ratios. Financial reporting encompasses preparing and presenting financial statements and reports to stakeholders, including shareholders, management, investors, and regulatory authorities.

### **1.3.7 Asset Management:**

Asset management focuses on optimizing the utilization and management of the organization's assets to generate maximum returns. This includes decisions related to asset acquisition, allocation, maintenance, and disposal.

### **1.3.8 Dividend Policy:**

Dividend policy refers to determining the portion of earnings to be distributed to shareholders as dividends and the amount to be retained in the organization for reinvestment. It involves striking a balance between rewarding shareholders and ensuring sufficient funds for future growth and investment opportunities.

By effectively performing these functions, financial management contributes to the overall financial well-being and success of the organization. It helps in maximizing shareholder value, ensuring financial stability, and supporting strategic decision-making.

## **1.4 Self-Assessment Questions**

1. What are the core principles of financial management, and how do they guide financial decision-making in organizations?
2. How do organizations evaluate investment opportunities, and what criteria are used to make investment decisions?
3. What are the primary sources of financing available to businesses, and how do firms determine their optimal capital structure?
4. What strategies and techniques are employed in managing assets effectively, especially in the areas of working capital, inventory, and accounts receivable?
5. What is the goal of financial management, and how does it relate to shareholder wealth maximization?
6. How do firms balance profit maximization with other organizational goals, such as growth, sustainability, and corporate social responsibility?
7. What are the mechanisms and strategies for creating value for shareholders and stakeholders in financial management?
8. What are agency problems in financial management, and what measures can organizations take to mitigate these conflicts of interest?
9. What are the key functions of financial management, and how do they contribute to the financial success and stability of organizations?

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Unit:2

## **2 Tools of Financial Analysis and Planning**

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## **Introduction**

This unit aims to equip students with a comprehensive understanding of the various tools and techniques used in financial analysis and planning. It delves into the methods for analyzing financial statements, including the income statement, balance sheet, and cash flow statement, highlighting the importance of each. Students will explore ratio analysis as a fundamental tool for assessing a company's financial health and performance, examining categories such as liquidity, activity, leverage, and coverage ratios. Additionally, the unit covers profitability ratios to measure a company's ability to generate profit relative to its revenue and assets. Key concepts such as the operating cycle and cash flow cycle, trend analysis, common-size analysis, and index analysis will also be explored, providing students with the skills to assess financial performance and make informed decisions in financial management.

## **Objectives**

- To provide a comprehensive understanding of the various tools used in financial analysis and planning.
- To delve into the techniques and methods for analyzing financial statements, including the income statement, balance sheet, and cash flow statement.
- To identify and comprehend the key aspects of financial statement analysis, including the importance of each financial statement.
- To examine ratio analysis as a fundamental tool in assessing a company's financial health and performance.
- To investigate the different categories of ratios, including liquidity, activity, leverage, and coverage ratios, and their significance in financial analysis.
- To assess profitability ratios and their role in measuring a company's ability to generate profit relative to its revenue and assets.
- To distinguish between the operating cycle and cash flow cycle, and their importance in financial management.
- To understand trend analysis, common-size analysis, and index analysis as techniques for assessing financial performance and making informed decisions.

## **2.1 Financial Statement Analysis**

Financial statement analysis is the process of examining and interpreting a company's financial statements to gain insights into its financial performance, position, and growth potential. It is an essential tool used by investors, creditors, analysts, and other stakeholders to make informed decisions about the company.

Three primary financial statements are analyzed in financial statement analysis:

### **2.1.1 Income Statement:**

The income statement, also known as the profit and loss statement, shows a company's revenues, expenses, and profits or losses over a specific period, such as a quarter or a year. It provides a snapshot of the company's profitability during that period.

### **2.1.2 Balance Sheet:**

The balance sheet provides a snapshot of a company's financial position at a specific point in time. It shows the company's assets, liabilities, and shareholders' equity. The balance sheet helps assess the company's liquidity, solvency, and overall financial health.

### **2.1.3 Cash Flow Statement:**

The cash flow statement reports the cash generated and used by a company during a specific period. It classifies cash flows into operating activities, investing activities, and financing activities. The cash flow statement helps to understand the company's ability to generate cash and manage its cash flows effectively.

## **2.2 Key Aspects of Financial Statement Analysis:**

### **2.2.1 Ratio Analysis:**

Financial ratios are calculated using data from the financial statements to assess various aspects of a company's performance and financial health. Common financial ratios include profitability ratios, liquidity ratios, solvency ratios, and efficiency ratios.

### **2.2.2 Vertical Analysis:**

Vertical analysis involves expressing each item on the financial statement as a percentage of a base item. It allows for comparisons over time and with other companies in the same industry.

### **2.2.3 Horizontal Analysis:**

Horizontal analysis, also known as trend analysis, compares financial data over multiple periods to identify trends and patterns in a company's performance.

### **2.2.4 Common Size Statements:**

Common-size financial statements express each line item as a percentage of total revenue (for income statement) or total assets (for balance sheet). It helps to compare companies of different sizes.

### **Example of Financial Statement Analysis:**

Let's consider Company XYZ, which operates in the retail industry. We will analyze its financial statements to assess its financial performance.

#### **Income Statement (in \$ thousands):**

Revenue: \$1,500,000

Cost of Goods Sold (COGS): \$900,000

Gross Profit: \$600,000

Operating Expenses: \$300,000

Operating Income: \$300,000

Net Income: \$200,000

#### **Balance Sheet (in \$ thousands):**

Total Assets: \$1,200,000

Total Liabilities: \$800,000

Shareholders' Equity: \$400,000

#### **Cash Flow Statement (in \$ thousands):**

Operating Cash Flow: \$250,000



Investing Cash Flow: (\$100,000)

Financing Cash Flow: (\$150,000)

Net Change in Cash: \$0 (No change in cash during the period)

Based on this data, we can calculate various financial ratios like the profit margin (net income/revenue), current ratio (current assets/current liabilities), debt-to-equity ratio (total debt/shareholders' equity) and analyze trends in revenue and expenses over multiple periods. This analysis will help stakeholders understand Company XYZ's profitability, liquidity, solvency, and efficiency.

## **2.3 Ratio Analysis**

### **2.3.1 Liquidity Ratios**

Liquidity ratios assess a company's ability to meet its short-term debt obligations and reflect its liquidity and financial flexibility. These ratios focus on the relationship between a company's current assets and current liabilities. Some commonly used liquidity ratios include:

#### **2.3.1.1 Current Ratio:**

The current ratio measures a company's ability to pay its short-term liabilities with its current assets.

**Formula: Current Ratio = Current Assets / Current Liabilities**

Example:

Company ABC has current assets of \$500,000 and current liabilities of \$250,000. Calculate the current ratio.

$$\text{Current Ratio} = \$500,000 / \$250,000 = 2$$

#### **2.3.1.2 Quick Ratio (Acid-Test Ratio):**

The quick ratio is a more stringent measure of liquidity that excludes inventory from current assets, as inventory may not be easily converted into cash in the short term.

**Formula: Quick Ratio = (Current Assets - Inventory) / Current Liabilities**

Example:

Company XYZ has current assets of \$400,000, including \$100,000 of inventory, and current liabilities of \$200,000. Calculate the quick ratio.

$$\text{Quick Ratio} = (\$400,000 - \$100,000) / \$200,000 = 1.5$$

#### **2.3.1.3 Cash Ratio:**

The cash ratio is the most conservative liquidity measure, considering only the most liquid current assets, which include cash and cash equivalents.

**Formula: Cash Ratio = Cash and Cash Equivalents / Current Liabilities**

Example:

Company DEF has cash and cash equivalents of \$150,000 and current liabilities of \$75,000. Calculate the cash ratio.

$$\text{Cash Ratio} = \$150,000 / \$75,000 = 2$$

#### **2.3.1.4 Working Capital:**

Working capital represents the excess of current assets over current liabilities and indicates the company's short-term financial position.

**Formula: Net Working Capital = Current Assets - Current Liabilities**

Example:

Company GHI has current assets of \$300,000 and current liabilities of \$150,000. Calculate the working capital.

$$\text{Net Working Capital} = \$300,000 - \$150,000 = \$150,000$$

#### **2.3.1.5 Operating Cash Flow Ratio:**

The operating cash flow ratio assesses a company's ability to generate cash flow from its operations to cover its short-term obligations.

**Formula: Operating Cash Flow Ratio = Operating Cash Flow / Current Liabilities**

Example:

Company JKL has an operating cash flow of \$200,000 and current liabilities of \$100,000. Calculate the operating cash flow ratio.

$$\text{Operating Cash Flow Ratio} = \$200,000 / \$100,000 = 2$$

Liquidity ratios help investors and creditors evaluate a company's short-term financial health and its ability to manage its working capital effectively. Generally, higher liquidity ratios indicate a better ability to meet short-term obligations and provide more financial security. However, excessively high liquidity ratios may also imply underutilization of resources, and finding the right balance is crucial for financial management.

### **2.3.2 Activity Ratios**

Activity ratios, also known as asset turnover ratios, measure how efficiently a company utilizes its assets to generate sales and revenue. These ratios assess the company's operational efficiency and effectiveness in managing its resources. Some commonly used activity ratios include:

#### **2.3.2.1 Inventory Turnover Ratio:**

The inventory turnover ratio indicates how many times a company's inventory is sold and replaced within a specific period, typically a year.

**Formula: Inventory Turnover Ratio = Cost of Goods Sold / Average Inventory**

Example:

Company ABC had a cost of goods sold of \$500,000 and an average inventory of \$100,000. Calculate the inventory turnover ratio.

$$\text{Inventory Turnover Ratio} = \$500,000 / \$100,000 = 5$$

#### **2.3.2.2 Accounts Receivable Turnover Ratio:**

The accounts receivable turnover ratio measures how many times a company collects its average accounts receivable during a specific period.

**Formula: Accounts Receivable Turnover Ratio = Net Credit Sales / Average Accounts Receivable**

Example:

Company XYZ had net credit sales of \$800,000 and an average accounts receivable of \$200,000. Calculate the accounts receivable turnover ratio.

$$\text{Accounts Receivable Turnover Ratio} = \$800,000 / \$200,000 = 4$$

#### **2.3.2.3 Accounts Payable Turnover Ratio:**

The accounts payable turnover ratio assesses how many times a company pays its suppliers during a specific period.

**Formula: Accounts Payable Turnover Ratio = Net Credit Purchases / Average Accounts Payable**

Example:

Company DEF had net credit purchases of \$600,000 and an average account payable of \$150,000. Calculate the accounts payable turnover ratio.

$$\text{Accounts Payable Turnover Ratio} = \$600,000 / \$150,000 = 4$$

#### **2.3.2.4 Total Asset Turnover Ratio:**

The total asset turnover ratio measures how efficiently a company uses its total assets to generate revenue.

**Formula: Total Asset Turnover Ratio = Sales Revenue / Average Total Assets**

Example:

Company GHI had sales revenue of \$2,000,000 and average total assets of \$1,000,000. Calculate the total asset turnover ratio.

$$\text{Total Asset Turnover Ratio} = \$2,000,000 / \$1,000,000 = 2$$

Activity ratios provide insights into a company's operational efficiency and asset management. Higher activity ratios generally indicate better utilization of assets and increased revenue generation. However, it's essential to compare these ratios with industry benchmarks and historical trends for a more comprehensive analysis of a company's performance. Low activity ratios may signal potential issues with inventory management, credit policies, or customer payment practices, requiring further investigation and improvement.

### 2.3.3 Leverage Ratios

Leverage ratios, also known as solvency ratios or debt ratios, assess a company's ability to meet its long-term financial obligations and the extent to which it relies on debt financing. These ratios provide insights into a company's financial risk and its capacity to handle debt.

Some common leverage ratios include:

#### 2.3.3.1 Debt-to-Equity Ratio:

The debt-to-equity ratio measures the proportion of a company's total debt to its shareholders' equity. It indicates the level of financial leverage employed by the company.

**Formula: Debt-to-Equity Ratio = Total Debt / Shareholders' Equity**

Example:

Company ABC has total debt of \$800,000 and shareholders' equity of \$400,000. Calculate the debt-to-equity ratio.

$$\text{Debt-to-Equity Ratio} = \$800,000 / \$400,000 = 2$$

#### 2.3.3.2 Debt Ratio:

The debt ratio shows the proportion of a company's total assets financed by debt. It indicates the company's reliance on debt to fund its assets.

**Formula: Debt Ratio = Total Debt / Total Assets**

Example:

Company XYZ has total debt of \$1,200,000 and total assets of \$2,000,000. Calculate the debt ratio.

$$\text{Debt Ratio} = \$1,200,000 / \$2,000,000 = 0.6 \text{ or } 60\%$$

#### 2.3.3.3 Equity Ratio:

The equity ratio represents the portion of a company's total assets that is financed by shareholders' equity. It indicates the degree of financial stability and protection for creditors.

**Formula: Equity Ratio = Shareholders' Equity / Total Assets**

Example:

Company DEF has shareholders' equity of \$600,000 and total assets of \$1,500,000. Calculate the equity ratio.

$$\text{Equity Ratio} = \$600,000 / \$1,500,000 = 0.4 \text{ or } 40\%$$

Leverage ratios are crucial for investors and creditors to assess a company's financial health and risk. A high debt-to-equity ratio and debt ratio may indicate higher financial risk and potential difficulties in meeting debt obligations. On the other hand, a low debt-to-equity ratio and debt ratio may suggest a more conservative capital structure and lower financial risk. It's essential to consider these ratios in conjunction with other financial metrics and industry benchmarks for a comprehensive analysis of a company's financial position and risk profile.

### **2.3.4 Coverage Ratios**

Coverage ratios assess a company's ability to meet its financial obligations and measure the extent to which its cash flow can cover various expenses or financial commitments. These ratios are essential for creditors and investors as they provide insights into a company's ability to service its debt and meet other fixed obligations.

Some common coverage ratios include:

#### **2.3.4.1 Interest Coverage Ratio:**

The interest coverage ratio measures a company's ability to meet its interest expenses with its operating income. It indicates the safety margin available to cover interest payments.

**Formula: Interest Coverage Ratio = Operating Income / Interest Expense**

Example:

Company ABC has an operating income of \$500,000 and interest expenses of \$100,000. Calculate the interest coverage ratio.

$$\text{Interest Coverage Ratio} = \$500,000 / \$100,000 = 5$$

#### **2.3.4.2 Debt Service Coverage Ratio (DSCR):**

The debt service coverage ratio assesses a company's ability to service its debt obligations, including both principal and interest payments. It is commonly used in evaluating a company's capacity to handle long-term debt.

**Formula:  $DSCR = (\text{Operating Income} + \text{Depreciation}) / (\text{Interest Expense} + \text{Principal Payments})$**

Example:

Company XYZ has an operating income of \$400,000, depreciation of \$50,000, interest expense of \$80,000, and principal payments of \$150,000. Calculate the debt service coverage ratio.

$$DSCR = (\$400,000 + \$50,000) / (\$80,000 + \$150,000) = 2$$

#### **2.3.4.3 Fixed Charge Coverage Ratio:**

The fixed charge coverage ratio includes all fixed charges that a company must pay, such as interest, lease payments, and preferred stock dividends. It indicates a company's ability to meet all these fixed obligations with its operating income.

**Formula:  $\text{Fixed Charge Coverage Ratio} = (\text{Operating Income} + \text{Fixed Charges}) / (\text{Fixed Charges} + \text{Interest Expense})$**

Example:

Company DEF has an operating income of \$300,000, fixed charges (including lease payments and preferred stock dividends) of \$50,000, and interest expenses of \$40,000. Calculate the fixed charge coverage ratio.

$$\text{Fixed Charge Coverage Ratio} = (\$300,000 + \$50,000) / (\$50,000 + \$40,000) = 3$$

Coverage ratios help stakeholders evaluate a company's financial health and its capacity to meet financial obligations. Higher coverage ratios indicate better financial stability and a stronger ability to service debt and other fixed expenses. Conversely, lower coverage ratios may indicate higher financial risk and potential difficulties in fulfilling obligations. It's essential to compare coverage ratios to industry benchmarks and analyze trends over time for a comprehensive assessment of a company's financial position.

### 2.3.5 Profitability Ratios

Profitability ratios assess a company's ability to generate profits relative to its sales, assets, or equity. These ratios are crucial for investors and stakeholders as they indicate the company's efficiency in generating profits and managing its resources.

Some common profitability ratios include:

#### 2.3.5.1 Gross Profit Margin:

The gross profit margin measures the percentage of revenue that exceeds the cost of goods sold. It shows how efficiently a company produces its products or services.

**Formula: Gross Profit Margin = (Gross Profit / Revenue) × 100**

Example:

Company ABC has a gross profit of \$500,000 and revenue of \$1,000,000. Calculate the gross profit margin.

$$\text{Gross Profit Margin} = (\$500,000 / \$1,000,000) \times 100 = 50\%$$

#### 2.3.5.2 Operating Profit Margin:

The operating profit margin indicates the percentage of revenue remaining after deducting operating expenses but before interest and taxes. It reveals how well a company manages its core operations.

**Formula: Operating Profit Margin = (Operating Income / Revenue) × 100**

Example:

Company XYZ has an operating income of \$200,000 and revenue of \$800,000. Calculate the operating profit margin.

$$\text{Operating Profit Margin} = (\$200,000 / \$800,000) \times 100 = 25\%$$

#### 2.3.5.3 Net Profit Margin:

The net profit margin represents the percentage of revenue that translates into net profit after all expenses, including taxes and interest.

**Formula: Net Profit Margin = (Net Income / Revenue) × 100**

Example:



Company DEF has a net income of \$100,000 and revenue of \$400,000. Calculate the net profit margin.

$$\text{Net Profit Margin} = (\$100,000 / \$400,000) \times 100 = 25\%$$

#### **2.3.5.4 Return on Assets (ROA):**

ROA measures how effectively a company utilizes its assets to generate profits.

**Formula: ROA = (Net Income / Average Total Assets) × 100**

Example:

Company GHI has a net income of \$1,000,000 and an average total asset of \$5,000,000. Calculate the return on assets.

$$\text{ROA} = (\$1,000,000 / \$5,000,000) \times 100 = 20\%$$

#### **2.3.5.5 Return on Equity (ROE):**

ROE shows the percentage of net income relative to shareholders' equity. It measures how efficiently a company generates profits for its shareholders.

**Formula: ROE = (Net Income / Average Shareholders' Equity) × 100**

Example:

Company JKL has a net income of \$500,000 and an average shareholders' equity of \$2,500,000. Calculate the return on equity.

$$\text{ROE} = (\$500,000 / \$2,500,000) \times 100 = 20\%$$

Profitability ratios help stakeholders assess a company's ability to generate profits and its overall financial performance. Higher profitability ratios are generally favorable, indicating better financial health and efficient management. However, it's essential to consider profitability ratios in conjunction with other financial ratios and industry benchmarks for a comprehensive evaluation of a company's financial position.

## **2.4 Operating Cycle and Cash Flow Cycle**

The operating cycle and cash flow cycle are two important metrics used to evaluate a company's efficiency in managing its working capital. These cycles provide insights into how quickly a company can convert its resources into cash.

### **2.4.1 Operating Cycle:**

The operating cycle represents the time it takes for a company to convert its raw materials into finished goods, sell those goods to customers, and collect cash from the sales. It includes two key components:

#### **2.4.1.1 a) Days Inventory Outstanding (DIO):**

DIO measures the average number of days a company takes to sell its inventory.

Formula:  $DIO = (\text{Average Inventory} / \text{Cost of Goods Sold}) \times 365$

#### **2.4.1.2 b) Days Sales Outstanding (DSO):**

DSO measures the average number of days a company takes to collect its accounts receivable.

Formula:  $DSO = (\text{Average Accounts Receivable} / \text{Revenue}) \times 365$

The operating cycle can be calculated as the sum of DIO and DSO:

Operating Cycle = DIO + DSO

Example:

Company XYZ has an average inventory of \$50,000 and a cost of goods sold of \$200,000. It also has an average accounts receivable of \$30,000 and an annual revenue of \$240,000. Calculate the operating cycle.

$DIO = (\$50,000 / \$200,000) \times 365 \approx 91.25 \text{ days}$

$DSO = (\$30,000 / \$240,000) \times 365 \approx 45.63 \text{ days}$

Operating Cycle = 91.25 days + 45.63 days  $\approx 136.88 \text{ days}$

### **2.4.2 Cash Flow Cycle:**

The cash flow cycle represents the time it takes for a company to convert its raw materials into cash received from customers. It is calculated as the difference between the operating cycle and the average payment period (Days Payable Outstanding - DPO).

#### **2.4.2.1 c) Days Payable Outstanding (DPO):**

DPO measures the average number of days a company takes to pay its suppliers.

Formula:  $DPO = (\text{Average Accounts Payable} / \text{Cost of Goods Sold}) \times 365$

The cash flow cycle can be calculated as follows:

Cash Flow Cycle = Operating Cycle - DPO

Example:

Company ABC has an average account payable of \$20,000 and a cost of goods sold of \$180,000.

Calculate the cash flow cycle.

$$\text{DPO} = (\$20,000 / \$180,000) \times 365 \approx 40.56 \text{ days}$$

$$\text{Cash Flow Cycle} = 136.88 \text{ days} - 40.56 \text{ days} \approx 96.32 \text{ days}$$

The operating cycle and cash flow cycle are vital for a company's liquidity management. A shorter operating cycle indicates that the company can efficiently convert inventory and receivables into cash. A shorter cash flow cycle indicates that the company is prompt in paying its suppliers. These cycles help companies optimize their working capital management and maintain healthy cash flow positions.

Businesses need to monitor their operating cycle and cash flow cycle regularly to identify potential inefficiencies and take corrective actions. By reducing the cycle times, companies can enhance their cash flow, improve their financial health, and meet short-term obligations effectively.

## 2.5 Trend Analysis

Trend analysis, also known as time-series analysis, is a statistical technique used to identify and analyze patterns and trends in data over a specific period. It helps in understanding the direction and momentum of data points, allowing analysts to make informed decisions and forecasts. In finance and business, trend analysis is commonly applied to financial statements and economic indicators to assess performance, identify growth opportunities, and predict future outcomes.

The steps involved in trend analysis are as follows:

### **Data Collection:**

Gather historical data related to the variable of interest (e.g., revenue, expenses, profit, etc.) over a specific period, usually sequential periods (months, quarters, or years).

### **Data Arrangement:**

Organize the collected data in chronological order to create a time series data set.

### **Data Visualization:**

Plot the time series data on a graph to visualize the trends and patterns over time.

### **Calculate Trend Measures:**

Calculate trend measures such as the average, moving averages, and growth rates to identify the overall direction of the data.

### **Interpretation:**

Interpret the results to understand the trends, growth rates, seasonality, and any significant changes or deviations in the data.

### **Example:**

Let's consider a fictional company XYZ, which has collected its annual revenue data for the past five years (in millions):

Year 1: \$50

Year 2: \$55

Year 3: \$60

Year 4: \$65

Year 5: \$70

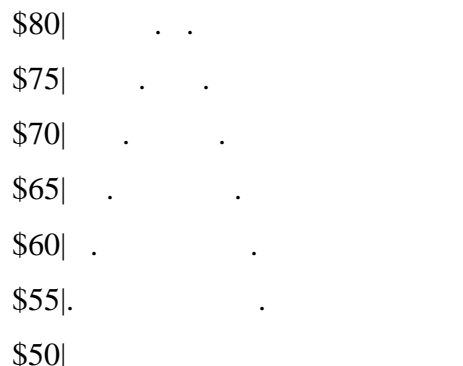
Step 1: Data Collection - We have collected the annual revenue data for the past five years.

Step 2: Data Arrangement - The data is arranged in chronological order as follows:

Year 1, Year 2, Year 3, Year 4, Year 5

Step 3: Data Visualization - Plotting the data on a line graph:

Revenue (in millions)



Year 1 Year 2 Year 3 Year 4 Year 5

Step 4: Calculate Trend Measures - Calculate the average revenue growth rate:

**Average Revenue Growth Rate = [(Year 5 Revenue - Year 1 Revenue) / Year 1 Revenue] × 100**

Average Revenue Growth Rate =  $[(70 - 50) / 50] \times 100 \approx 40\%$

Step 5: Interpretation - Based on the trend analysis, company XYZ's revenue has been steadily increasing over the past five years, with an average growth rate of approximately 40% per year.

Trend analysis helps businesses identify positive or negative trends, seasonal variations, and potential areas for improvement. It provides valuable insights for strategic planning, resource allocation, and decision-making to achieve long-term success and sustainability.

## **2.6 Common-size analysis and index analysis**

Common-size analysis and index analysis are two financial analysis techniques used to evaluate and compare financial statements. Both methods help in understanding the relative significance of different components of financial statements and provide insights into a company's financial health and performance.

### **2.6.1 Common-Size Analysis:**

The common-size analysis involves expressing each line item in a financial statement as a percentage of a common base. Typically, the base used for the income statement is total revenue, and for the balance sheet, it is total assets. This allows for easy comparison of different financial statements over time or between companies of varying sizes.

Formula for Common-Size Analysis:

**Common-Size Percentage = (Individual Line Item / Base Item) × 100**

Example:

Consider the following simplified income statement for Company ABC:

Revenue: \$500,000

Cost of Goods Sold: \$300,000

Gross Profit: \$200,000

Operating Expenses: \$100,000

Net Income: \$100,000

Common-Size Analysis of Income Statement:

Revenue: 100%

Cost of Goods Sold: 60%  $(300,000 / 500,000) \times 100$

Gross Profit: 40%  $(200,000 / 500,000) \times 100$

Operating Expenses: 20%  $(100,000 / 500,000) \times 100$

Net Income: 20%  $(100,000 / 500,000) \times 100$

Common-size analysis helps identify the proportion of each expense or revenue item relative to the total revenue. It is particularly useful for comparing the cost structure or profitability of different companies within the same industry.

### 2.6.2 Index Analysis:

Index analysis involves comparing financial data over multiple periods using a selected base period as a reference. The base period is assigned an index value of 100, and the index value for other periods is calculated relative to the base period. This method helps in understanding the percentage change in financial data over time.

The formula for Index Analysis:

**Index Value = (Current Period Amount / Base Period Amount)  $\times$  100**

Example:

Consider the following simplified revenue data for Company XYZ over three years:

Year 1: \$200,000 (Base Year)

Year 2: \$240,000

Year 3: \$280,000

Index Analysis of Revenue:

Year 1: 100 (Base Year)

Year 2:  $(240,000 / 200,000) \times 100 = 120$

Year 3:  $(280,000 / 200,000) \times 100 = 140$

Index analysis helps in understanding the percentage change in revenue over the years. In this example, revenue increased by 20% in Year 2 and by 40% in Year 3 relative to the base year (Year 1).

Both common-size analysis and index analysis are valuable tools for financial analysts, investors, and managers to gain insights into financial trends, identify areas of concern, and make informed decisions related to investments, resource allocation, and strategic planning.

## **2.7 Self-Assessment Questions**

- What are the key tools used in financial analysis and planning, and how do they contribute to decision-making in organizations?
- How do financial analysts use financial statements, including the income statement, balance sheet, and cash flow statement, to assess a company's financial performance?
- What are the key components and purposes of the income statement, balance sheet, and cash flow statement?
- How does ratio analysis provide insights into a company's liquidity, activity, leverage, and coverage?
- What are the key profitability ratios, and how are they calculated and interpreted in financial analysis?
- What is the significance of the operating cycle and cash flow cycle in financial management, and how are they calculated?
- How does trend analysis assist in identifying patterns and changes in financial performance over time?
- What is common-size analysis, and how does it help in comparing financial statements across different periods, or companies?
- How does index analysis allow for benchmarking and comparing financial data to industry averages or market indices?

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Unit:3

### **3 Time Value of Money**

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**Introduction:**

This unit provides a comprehensive understanding of the time value of money, a foundational concept in finance. It examines the principles and calculations of simple interest and its applications in various financial scenarios. The unit delves into compound interest, exploring its calculation, compounding frequencies, and the impact on the future value of investments. Students will analyze and compare simple and compound interest, understanding their respective advantages and limitations. The unit also covers the effect of multiple compounding periods within a year on investment growth and how to calculate future value under different compounding frequencies. Additionally, the unit explores annuities, including ordinary annuities and annuities due, and their significance in financial planning. Students will learn to analyze loan amortization schedules, understand the allocation of payments toward principal and interest, and calculate outstanding loan balances. Through these topics, students will gain essential skills in evaluating financial scenarios and making informed financial decisions.

**Objectives:**

- To provide a comprehensive understanding of the time value of money as a foundational concept in finance.
- To examine the principles of simple interest, its calculation, and its applications in financial scenarios.
- To delve into the concept of compound interest, understanding its calculation, compounding frequencies, and the impact on the future value of investments.
- To analyze and compare the differences between simple interest and compound interest, including their respective advantages and limitations.
- To understand how multiple compounding periods within a year affect investment growth and to calculate the future value under various compounding frequencies.
- To explore annuities as a series of equal cash flows over time, including both ordinary annuities and annuities due, and their significance in financial planning.
- To analyze loan amortization schedules, understand the allocation of payments toward principal and interest, and calculate outstanding loan balances.

### 3.1 Time Value of Money

The Time Value of Money (TVM) is a fundamental financial concept that represents the idea that a sum of money has a different value today compared to its value at some point in the future. In essence, it recognizes that the purchasing power of money changes over time due to factors like inflation, opportunity cost, and risk.

Two core principles underlie the concept of the time value of money:

**Future Value (FV):** This concept refers to the value of a sum of money at a future point in time, given a specified interest rate or rate of return. In other words, it calculates how much a present sum will be worth in the future after it has earned interest or investment returns.

**Present Value (PV):** Present value is the reverse of future value. It represents the current worth of a sum of money that is to be received or paid in the future, discounted at a specific interest rate. In other words, it calculates how much a future sum is worth in today's dollars.

The time value of money is a crucial concept used in various financial calculations and decision-making processes. It has numerous practical applications, including:

**Investment Analysis:** Evaluating the potential return on investments and comparing investment opportunities.

- **Loan and Mortgage Calculations:** Determining monthly loan payments, assessing mortgage affordability, and comparing different financing options.
- **Capital Budgeting:** Assessing the profitability of long-term projects and investment decisions by discounting future cash flows to their present value.
- **Retirement Planning:** Estimating the amount of savings needed to achieve financial goals in retirement and determining the future value of retirement contributions.
- **Valuation of Securities:** Valuing stocks, bonds, and other financial instruments based on their expected future cash flows.
- **Inflation Adjustment:** Adjusting cash flows and financial data for the impact of inflation to make meaningful comparisons over time.

TVM is a critical concept in finance that recognizes the changing value of money over time. It allows individuals and businesses to make informed financial decisions by quantifying the relationship between present and future cash flows and factoring in the influence of interest rates and inflation.

### **3.2 Simple Interest**

Simple interest is a straightforward method of calculating interest on an initial amount, also known as the principal, over a specific period. The formula for calculating simple interest is:

$$SI = P_0 * (i) * (n)$$

Where:

SI is the simple interest

P<sub>0</sub> is the principal amount

i is the interest rate per period

n is the number of periods

Let's consider an example to understand how simple interest works. Suppose you lend \$1,000 to a friend for a duration of 5 years at an annual interest rate of 6%. Using the formula, we can calculate the simple interest earned over this period:

$$SI = \$1,000 * 0.06 * 5$$

$$SI = \$300$$

In this case, the simple interest earned on the loan is \$300. This means that at the end of the 5 years, your friend would owe you the original principal of \$1,000 plus the simple interest of \$300, resulting in a total repayment of \$1,300.

It's important to note that with simple interest, the interest remains constant throughout the loan duration and is calculated solely on the original principal. There is no compounding effect, meaning interest is not earned on previously earned interest.

Example:

Suppose you invest \$5,000 in a savings account that offers a simple interest rate of 4% per year. You want to determine the future value of your investment after 8 years, the present value of that amount, the number of years it would take for your investment to double, and the interest rate needed to double your investment in 10 years.

### 3.2.1 Future Value (FV):

Using the formula for simple interest, we can calculate the future value of the investment after 8 years:

$$FV = P_0 * (1 + i * n)$$

$$FV = \$5,000 * (1 + 0.04 * 8)$$

$$FV = \$5,000 * (1 + 0.32)$$

$$FV = \$5,000 * 1.32$$

$$FV = \$6,600$$

So, the future value of your investment after 8 years would be \$6,600.

### 3.2.2 Present Value (PV):

To determine the present value, we can rearrange the formula for simple interest:

$$PV = FV / (1 + i * n)$$

$$PV = \$6,600 / (1 + 0.04 * 8)$$

$$PV = \$6,600 / (1 + 0.32)$$

$$PV = \$6,600 / 1.32$$

$$PV \approx \$5,000$$

Therefore, the present value of \$6,600 after 8 years would be approximately \$5,000.

### 3.2.3 Number of Years (n):

Let's say you want to know how many years it would take for your investment to double. We can rearrange the simple interest formula to find the number of years (n):

$$FV = P_0 * (1 + i * n)$$

$$2 * P_0 = P_0 * (1 + i * n)$$

Here, we substitute the future value (FV) with twice the principal amount ( $2 * P_0$ ):

$$2 * \$5,000 = \$5,000 * (1 + 0.04 * n)$$

$$2 = 1 + 0.04 * n$$

$$0.04 * n = 1$$

$$n = 1 / 0.04$$

$$n = 25$$

So, it would take approximately 25 years for your investment to double.

### 3.2.4 Interest Rate (i):

Now, let's determine the interest rate required for your investment to double in 10 years. Again, we rearrange the simple interest formula:

$$FV = P0 * (1 + i * n)$$

$$2 * P0 = P0 * (1 + i * n)$$

Substituting the values:

$$2 * \$5,000 = \$5,000 * (1 + i * 10)$$

$$2 = 1 + i * 10$$

$$i * 10 = 2 - 1$$

$$i * 10 = 1$$

$$i = 1 / 10$$

$$i = 0.1$$

Therefore, an interest rate of 0.1 or 10% per year would be required for your investment to double in 10 years.

In this example, we calculated the future value, present value, number of years, and interest rate using simple interest.

## 3.3 Compound Interest

Compound interest is the concept of earning interest not only on the initial amount (principal) but also on the accumulated interest from previous periods. It is the most common method used in financial calculations and has a significant impact on the growth of investments over time.

The formula for compound interest is given by:

$$FV = PV * (1 + i)^n$$

Where:

FV is the future value of the investment.

PV is the principal or present value of the investment.

i is the interest rate per period.

n is the number of periods.

Now, let's calculate the future value, present value, number of years, and interest rate in an example:

Example:

You invest \$10,000 in a savings account with an annual compound interest rate of 5%. You want to determine the future value of your investment, the present value of a specified amount, the number of years it would take for your investment to reach a certain value, and the interest rate needed to achieve a specific future value.

### **3.3.1 Future Value (FV):**

Suppose you want to calculate the future value after 8 years:

$$FV = \$10,000 * (1 + 0.05)^8$$

$$FV = \$10,000 * (1.05)^8$$

$$FV \approx \$14,693.28$$

So, the future value of your investment after 8 years would be approximately \$14,693.28.

### **3.3.2 Present Value (PV):**

If you want to determine the present value required to achieve a future value of \$15,000 after 5 years:

$$PV = \$15,000 / (1 + 0.05)^5$$

$$PV = \$15,000 / (1.05)^5$$

$$PV \approx \$11,822.65$$

Therefore, the present value required to achieve a future value of \$15,000 after 5 years would be approximately \$11,822.65.

### **3.3.3 Number of Years (n):**

Let's say you want to find out how many years it would take for your investment to double:



$$\$10,000 * (1 + 0.05)^n = \$20,000$$

$$(1.05)^n = 2$$

$$n = \log(2) / \log(1.05)$$

$$n \approx 14.21$$

So, it would take approximately 14.21 years for your investment to double.

### 3.3.4 Interest Rate (i):

Suppose you want to determine the interest rate required to achieve a future value of \$25,000 after 10 years:

$$\$10,000 * (1 + i)^{10} = \$25,000$$

$$(1 + i)^{10} = 2.5$$

$$i = (2.5)^{(1/10)} - 1$$

$$i \approx 0.0976 \text{ or } 9.76\%$$

Therefore, an interest rate of approximately 9.76% per year would be required to achieve a future value of \$25,000 after 10 years.

In this example, we calculated the future value, present value, number of years, and interest rate using compound interest. Compound interest allows for the growth of an investment by considering the accumulation of interest over time, making it a powerful concept in finance.

## 3.4 Comparison between Simple and Compound Interest:

- Calculation: Simple interest uses a straightforward calculation based on the principal, interest rate, and time, while compound interest considers the compounding effect of earning interest on interest.
- Growth: Simple interest shows linear growth, while compound interest exhibits exponential growth.
- Future Value: The future value of an investment with simple interest increases linearly, while the future value with compound interest increases exponentially.
- Effect on Principal: In simple interest, the principal remains the same throughout the investment period, whereas in compound interest, the principal grows as interest is added to it.

Simple interest is a basic calculation based on the principal, interest rate, and time, resulting in linear growth, whereas compound interest considers the compounding effect, resulting in exponential growth and greater potential returns on investments over the long term.

### **3.5 Multiple Compounding**

Each compounding frequency offers different levels of growth and compounding effects on the investment or debt, leading to variations in the final amounts earned or owed. The choice of compounding frequency depends on the terms of the financial arrangement and the preferences of the parties involved.

#### **3.5.1 Annually:**

Annually compounding refers to the frequency at which the interest is calculated and added to the principal once every year. At the end of each year, the interest earned is added to the initial investment, and subsequent interest is calculated based on the updated amount for the next year.

Formula:  $FV = PV * (1 + r/m)^{(n*m)}$

Example: Suppose you invest \$1,000 at an annual interest rate of 5% with annual compounding. After 3 years, the future value can be calculated as follows:

$$FV = \$1,000 * (1 + 0.05)^3 = \$1,157.63$$

#### **3.5.2 Semi-annually:**

Semi-annually compounding means that interest is calculated and added to the principal twice a year, at regular intervals of every six months. The interest earned in each six months is added to the initial investment, and the new total amount becomes the basis for calculating interest for the next period.

Formula:  $FV = PV * (1 + r/2)^{(2n)}$

Example: Let's consider the same investment of \$1,000 with an annual interest rate of 5% compounded semi-annually. After 3 years, the future value can be calculated as follows:

$$FV = \$1,000 * (1 + 0.05/2)^{(2*3)} = \$1,159.27$$

### 3.5.3 Quarterly:

Quarterly compounding involves calculating and adding interest to the principal four times a year, at intervals of every three months. After each quarter, the interest earned is added to the original amount, and the new total becomes the basis for calculating interest for the subsequent quarter

Formula:  $FV = PV * (1 + r/4)^{(4n)}$

Example: Using the same investment scenario but with quarterly compounding, the future value after 3 years can be calculated as follows:

$$FV = \$1,000 * (1 + 0.05/4)^{(4*3)} = \$1,160.71$$

### 3.5.4 Monthly:

Monthly compounding occurs when interest is calculated and added to the principal monthly. At the end of each month, the interest earned is added to the initial investment, and subsequent interest is calculated based on the updated amount for the next month.

Formula:  $FV = PV * (1 + r/12)^{(12n)}$

Example: Suppose the investment has monthly compounding. After 3 years, the future value can be calculated as follows:

$$FV = \$1,000 * (1 + 0.05/12)^{(12*3)} = \$1,161.62$$

### 3.5.5 Daily:

Daily compounding means that interest is calculated and added to the principal every day. This compounding frequency is commonly used in financial instruments like savings accounts and loans. The interest earned each day is added to the principal, and interest for the next day is calculated based on the new total amount.

Formula:  $FV = PV * (1 + r/365)^{(365n)}$

Example: Assuming the investment has daily compounding. After 3 years, the future value can be calculated as follows:

$$FV = \$1,000 * (1 + 0.05/365)^{(365*3)} = \$1,161.83$$

### 3.5.6 Continuous Compounding:

Continuous compounding is a theoretical concept where interest is calculated and added to the principal an infinite number of times throughout the investment period. In continuous compounding, time is divided into infinitely small intervals, and interest is continuously compounded based on the continuously changing principal balance using the mathematical constant "e".

Formula:  $FV = PV * e^{(r*t)}$

Example: Consider continuous compounding with the same investment. After 3 years, the future value can be calculated as follows:

$$FV = \$1,000 * e^{(0.05*3)} = \$1,165.31$$

In each example, PV represents the initial principal (in this case, \$1,000), r represents the interest rate (in decimal form), n represents the number of compounding periods, and FV represents the future value at the end of the investment period

## 3.6 Annuities

An annuity refers to a series of regular payments or receipts of equal amounts made at fixed intervals over a specified period. It is a financial product commonly used for retirement planning or providing a steady income stream.

Annuities can be classified into two main types:

### Ordinary Annuity:

In an ordinary annuity, the payments or receipts are made at the end of each period. For example, if you receive a fixed monthly payment for 10 years, with the payment being made at the end of each month, it is considered an ordinary annuity.

### Annuity Due:

In an annuity due, the payments or receipts are made at the beginning of each period. For instance, if you make monthly deposits into an investment account, with the deposit being made at the beginning of each month, it is classified as an annuity due.

### 3.6.1 Ordinary Annuity

An ordinary annuity refers to a series of regular payments or receipts made at the end of each period over a specified time frame. The payments or receipts are of equal amounts and occur at consistent intervals, such as monthly, quarterly, or annually.

The future value (FV) and present value (PV) of an ordinary annuity can be calculated using the following formulas:

Future Value of an Ordinary Annuity (FV):

$$FV = P * [(1 + r)^n - 1] / r$$

Present Value of an Ordinary Annuity (PV):

$$PV = P * [1 - (1 + r)^{-n}] / r$$

Where:

P represents the payment amount made at the end of each period

r denotes the interest rate per compounding period

n represents the total number of compounding periods

Now let's calculate the future value, present value, number of years, and interest of an ordinary annuity with an example:

Example:

You decide to invest \$1,000 at an annual interest rate of 6% for a period of 5 years, with monthly payments of \$100.

To find the future value (FV), we use the formula:

$$FV = P * [(1 + r)^n - 1] / r$$

In this case:

P = \$100 (monthly payment)

r = 6% per year (interest rate divided by 12 since it's monthly compounding)

n = 5 years \* 12 months/year (total number of compounding periods)

Plugging in the values, we get:

$$FV = \$100 * [(1 + 0.06/12)^{(5*12)} - 1] / (0.06/12)$$

$$= \$100 * [(1.005)^{60} - 1] / (0.005)$$

$$\approx \$6,653.29$$

Therefore, the future value of this ordinary annuity after 5 years would be approximately \$6,653.29.

To find the present value (PV), we use the formula:

$$PV = P * [1 - (1 + r)^{-n}] / r$$

Using the same values as before, we get:

$$PV = \$100 * [1 - (1 + 0.06/12)^{-5*12}] / (0.06/12)$$

$$= \$100 * [1 - (1.005)^{-60}] / (0.005)$$

$$\approx \$524.30$$

Hence, the present value of this ordinary annuity is approximately \$524.30.

The number of years is given as 5 years.

To calculate the interest earned, we subtract the total payments made from the future value:

$$\text{Interest} = FV - (P * n)$$

$$= \$6,653.29 - (\$100 * 5 * 12)$$

$$= \$6,653.29 - \$6,000$$

$$= \$653.29$$

Therefore, the interest earned in this example is \$653.29.

It's important to note that the formulas assume consistent payments at regular intervals and a fixed interest rate throughout the annuity period. Additionally, the formulas don't account for taxes, fees, or inflation, which can affect the actual value of an annuity. Consulting with a financial advisor can provide personalized guidance based on your specific financial situation and goals.

### 3.6.2 Annuity Due

Annuity due is similar to an ordinary annuity but with one key difference: the payments or receipts are made at the beginning of each period instead of at the end. In other words, the cash flows occur at the start of each compounding period.

The formula for calculating the future value (FV) and present value (PV) of an annuity due is as follows:

Future Value of an Annuity Due (FV):

$$FV = P * [(1 + r)^n - 1] / r * (1 + r)$$

Present Value of an Annuity Due (PV):

$$PV = P * [1 - (1 + r)^{-n}] / r * (1 + r)$$

Where:

P represents the payment amount made at the beginning of each period

r denotes the interest rate per compounding period

n represents the total number of compounding periods

Let's calculate the future value, present value, number of years, and interest of an annuity due with an example:

Example:

You plan to save \$200 at the beginning of each quarter in a savings account that offers an annual interest rate of 4%, compounded quarterly, for a total of 10 years.

To find the future value (FV) of the annuity due, we use the formula:

$$FV = P * [(1 + r)^n - 1] / r * (1 + r)$$

In this case:

P = \$200 (quarterly payment)

r = 4% per year (interest rate divided by 4 since it's quarterly compounding)

n = 10 years \* 4 quarters/year (total number of compounding periods)

Plugging in the values, we get:

$$\begin{aligned} FV &= \$200 * [(1 + 0.04/4)^{10*4} - 1] / (0.04/4) * (1 + 0.04/4) \\ &= \$200 * [(1.01)^{40} - 1] / (0.01) * (1.01) \\ &\approx \$10,624.24 \end{aligned}$$

Therefore, the future value of this annuity due after 10 years would be approximately \$10,624.24.

To find the present value (PV) of the annuity due, we use the formula:

$$PV = P * [1 - (1 + r)^{-n}] / r * (1 + r)$$

Using the same values as before, we get:

$$\begin{aligned} PV &= \$200 * [1 - (1 + 0.04/4)^{-10*4}] / (0.04/4) * (1 + 0.04/4) \\ &= \$200 * [1 - (1.01)^{-40}] / (0.01) * (1.01) \end{aligned}$$

$\approx \$8,960.90$

Hence, the present value of this annuity due is approximately \$8,960.90.

The number of years is given as 10 years.

To calculate the interest earned, we subtract the total payments made from the future value:

$$\begin{aligned}\text{Interest} &= \text{FV} - (\text{P} * \text{n}) \\ &= \$10,624.24 - (\$200 * 10 * 4) \\ &= \$10,624.24 - \$8,000 \\ &= \$2,624.24\end{aligned}$$

Therefore, the interest earned in this example is \$2,624.24.

Remember that the annuity due assumes payments made at the beginning of each period and a fixed interest rate throughout the annuity period. Keep in mind any additional factors such as taxes, fees, or inflation that may affect the actual value of an annuity. Consulting with a financial advisor can provide personalized advice based on your specific financial circumstances and goals.

### **3.7 Loan Amortization**

Loan amortization is the process of gradually paying off a loan through a series of periodic payments. Each payment consists of both principal (the original amount borrowed) and interest (the cost of borrowing). Over time, the proportion of the payment that goes towards reducing the principal increases, while the portion allocated to interest decreases.

The formula for calculating the periodic payment in a loan amortization schedule is as follows:

$$\text{Payment} = \text{P} * (\text{r} * (1 + \text{r})^{\text{n}}) / ((1 + \text{r})^{\text{n}} - 1)$$

Where:

P represents the principal loan amount

r denotes the periodic interest rate

n is the total number of payments

The loan amortization schedule is a table that outlines the breakdown of each payment throughout the loan term. It includes details such as the payment number, payment amount, principal portion, interest portion, and the remaining balance after each payment.

Let's illustrate the loan amortization process with an example:



To calculate the loan amortization for a loan of \$10,000 with an annual interest rate of 6% to be repaid over 5 years (60 monthly payments), we need to determine the monthly payment amount and create an amortization schedule.

The formula for Calculating Monthly Payment Amount (M):

$$M = P * (r * (1 + r)^n) / ((1 + r)^n - 1)$$

Where:

P = Principal amount of the loan (\$10,000)

r = Monthly interest rate (annual interest rate / 12)

n = Total number of payments (60 monthly payments)

Let's calculate the monthly payment amount first:

$$r = 6\% / 12 = 0.005 \text{ (0.5\% monthly interest rate)}$$

$$n = 60 \text{ (60 monthly payments)}$$

$$M = \$10,000 * (0.005 * (1 + 0.005)^{60}) / ((1 + 0.005)^{60} - 1)$$

$$M \approx \$193.33 \text{ (rounded to two decimal places)}$$

The monthly payment amount is approximately \$193.33.

Now, let's create the loan amortization schedule to see how the loan is repaid over time. The schedule will include the payment number, payment amount, interest paid, principal paid, and remaining loan balance.

Loan Amortization Schedule:

Payment	Payment Amount	Interest Paid	Principal Paid	Remaining Balance
1	\$193.33	\$50.00	\$143.33	\$9,856.67
2	\$193.33	\$51.90	\$141.43	\$9,715.24
3	\$193.33	\$51.06	\$142.27	\$9,572.97
4	\$193.33	\$50.23	\$143.10	\$9,429.87
5	\$193.33	\$49.38	\$143.95	\$9,285.92
...	...	...	...	...
60	\$193.33	\$5.69	\$187.64	\$0.00

The amortization schedule shows that with each monthly payment, a portion goes towards interest and the remaining amount reduces the principal balance. Over time, the interest portion decreases while the principal portion increases. After 60 monthly payments, the loan is fully repaid, and the remaining balance becomes zero.

Note: The interest and principal values in the table are rounded for simplicity and may not add up exactly to the original loan amount.

### **3.8 Self-Assessment Questions**

- What is the time value of money, and why is it a critical concept in financial decision-making?
- How does simple interest work, and what are the key components of the simple interest formula?
- What is compound interest, and how does it differ from simple interest? How does compounding frequency affect the future value of an investment?
- In what scenarios is simple interest more appropriate, and when is compound interest a better choice for evaluating investments?
- How does the frequency of compounding periods within a year impact the growth of an investment, and how is it calculated?
- What are annuities, and what are the differences between ordinary annuities and annuities due? How are they used in financial planning?
- How are loan amortization schedules created, and how is each loan payment allocated between principal and interest?

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Unit:4

## **4 Long-Term Securities Valuation**

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**Introduction:**

This unit aims to provide students with a comprehensive understanding of the various concepts and methods used for the valuation of long-term securities. It explores the distinctions among valuation techniques for bonds, preferred stock, and common stock, delving into the intricacies of bond valuation, including the calculation of bond prices, yield to maturity (YTM), and factors influencing bond values. The unit examines the unique features of preferred stock, dividend preferences, and methods for determining its value. Additionally, it covers the methods and models for valuing common stock, considering dividends, growth rates, and market conditions. Understanding rates of return, or yields, and their significance in assessing the attractiveness of long-term securities is also a key focus. Through this comprehensive framework, students will gain essential skills for evaluating and valuing long-term investment opportunities.

**Objectives:**

- To provide a comprehensive understanding of the various concepts and methods used for the valuation of long-term securities.
- To explore the distinctions among valuation concepts and techniques, including those used for bonds, preferred stock, and common stock.
- To delve into the intricacies of bond valuation, including the calculation of bond prices, yield to maturity (YTM), and factors influencing bond values.
- To examine the valuation of preferred stock, including its unique features, dividend preferences, and methods for determining preferred stock prices.
- To explore the methods and models used for valuing common stock, considering factors such as dividends, growth rates, and market conditions.
- To understand the concept of rates of return, or yields, and their significance in assessing the attractiveness of long-term securities.

## **4.1 Distinctions Among Valuation Concepts**

There are several valuation concepts used in finance and investment analysis that have distinct characteristics and applications. Here are some key distinctions among common valuation concepts:

### **4.1.1 Intrinsic Value vs. Market Value:**

Intrinsic value refers to the estimated true value of an asset based on its fundamental characteristics, cash flows, and potential future earnings. It is determined through various valuation techniques like discounted cash flow (DCF) analysis. Market value, on the other hand, represents the current price of the asset in the market based on supply and demand dynamics and investor sentiment. Intrinsic value and market value may differ, and investors seek opportunities where market value is below intrinsic value to identify undervalued assets.

### **4.1.2 Fair Value vs. Book Value:**

Fair value is an estimate of the price at which an asset or liability could be exchanged between willing parties in an arm's length transaction. It is based on market conditions, comparable transactions, and other relevant factors. Fair value is used in financial reporting, particularly for assets held at fair value under accounting standards. Book value, on the other hand, represents the value of an asset or liability as recorded in the company's financial statements, usually based on historical cost or net carrying value after accounting adjustments.

### **4.1.3 Going Concern Value vs. Liquidation Value:**

Going concern value represents the value of a business or asset assuming it continues to operate and generate cash flows in the future. It considers the expected profitability, growth potential, and sustainability of the business. Liquidation value, on the other hand, represents the value of a business or asset if it were to be sold or liquidated under distressed or forced conditions. Liquidation value is typically lower than the going concern value since it assumes a shorter time frame and the need to sell assets quickly.

It's important to note that valuation concepts may overlap or be used in combination, depending on the specific asset or situation. Different valuation techniques and concepts are applied to suit the characteristics and requirements of the asset being valued, providing investors and analysts with various tools to assess and determine the value of different types of assets and businesses.

## **4.2 Bond**

A bond is a debt instrument issued by a borrower, typically a government or a corporation, to raise capital. It is considered a fixed-income instrument because it provides investors with a fixed or predictable stream of income in the form of periodic interest payments. The issuer of the bond agrees to pay a predetermined interest rate (referred to as the coupon rate) to bondholders for the life of the bond.

This fixed-income feature of bonds is attractive to investors seeking stable and predictable cash flows. Unlike stocks or other equity investments, where returns are dependent on the performance of the underlying company, bonds offer a known income stream. The issuer is contractually obligated to make interest payments to bondholders according to the agreed-upon terms.

The fixed-income nature of bonds makes them particularly suitable for income-focused investors who prioritize regular interest payments. Additionally, bonds can provide a level of stability and risk diversification to an investment portfolio, as they tend to have lower volatility compared to stocks.

### **4.2.1 Features of a Bond:**

#### **4.2.1.1 Principal/Par Value:**

The face value of the bond is the amount that will be repaid to the bondholder at maturity.

#### **4.2.1.2 Coupon/Interest Rate:**

The fixed or variable interest rate paid by the issuer to the bondholder, usually expressed as a percentage of the bond's par value. It determines the periodic interest payments made to bondholders.

#### **4.2.1.3 Maturity Date:**

The date when the bond reaches its full term and the issuer is obligated to repay the principal amount to the bondholder.

#### **4.2.1.4 Coupon Payment Dates:**

The dates on which interest payments are made to the bondholder. These payments can be annual, semi-annual, quarterly, or monthly, depending on the terms of the bond.



#### **4.2.1.5 Callability:**

Some bonds may have a call provision that allows the issuer to redeem the bond before its maturity date. This gives the issuer the option to repay the bond early, which can be beneficial if interest rates have declined since the bond was issued.

#### **4.2.1.6 Credit Rating:**

Bonds are assigned credit ratings by credit rating agencies based on the issuer's creditworthiness. Higher-rated bonds are considered lower risk, while lower-rated bonds carry higher risk but offer potentially higher yields.

### **4.2.2 Types of Bonds:**

#### **4.2.2.1 Government Bonds:**

Issued by governments to fund public spending or manage budget deficits. They are generally considered low risk because they are backed by the government's ability to tax and print money.

#### **4.2.2.2 Corporate Bonds:**

Issued by corporations to raise capital for various purposes such as expansion, acquisitions, or debt refinancing. Corporate bonds carry higher risk compared to government bonds and may offer higher yields to compensate investors for the additional risk.

#### **4.2.2.3 Municipal Bonds:**

Issued by state and local governments or agencies to finance public projects like infrastructure development. Municipal bonds offer tax advantages as interest income is often exempt from federal income tax and, in some cases, state and local taxes.

#### **4.2.2.4 Zero-Coupon Bonds:**

These bonds do not pay regular interest payments. Instead, they are issued at a discount to their face value and provide the full principal amount at maturity. The difference between the purchase price and the face value represents the bondholder's return.

#### **4.2.2.5 Convertible Bonds:**

These bonds give the bondholder the option to convert the bond into a predetermined number of the issuer's common stock. Convertible bonds offer potential upside if the issuer's stock price increases.

### 4.2.3 Bond Valuation

Bond valuation is the process of determining the intrinsic value of a bond, which represents the present value of its expected future cash flows. Investors and analysts need to assess the value of a bond before making investment decisions.

The value of a bond is influenced by several factors, including the bond's coupon rate, maturity, market interest rates, and creditworthiness of the issuer. The basic principle of bond valuation is that the present value of the bond's future cash flows, which consist of periodic coupon payments and the final principal repayment, should equal the market price of the bond.

The most used approach for bond valuation is the discounted cash flow (DCF) method. This method involves discounting the bond's future cash flows back to their present value using an appropriate discount rate or required rate of return.

$$V = I(PVIFA_{kd,n}) + MV(PVIF_{kd,n})$$

V: The variable "V" represents the market value or intrinsic value of the bond. It is the value that we are trying to determine through bond valuation.

I: The variable "I" represents the periodic coupon payment of the bond. This is the fixed interest payment that the bondholder receives at regular intervals, usually annually or semi-annually.

PVIFA<sub>kd,n</sub>: The term PVIFA<sub>kd,n</sub> refers to the present value interest factor of annuity for a discount rate "kd" and some periods "n." This factor helps calculate the present value of the bond's coupon payments over its lifespan.

MV: The variable "MV" represents the maturity value or face value of the bond. This is the final principal repayment that the bondholder receives when the bond matures.

PVIF<sub>kd,n</sub>: The term PVIF<sub>kd,n</sub> represents the present value interest factor for a discount rate "kd" and a number of periods "n." This factor helps calculate the present value of the bond's maturity value.

#### Example

ABC Company has outstanding an 8 percent, four-year, \$10,000-par-value bond on which interest is paid annually. If the market-required rate of return is 15 percent, what is the market value of the bond?

where:

V = Market value of the bond

I = Annual coupon payment

PVIFA = Present Value Interest Factor for an Annuity

kd = Market required rate of return (yield to maturity)

n = Number of years to maturity

MV = Maturity value or face value

Given:

Annual coupon payment (I) =  $8\% * \$10,000 = \$800$

The market required rate of return (kd) = 15%

Number of years to maturity (n) = 4

Maturity value (MV) = \$10,000

Step 1: Calculate the Present Value Interest Factor for an Annuity (PVIFA)

$$PVIFA = (1 - (1 + kd)^{-n}) / kd$$

Using the formula:

$$PVIFA = (1 - (1 + 0.15)^{-4}) / 0.15$$

$$PVIFA \approx 2.8551$$

Step 2: Calculate the Present Value of the Coupon Payments

$$\text{Present Value of Coupon Payments} = I * PVIFA$$

$$\text{Present Value of Coupon Payments} = \$800 * 2.8551 = \$2,284.08$$

Step 3: Calculate the Present Value of the Face Value Payment at Maturity

$$\text{Present Value of Face Value} = MV * (1 + kd)^{-n}$$

$$\text{Present Value of Face Value} = \$10,000 * (1 + 0.15)^{-4} = \$5,706.33$$

Step 4: Calculate the Market Value of the Bond

$$\text{Market Value of the Bond} = \text{Present Value of Coupon Payments} + \text{Present Value of Face Value}$$

Market Value of the Bond = \$2,284.08 + \$5,706.33 = \$7,990.41

Therefore, when the market-required rate of return is 15 percent, the market value of the bond is approximately \$7,990.41.

#### 4.2.4 Perpetual Bond

A perpetual bond, also known as a perpetual or perpetuity, is a type of bond that has no maturity date. Unlike regular bonds that have a fixed maturity period, perpetual bonds do not have a specified date when the principal will be repaid. Instead, they pay a fixed coupon interest indefinitely.

The formula  $V = I(PVIFA_{kd,n}) + MV(PVIF_{kd,n})$  is typically used to value bonds with a finite maturity. Since perpetual bonds have no maturity, the formula needs to be adjusted to account for the perpetual nature of the bond.

For a perpetual bond, the formula can be simplified as follows:

$$V = I / kd$$

Where:

V = Market value or intrinsic value of the perpetual bond

I = Annual coupon payment

kd = Required rate of return or discount rate

The valuation of a perpetual bond is based on the concept of present value. It calculates the present value of the perpetual stream of coupon payments.

Let's illustrate the valuation of a perpetual bond using an example:

Suppose there is a perpetual bond that pays an annual coupon of \$100 and the required rate of return in the market is 5%. In this case, the valuation of the perpetual bond can be calculated as:

$$V = \$100 / 0.05$$

$$V = \$2,000$$

Therefore, the market value of the perpetual bond is \$2,000 based on an annual coupon payment of \$100 and a required rate of return of 5%.

### 4.2.5 Non-Zero-Coupon Bond

A zero-coupon bond, also known as a discount bond or pure discount bond, is a type of bond that does not pay periodic interest (coupon) payments. Instead, it is issued at a discount to its face value and the investor receives the face value of the bond at maturity.

The formula  $V = I(PVIFA_{kd,n}) + MV(PVIF_{kd,n})$  is commonly used to value bonds with coupon payments. However, since zero-coupon bonds do not have coupon payments, the formula is simplified for their valuation.

For a zero-coupon bond, the valuation formula is as follows:

$$V = MV(PVIF_{kd,n})$$

Where:

$V$  = Market value or intrinsic value of the zero-coupon bond

$MV$  = Maturity value or face value of the bond

$PVIF_{kd,n}$  = Present value interest factor of the discount rate  $k_d$  for  $n$  periods

The valuation of a zero-coupon bond is based on the concept of present value. It calculates the present value of the bond's maturity value.

Let's illustrate the valuation of a zero-coupon bond using an example:

Suppose there is a zero-coupon bond with a face value (maturity value) of \$1,000 and a maturity period of 5 years. The required rate of return in the market is 8%. In this case, the valuation of the zero-coupon bond can be calculated as:

$$V = \$1,000 * (1 / (1 + 0.08)^5)$$

$$V \approx \$680.58$$

Therefore, the market value of the zero-coupon bond is approximately \$680.58 based on a face value of \$1,000, a maturity period of 5 years, and a required rate of return of 8%.

It's important to note that zero-coupon bonds are typically more sensitive to changes in interest rates compared to bonds with coupon payments. As interest rates increase, the market value of zero-coupon bonds decreases, and vice versa. The valuation formula allows investors to determine

the fair value of a zero-coupon bond based on their required rate of return and the bond's maturity value.

#### **4.2.6 Discount Bond:**

A discount bond is a bond that is sold below its face value or par value. The face value is the amount that the bond will be worth at its maturity. When a bond is issued as a discount bond, it means that the market interest rate is higher than the coupon rate of the bond. As a result, investors are willing to purchase the bond at a discounted price to compensate for the lower coupon payments. The discount is essentially the difference between the purchase price and the face value of the bond.

For example, if a bond with a face value of \$1,000 is issued as a discount bond and is sold for \$900, the discount is \$100 ( $\$1,000 - \$900$ ). The bondholder will receive the face value of \$1,000 at maturity, resulting in a gain of \$100.

##### **4.2.6.1 Par Bond:**

A par bond, also known as a face-value bond or a coupon bond, is a bond that is issued and traded at its face value. The face value is the amount that the bondholder will receive at maturity. When a bond is issued as a par bond, it means that the market interest rate is equal to the coupon rate of the bond. The coupon rate is the fixed interest rate that the bond pays to investors periodically.

For example, if a bond with a face value of \$1,000 is issued as a par bond, it will be sold for \$1,000. The bondholder will receive the face value of \$1,000 at maturity, and the coupon payments will be equal to the coupon rate, providing a steady income stream.

##### **4.2.6.2 Premium Bond:**

A premium bond is a bond that is sold above its face value. This occurs when the market interest rate is lower than the coupon rate of the bond. Investors are willing to pay a premium price for the bond because the coupon payments are higher than the prevailing market rates. The premium is the difference between the purchase price and the face value of the bond.

For example, if a bond with a face value of \$1,000 is issued as a premium bond and is sold for \$1,100, the premium is \$100 ( $\$1,100 - \$1,000$ ). The bondholder will still receive the face value of \$1,000 at maturity, resulting in a loss of \$100.

In short, a discount bond is sold below its face value, a par bond is sold at its face value, and a premium bond is sold above its face value. The pricing of bonds depends on the relationship between the market interest rate and the coupon rate, which determines whether the bond is issued as a discount, par, or premium bond.

## **4.3 Equity Instrument**

An equity instrument is a financial contract that represents ownership in a company, entitling the holder to a share of the company's assets and earnings. Equity instruments are a fundamental component of the capital structure of a corporation and are typically issued in the form of shares or stock.

Here are key points to understand about equity instruments:

### **4.3.1 Ownership Stake:**

When an individual or entity holds an equity instrument, it effectively ownsowns a portion of the issuing company. This ownership stake gives them certain rights, such as the right to vote on company matters and the right to receive dividends when the company distributes profits.

### **4.3.2 Common and Preferred Stock:**

Equity instruments come in various forms, with common stock and preferred stock being the most common. Common stockholders have voting rights in the company and may receive dividends, but their claims on company assets and earnings are subordinate to those of preferred stockholders. Preferred stockholders typically have a fixed dividend rate and may have other privileges, such as priority in receiving assets in the event of liquidation.

### **4.3.3 Dividend Payments:**

Companies that issue equity instruments may choose to distribute a portion of their profits to shareholders in the form of dividends. The amount of dividends paid to each shareholder is typically proportional to their ownership stake in the company.

### **4.3.4 Capital Raising:**

Companies use equity instruments as a means of raising capital. When a company goes public through an initial public offering (IPO), it issues shares of common stock to the public, raising funds for various purposes, such as expansion, research and development, or debt repayment.

#### **4.3.5 Ownership Rights:**

Equity instrument holders have certain rights, including the right to attend shareholder meetings, vote on corporate decisions (usually one vote per share of common stock), and receive financial reports and disclosures about the company's performance.

#### **4.3.6 Market Value:**

The value of equity instruments can fluctuate based on various factors, including the company's financial performance, industry trends, economic conditions, and investor sentiment. This market value determines the price at which shares of equity instruments can be bought or sold in the stock market.

#### **4.3.7 Risk and Return:**

Holding equity instruments carries both potential rewards and risks. Shareholders have the potential to benefit from capital appreciation (the increase in the market value of their shares) and dividend income. However, they also face the risk of losing some or all of their investment if the company's financial health deteriorates.

#### **4.3.8 Liquidity:**

Equity instruments are typically traded on stock exchanges, providing investors with liquidity. They can buy or sell shares at prevailing market prices, allowing for easy entry and exit from investments.

#### **4.3.9 Preferred Stock**

Preferred stock, also known as preference shares or preferred shares, is a type of ownership security issued by a corporation. Preferred stock represents ownership in a company, similar to common stock, but typically has different characteristics and rights.

Here are some key features of preferred stock:

##### **4.3.9.1 Priority in Dividend Payments:**

Preferred stockholders have a higher claim on the company's earnings compared to common stockholders. They are entitled to receive dividends before any dividends can be paid to common



stockholders. The dividend rate for preferred stock is usually fixed, stated as a percentage of the par value.

#### **4.3.9.2 Fixed Dividend Payments:**

Preferred stock often carries a fixed dividend rate, which means the dividend payment is predetermined and does not fluctuate based on the company's profitability. This fixed dividend gives the preferred stock a more bond-like characteristic.

#### **4.3.9.3 Preference in Asset Distribution:**

In the event of a company liquidation or bankruptcy, preferred stockholders have a higher claim on the company's assets compared to common stockholders. They have priority in receiving their invested capital back before any distribution is made to common stockholders.

#### **4.3.9.4 Non-Voting or Limited Voting Rights:**

Preferred stockholders generally do not have voting rights in corporate decisions. However, in some cases, they may have limited voting rights on specific matters, such as changes to the terms of the preferred stock or in the event of non-payment of dividends.

#### **4.3.9.5 Callability and Convertibility:**

Preferred stock may have additional features such as callability and convertibility. Callability allows the issuing company to redeem the preferred shares at a predetermined price after a specific period. Convertibility provides the option for preferred stockholders to convert their shares into a predetermined number of common shares.

Preferred stock provides investors with a combination of characteristics from both equity and debt instruments. It offers a steady income stream through fixed dividends while providing some ownership rights and potential for capital appreciation. However, preferred stockholders typically have a lower potential for capital gains compared to common stockholders.

### **4.3.10 Preferred Stock Valuation**

Preferred stock valuation involves determining the fair market value of a preferred stock. The value is based on the expected future cash flows from the stock, such as the expected dividends and the required rate of return of investors.

The formula commonly used to value preferred stock is:

$$V = D / r$$

Where:

V = Value of the preferred stock

D = Dividend payment per period

r = Required rate of return

Here's an example to illustrate preferred stock valuation:

Let's consider a preferred stock that pays an annual dividend of \$5 and has a required rate of return of 8%. We want to determine the fair market value of this preferred stock.

Using the formula:

$$V = D / r$$

$$V = \$5 / 0.08$$

$$V = \$62.50$$

Therefore, based on the given information, the fair market value of the preferred stock would be \$62.50.

### **4.3.11 Common Stock**

Common stock, also known as ordinary shares or equity shares, represents ownership in a corporation. It is a type of security that gives shareholders ownership rights and a claim on the company's earnings and assets.

Here are some key characteristics of common stock:

#### **4.3.11.1 Ownership:**

Common stockholders are the owners of the company and have voting rights in corporate decisions, such as the election of the board of directors.

#### **4.3.11.2 Dividends:**

Common stockholders may receive dividends if the company declares them. Dividends are typically paid out of the company's profits, but the payment is not guaranteed and can vary based on the company's financial performance.

#### **4.3.11.3 Residual Claim:**

In the event of the company's liquidation or bankruptcy, common stockholders have a residual claim on the company's assets. They are entitled to a portion of the remaining assets after all debts and obligations are paid.

#### **4.3.11.4 Risk and Return:**

Common stock represents an ownership stake in the company and is considered a riskier investment compared to other types of securities, such as bonds. Common stockholders can benefit from capital appreciation if the company's stock price increases, but they also bear the risk of potential losses if the stock price declines.

#### **4.3.11.5 Limited Liability:**

Common stockholders have limited liability, which means their potential losses are generally limited to the amount they have invested in the stock. They are not personally responsible for the company's debts or liabilities.

#### **4.3.11.6 Market Price:**

The value of common stock is determined by supply and demand in the stock market. The stock price can fluctuate based on various factors, including the company's financial performance, industry conditions, and investor sentiment.

Common stock plays a crucial role in providing companies with equity capital to fund their operations, expansion, and investments. It represents a long-term ownership interest in the company and offers potential financial rewards to investors through dividends and capital gains.

### **4.3.12 Common Stock Valuation**

#### **4.3.12.1 Constant Growth**

Common stock valuation using the dividend discount model (DDM) for constant growth is a method to determine the intrinsic value of a company's common stock. It assumes that the company's dividends will grow at a constant rate indefinitely. The formula for the DDM is as follows:

$$V = D1 / (r - g)$$

Where:

V = Intrinsic value of the stock

D1 = Expected dividend payment one period in the future

r = Required rate of return or discount rate

g = Constant growth rate of dividends

Here's an example to illustrate the common stock valuation using the dividend discount model for constant growth:

Let's assume a company, ABC Corp., is expected to pay a dividend of \$2 per share next year (D1). The required rate of return for investors is 10% (r), and the company is expected to grow its dividends at a constant rate of 5% (g) indefinitely.

Using the formula, we can calculate the intrinsic value of the stock (V):

$$V = \$2 / (0.10 - 0.05)$$

$$V = \$2 / 0.05$$

$$V = \$40$$

Therefore, based on the assumptions and calculations, the intrinsic value of ABC Corp.'s common stock is \$40 per share.

### *Zero or No Growth*

Common stock valuation using the dividend discount model (DDM) for zero growth is a method to determine the intrinsic value of a company's common stock when the dividends are expected to

remain constant over time. In this case, the value of the stock is based on the present value of its expected future dividends.

The formula for the DDM for zero growth is as follows:

$$V = D / r$$

Where:

V = Intrinsic value of the stock

D = Expected dividend payment

r = Required rate of return or discount rate

Here's an example to illustrate the common stock valuation using the dividend discount model for zero growth:

Let's consider a company, XYZ Corp., that is expected to pay a constant annual dividend of \$5 per share indefinitely. The required rate of return for investors is 8%.

Using the formula, we can calculate the intrinsic value of the stock (V):

$$V = \$5 / 0.08$$

$$V = \$62.50$$

Therefore, based on the assumptions and calculations, the intrinsic value of XYZ Corp.'s common stock is \$62.50 per share.

#### **4.3.12.2 Growth Phases**

The growth phase model of common stock valuation is a method used to determine the intrinsic value of a stock when the dividend growth rate varies over time, reflecting different phases of a company's expected earnings and growth. This model accounts for changing growth rates by calculating the present value of expected future dividends.

In the given example, ABC Company is expected to increase its dividend at a 20% annual rate for the first four years, then at a 13% rate for the next four years, and finally at a 7% rate thereafter. The required rate of return for investors is 16%.

To calculate the value of a share of this stock, we need to determine the present value of the expected future dividends. Here's how we can apply the growth phase model:

Determine the dividend growth rates for each phase:

Phase 1: 20% growth rate for 4 years

Phase 2: 13% growth rate for 4 years

Phase 3: 7% growth rate (ongoing)

Calculate the present value of each phase's dividends:

$$\text{Phase 1: } PV_1 = D_1 / (1 + r)^1 + D_2 / (1 + r)^2 + D_3 / (1 + r)^3 + D_4 / (1 + r)^4$$

$$\text{Phase 2: } PV_2 = D_5 / (1 + r)^5 + D_6 / (1 + r)^6 + D_7 / (1 + r)^7 + D_8 / (1 + r)^8$$

$$\text{Phase 3: } V_8 = D_9 / (r - g_3)$$

$$PV_3 = V_8 / (1 + r)^8$$

Calculate the total present value of all phases' dividends:

$$\text{Total } V_0 = PV = PV_1 + PV_2 + PV_3$$

Sum up the present values to get the intrinsic value of the stock.

Let's calculate the value using the given information:

Phase 1:

$$D_1 = \$1.60, r = 16\%$$

$$PV_1 = (1.60 / (1 + 0.16)^1) + (1.60 * 1.20 / (1 + 0.16)^2) + (1.60 * 1.20^2 / (1 + 0.16)^3) + (1.60 * 1.20^3 / (1 + 0.16)^4)$$

Phase 2:

$$D_5 = D_4 * 1.13 = 1.60 * (1.20)^4 * 1.13, r = 16\%$$

$$PV_2 = (D_5 / (1 + 0.16)^5) + (D_5 * 1.13 / (1 + 0.16)^6) + (D_5 * 1.13^2 / (1 + 0.16)^7) + (D_5 * 1.13^3 / (1 + 0.16)^8)$$

Phase 3:

$$D_9 = D_8 * 1.07 = D_7 * (1.20)^4 * 1.13 * 1.07, r = 16\%, g_3 = 7\%$$

$$V_8 = D_9 / (0.16 - 0.07)$$

$$PV_3 = V_8 / (1 + 0.16)^8$$

$$\text{Total } V_0 = PV = PV_1 + PV_2 + PV_3$$

By summing up the present values, we can determine the value to place on a share of this stock.

### **4.3.13 Rates of Return (or Yields)**

Rates of return, also known as yields, play a crucial role in long-term valuation, especially when assessing the attractiveness of investments. These rates represent the percentage gain or loss an investor can expect to earn from an investment over time. They are essential in determining the profitability and risk associated with various financial instruments, such as stocks and bonds.

#### **4.3.13.1 Bond Yield**

To calculate the yield to maturity (YTM) using the formula  $I(PVIFA_{kd,n}) + MV(PVIF_{kd,n})$ , we need to determine the values of I (coupon payment), PV (present value or market price), F (face value), n (number of periods), and kd (required yield).

In this case:

I = Coupon payment = 8% of \$1,000 = \$80 (since the coupon rate is 8%)

PV = Present value or market price = \$935

F = Face value = \$1,000

n = Number of periods = 10 years \* 2 (since interest payments are made semiannually) = 20 periods

kd = Required yield or YTM (to be determined)

Using the given formula:

$$PV = I(PVIFA_{kd,n}) + MV(PVIF_{kd,n})$$

$$\$935 = \$80(PVIFA_{kd,20}) + \$1,000(PVIF_{kd,20})$$

To solve for kd (YTM) using interpolation, we can use trial and error to find the approximate yield that satisfies the equation. We start with a reasonable guess for the yield, then calculate the left-

hand side and compare it with the right-hand side. We continue adjusting the guess until we find a yield that makes the equation balance.

Here's an example of the trial and error process:

Start with a guess for YTM, let's say 5%.

Calculate the left-hand side of the equation:

$$PV = \$80(PVIFA5\%,20) + \$1,000(PVIF5\%,20)$$

$$PV \approx \$1,030.70$$

Compare the calculated PV with the actual PV (\$935).

Since the calculated PV is higher than the actual PV, we need to decrease the yield.

Adjust the guess for YTM to a lower value, let's say 4%.

Recalculate the left-hand side of the equation using the new guess for YTM:

$$PV = \$80(PVIFA4\%,20) + \$1,000(PVIF4\%,20)$$

$$PV \approx \$935.43$$

Compare the newly calculated PV with the actual PV (\$935).

The newly calculated PV is closer to the actual PV.

Continue this process of adjusting the guess and recalculating until we find a yield that closely matches the actual market price of \$935.

$$\text{Yield} = \text{low interest value} + \frac{(\text{value at low interest} - \text{value at unknown interest})}{(\text{value at low interest} - \text{value at high interest})} * (I_{\text{high}} - I_{\text{low}})$$

Where:

By repeating the process and adjusting the guess for YTM, we can iteratively approach the actual yield to maturity for the bond. Interpolation helps refine the estimation, allowing for a more accurate YTM calculation.



#### **4.3.13.2 Preferred Stock Yield**

The yield on preferred stock, also known as the preferred stock yield or dividend yield, represents the annual dividend income generated by a preferred stock relative to its market price. It is expressed as a percentage and provides investors with an idea of the return they can expect from owning the preferred stock.

The formula to calculate the preferred stock yield is as follows:

$$\text{Preferred Stock Yield} = \text{Annual Dividend} / \text{Market Price}$$

Let's consider an example to calculate the preferred stock yield:

ABC Company has issued preferred stock with a par value of \$100. The preferred stock pays an annual dividend of \$8. The current market price of the preferred stock is \$95.

$$\text{Preferred Stock Yield} = \text{Annual Dividend} / \text{Market Price}$$

$$\text{Preferred Stock Yield} = \$8 / \$95$$

$$\text{Preferred Stock Yield} \approx 0.0842 \text{ or } 8.42\%$$

In this example, the preferred stock yield is approximately 8.42%. It indicates that investors can expect to receive an 8.42% return on their investment in the preferred stock based on the annual dividend payout and the market price.

#### **4.3.13.3 Common Stock Yield**

The yield on common stock, also known as the dividend yield, represents the annual dividend income generated by a common stock relative to its market price. The Gordon Growth Model is commonly used to calculate the yield on common stock. The formula for the Gordon Growth Model is as follows:

$$\text{Common Stock Yield} = \text{Dividend Per Share} / \text{Market Price Per Share}$$

Let's consider an example to calculate the common stock yield using the Gordon Growth Model: ABC Company's common stock currently pays a dividend of \$2 per share. The market price per share is \$50. The company is expected to increase its dividends at a constant growth rate of 5% per year.

To calculate the common stock yield, we first need to determine the expected dividend per share in the future. We can use the Gordon Growth Model formula:

Expected Dividend Per Share = Dividend Per Share \* (1 + Growth Rate)

Expected Dividend Per Share = \$2 \* (1 + 0.05) = \$2.10

Now, we can calculate the common stock yield:

Common Stock Yield = Expected Dividend Per Share / Market Price Per Share

Common Stock Yield = \$2.10 / \$50 = 0.042 or 4.2%

In this example, the common stock yield is approximately 4.2%. It indicates that investors can expect to receive a 4.2% return on their investment in the common stock based on the expected dividend payout and the market price.

#### **4.4 Self-Assessment Questions**

- What are the key concepts and principles involved in the valuation of long-term securities, and why is valuation important for investors and issuers?
- How do valuation concepts differ between various types of securities, such as bonds, preferred stock, and common stock?
- In bond valuation, what factors influence the bond's price, and how is the yield to maturity (YTM) calculated? How does YTM impact bond valuation?
- What are the distinguishing features of preferred stock, and how is the valuation of preferred stock different from that of common stock?
- What methods and models are commonly used for valuing common stock, and how do they account for factors like dividends, growth rates, and market conditions?
- How do rates of return, or yields, serve as important metrics for assessing the potential profitability and risk associated with long-term securities?
- In the context of bond valuation, how do the coupon rate, prevailing interest rates, and the bond's maturity affect its price and yield?
- What are the key considerations for investors when choosing between different types of long-term securities, such as bonds, preferred stock, and common stock?

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Unit:5

## **5 Risk and Return**

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**Introduction:**

This unit provides a comprehensive understanding of the concepts of risk and return in the context of investment and finance. It explores different types of investment returns, including capital gains, dividends, and total returns, and examines how they contribute to an investor's overall return. The unit delves into various forms of financial risk, such as market risk, credit risk, and liquidity risk, and how these risks influence investment decisions. It examines attitudes toward risk and the trade-off between risk and potential return, as well as the concepts of risk tolerance and risk appetite. The unit introduces the concept of a portfolio and the importance of diversification in reducing risk, exploring strategies like sector, asset class, and international diversification. It also covers the Capital Asset Pricing Model (CAPM) as a tool for estimating expected returns based on systematic risk and introduces the Arbitrage Pricing Theory (APT) as an alternative model for asset pricing. Through these topics, students will gain essential skills in evaluating investment opportunities and managing risk in their portfolios.

**Objectives:**

- To provide a comprehensive understanding of the concepts of risk and return in the context of investment and finance.
- To explore different types of investment returns, including capital gains, dividends, and total returns, and how they contribute to an investor's overall return.
- To delve into the various forms of financial risk, such as market risk, credit risk, and liquidity risk, and understand how they affect investment decisions.
- To examine the concept of attitude toward risk and how it influences investment choices, including the trade-off between risk and potential return.
- To explore the concept of risk tolerance, which represents an individual's or entity's willingness and capacity to accept risk in their investment portfolio.
- To define risk appetite as an organization's or individual's broader willingness to take on risk in pursuit of financial goals and objectives.
- To introduce the concept of a portfolio as a collection of assets, and how diversification can reduce risk in a portfolio.
- To explore the CAPM as a tool for estimating the expected return on an investment based on its systematic risk.
- To introduce APT as an alternative model for asset pricing, considering multiple factors that may influence expected returns.
- To examine various diversification strategies and their role in risk management, including sector diversification, asset class diversification, and international diversification.

## 5.1 Return

The gain or loss on an investment over a certain period. It is a measure of the profitability of an investment and is often expressed as a percentage. There are different types of returns, including total return, simple return, and annualized return, depending on how the return is calculated and the time frame considered.

The formula for calculating simple return is as follows:

$$\text{Simple Return} = (\text{Ending Value} - \text{Beginning Value}) / \text{Beginning Value}$$

Where:

Ending Value is the current value of the investment.

The beginning Value is the initial value of the investment.

Let's consider an example to understand the calculation of a simple return:

Example:

Suppose you bought 100 shares of ABC Company for \$50 per share. After one year, the price of the shares has increased to \$60 per share. Calculate the simple return on your investment.

Solution:

$$\text{Beginning Value} = 100 \text{ shares} * \$50 \text{ per share} = \$5,000$$

$$\text{Ending Value} = 100 \text{ shares} * \$60 \text{ per share} = \$6,000$$

$$\text{Simple Return} = (\$6,000 - \$5,000) / \$5,000$$

$$\text{Simple Return} = \$1,000 / \$5,000$$

$$\text{Simple Return} = 0.20 \text{ or } 20\%$$

In this example, the simple return on your investment is 20%. This means that your investment in ABC Company has generated a 20% gain over the one year.

### 5.1.1 Actual Return:

Actual return, also known as realized return, refers to the actual gain or loss made on an investment over a specific period. It is based on the real, historical performance of the investment and is calculated by comparing the ending value of the investment with its initial value.

The formula for calculating the actual return is the same as the formula for simple return, which we discussed earlier:

$$\text{Actual Return} = (\text{Ending Value} - \text{Beginning Value}) / \text{Beginning Value}$$

The actual return can be positive, indicating a gain, or negative, indicating a loss. It provides investors with a clear picture of how well their investment has performed.

Example:

Suppose you purchased a stock for \$1,000 and sold it after a year for \$1,200. The actual return on the investment would be:

$$\text{Actual Return} = (\$1,200 - \$1,000) / \$1,000$$

$$\text{Actual Return} = \$200 / \$1,000$$

$$\text{Actual Return} = 0.20 \text{ or } 20\%$$

In this example, the actual return is 20%, indicating a 20% gain on the investment.

### 5.1.2 Expected Return:

Expected return, on the other hand, is a forward-looking concept that represents the average return an investor anticipates on an investment in the future. It is based on the investor's projections and estimates of the investment's potential performance.

The expected return considers various factors, including historical performance, economic conditions, market trends, and the specific characteristics of the investment. It is often used in financial modeling and portfolio management to assess the potential risks and rewards of different investment options.



The expected return formula is used to calculate the average return an investor anticipates on an investment, considering the probabilities of different outcomes. It is a weighted average of all possible returns, where each return is multiplied by its corresponding probability.

Mathematically, the formula for expected return can be expressed as follows:

$$\text{Expected Return} = \Sigma(\text{Probability of Return } i \times \text{Return } i)$$

$$\text{Expected Return} = (\text{Probability of Return 1} \times \text{Return 1}) + (\text{Probability of Return 2} \times \text{Return 2}) + \dots + (\text{Probability of Return } n \times \text{Return } n)$$

Where:

"Probability of Return x" is the likelihood or probability of each possible return occurring.

"Return x" is the return associated with each outcome.

Example:

Let's consider an investment in a stock with two possible outcomes: a 20% chance of a 10% return and an 80% chance of a 5% return.

$$\text{Expected Return} = (0.20 \times 10\%) + (0.80 \times 5\%)$$

$$\text{Expected Return} = 0.02 + 0.04$$

$$\text{Expected Return} = 0.06 \text{ or } 6\%$$

In this example, the expected return on the stock investment is 6%. This means that based on the probabilities and potential returns associated with the investment, the investor anticipates earning an average return of 6% on their investment.

## 5.2 Risk

The uncertainty or variability of returns associated with an investment. It represents the potential for an investment's actual returns to differ from its expected returns. Generally, higher risk is associated with higher potential returns, but it also means there is a greater chance of experiencing losses.

One of the most used measures of risk is the standard deviation, which quantifies the dispersion of returns around the average return (expected return) of an investment. The formula for calculating the standard deviation of a set of returns is as follows:

$$\text{Standard Deviation } (\sigma) = \sqrt{[\Sigma(R_i - R_m)^2 / n]}$$

Where:

$R_i$  is each return in the data set.

$R_m$  is the mean (average) return of the data set.

$\Sigma$  signifies the summation, which means you need to calculate the squared difference for each return and then sum them up.

$n$  is the total number of returns in the data set.

Example:

Let's consider an investment with the following annual returns over five years: 6%, 10%, -2%, 8%, and 5%. To calculate the standard deviation, we need to follow these steps:

Step 1: Calculate the mean (average) return ( $R_m$ ):

$$R_m = (6\% + 10\% - 2\% + 8\% + 5\%) / 5 = 5.4\%$$

Step 2: Calculate the squared difference for each return  $(R_i - R_m)^2$ :

$$(6\% - 5.4\%)^2 = 0.0036$$

$$(10\% - 5.4\%)^2 = 0.0225$$

$$(-2\% - 5.4\%)^2 = 7.84$$

$$(8\% - 5.4\%)^2 = 0.0656$$

$$(5\% - 5.4\%)^2 = 0.0016$$

Step 3: Sum up the squared differences:

$$\Sigma(R_i - R_m)^2 = 0.0036 + 0.0225 + 7.84 + 0.0656 + 0.0016 = 7.9333$$

Step 4: Divide the sum by the total number of returns (n) and take the square root:

$$\sigma = \sqrt{(7.9333 / 5)} \approx \sqrt{1.5867} \approx 1.2593$$

The standard deviation of the returns is approximately 1.2593 (or 12.59%).

The higher the standard deviation, the greater the risk associated with the investment. A higher standard deviation indicates that the returns have more variability, and therefore, the investment is considered riskier. Conversely, a lower standard deviation implies less variability and lower risk. Investors often use the standard deviation as a measure of risk to compare different investments and build well-diversified portfolios to manage risk effectively.

### **5.2.1 Attitude toward risk**

It refers to an individual's or investor's willingness to take on risk in pursuit of potential rewards. It is a crucial concept in finance and investment decision-making. Different individuals have different attitudes toward risk, which influences their investment choices and behaviors. There are typically three main types of attitudes toward risk:

#### **5.2.1.1 Risk-Averse:**

Risk-averse individuals are cautious and prefer lower-risk investments with more predictable returns. They prioritize the preservation of capital and are willing to accept lower potential returns in exchange for reduced risk. These investors may be uncomfortable with the idea of losing money and may seek stable assets such as government bonds or blue-chip stocks.

#### **5.2.1.2 Risk-Neutral:**

Risk-neutral individuals are indifferent to risk and make investment decisions solely based on expected returns. They are not concerned about risk as long as the potential returns are in line with their expectations. This attitude is less common among individual investors and is often associated with professional investors and institutions.

#### **5.2.1.3 Risk-Seeking:**

Risk-seeking individuals are more willing to take on higher levels of risk to achieve higher potential returns. They are comfortable with uncertainty and may be attracted to investments with the possibility of substantial gains, even if it means a higher likelihood of losses. Risk-seeking investors may venture into speculative investments, startups, or high-growth stocks.

It's important to note that an individual's attitude toward risk is not fixed and can change over time, influenced by factors such as financial goals, life stage, market conditions, and past experiences. Moreover, investors may have different risk preferences for different investment goals (e.g., retirement savings vs. short-term trading).

Understanding one's attitude toward risk is crucial for developing an appropriate investment strategy that aligns with their financial objectives and emotional comfort level. A well-balanced investment portfolio considers the investor's risk tolerance, diversification, and investment time horizon. By considering these factors, investors can create a portfolio that optimizes the potential for returns while managing risk in a way that is suitable for their individual preferences and circumstances.

### **5.2.2 Risk Tolerance:**

Risk tolerance refers to an individual's ability to endure fluctuations in the value of their investments without experiencing significant emotional distress. It is a psychological trait that reflects an investor's comfort level with uncertainty and the potential for losses. An investor with a high-risk tolerance is more likely to remain calm and patient during market downturns, while an investor with a low-risk tolerance may become anxious or make impulsive decisions in response to market volatility.

Factors influencing risk tolerance include an individual's financial situation, investment goals, time horizon, and personal attitudes toward money and risk. For example, a young investor with a stable income and a long investment time horizon may have a higher risk tolerance, as they have time to recover from short-term market fluctuations. On the other hand, a retiree living off their savings may have a lower risk tolerance, as they cannot afford significant losses that could impact their standard of living.

### **5.2.3 Risk Appetite:**

Risk appetite, on the other hand, is more closely related to an investor's willingness to actively seek out and take on risk in pursuit of higher returns. It is a proactive stance toward risk and reflects the degree to which an investor is willing to allocate their investment portfolio to riskier assets with the potential for higher rewards.

An investor with a high-risk appetite is more inclined to invest in assets such as small-cap stocks, emerging markets, or high-yield bonds that carry higher levels of risk but also offer the potential for greater returns. They are comfortable taking on additional risks to achieve their financial goals. Conversely, an investor with a low-risk appetite may prefer to stick to more conservative investments with lower potential returns but also lower risk.

Both risk tolerance and risk appetite play a crucial role in shaping an individual's investment strategy and asset allocation decisions. Understanding one's risk tolerance helps ensure that their investment choices align with their emotional comfort level, reducing the likelihood of making impulsive decisions based on market fluctuations. Risk appetite, on the other hand, can influence an investor's portfolio diversification, as higher risk appetites may lead to a greater allocation to riskier assets.

#### **5.2.4 Coefficient of Variation**

coefficient of variation (CV) is a statistical measure that expresses the relative variability of a dataset's values, making it useful for comparing the variability of different datasets with different units of measurement. It is calculated by dividing the standard deviation of the dataset by the mean and then multiplying by 100 to express it as a percentage. The formula for the coefficient of variation is as follows:

$$\text{Coefficient of Variation (CV)} = (\text{Standard Deviation} / \text{Mean}) * 100$$

A lower CV indicates less variability relative to the mean, while a higher CV indicates more variability relative to the mean.

Let's calculate the coefficient of variation with the help of an example:

Example:

Suppose we have two datasets representing the monthly sales of two companies, A and B, for the past six months:

Company A Mean= 175                      Standard Deviation = 18.71  
Company B Mean= 3666.67              Standard Deviation = 288.37

Step 3: Calculate the coefficient of variation for each dataset.

CV for Company A =  $(18.71 / 175) * 100 \approx 10.69\%$

CV for Company B =  $(288.37 / 3666.67) * 100 \approx 7.86\%$

In this example, the coefficient of variation for Company A is approximately 10.69%, indicating that its monthly sales have relatively low variability compared to the mean. On the other hand, the coefficient of variation for Company B is approximately 7.86%, suggesting that its monthly sales have relatively higher variability compared to the mean.

### **5.3 Portfolio:**

A portfolio is a collection of financial investments held by an individual, institution, or entity. It typically includes a mix of assets such as stocks, bonds, cash, real estate, and other investment vehicles. The primary goal of creating a portfolio is to diversify investments and spread risk, aiming to achieve a balance between potential returns and risk management.

Investors use portfolios to manage their financial assets and work towards specific financial goals, such as wealth accumulation, income generation, or retirement planning. The selection of assets within a portfolio is based on the investor's risk tolerance, investment objectives, time horizon, and market outlook.

#### **5.3.1 Modern Portfolio Theory (MPT):**

Modern Portfolio Theory, developed by economist Harry Markowitz in the 1950s, is a framework for constructing efficient investment portfolios. It is based on the principle that an investor can maximize their expected return for a given level of risk or minimize risk for a targeted level of return by diversifying their investments.

#### **5.3.2 Diversification:**

MPT emphasizes the importance of diversification across different asset classes and securities. By investing in assets that have low or negative correlations, the overall portfolio risk can be reduced.

When some assets in the portfolio decline in value, others may increase, balancing the overall performance.

### **5.3.3 Risk and Return:**

MPT recognizes that investors demand higher returns for taking on higher levels of risk. It aims to find the optimal balance between risk and return by selecting assets with different risk characteristics to achieve the best possible risk-adjusted return.

### **5.3.4 Efficient Frontier:**

MPT introduces the concept of the efficient frontier, which represents the set of portfolios that offer the highest expected return for any given level of risk. Portfolios that lie on the efficient frontier are considered optimal as they provide the maximum return for a given level of risk or the minimum risk for a targeted level of return.

According to Harry Markowitz's Modern Portfolio Theory (MPT), the association between portfolio components, as represented by their correlations, is of critical importance in the construction of efficient portfolios. MPT emphasizes the benefits of diversification and aims to maximize the expected return for a given level of risk. The association between portfolio components (assets) is a key determinant of portfolio risk and return. Here's why it is important:

### **5.3.5 Risk Reduction:**

MPT recognizes that not all assets move in the same direction or have the same volatility. By including assets with low or negative correlations in a portfolio, investors can achieve risk reduction through diversification. When some assets in the portfolio may experience negative returns or high volatility, others may perform better or remain stable. As a result, the overall risk of the portfolio is reduced.

### **5.3.6 Optimal Asset Allocation:**

The association between assets influences the optimal asset allocation in a portfolio. MPT uses mathematical optimization techniques to find the allocation that maximizes expected returns while minimizing risk. Correlations play a crucial role in this process, as they affect the covariance

structure of the portfolio components. An optimal asset allocation considers how the assets' returns move about each other to construct a well-balanced portfolio.

### **5.3.7 Market Conditions:**

The correlation between assets can change over time, especially during different market conditions. Understanding how correlations evolve allows investors to adjust their portfolios dynamically. For example, during periods of high market volatility, correlations between assets may increase, reducing the diversification benefits. Being aware of these changes helps investors manage risk effectively and adapt their portfolios accordingly.

### **5.3.8 Portfolio Risk Management:**

The association between portfolio components affects the overall risk of the portfolio. High correlations between assets can lead to increased portfolio volatility, especially during market downturns. By incorporating assets with different correlations, investors can better manage portfolio risk and potentially achieve smoother and more stable returns over the long term.

## **5.4 Portfolio Return**

Portfolio return refers to the overall performance or gain/loss of a collection of assets held by an investor in a portfolio. It is a weighted average of the individual returns of the assets in the portfolio, taking into account the proportion of each asset's investment in the portfolio.

The statistical formula for portfolio return ( $R_p$ ) is as follows:

$$R_p = \sum(W_i * R_i)$$

Where:

$R_p$  = Portfolio return

$W_i$  = Weight of the  $i$ th asset in the portfolio (expressed as a decimal)

$R_i$  = Return of the  $i$ th asset in the portfolio (expressed as a decimal)



To calculate the portfolio return, follow these steps:

Step 1: Determine the weights of each asset in the portfolio. The weight of an asset is calculated as the value of the asset divided by the total value of the portfolio.

Step 2: Identify the returns of each asset in the portfolio. The return of an asset is typically calculated as the percentage change in its value from the beginning to the end of the investment period.

Step 3: Multiply the weight of each asset by its corresponding return.

Step 4: Sum up the weighted returns of all assets in the portfolio to calculate the portfolio return.

Let's go through an example to illustrate the calculation of portfolio return:

Suppose an investor holds a portfolio with two assets:

Asset A: Investment = \$20,000, Return = 0.10 (10%)

Asset B: Investment = \$30,000, Return = 0.08 (8%)

Step 1: Calculate the weights of each asset:

Weight of Asset A =  $\$20,000 / (\$20,000 + \$30,000) = 0.4$  (40%)

Weight of Asset B =  $\$30,000 / (\$20,000 + \$30,000) = 0.6$  (60%)

Step 2: Calculate the return of each asset (already given in the example):

Return of Asset A = 0.10 (10%)

Return of Asset B = 0.08 (8%)

Step 3: Multiply the weights by the corresponding returns:

Weighted Return of Asset A =  $0.4 * 0.10 = 0.04$  (4%)

Weighted Return of Asset B =  $0.6 * 0.08 = 0.048$  (4.8%)

Step 4: Sum up the weighted returns:

Portfolio Return ( $R_p$ ) =  $0.04 + 0.048 = 0.088$  (8.8%)

So, the portfolio return is 8.8%. This means that the overall return of the investor's portfolio, considering the weights of each asset, is 8.8% for the given investment period.

## 5.5 Portfolio Risk

Portfolio risk refers to the uncertainty or variability of the returns of a collection of assets held in a portfolio. It takes into account the individual risk levels of each asset as well as the correlation between the assets. Diversification and asset allocation are commonly used strategies to manage and reduce portfolio risk.

The statistical formula for portfolio risk ( $\sigma_p$ ) is as follows:

$$\sigma_p = \sqrt{[\sum(W_i^2 * \sigma_i^2) + \sum\sum(W_i * W_j * \rho_{ij} * \sigma_i * \sigma_j)]}$$

Where:

$\sigma_p$  = Portfolio risk (standard deviation of portfolio returns)

$W_i$  = Weight of the  $i$ th asset in the portfolio (expressed as a decimal)

$\sigma_i$  = Standard deviation of the  $i$ th asset's returns

$\rho_{ij}$  = Correlation coefficient between the returns of assets  $i$  and  $j$

$\sigma_j$  = Standard deviation of the  $j$ th asset's returns

To calculate the portfolio risk, follow these steps:

Step 1: Determine the weights of each asset in the portfolio.

Step 2: Identify the standard deviation of the returns of each asset. The standard deviation measures the dispersion or variability of returns around the mean return.

Step 3: Calculate the correlation coefficient between the returns of each pair of assets. The correlation coefficient measures the degree of linear relationship between two variables, in this case, the returns of assets i and j.

Step 4: Use the formula to calculate the portfolio risk by summing up the weighted standard deviations and the weighted correlation terms.

Let's go through an example to illustrate the calculation of portfolio risk:

Suppose an investor holds a portfolio with two assets:

Asset A: Weight = 0.4 (40%), Standard Deviation = 0.15 (15%)

Asset B: Weight = 0.6 (60%), Standard Deviation = 0.10 (10%)

The correlation coefficient between Asset A and Asset B = 0.4

Step 1: Calculate the weighted standard deviations:

Weighted Standard Deviation of Asset A =  $0.4 * 0.15 = 0.06$

Weighted Standard Deviation of Asset B =  $0.6 * 0.10 = 0.06$

Step 2: Calculate the weighted correlation term:

Weighted Correlation Term =  $0.4 * 0.6 * 0.4 * 0.15 * 0.10 = 0.00144$

Step 3: Sum up the weighted standard deviations and the weighted correlation term:

$\sigma_p = \sqrt{[(0.06^2 + 0.06^2) + 2 * 0.00144]} \approx \sqrt{[0.0072 + 0.00288]} \approx \sqrt{0.01008} \approx 0.1004 \text{ (10.04\%)}$

So, the portfolio risk (standard deviation of portfolio returns) is approximately 10.04%. This means that the variability of the investor's portfolio returns is around 10.04% for the given investment period, taking into account the individual risk of each asset and their correlation.

## 5.6 Capital Asset Pricing Model

The Capital Asset Pricing Model (CAPM) is a widely used financial model that helps investors calculate the expected return on an individual asset or a portfolio. It is based on the relationship between the risk of an asset and its expected return.

The formula for the Capital Asset Pricing Model (CAPM) is as follows:

$$\text{Expected Return}(R_i) = R_f + \beta_i \times (R_m - R_f)$$

The CAPM formula indicates that the expected return of an asset or portfolio is equal to the risk-free rate plus a risk premium, which is determined by multiplying the asset's beta by the market risk premium (the difference between the expected market return and the risk-free rate).

Example:

Let's say you want to calculate the expected return of a stock with a beta of 1.2, given the following information:

Risk-free rate ( $R_f$ ) = 3%

Expected market return ( $R_m$ ) = 8%

Using the CAPM formula:

$$R_i = 0.03 + 1.2 \times (.08 - .03)$$

$$R_i = 0.03 + 1.2 \times (.05)$$

$$R_i = 0.03 + 0.06$$

$$R_i = 0.09$$

So, according to the CAPM, the expected return of the stock is 9%. This means that based on its beta and the overall market's expected return, the stock is expected to provide a return of 9% per year.

## 5.7 Arbitrage Pricing Theory

Arbitrage Pricing Theory (APT) is a financial model used to determine the expected return of an asset based on multiple factors that are believed to influence its performance. It was developed as an alternative to the Capital Asset Pricing Model (CAPM) by Stephen Ross in the 1970s. APT is a multifactor model that considers the sensitivity of an asset's returns to various macroeconomic factors.

The fundamental idea behind APT is that the expected return of an asset can be explained by its exposure to systematic risk factors. Systematic risk factors are macroeconomic variables or factors that affect the overall market and impact a wide range of assets. These factors can include changes in interest rates, inflation rates, GDP growth, exchange rates, and other economic indicators.

The APT model is based on the following assumptions:

### **No arbitrage opportunities:**

APT assumes that investors will not allow any riskless arbitrage opportunities to persist in the market.

### **Factor exposure:**

The expected return of an asset is directly related to its exposure to systematic risk factors.

### **Factor sensitivities:**

The sensitivity of an asset's returns to each factor is represented by a factor loading or beta.

The APT formula to calculate the expected return of an asset is as follows:

$$\text{Expected Return}(R_i) = R_f + \sum_{k=1}^n \beta_k \times F_k$$

where:

$R_i$  = Expected return of the asset

$R_f$  = Risk-free rate of return

$n$  = Number of systematic risk factors considered in the model

$\beta_k$  = Factor loading (sensitivity) of the asset to the  $k$ -th risk factor

$F_k$  = Expected excess return of the  $k$ -th risk factor

## 5.8 Diversification

Diversification is a risk management strategy that involves spreading investments across various assets or asset classes to reduce the overall risk of a portfolio. The idea behind diversification is that different investments have different levels of risk, and by holding a diversified portfolio, the impact of negative events affecting one investment may be mitigated by positive performance in other investments.

The main goal of diversification is to achieve a balance between risk and return by combining assets with low or negative correlations. When assets have a low correlation, their prices tend to move independently of each other. As a result, the risk of the overall portfolio is reduced because not all investments are affected in the same way by market fluctuations.

### 5.8.1 Benefits of Diversification:

#### **Risk Reduction:**

Diversification helps reduce the overall risk of the portfolio because it reduces the impact of individual assets or sector-specific risks.

#### **Smoother Returns:**

A diversified portfolio tends to have more stable returns over time compared to a concentrated portfolio, which may experience greater volatility.

### **Improved Performance:**

Diversification allows investors to take advantage of opportunities in different markets and industries, potentially leading to better overall performance.

### **Protection Against Market Downturns:**

By holding assets with low correlations, the negative impact of a market downturn on one asset may be offset by positive performance in other assets.

## **5.9 Diversification Strategies:**

### **5.9.1 Asset Allocation:**

Investors allocate their funds across different asset classes, such as stocks, bonds, real estate, and commodities, to achieve a balanced and diversified portfolio.

### **5.9.2 Geographic Diversification:**

Investing in securities from different countries or regions helps reduce exposure to country-specific risks and economic conditions.

### **5.9.3 Industry Diversification:**

Spreading investments across various industries helps mitigate risks associated with industry-specific factors.

### **5.9.4 Time Diversification:**

Investing over different time horizons, such as short-term, medium-term, and long-term, reduces the impact of market volatility.

## **5.10 Self-Assessment Questions:**

- What is the relationship between risk and return on investment, and why is it essential for investors to understand this relationship?
- How are investment returns categorized, and what are the key components of total return for various types of assets?
- What are the different types of financial risk, and how do they impact investment decisions and portfolio construction?
- How do individual attitudes toward risk influence investment choices, and what are the factors that determine an individual's risk tolerance?
- What is risk appetite, and how does it guide an organization's approach to risk management and investment strategies?
- How is the coefficient of variation calculated, and what does it reveal about the risk-adjusted return of investments?
- What is the concept of portfolio construction, and how does diversification help reduce risk in a portfolio?
- How do the expected returns and risks of individual assets contribute to the overall return and risk of a portfolio?
- What is the Capital Asset Pricing Model (CAPM), and how does it estimate the expected return on an investment based on systematic risk?
- What is the Arbitrage Pricing Theory (APT), and how does it differ from CAPM in explaining asset pricing?
- What are some effective diversification strategies, and how can investors use diversification to manage risk in their portfolios?

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Unit:6

## **6 Working Capital Management -I**

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## **Introduction**

This unit provides a comprehensive understanding of the concept of working capital and its critical significance in financial management. It explores the common challenges and issues associated with working capital management that organizations face, emphasizing the importance of financing current assets effectively and efficiently. The unit distinguishes between short-term and long-term financing options, analyzing sources and strategies such as trade credit, bank loans, and commercial paper. It evaluates the role of long-term financing in supporting current assets, examining the advantages and disadvantages of using long-term sources. The concept of finding the optimal mix of short-term and long-term financing to meet an organization's working capital needs is also explored. Additionally, the unit addresses how uncertainty in revenue and expenses impacts working capital management and the necessity of maintaining a margin of safety. It delves into the trade-off between risk and profitability in working capital management decisions, including liquidity risk and investment return. Finally, the unit examines the motives for holding cash—transaction, precautionary, speculative, and operational—and how these motives influence working capital decisions. Through these topics, students will gain essential skills for managing working capital to ensure organizational efficiency and financial stability.

## **Objectives**

- To provide a comprehensive understanding of the concept of working capital and its significance in financial management.
- To explore the common challenges and issues associated with working capital management that organizations face.
- To examine the importance of financing current assets effectively and efficiently and to distinguish between short-term and long-term financing options.
- To analyze short-term financing sources and strategies, including trade credit, bank loans, and commercial paper.
- To evaluate the role of long-term financing in supporting current assets and the advantages and disadvantages of using long-term sources.
- To explore the concept of finding the optimal mix of short-term and long-term financing to meet the organization's working capital needs.
- To understand how uncertainty in revenue and expenses impacts working capital management and the concept of maintaining a margin of safety.
- To examine the trade-off between risk and profitability in working capital management decisions, including liquidity risk and investment return.
- To delve into the motives for holding cash, including transaction, precautionary, speculative, and operational motives, and how they influence working capital decisions.

## **6.1 Working Capital Management**

Working capital is the difference between a company's current assets and current liabilities. It represents the funds available to a company for its day-to-day operations and is a measure of its short-term liquidity. Positive working capital indicates that a company has more current assets than current liabilities, while negative working capital indicates the opposite.

Working capital management is the process of efficiently managing a company's current assets and current liabilities to ensure that it maintains an optimal level of working capital. The goal of working capital management is to strike a balance between maximizing liquidity and minimizing costs, while also ensuring that the company can meet its short-term financial obligations.

### **6.1.1 Working capital management issues**

#### **6.1.2 Cash Management:**

Properly managing cash flow to ensure that the company has enough cash on hand to meet its day-to-day expenses and short-term obligations. This involves efficient collection of receivables and careful management of payables.

Example: A retail company needs to manage its cash flow to pay suppliers for inventory while also collecting cash from customers promptly.

#### **6.1.3 Inventory Management:**

Managing inventory levels to avoid stockouts and overstock situations. Maintaining the right balance of inventory helps optimize working capital.

Example: An electronics manufacturer must monitor its inventory levels to avoid holding excess inventory that ties up cash or running out of critical components and disrupting production.

#### **6.1.4 Accounts Receivable Management:**

Managing the credit policies and collections process to reduce the average collection period and minimize the risk of bad debts.

Example: A software company must implement efficient credit and collections procedures to ensure timely payment from its clients and reduce the risk of non-payment.

#### **6.1.5 Accounts Payable Management:**

Extending payment terms with suppliers while maintaining good relationships to optimize the use of trade credit and preserve cash.

Example: An automotive manufacturer may negotiate extended payment terms with its suppliers to free up cash for other operational needs.

#### **6.1.6 Short-Term Financing:**

Deciding on the appropriate mix of short-term financing sources, such as bank loans, lines of credit, or trade credit, to meet short-term funding needs at the lowest cost.

Example: A construction company may use a short-term bank loan to cover its working capital needs during a period of rapid expansion.

#### **6.1.7 Seasonal Variations:**

Planning for seasonal fluctuations in working capital needs and ensuring sufficient funds are available during peak demand periods.

Example: A toy manufacturer must anticipate increased working capital needs during the holiday season and arrange for additional financing if necessary.

#### **6.1.8 Risk Management:**

Identifying and mitigating risks associated with working capital, such as currency risk, interest rate risk, and supplier risk.

Example: An international company must hedge against currency fluctuations to minimize the impact on its working capital.

#### **6.1.9 Technology and Automation:**

Leveraging technology and automation to streamline working capital processes, reduce errors, and improve efficiency.

Example: An e-commerce company may use automated invoicing and payment systems to speed up cash collections and payments.

### **6.1.10 Forecasting and Budgeting:**

Developing accurate cash flow forecasts and budgets to anticipate future working capital requirements and plan accordingly.

Example: A hospitality company must forecast its cash flow needs during the low season to ensure it has enough working capital to cover expenses.

By effectively managing working capital, a company can improve its financial health, ensure smooth operations, and enhance its ability to pursue growth opportunities.

### **6.1.11 Financing Current Assets: Short-Term and Long-Term Mix**

Financing current assets involves determining the appropriate mix of short-term and long-term financing to fund a company's current assets, such as inventory, accounts receivable, and cash. The goal is to ensure that the company has enough funds to support its day-to-day operations without holding excess cash or relying too heavily on short-term debt.

## **6.2 Spontaneous Financing:**

Spontaneous financing refers to the use of short-term liabilities to fund short-term assets without the need for additional planning or negotiation. It involves matching the timing of the firm's assets and liabilities. The main sources of spontaneous financing are trade credit from suppliers and accounts payable. When a company purchases goods or services on credit from its suppliers, it essentially uses supplier financing to fund its inventory. The company can then convert this inventory into sales and accounts receivable, which, when collected, provide the necessary cash to pay off the accounts payable.

For example, let's say Company A buys \$50,000 worth of raw materials on credit from its suppliers and pays them in 30 days. During this period, Company A uses the raw materials to manufacture finished goods and sells them to customers on credit. The customers pay the company within 60 days. So, Company A collects cash from its customers before it needs to pay its suppliers, effectively using the spontaneous financing provided by trade credit.

### **6.3 Hedging (Maturity Matching) Approach:**

The hedging approach in working capital management aims to match the maturities of assets and liabilities to reduce liquidity risk. The goal is to ensure that the company has sufficient funds available when needed to meet its short-term obligations. It involves using long-term financing to fund long-term assets and short-term financing for short-term assets.

The idea behind the maturity-matching approach is to minimize the risk of a liquidity crisis. Short-term assets, such as accounts receivable and inventory, are typically financed using short-term liabilities, such as trade credit and short-term loans. Long-term assets, such as property, plant, and equipment, are financed with long-term debt and equity.

By matching the maturities of assets and liabilities, a company can avoid the risk of being unable to repay short-term obligations due to a shortage of cash. This approach is particularly important for companies that face fluctuations in cash flows or seasonal demand patterns.

For example, Company B operates in a seasonal industry, and its sales peak during the holiday season. To finance the increased inventory and accounts receivable during this period, the company arranged a short-term line of credit from a bank. This line of credit provides the necessary funds to cover the working capital needs during the busy season. Once the sales season is over, the company repays the line of credit using the cash collected from customers.

Both spontaneous financing and the hedging approach are essential strategies for managing working capital effectively. The choice of approach depends on the company's specific financial situation, risk tolerance, and industry dynamics. Effective working capital management is critical for ensuring the company's liquidity, financial stability, and ability to seize growth opportunities while minimizing the cost of financing.



## **6.4 Short-Term Financing:**

### **6.4.1 Trade Credit:**

Many businesses obtain short-term financing by obtaining trade credit from suppliers. This allows the company to purchase inventory or raw materials on credit and pay for them later, typically within 30 to 90 days. Trade credit can help improve working capital by providing a short-term source of funding without incurring interest costs.

### **6.4.2 Bank Loans:**

Short-term bank loans, such as lines of credit and revolving credit facilities, provide additional working capital during periods of seasonal or temporary cash flow fluctuations. These loans are usually paid back within a year and can be renewed as needed.

### **6.4.3 Commercial Paper:**

Larger, creditworthy companies may issue commercial paper, which is a short-term unsecured promissory note. Investors purchase these notes, providing the company with quick access to funds for working capital needs.

## **6.5 Long-Term Financing:**

### **6.5.1 Long-Term Loans:**

Companies may use long-term loans or term loans to finance capital-intensive projects or investments in fixed assets. By using long-term financing for capital expenditures, companies can avoid straining short-term working capital.

### **6.5.2 Bonds:**

Issuing bonds allows a company to raise funds from investors for long-term financing needs. Bonds typically have longer maturities, and the proceeds can be used to finance major projects or acquisitions.

### **6.5.3 Equity Financing:**

Raising funds through issuing common or preferred stock provides a long-term source of capital for a company. Equity financing does not require repayment and can be used to fund growth initiatives.

### **6.6 Optimal Mix:**

The optimal mix of short-term and long-term financing for working capital management depends on various factors, including the company's industry, size, financial health, and the nature of its working capital requirements. Striking the right balance is crucial to ensure that the company maintains sufficient liquidity while avoiding excessive debt or idle cash.

For example, a retail company with seasonal fluctuations in sales may use short-term financing, such as a line of credit, to manage working capital during peak seasons. On the other hand, a capital-intensive manufacturing company may utilize long-term loans or bonds to finance its expansion plans and equipment purchases.

### **6.7 Uncertainty and the Margin of Safety**

Uncertainty refers to the unpredictability of future outcomes or cash flows. When a firm faces uncertainty in its business environment, it must take precautions to safeguard its financial stability and profitability. One way to handle uncertainty is by providing a margin of safety.

The margin of safety is the extent to which a company's expected net cash flows exceed its contractual payments on debt obligations. It represents a buffer or cushion that protects the company from adverse fluctuations in cash flows. The greater the uncertainty, the larger the margin of safety required.

Two key approaches to creating a margin of safety are:

### **6.7.1 Increasing the Level of Current Assets:**

To mitigate the risk of unexpected cash drains, a company can hold higher levels of current assets, especially cash and marketable securities. These liquid assets provide the company with quick access to funds, ensuring it can meet short-term financial obligations and handle unexpected cash flow fluctuations. However, holding excess current assets may result in lower returns as these assets typically yield lower returns compared to long-term investments.

### **6.7.2 Lengthening the Maturity Schedule of Financing:**

Another way to provide a margin of safety is by borrowing on a longer-term basis. By opting for long-term financing, the company ensures that it has stable and predictable interest costs over the financing period. This approach reduces the risk of refinancing short-term debt during unfavorable market conditions, such as rising interest rates. However, long-term debt generally comes with higher interest costs compared to short-term debt.

## **6.8 Balancing Risk and Profitability:**

The decision to increase current assets or opt for long-term financing involves a trade-off between risk and profitability. A higher margin of safety, achieved through increased current assets or longer-term financing, provides greater financial stability and reduces the risk of default. However, it may lead to lower profitability due to the opportunity cost of holding excess cash or higher interest expenses on long-term debt.

On the other hand, a lower margin of safety achieved through shorter-term financing or reduced current assets may result in higher profitability. Still, it exposes the firm to the risk of being unable to meet debt obligations during unexpected cash flow shortages.

The choice of an appropriate margin of safety depends on management's risk tolerance, the industry's financial environment, and the company's growth and cash flow characteristics. Financial managers must carefully analyze the trade-offs between risk and profitability to arrive at an optimal margin of safety that aligns with the firm's objectives and risk appetite.

## **6.9 Risk & Profitability**

Risk and profitability are critical factors in determining the appropriate margin of safety in working capital management. The margin of safety represents the degree of protection or cushion a company establishes to mitigate the impact of uncertainty in its business operations. Let's explore the relationship between risk and profitability and how they influence the decision-making process for establishing the margin of safety.

### **6.9.1 Risk:**

In the context of working capital management, risk refers to the uncertainty and variability in the company's cash flows, sales demand, and overall business environment.

Higher risk implies a greater likelihood of unexpected cash flow shortages, which can lead to financial distress and inability to meet debt obligations.

To address the risk, a company needs to maintain a higher margin of safety, either by holding more liquid assets or using longer-term financing to ensure the availability of funds during difficult times. The level of risk tolerance varies among companies based on their financial strength, industry dynamics, and overall business strategy.

### **6.9.2 Profitability:**

Profitability refers to a company's ability to generate returns on its investments and use its available resources efficiently to maximize shareholder wealth.

Holding excess liquidity (more current assets) or using longer-term financing typically comes with costs. Holding liquid assets may lead to lower returns compared to investing in long-term projects, while long-term financing may involve higher interest expenses.

The company's financial management team must strike a balance between profitability and risk. It should carefully consider the cost of different solutions to maintain the margin of safety.

Finding the Optimal Margin of Safety:

Financial managers must assess the trade-offs between risk and profitability to find the optimal margin of safety that aligns with the company's objectives and risk appetite. They can determine

the least costly solution for various levels of risk, considering factors such as interest rates, financing terms, and expected returns on different investments. By understanding the cost involved in providing a margin of safety, management can set risk tolerances in line to maximize shareholder wealth. The decision-making process will involve evaluating the company's liquidity needs, its ability to access credit in emergencies, and the potential costs and benefits associated with different financing options.

## **6.10 Motives for Holding Cash**

Holding cash is a critical aspect of working capital management for any company. Cash serves various important purposes, and businesses hold cash for several motives. The primary motives for holding cash are as follows:

### **6.10.1 Transaction Motive:**

The transaction motive is the most basic reason for holding cash. Companies need cash to facilitate day-to-day business operations, such as paying suppliers, employees, and other operating expenses. Cash is essential for conducting routine transactions efficiently and ensuring smooth business operations.

### **6.10.2 Precautionary Motive:**

The precautionary motive for holding cash is driven by the need for a safety buffer to handle unforeseen events or emergencies. Maintaining cash reserves provides a financial cushion to cope with unexpected cash outflows or revenue shortfalls. It acts as a protective measure against uncertainty and helps companies avoid financial distress.

### **6.10.3 Speculative Motive:**

The speculative motive for holding cash is based on taking advantage of potential investment opportunities that may arise in the future. By holding cash, companies can quickly seize favorable investment chances, such as acquiring undervalued assets, investing in growth opportunities, or making strategic acquisitions. Cash allows businesses to be flexible and agile in responding to changing market conditions.

Below mentioned motives are other than primary motives mentioned above.

#### **6.10.4 Compensating Balance Motive:**

Financial institutions often require businesses and borrowers to maintain a certain level of cash or deposits in their accounts as part of loan agreements. These required balances, known as compensating balances, ensure that the institution earns revenue through account fees or interest charges. Businesses hold cash to comply with these contractual obligations.

#### **6.10.5 Credit Motive:**

Holding cash can enhance an individual's or business's creditworthiness. Lenders and creditors may view a borrower more favorably if they have a cash reserve, as it indicates the ability to repay loans, meet financial commitments and manage risk effectively. Cash reserves can facilitate access to credit and favorable lending terms.

#### **6.10.6 Operational Motive:**

Companies often hold cash to support their daily operations and maintain a smooth production process. Cash is needed for inventory purchases, paying suppliers, covering employee salaries, and covering other operational expenses. Having cash readily available ensures the continuity of business activities.

#### **6.10.7 Strategic Investment Motive:**

Organizations may hold cash as part of their strategic investment strategy. This may involve accumulating cash reserves to pursue strategic acquisitions, mergers, or investments in research and development. Holding cash positions, the company to take advantage of growth opportunities when they arise.

#### **6.10.8 Seasonal Motive:**

Some businesses experience seasonal fluctuations in demand, production, or revenue. They may need to hold cash during peak seasons to meet increased operational needs and expenses. This motive helps ensure the company's stability throughout the year.

#### **6.10.9 Tax Motive:**

Managing cash can have tax implications. Businesses may hold cash strategically to optimize their tax planning and liability. Timing disbursements and receipts can affect the timing of taxable events and tax deductions.

### **6.10.10 Interest Rate Motive:**

Interest rate movements can influence the decision to hold cash. When interest rates are expected to rise, individuals and organizations may hold more cash to take advantage of higher yields on investments. Conversely, during periods of low-interest rates, they may hold less cash as the opportunity cost of holding cash increases.

### **6.11 Self-Assessment Questions**

- What is working capital, and why is it considered a crucial component of a company's financial management?
- What are the common challenges and issues that organizations face in managing their working capital effectively?
- How do short-term financing options, such as trade credit and bank loans, differ from long-term financing options in supporting current assets?
- What are the advantages and disadvantages of using short-term financing for working capital needs?
- When is it advisable for an organization to consider long-term financing for its current assets, and what factors influence this decision?
- How can organizations determine the optimal mix of short-term and long-term financing to maintain a healthy working capital position?
- What role does uncertainty play in working capital management, and how can organizations maintain a margin of safety to mitigate risks?
- How does the balance between risk and profitability impact the selection of working capital management strategies, such as maintaining high liquidity versus investing excess cash for returns?
- What are the various motives for holding cash, and how do they align with the organization's goals and operational requirements?

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Unit:7

## **7 Working Capital Management-II**

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## **Introduction**

This unit provides a comprehensive understanding of accounts receivable and inventory management, emphasizing their significance in financial management and their impact on cash flow. It explores the development and implementation of credit standards and policies, including assessing creditworthiness, setting credit limits, and managing credit risk. The unit examines the establishment of credit terms, efficient collection strategies, and methods to reduce the average collection period and improve receivables turnover ratios. It also analyzes techniques for minimizing bad debt and late payments from customers, such as credit insurance and guarantees, highlighting how effective accounts receivable management optimizes cash flow and liquidity. Additionally, the unit delves into inventory management, exploring the importance of various inventory types, including raw materials, work-in-progress, and finished goods, across different industries. It examines the costs associated with holding inventory—carrying costs, ordering costs, and shortage costs—and their impact on financial performance. The unit explains the ABC (Activity-Based Costing) method for categorizing inventory items based on cost drivers and importance and explores the EOQ (Economic Order Quantity) model to determine the optimal order quantity for inventory items. Through these topics, students will gain essential skills for managing accounts receivable and inventory to enhance organizational efficiency and financial stability.

## **Objectives**

- To provide a comprehensive understanding of accounts receivable, their significance in financial management, and their impact on cash flow.
- To explore the development and implementation of credit standards and policies, including assessing creditworthiness, setting credit limits, and managing credit risk.
- To examine the establishment of credit terms and the strategies for efficient collections, reducing the average collection period, and improving receivables turnover ratios.
- To analyze techniques and strategies for minimizing bad debt and late payments from customers, including credit insurance and guarantees.
- To understand how effective accounts receivable management contributes to optimizing cash flow and liquidity in an organization.
- To develop a comprehensive understanding of inventory management, its importance, and its role within supply chain operations.
- To explore the various types of inventories, including raw materials, work-in-progress, and finished goods, and understand their significance in different industries.
- To analyze the costs associated with holding inventory, including carrying costs, ordering costs, and shortage costs, and their impact on financial performance.
- To explain the ABC (Activity-Based Costing) method and its application in categorizing inventory items based on cost drivers and importance.
- To examine the EOQ model, its formula, and how it helps determine the optimal order quantity for inventory items.

Accounts Receivable and Inventory Management are essential components of working capital management in a company. Effective management of these two elements is crucial for maintaining a healthy cash flow, optimizing operational efficiency, and minimizing financial risks.

## **7.1 Accounts Receivable Management**

Accounts Receivable Management is a critical component of working capital management for businesses. It involves efficiently handling the credit sales made to customers and ensuring timely collection of outstanding receivables.

Imagine a retail company that sells electronic gadgets. The company offers credit terms to its customers, allowing them to make purchases on credit and pay within 30 days. The company wants to improve its accounts receivable management to reduce the average collection period and accelerate cash inflows.

### **7.1.1 Strategies for Account Receivable Management**

#### **7.1.1.1 Credit Policy:**

The company establishes a credit policy that allows customers with a good credit history to have a credit limit of up to \$1,000. This policy helps mitigate the risk of bad debts while still attracting potential customers.

#### **7.1.1.2 Credit Evaluation:**

Before extending credit to new customers, the company conducts credit evaluations by checking their credit scores and payment histories. For example, a customer with a credit score above 700 and a clean payment history can be approved for a \$1,000 credit limit.

#### **7.1.1.3 Invoicing and Billing:**

The company ensures that invoices are generated promptly after each sale and are accurate and detailed, specifying the purchased items, quantities, prices, and payment due date.

#### **7.1.1.4 Collections:**

To improve collections, the company sends automated reminders to customers five days before the due date and follows up with a phone call if payment is not received by the due date. This proactive approach encourages customers to pay on time.

#### **7.1.1.5 Discounts and Incentives:**

To incentivize early payments, the company offers a 2% discount on the invoice amount if customers pay within the first 10 days. This strategy encourages customers to make early payments and reduces the average collection period.

### **7.2 Credit Standards:**

Credit standards refer to the criteria that a company sets to assess the creditworthiness of potential customers before extending credit to them. These standards help mitigate the risk of bad debts and ensure that the company deals with financially stable customers.

Example: ABC Electronics is a wholesale electronics distributor. They have set a credit standard that requires customers to have a minimum credit score of 700 and a clean payment history for the past two years to be eligible for credit. This ensures that they are dealing with financially responsible customers.

#### **7.2.1 Credit Terms:**

Credit terms are the conditions under which a company allows customers to make purchases on credit. These terms specify the length of time within which customers must make payment.

Example: XYZ Furniture offers its customers a 30-day credit term. This means that customers can purchase furniture on credit and must make the payment within 30 days from the date of purchase.

#### **7.2.2 Default Risk:**

Default risk refers to the probability that a customer will fail to meet their payment obligations, leading to bad debts for the company.

Example: ABC Apparel extends credit to a new customer without thoroughly checking their credit history. Unfortunately, the customer faces financial difficulties and is unable to pay their outstanding balance. This results in a default, causing a loss for ABC Apparel.

#### **7.2.3 Collection Policy and Procedures:**

Collection policies and procedures outline the steps a company will take to recover outstanding payments from customers who have not paid within the specified credit term.

Example: XYZ Tech Company has a collection policy that involves sending automated reminders to customers five days before the payment due date. If payment is not received within five days

after the due date, a collection agent calls the customer to inquire about the payment. If necessary, the company may apply late fees or take legal action for severe delinquencies.

#### **7.2.4 Analyzing the Credit Applicant:**

When a new customer applies for credit, the company analyzes their creditworthiness based on factors such as credit history, financial statements, and payment behavior.

Example: LMN Supplies receives a credit application from a potential customer. To analyze the applicant's creditworthiness, they review the applicant's credit report, bank statements, and trade references. Based on this analysis, LMN Supplies determines whether to approve or deny the credit application.

#### **7.2.5 Credit Analysis:**

Credit analysis involves evaluating the credit risk associated with each customer. It helps companies decide on appropriate credit limits and terms.

Example: XYZ Distributors conducts credit analysis for its customers by calculating their debt-to-income ratio, payment history, and other financial indicators. Based on the analysis, the company decided to offer a \$5,000 credit limit with a 60-day credit term to a customer with a strong credit profile.

Effective credit management practices, including setting appropriate credit standards, monitoring credit terms, and conducting thorough credit analysis, are crucial for businesses to minimize default risk, optimize cash flow, and maintain a healthy financial position.

### **7.3 Inventory Management**

Inventory Management is a vital aspect of supply chain and operations management that involves overseeing the acquisition, storage, and utilization of materials and goods. It plays a critical role in ensuring an organization's smooth operations, cost control, and customer satisfaction.

Consider a manufacturing company that produces furniture. The company wants to optimize its inventory management to reduce carrying costs while ensuring that it has enough stock to meet customer demand.

### **7.3.1 Strategies For Inventory Management:**

#### **7.3.1.1 Demand Forecasting:**

The company uses historical sales data and market trends to forecast demand accurately. For instance, based on past sales patterns, the company predicts an increase in demand for furniture during the holiday season.

#### **7.3.1.2 Safety Stock:**

To prevent stockouts during peak demand periods, the company maintains a safety stock of 10% of the average monthly sales. This buffer ensures that the company can fulfill orders even during unexpected demand spikes.

#### **7.3.1.3 Just-In-Time (JIT) Inventory:**

The company adopts JIT inventory management, where it orders raw materials from suppliers only when needed in the production process. This approach reduces excess inventory and storage costs.

#### **7.3.1.4 ABC Analysis:**

The company classifies its inventory into three categories based on value and importance. Category A includes high-value and high-demand items, B includes medium-value items, and C includes low-value and low-demand items. The company pays closer attention to managing category A items.

#### **7.3.1.5 Inventory Turnover:**

The company calculates its inventory turnover ratio, which measures how quickly inventory is sold and replenished. For example, if the company's inventory turnover ratio is 6, it means that inventory is being replenished approximately every two months (12 months / 6 turnovers).

#### **7.3.1.6 Inventory Controls:**

The company implements strict inventory controls, such as limiting access to the inventory storage area, using surveillance cameras, and conducting regular physical counts to prevent theft or pilferage.

By implementing effective accounts receivable and inventory management strategies, both the retail company and the manufacturing company can enhance their cash flow, reduce costs, and improve their overall financial performance.

## **7.4 Inventory Management and Control:**

Inventory management is the process of efficiently overseeing the purchase, storage, and usage of inventory to meet customer demand while minimizing carrying costs and stockouts. Effective inventory control ensures that a company maintains optimal inventory levels, reducing holding costs and improving overall operational efficiency.

### **7.4.1 Classification: What to Control?**

In inventory management, items are classified based on their importance and usage, which helps in determining the appropriate control measures for each category. The most common classification method is the ABC analysis, which categorizes inventory items into three groups: A, B, and C.

Items: High-value items with low demand but significant impact on sales and profits.

B items: Moderate-value items with moderate demand and impact.

C items: Low-value items with high demand but minimal impact on sales and profits.

Example: A retail store uses the ABC analysis to classify its inventory. TVs and laptops, which are high-value and low-demand products, fall into the A category. Smartphone accessories, moderate-value items with moderate demand, fall into the B category. Lastly, low-value and high-demand items like cables and screen protectors fall into the C category.

## **7.5 ABC Costing Method:**

The ABC costing method is used to allocate overhead costs to inventory items based on their consumption of resources. It allows businesses to understand the true cost of carrying each item in their inventory accurately.

Example: A manufacturing company uses the ABC costing method to calculate the cost of producing different products. The method identifies the activities involved in production, such as material handling, machine setup, and quality inspection. The cost of each activity is then allocated to the respective products based on the usage of these activities during production.



## **7.6 Economic Order Quantity (EOQ):**

EOQ is the optimal order quantity that minimizes total inventory costs by finding the right balance between ordering and holding costs.

Formula for EOQ:  $EOQ = \sqrt{(2 \times D \times S) / H}$

Where:

D = Annual demand quantity

S = Ordering cost per order

H = Holding cost per unit per year

Example: A company has an annual demand for a particular item of 2,000 units. The ordering cost per order is \$100, and the holding cost per unit per year is \$5. Using the EOQ formula:

$EOQ = \sqrt{(2 \times 2,000 \times 100) / 5} = \sqrt{(400,000)} = 632 \text{ units (approx.)}$

### **7.6.1 Order Point:**

The order point is the inventory level at which a new order should be placed to replenish stock before it runs out during the lead time (time between placing an order and receiving it).

The formula for Order Point:  $\text{Order Point} = (\text{Average daily demand} \times \text{Lead time in days}) + \text{Safety stock}$

Example: A retail store sells 20 units of a product on average each day, and the lead time to receive new inventory is five days. The store wants to maintain a safety stock of 30 units. The order point will be:

### **7.6.2 Maximum Inventory Level:**

The maximum inventory level, also known as the maximum stock level or maximum stock threshold, represents the highest quantity of inventory that a business is willing or able to hold at any given time. It serves as an upper limit to prevent overstocking, which can tie up capital and lead to increased holding costs. The maximum inventory level is typically set based on factors like storage capacity, budget constraints, and the organization's inventory policies.

### **7.6.3 Minimum Inventory Level:**

The minimum inventory level, also known as the reorder point (ROP) or safety stock level, is the lowest quantity of inventory that a business should maintain before placing a new order. It acts as a buffer to avoid stockouts and ensure that there is sufficient stock on hand to meet demand during the lead time or until the new order arrives. The minimum inventory level is determined by considering factors like lead time variability, demand variability, and the desired service level.

### **7.7 Self-Assessment Questions:**

- What are accounts receivable, and why are they important for an organization's financial health and liquidity?
- How do credit standards and policies influence the extension of credit to customers, and what factors are considered when assessing creditworthiness?
- What strategies can organizations employ to efficiently manage credit risk, including mitigating the impact of bad debt?
- How are credit terms established, and what role do they play in accounts receivable management?
- What techniques can businesses use to improve collections, reduce the average collection period, and enhance receivables turnover ratios?
- How does the concept of a bad debt reserve or allowance for doubtful accounts affect financial reporting and accounts receivable management?
- How does efficient accounts receivable management contribute to optimizing an organization's cash flow and liquidity?
- What is inventory management, and why is it essential for organizations involved in manufacturing, distribution, or retail?
- What are the different types of inventories, and how do they vary in terms of usage and management requirements?
- How do carrying costs, ordering costs, and shortage costs impact the overall cost of holding inventory?
- What is the ABC (Activity-Based Costing) method, and how does it help classify inventory items based on cost drivers and significance?
- How is the Economic Order Quantity (EOQ) calculated, and how does it assist organizations in determining the ideal order quantity for inventory items?
- What are the advantages and disadvantages of different inventory management methods, such as Economic Order Quantity (EOQ) and Just-In-Time (JIT) systems?
- How does the concept of safety stock contribute to inventory management, and what role does it play in preventing stockouts?

- How can organizations optimize their inventory levels to balance the cost of holding inventory with the risk of stockouts and lost sales?

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Unit:8

## **8 Investment in Capital Assets**

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## **Introduction**

This unit provides a comprehensive understanding of capital investments and their critical role in long-term financial decision-making. It explores the step-by-step process of capital budgeting, from project identification to post-implementation evaluation, ensuring that students grasp the entire lifecycle of investment projects. The unit teaches how to calculate and analyze after-tax incremental operating cash flows associated with capital projects, providing a solid foundation for financial analysis. Additionally, it introduces various capital budgeting techniques used for evaluating investment proposals, including Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period, and Profitability Index. Through these topics, students will gain essential skills for making informed and strategic capital investment decisions that enhance organizational growth and profitability.

## **Objectives**

- To provide a comprehensive understanding of capital investments and their significance in long-term financial decision-making.
- To explore the step-by-step process of capital budgeting, from project identification to post-implementation evaluation.
- To teach how to calculate and analyze the after-tax incremental operating cash flows associated with capital projects.
- To introduce various capital budgeting techniques used for evaluating investment proposals, such as Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period, and Profitability Index.

## **8.1 Investment in Capital Assets**

Investment in capital assets, also known as capital expenditure (CAPEX), refers to the acquisition, upgrade, or expansion of long-term assets that are essential for a business's operations and are expected to provide benefits over an extended period. These assets can include property, buildings, machinery, equipment, vehicles, technology infrastructure, and other fixed assets.

Capital assets are different from operating expenses, which are incurred to maintain the day-to-day business operations. Capital expenditures are made to enhance the company's productive capacity, improve efficiency, or support growth opportunities.

### **8.1.1 Importance of Investment in Capital Assets:**

#### **8.1.1.1 Growth and Expansion:**

Investing in capital assets allows a company to expand its production capacity, enter new markets, and pursue growth opportunities. It enables the company to meet increasing demand for its products or services.

#### **8.1.1.2 Modernization and Efficiency:**

Upgrading or replacing outdated equipment and technology can lead to improved productivity, reduced operating costs, and better efficiency, leading to higher profitability.

#### **8.1.1.3 Competitive Advantage:**

Acquiring advanced machinery or technology can provide a competitive edge, as it enables the company to offer better quality products or services and meet customer demands more effectively.

#### **8.1.1.4 Long-Term Returns:**

Capital assets generate returns over an extended period, contributing to the company's financial health and long-term sustainability.

Example:

XYZ Manufacturing Company, a textile manufacturer, is experiencing increased demand for its products due to a growing customer base. To meet this demand and improve its efficiency, XYZ decided to invest in new machinery and equipment. The new equipment will allow faster production and better-quality control.

The total cost of the new machinery and equipment is \$500,000. XYZ expects these assets to have a useful life of 10 years. The company estimates that the investment will increase its annual revenue by \$150,000 and reduce operating costs by \$50,000 per year.

Calculation of Return on Investment (ROI):

$$\text{ROI} = (\text{Net Annual Benefit} / \text{Cost of Investment}) \times 100$$

$$\text{Net Annual Benefit} = \text{Annual Revenue Increase} - \text{Annual Cost Savings}$$

$$\text{Net Annual Benefit} = \$150,000 - \$50,000 = \$100,000$$

$$\text{ROI} = (\$100,000 / \$500,000) \times 100$$

$$\text{ROI} = 20\%$$

In this example, the return on investment for the capital assets is 20%. It means that XYZ Manufacturing Company can expect to recover its initial investment in the machinery and equipment within five years ( $1 / 0.20$ ).

This investment in capital assets not only supports the company's growth plans but also improves its profitability and competitive position in the market. As a result, the investment decision is likely to be beneficial for the long-term success of the business.

## **8.2 Capital Budgeting Process**

Capital budgeting is a crucial process that involves evaluating and selecting long-term investment projects that align with a company's strategic goals and objectives. The primary goal of capital budgeting is to allocate the company's financial resources to projects that are expected to yield the highest return and create long-term value for shareholders.

The capital budgeting process typically involves the following steps:

### **8.2.1 Project Identification:**

The first step is to identify potential investment projects that align with the company's overall strategic plan. These projects could include the acquisition of new assets, expansion of existing facilities, research and development initiatives, or other long-term investments.



### **8.2.2 Project Screening:**

In this step, potential projects are evaluated based on their feasibility, potential return, and alignment with the company's objectives. Projects that do not meet certain criteria, such as a minimum required rate of return or strategic fit, may be eliminated from further consideration.

### **8.2.3 Project Evaluation:**

The evaluation phase involves conducting a thorough analysis of each remaining project. Various financial techniques and methods are used to assess the projects, including:

#### **8.2.3.1 Net Present Value (NPV):**

NPV measures the difference between the present value of cash inflows and outflows of a project. A positive NPV indicates that the project is expected to generate more cash inflows than outflows, adding value to the company.

#### **8.2.3.2 Internal Rate of Return (IRR):**

IRR is the discount rate at which the NPV of a project becomes zero. It represents the project's rate of return, and projects with higher IRRs are generally preferred.

#### **8.2.3.3 Payback Period:**

The payback period measures the time required for a project to recoup its initial investment. Shorter payback periods are usually preferred, as they indicate a faster return on investment.

#### **8.2.3.4 Profitability Index (PI):**

PI is the ratio of the present value of cash inflows to the present value of cash outflows. A PI greater than 1 indicates a profitable project.

### **8.2.4 Project Selection:**

After evaluating all potential projects, the management must decide which projects to undertake based on their financial merits and strategic importance. Projects with positive NPV, high IRR, and a good strategic fit are more likely to be selected.

### **8.2.5 Project Implementation:**

Once projects are selected, they are implemented, and the necessary resources are allocated to execute them successfully. This phase involves detailed planning, budgeting, and monitoring to ensure projects stay on track and deliver the expected outcomes.

### **8.2.6 Project Review and Control:**

After the projects are implemented, regular monitoring and evaluation are essential to assess their performance against the initial projections. If a project is not meeting expectations or facing significant challenges, corrective actions may be taken.

The capital budgeting process is crucial for effective financial planning and resource allocation. By selecting the right investment projects, companies can maximize shareholder wealth, enhance their competitive position, and achieve long-term financial sustainability. However, it is essential to remember that capital budgeting involves uncertainty, and the actual outcomes may differ from initial projections. Therefore, continuous monitoring and flexibility in decision-making are vital throughout the process.

## **8.3 Estimating Project “After-Tax Incremental Operating Cash Flows”**

Estimating the project "after-tax incremental operating cash flows" is a critical step in capital budgeting. It involves evaluating the cash flows generated by a specific investment project after considering taxes and identifying the incremental cash flows resulting from the project compared to the status quo (i.e., without the project).

Step-by-step method for estimating after-tax incremental operating cash flows:

### **8.3.1 Step 1: Identify Relevant Cash Flows**

Identify the relevant cash flows associated with the investment project. These cash flows include both operating cash inflows (e.g., revenue, cost savings) and operating cash outflows (e.g., operating expenses, taxes).

### **8.3.2 Step 2: Determine Incremental Cash Flows**

Determine the incremental cash flows resulting from the project. Incremental cash flows are the changes in cash flows that occur due to the investment project. To calculate incremental cash flows, subtract the cash flows without the project (status quo) from the cash flows with the project.

### **8.3.3 Step 3: Consider Tax Effects**

Calculate the tax effects on cash flows. Take into account the applicable tax rate and any tax deductions or credits related to the project. Taxes can significantly impact the after-tax cash flows, so it's essential to accurately assess the tax implications.

### **8.3.4 Step 4: Calculate After-Tax Incremental Operating Cash Flows**

Add back any non-cash expenses (e.g., depreciation) that were deducted for tax purposes. This is done because depreciation is a non-cash expense and does not directly affect cash flows. Subtract any incremental taxes paid on cash inflows and add back any tax savings on cash outflows. The resulting figure will be the after-tax incremental operating cash flow for each period.

### **8.3.5 Cash (not accounting income) flows:**

Cash flows refer to the actual cash generated or spent by the project, rather than accounting income. Accounting income includes non-cash items like depreciation, which do not directly impact cash flows. In capital budgeting, we focus on cash flows because they represent the actual cash available to the company.

Example:

Suppose a company has \$100,000 in sales revenue, \$70,000 in cash expenses (excluding depreciation), and \$20,000 in depreciation expenses. The accounting income would be  $\$100,000 - \$70,000 - \$20,000 = \$10,000$ . However, the actual cash flow is  $\$100,000 - \$70,000 = \$30,000$ .

Justification:

Cash flows are crucial because they represent the liquidity and financial health of the project, enabling better decision-making.

Operating (not financing) flows:

Operating cash flows pertain to the cash generated or used in the core operations of the project. They exclude financing activities like issuing or repurchasing stocks and bonds, as these are not directly related to the project's profitability.

Example:

Suppose a company receives \$10,000 from issuing new shares to investors. This amount is not an operating cash flow; it is a financing inflow and should not be considered in project evaluation.

Justification:

By focusing on operating cash flows, we assess the performance of the project's core business operations, providing a clearer picture of its profitability.

After-tax flows:

After-tax flows consider the effect of taxes on cash flows. Taxes can significantly impact the net cash flow available for the company, and ignoring taxes would lead to inaccurate evaluations.

Example:

Let's say a project generates \$50,000 in profit before taxes, and the tax rate is 30%. The after-tax cash flow is calculated as  $\$50,000 - (\$50,000 * 0.30) = \$35,000$ .

Justification:

By incorporating taxes, we get a more accurate representation of the actual cash available to the company for reinvestment or distribution to shareholders.

Incremental flows:

Incremental cash flows represent the changes in cash flows resulting from the project compared to the status quo (without the project). We need to focus on incremental cash flows to understand the project's impact and whether it adds value to the company.

Example:

Suppose a company is considering expanding its product line. The incremental cash flow will be the additional cash generated by the new product compared to the existing products.

Justification:

Incremental cash flows help isolate the project's impact and enable better decision-making by considering only the relevant cash flow changes.

Overall Justification:

By adhering to these characteristics and principles, we ensure that the cash flow analysis is based on actual cash inflows and outflows, relevant to the project's core operations, and appropriately accounts for taxes and project-specific impacts. This approach enables better project evaluation and helps companies make informed investment decisions.

## **8.4 Capital Budgeting Techniques**

Capital budgeting techniques are used to evaluate and select potential investment projects that require long-term capital expenditure. Some common capital budgeting techniques include Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period, and Profitability Index (PI). Let's explain each technique with an example and calculation:

Example: ABC Company is considering investing in a new manufacturing plant. The initial investment for the project is \$500,000. The plant is expected to generate cash flows of \$150,000 per year for the next five years. The company's required rate of return for similar projects is 10%.

### **8.4.1 Net Present Value (NPV):**

NPV is the present value of all future cash inflows minus the initial investment. A positive NPV indicates that the project is expected to generate returns higher than the required rate of return and is thus considered favorable.

Calculation:

$$\text{NPV} = \text{PV of Cash Flows} - \text{Initial Investment}$$

$$\text{PV of Cash Flows} = \text{CF}_1 / (1+r)^1 + \text{CF}_2 / (1+r)^2 + \dots + \text{CF}_5 / (1+r)^5$$

where CF is the cash flow for each year and r is the required rate of return.

For our example:

$$\text{NPV} = (\$150,000 / (1+0.10)^1) + (\$150,000 / (1+0.10)^2) + \dots + (\$150,000 / (1+0.10)^5) - \$500,000$$

### **8.4.2 Internal Rate of Return (IRR):**

IRR is the discount rate that equates the present value of cash inflows to the initial investment. It represents the rate of return at which the project's NPV becomes zero.

Calculation:

$$0 = CF1 / (1+IRR)^1 + CF2 / (1+IRR)^2 + \dots + CF5 / (1+IRR)^5 - \text{Initial Investment}$$

For our example:

Using trial and error or financial calculators, the IRR is found to be approximately 15.9%.

### **8.4.3 Payback Period:**

The payback Period is the time it takes for the project to recoup the initial investment. It measures the time it takes for the cumulative cash flows to equal or exceed the initial investment.

Calculation:

$$\text{Payback Period} = \text{Initial Investment} / \text{Average Annual Cash Flow}$$

For our example:

$$\text{Payback Period} = \$500,000 / \$150,000 = 3.33 \text{ years}$$

### **8.4.4 Profitability Index (PI):**

PI is the ratio of the present value of cash inflows to the initial investment. It helps assess the value created per dollar of investment.

Calculation:

$$PI = \text{PV of Cash Flows} / \text{Initial Investment}$$

Given:

$$\text{Initial Investment (I)} = \$500,000$$

$$\text{Cash Flows (CF)} = \$150,000 \text{ per year for the next five years}$$

$$\text{Required Rate of Return (r)} = 10\%$$

Step 1: Calculate the present value of cash flows (PV of CFs).

$$\text{PV of CFs} = CF1 / (1+r)^1 + CF2 / (1+r)^2 + \dots + CF5 / (1+r)^5$$

Where:

CF1 = Cash flow in Year 1

CF2 = Cash flow in Year 2

...

CF5 = Cash flow in Year 5

Using the formula, we get:

$$\text{PV of CFs} = \$150,000 / (1+0.10)^1 + \$150,000 / (1+0.10)^2 + \$150,000 / (1+0.10)^3 + \$150,000 / (1+0.10)^4 + \$150,000 / (1+0.10)^5$$

$$\text{PV of CFs} = \$150,000 / 1.1 + \$150,000 / 1.21 + \$150,000 / 1.331 + \$150,000 / 1.4641 + \$150,000 / 1.61051$$

$$\text{PV of CFs} \approx \$136,363.64 + \$123,966.94 + \$112,360.33 + \$101,509.39 + \$91,372.17$$

$$\text{PV of CFs} \approx \$565,572.47$$

Step 2: Calculate the Profitability Index (PI).

$$\text{PI} = \text{PV of CFs} / \text{Initial Investment}$$

$$\text{PI} = \$565,572.47 / \$500,000$$

$$\text{PI} \approx 1.13$$

The Profitability Index for the project is approximately 1.13. A PI greater than 1 indicates that the present value of cash inflows is higher than the initial investment, which means the project is expected to generate positive returns and is considered financially viable. In this case, the PI value of 1.13 indicates that for every dollar invested, the company expects to receive \$1.13 in present-value cash flows over the project's life.

These capital budgeting techniques help in evaluating the investment's viability and its potential impact on the company's financial performance. By comparing the results from various techniques,

the company can make informed decisions about which projects to undertake and prioritize their investments effectively.

## **8.5 Self-Assessment Questions**

- What are capital investments, and why are they critical for organizations in various industries?
- What is the capital budgeting process, and what are the key stages involved in evaluating potential capital projects?
- How do organizations identify and screen potential capital projects to determine their feasibility and alignment with strategic objectives?
- What is the importance of estimating after-tax incremental operating cash flows when evaluating capital investments?
- What factors and financial components are considered when estimating project cash flows, and how are they adjusted for taxes and other relevant factors?
- What are the key principles and assumptions underlying capital budgeting techniques such as Net Present Value (NPV) and Internal Rate of Return (IRR)?
- How is the Net Present Value (NPV) calculated, and how does it help organizations assess the profitability of capital projects?
- What is the significance of the Internal Rate of Return (IRR) in capital budgeting, and how is it used to make investment decisions?
- How does the Payback Period method help organizations determine how long it will take to recover their initial investment in a capital project?
- What is the Profitability Index (PI), and how does it assist organizations in ranking and prioritizing capital investment opportunities?

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Unit:9

## **9 Cost of Capital**

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## **Introduction**

This unit provides a comprehensive understanding of the concept of the cost of capital and its crucial role in financial decision-making. It explores the various components that make up the cost of capital, including the cost of debt, the cost of equity, and the weighted average cost of capital (WACC). Students will learn how to calculate the WACC using the cost of debt and cost of equity and understand its importance in discounting future cash flows for investment evaluation. The unit examines the factors influencing the cost of debt, such as interest rates, creditworthiness, and the company's financial health, as well as the factors affecting the cost of equity, including dividend yield, growth rate, and market risk. Through these topics, students will gain essential skills for determining the cost of capital and making informed financial decisions to optimize an organization's capital structure and investment strategy.

### **Objectives:**

- To provide a comprehensive understanding of the concept of cost of capital and its importance in financial decision-making.
- To explore the various components of the cost of capital, including the cost of debt, the cost of equity, and the weighted average cost of capital (WACC).
- To teach how to calculate the Weighted Average Cost of Capital (WACC) using the cost of debt and cost of equity, and understand its role in discounting future cash flows.
- To examine the factors influencing the cost of debt, including interest rates, creditworthiness, and the company's financial health.
- To analyze the factors affecting the cost of equity, including dividend yield, growth rate, and market risk.

## 9.1 Cost of Capital

The cost of capital is a critical concept in finance that represents the expected return rate required by investors or creditors to provide funds to a company. It is the cost a company must bear to finance its operations through a combination of debt and equity. The cost of capital is essential in evaluating investment projects, determining the appropriate capital structure, and making financial decisions that maximize shareholder value.

The cost of capital is composed of two main components:

### 9.1.1.1 Cost of Debt (kd):

The cost of debt is the interest rate a company pays on its borrowed funds. It is relatively straightforward to calculate as it is based on the interest rate charged by lenders for the debt issued by the company. The cost of debt is pre-tax, meaning the interest payments are tax-deductible, which reduces the effective cost.

Formula for Cost of Debt:

$$\text{Cost of Debt (kd)} = \text{Interest Rate on Debt} \times (1 - \text{Tax Rate})$$

For example, if a company issues debt with an annual interest rate of 5% and the corporate tax rate is 30%, the after-tax cost of debt would be:

$$kd = 0.05 \times (1 - 0.30) = 0.035 \text{ or } 3.5\%$$

### 9.1.1.2 Cost of Equity (ke):

The cost of equity represents the return rate expected by shareholders to invest in the company's stock. Unlike debt, equity does not have a fixed interest rate. The cost of equity is a bit more complex to determine as it involves assessing the required rate of return demanded by equity investors, which is influenced by factors like the risk-free rate, market risk premium, and the company's beta (a measure of its stock's volatility compared to the overall market).

The formula for Cost of Equity (using the Capital Asset Pricing Model - CAPM):

$$\text{Cost of Equity (ke)} = \text{Risk-Free Rate} + (\text{Beta} \times \text{Market Risk Premium})$$

For example, if the risk-free rate is 2%, the market risk premium is 6%, and the company's beta is 1.2, the cost of equity would be:

$$k_e = 0.02 + (1.2 \times 0.06) = 0.086 \text{ or } 8.6\%$$

## **9.2 Weighted Average Cost of Capital (WACC):**

The weighted average cost of capital is the overall cost of all sources of funding used by the company. It is calculated as the weighted average of the cost of debt and the cost of equity, where the weights are based on the proportion of debt and equity in the company's capital structure.

Formula for Weighted Average Cost of Capital (WACC):

$$\text{WACC} = (\text{Weight of Debt} \times \text{Cost of Debt}) + (\text{Weight of Equity} \times \text{Cost of Equity})$$

For example, if a company has a capital structure of 40% debt and 60% equity, and the cost of debt is 3.5% and the cost of equity is 8.6%, the WACC would be:

$$\text{WACC} = (0.40 \times 0.035) + (0.60 \times 0.086) = 0.0315 \text{ or } 3.15\%$$

The WACC is a crucial benchmark for evaluating investment projects. If a project's expected return rate is higher than the WACC, it is considered a good investment opportunity, as it would add value to the company and benefit shareholders. Conversely, if the project's expected return is lower than the WACC, it may not be a viable investment, as it would not generate sufficient returns to cover the cost of capital and create value for the shareholders.

The required rate of return for a specific investment project can be determined based on its unique risk characteristics. Additionally, a company may also have a group-specific required rate of return that reflects the overall risk profile of the company's projects and investments. Let's understand these concepts in detail:

### **9.2.1 Project-Specific Required Rate of Return:**

The project-specific required rate of return is the rate of return that an investment project must achieve to compensate investors for the level of risk associated with that particular project. It is calculated using the CAPM formula, which considers the risk-free rate, the project's beta (a measure of the project's systematic risk), and the market risk premium.

CAPM Formula for Project-Specific Required Rate of Return:

$$\text{Required Rate of Return} = \text{Risk-Free Rate} + (\text{Project Beta} \times \text{Market Risk Premium})$$

For example, if the risk-free rate is 2%, the market risk premium is 6%, and the project's beta is 1.5, the required rate of return for the project would be:

$$\text{Required Rate of Return} = 0.02 + (1.5 \times 0.06) = 0.11 \text{ or } 11\%$$

The project-specific required rate of return helps evaluate whether the project is capable of generating returns that compensate for its risk level. If the expected return of the project is higher than the required rate of return, it is considered a good investment opportunity.

### **9.2.2 Group-Specific Required Rate of Return:**

The group-specific required rate of return is an overall rate of return that reflects the risk profile of all the projects and investments undertaken by a company. It considers the weighted average of the required rates of return of individual projects, where the weights are based on the proportion of capital invested in each project.

The formula for Group-Specific Required Rate of Return (WACC):

$$\text{WACC} = (\text{Weight of Equity} \times \text{Required Rate of Return for Equity}) + (\text{Weight of Debt} \times \text{Required Rate of Return for Debt})$$

The WACC incorporates the risk associated with both equity and debt financing, and it serves as a benchmark for evaluating new investment opportunities. Projects with expected returns higher than the WACC are considered value-adding, while projects with expected returns lower than the WACC may not be worthwhile.

It is important to note that the project-specific required rate of return and the group-specific WACC are not always the same. Each investment project may have different risk characteristics, and therefore, the required rate of return will vary. The group-specific WACC considers the overall risk and financing mix of the company's projects and is used to assess the overall cost of capital and to make financial decisions that maximize shareholder value.

### **9.3 Dividend Discount Model (DDM)**

The Gordon Growth Model, also known as the Dividend Discount Model (DDM), is primarily used to calculate the cost of equity. To calculate WACC using the Gordon Growth Model, follow these steps:

#### **9.3.1 Calculate the Cost of Equity (Re) using the Gordon Growth Model:**

The Gordon Growth Model formula is as follows:

$$Re = (D1/P0) + g$$

Where:

Re = Cost of Equity

D1 = Expected Dividend Per Share for the next year

P0 = Current Stock Price

g = Growth Rate of Dividends

You can rearrange this formula to calculate.

D1:

$$D1 = Re * P0 - (Re * g)$$

**WACC = (Weight of Equity × Required Rate of Return for Equity) + (Weight of Debt × Required Rate of Return for Debt)**

### **9.4 Operating Leverage, Financial Leverage, and Total Leverage**

Operating Leverage, Financial Leverage, and Total Leverage are three important measures that help us understand the impact of fixed costs, debt financing, and the combined effect of both on a company's profitability and risk. Let's explain each concept with examples and calculations:

#### **9.4.1 Operating Leverage:**

Operating leverage measures the sensitivity of a company's operating income (earnings before interest and taxes, EBIT) to changes in its sales revenue. It shows how fixed costs affect a

company's profitability. Higher operating leverage means a higher proportion of fixed costs, and small changes in sales can result in significant changes in operating income.

The formula for Operating Leverage:

$$\text{Operating Leverage} = \text{Contribution Margin} / \text{Operating Income}$$

**Contribution Margin is the difference between total revenue and variable costs.**

Example:

Company XYZ has total revenue of \$1,000,000 and variable costs of \$600,000. Its fixed costs are \$200,000, and its operating income (EBIT) is \$200,000.

$$\text{Contribution Margin} = \text{Total Revenue} - \text{Variable Costs}$$

$$\text{Contribution Margin} = \$1,000,000 - \$600,000 = \$400,000$$

$$\text{Operating Leverage} = \text{Contribution Margin} / \text{Operating Income}$$

$$\text{Operating Leverage} = \$400,000 / \$200,000 = 2$$

In this example, the company's operating leverage is 2. It means that for every 1% increase in sales revenue, the company's operating income will increase by 2%. Similarly, for every 1% decrease in sales revenue, the operating income will decrease by 2%. High operating leverage can amplify both gains and losses, making the company more sensitive to changes in sales.

### **9.4.2 Financial Leverage:**

Financial leverage measures the impact of debt financing on a company's return on equity (ROE) and earnings per share (EPS). It shows how the use of debt can magnify the returns to shareholders when the company's operating income is higher than the interest cost, but it can also amplify losses when the operating income is lower than the interest cost.

The formula for Financial Leverage:

$$\text{Financial Leverage} = \text{Total Assets} / \text{Total Equity}$$

Example:



Company ABC has total assets of \$1,000,000 and total equity (common stock + retained earnings) of \$400,000.

Financial Leverage = Total Assets / Total Equity

Financial Leverage = \$1,000,000 / \$400,000 = 2.5

In this example, the company's financial leverage is 2.5. It means that the company has \$2.5 of total assets for every \$1 of equity. High financial leverage indicates that the company relies more on debt financing, which can lead to higher returns for shareholders when things go well, but it can also increase the risk of financial distress if the company's operating income declines.

refers to the use of debt to acquire additional assets. The degree of financial leverage indicates the extent to which a firm uses fixed-income securities, such as debt and preferred equity. Financial leverage can amplify both returns and risks; while it can increase the potential return on equity, it can also magnify potential losses.

Degree of Financial Leverage (DFL) can be calculated using the following formula:

$$DFL = \frac{EBIT}{EBIT - \text{Interest Expense}}$$

Where:

EBIT: Earnings Before Interest and Taxes.

Interest Expense: The cost of debt.

Let's consider a company, ABC Corp., with the following financial information:

EBIT (Earnings Before Interest and Taxes): \$500,000

Interest Expense: \$100,000

We can use the formula to calculate the Degree of Financial Leverage (DFL).

$$DFL = \frac{500,000}{500,000 - 100,000}$$

DFL=1.25

In this example, the Degree of Financial Leverage is 1.25. This means that for every 1% change in EBIT, the firm's Earnings Before Tax (EBT) will change by 1.25%. If the firm's EBIT increases by 10%, the EBT will increase by 12.5% ( $1.25 \times 10\%$ ). Conversely, if the EBIT decreases by 10%, the EBT will decrease by 12.5%.

This illustrates how financial leverage can amplify the impact of changes in operating income on the firm's earnings. Higher leverage means higher potential returns in good times but also higher risk in bad times, as the company must still service its debt obligations regardless of its operational performance.

### **9.4.3 Total Leverage:**

Total Leverage combines both operating leverage and financial leverage to show the overall impact on a company's earnings per share (EPS) due to changes in sales.

The formula for Total Leverage:

$$\text{Total Leverage} = \text{Operating Leverage} \times \text{Financial Leverage}$$

Example:

Using the operating leverage and financial leverage from the above examples:

$$\text{Operating Leverage} = 2$$

$$\text{Financial Leverage} = 2.5$$

$$\text{Total Leverage} = 2 \times 2.5 = 5$$

In this example, the company's total leverage is 5. It means that for every 1% increase in sales revenue, the company's EPS will increase by 5%. Similarly, for every 1% decrease in sales revenue, the EPS will decrease by 5%. Total leverage shows how both operating and financial factors together influence the company's profitability and risk.

Understanding these leverage measures helps management make informed decisions about their capital structure, financial strategies, and risk management. It also provides insights into how changes in sales and financing choices can impact a company's earnings and overall performance.

## 9.5 Cash-Flow Ability to Service Debt

Cash-flow ability to service debt refers to a company's capacity to generate sufficient cash flow from its operations to meet its debt obligations, including interest and principal payments when they become due. It is a crucial measure of a company's financial health and creditworthiness, as it shows how well the company can manage its debt burden without facing financial distress.

To assess a company's cash-flow ability to service debt, financial analysts and creditors often use various financial ratios that provide insights into the company's cash flow and its ability to cover debt-related expenses.

### 9.5.1 Interest Coverage Ratio:

Interest Coverage Ratio measures a company's ability to cover its interest expenses with its operating income. It shows how many times the operating income can cover the interest expense.

**Interest Coverage Ratio = EBIT / Interest Expenses**

Example:

Company XYZ has EBIT (Earnings Before Interest and Taxes) of \$500,000, and its annual interest expenses are \$100,000.

$$\text{Interest Coverage Ratio} = \$500,000 / \$100,000 = 5$$

In this example, the interest coverage ratio is 5. It means that the company's operating income is five times higher than its interest expenses. A higher interest coverage ratio indicates a strong ability to service debt.

### 9.5.2 Debt Service Coverage Ratio (DSCR):

Debt Service Coverage Ratio is a more comprehensive measure that assesses a company's ability to meet all of its debt obligations, including both interest and principal payments.

**DSCR = (EBITDA + Lease Payments + Other Non-Cash Expenses) / (Principal Payments + Interest Payments + Lease Payments)**

Example:

Company ABC has EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization) of \$800,000, principal payments of \$200,000, interest payments of \$50,000, and lease payments of \$30,000.

$$\text{DSCR} = (\$800,000 + \$30,000) / (\$200,000 + \$50,000 + \$30,000) = \$830,000 / \$280,000 = 2.96$$

In this example, the debt service coverage ratio is 2.96. It means that the company's operating income and non-cash expenses are 2.96 times higher than its debt-related payments. A DSCR above 1 indicates that the company generates enough cash flow to meet its debt obligations.

### **9.5.3 Free Cash Flow (FCF):**

Free Cash Flow represents the cash flow available to the company after all capital expenditures, operating expenses, and taxes. It is a crucial metric for assessing a company's ability to generate surplus cash flow that can be used to pay down debt or invest in growth opportunities.

$$\text{FCF} = \text{Operating Cash Flow} - \text{Capital Expenditures}$$

Example:

Company LMN has an operating cash flow of \$1,000,000 and capital expenditures of \$300,000.

$$\text{FCF} = \$1,000,000 - \$300,000 = \$700,000$$

In this example, the company has a free cash flow of \$700,000, which can be used to service debt or fund other projects.

Analyzing a company's cash-flow ability to service debt is essential for creditors, investors, and management to make informed decisions about its financial health and sustainability. Strong cash-flow generation allows a company to maintain financial flexibility, access credit at favorable terms, and pursue growth opportunities. On the other hand, a weak cash-flow position may indicate financial difficulties and higher credit risk.

## **9.6 Dividend policy**

Dividend policy refers to the decision-making process of a company regarding the distribution of its earnings to shareholders in the form of dividends. A company can adopt either an active or passive dividend policy, each with its implications for shareholders.

### **9.6.1 Active Dividend Policy:**

An active dividend policy is characterized by a deliberate and consistent approach to paying dividends. Companies with an active dividend policy aim to provide regular and predictable dividend payments to shareholders. They typically set a target dividend payout ratio or a fixed dividend amount per share, which they intend to maintain or increase over time.

Example:

Company XYZ has a policy of paying out 50% of its annual earnings as dividends to its shareholders. If the company reports earnings of \$1 million for the year, it will distribute \$500,000 (50% of \$1 million) as dividends to its shareholders.

**Advantages:**

- Provides shareholders with a steady income stream and a sense of stability.
- Attracts income-oriented investors who seek reliable dividend payments.
- Demonstrates confidence in the company's financial strength and prospects.

### **9.6.2 Passive Dividend Policy:**

A passive dividend policy, also known as a residual dividend policy, takes a different approach. Companies with a passive dividend policy prioritize funding their growth opportunities and capital projects first. They distribute dividends only with the remaining earnings after meeting their investment needs. As a result, dividend payments may fluctuate from one period to another based on the company's investment requirements.

Example:

Company ABC follows a passive dividend policy. In a year when the company has significant investment opportunities and capital expenditures, it may decide to retain a larger portion of its earnings to finance these projects. As a result, the dividend payout ratio for that year may be lower

than usual. Conversely, in a year with fewer investment needs, the company may distribute a higher dividend payout ratio to its shareholders.

**Advantages:**

- Allows the company to reinvest in growth opportunities, which can lead to higher future earnings and share value.
- Provides the company with financial flexibility to navigate economic downturns or unexpected expenses.
- Appeals to investors who prioritize capital appreciation over regular dividend income.

### **9.6.3 Comparison:**

The main difference between active and passive dividend policies lies in their approach to dividend distribution. Active dividend policies prioritize consistent and predictable dividend payments to shareholders, while passive dividend policies prioritize funding growth and investments before distributing dividends.

Both approaches have their merits, and the choice of dividend policy depends on various factors, such as the company's growth prospects, capital requirements, and the preferences of its shareholders.

It's important to note that the dividend policy adopted by a company can influence investor perceptions and the company's stock valuation. Investors often consider the dividend history and policy when making investment decisions, as it reflects management's view on the company's financial health and prospects.

### **9.6.4 Factors Affecting the Dividend Policy**

The dividend policies of a company are influenced by various internal and external factors. These factors play a crucial role in determining the amount and frequency of dividend payments. Some of the key factors influencing dividend policies are as follows:

**Profitability:** The most fundamental factor affecting dividend decisions is the company's profitability. Companies with consistent and sufficient earnings are more likely to pay dividends

regularly. A profitable company can generate enough cash to meet its operational needs while still having surplus funds for dividend distribution.

**Cash Flow:** Dividend payments require sufficient cash flow to be available in the company. Even if a company is profitable, it may not be able to pay dividends if its cash flow is tied up in working capital or long-term investments. Positive and stable cash flow is essential to support dividend payments.

**Capital Expenditure Requirements:** Companies with significant capital expenditure needs may retain a larger portion of their earnings to finance expansion and growth opportunities. Higher capital requirements may result in lower dividend payouts.

**Debt Obligations:** Companies with high debt levels may prioritize using their cash flow to service debt obligations before distributing dividends. Reducing debt and maintaining financial stability are often considered more important than paying dividends.

**Business Cycle:** Companies operating in cyclical industries may adjust their dividend policies accordingly. During economic downturns, when earnings may be lower, companies may reduce or omit dividend payments. Conversely, during periods of strong growth, companies may increase dividends.

**Legal and Regulatory Constraints:** Companies must comply with legal and regulatory requirements regarding dividend payments. For example, some countries have laws specifying the maximum dividend payout ratio or requiring companies to have sufficient retained earnings before paying dividends.

**Tax Considerations:** Tax laws can influence dividend policies. In some jurisdictions, dividend income may be subject to higher tax rates for investors, which can impact the attractiveness of dividend-paying stocks.

**Shareholder Expectations:** Companies often consider the preferences and expectations of their shareholders when determining dividend policies. If shareholders expect regular dividends, the company may strive to meet those expectations.

**Access to Capital Markets:** Companies with easy access to capital markets and low borrowing costs may be more inclined to pay dividends, as they can raise additional funds through debt or equity issuance if needed.

**Industry Norms:** Dividend policies can also be influenced by industry norms and practices. Companies may adjust their dividend policies to align with those of their peers to avoid potential market reactions or investor perceptions.

Companies need to strike a balance between distributing dividends to reward shareholders and retaining earnings to support future growth and financial stability. The decision on dividend policies involves careful evaluation of these factors and consideration of the long-term interests of the company and its shareholders.

## **9.7 Stock Dividend and Stock Splits**

### **9.7.1 Stock Dividend:**

A stock dividend is the distribution of additional shares of a company's stock to its existing shareholders, proportional to their current holdings. Unlike cash dividends, where shareholders receive cash payments, stock dividends increase the number of outstanding shares held by each shareholder. The total value of the shareholders' ownership remains the same, but their shareholding percentage changes. Companies typically issue stock dividends when they want to reward shareholders without using cash or when they want to conserve cash for other purposes.

Example:

Let's assume Company XYZ declares a 10% stock dividend. If a shareholder owns 100 shares of Company XYZ, they will receive an additional 10 shares (10% of 100) as a stock dividend. After the stock dividend, the shareholders will have a total of 110 shares, but the value of their ownership in the company will remain the same.

#### **9.7.1.1 Stock Splits:**

A stock split is a corporate action in which a company increases the number of outstanding shares by dividing its existing shares into multiple shares. The split does not affect the total market value of the company's shares. Instead, the split adjusts the stock price and the number of shares



outstanding, while the overall market capitalization remains unchanged. Stock splits are usually implemented to make the stock price more affordable to investors and to increase liquidity in the stock.

Example:

Let's say Company ABC has 1,000,000 shares outstanding, and its stock price is \$100 per share. The company decided to do a 2-for-1 stock split. After the split, each shareholder will receive an additional share for each share they already own. So, if an investor had 100 shares before the split, they would now have 200 shares (100 shares + 100 additional shares). The stock price will be adjusted to half its previous value, making it \$50 per share. The total market capitalization of the company remains the same.

Both stock dividends and stock splits are ways for companies to manage their capital structure and make their shares more attractive to investors. These actions do not change the underlying fundamentals of the company but can have an impact on the stock's trading liquidity and market perception.

## **9.8 Self-Assessment Questions**

- What is the cost of capital, and why is it a critical concept for businesses when making investment and financing decisions?
- How is the cost of debt determined, and what factors can influence the interest rates a company pays on its debt?
- What is the cost of equity, and what are the key components of the cost of equity, including dividend yield, growth rate, and market risk?
- Why is the Weighted Average Cost of Capital (WACC) used in financial valuation, and how is it calculated using the weights of debt and equity?
- How does the WACC concept assist organizations in evaluating the attractiveness of potential investment projects?
- What is the relationship between operating leverage, financial leverage, and total leverage, and how do these concepts impact a company's cost of capital?
- How does a company's cash-flow ability to service debt affect its cost of capital and creditworthiness?
- What are the various dividend policies that companies can adopt, and how do these policies influence the cost of equity and overall cost of capital?

- What are stock dividends and stock splits, and how do these corporate actions impact a company's capital structure and cost of capital?
- How does a company's choice of financing sources, such as debt or equity, affect its overall cost of capital and financial risk?

## 9.9 References

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