

Intro to Finance

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Unit 1 – Financial Management Basics

1.1 Role and Goals of Financial Management

Financial management is crucial for maximizing shareholder wealth and ensuring a company's long-term success. It involves making decisions that increase stock value, attract investors, and support growth. Financial managers play a key role in capital budgeting, working capital management, and risk assessment.

Short-term financial management focuses on liquidity and working capital, while long-term management involves capital budgeting and strategic planning. The goal is to balance risk and return, aligning managerial decisions with shareholder interests to create sustainable value and maintain a competitive edge.

The Role and Goals of Financial Management

Goal of financial management

- Maximize shareholder wealth determined by the market value of the firm's common stock
- Involves making decisions that increase the value of the firm's shares (stock price appreciation, dividends)
- Aligns the interests of managers and shareholders ensures efficient allocation of resources
- Attracts investors and facilitates raising capital (IPOs, bond issuances)
- Contributes to the long-term sustainability and growth of the firm supports competitive advantage

Responsibilities of financial managers

- Capital budgeting
- Evaluating and selecting long-term investment projects (new factories, R&D)
- Assessing the profitability and risk of potential investments using financial metrics (NPV, IRR)
- Determining the optimal mix of debt and equity financing for projects balancing cost and risk
- Working capital management
- Managing short-term assets and liabilities (cash, inventory, accounts receivable/payable)
- Ensuring sufficient liquidity to meet short-term obligations avoiding financial distress
- Optimizing the firm's cash conversion cycle minimizing working capital needs
- Financial planning and forecasting
- Developing long-term financial plans and budgets guiding strategic decision-making
- Projecting future cash flows, profitability, and financial position under different scenarios
- Identifying potential financial challenges and opportunities proactively addressing them
- Risk management

- Identifying and assessing financial risks (market risk, credit risk, liquidity risk)
- Implementing strategies to mitigate or hedge against risks (derivatives, insurance)
- Monitoring and adjusting risk management strategies as needed adapting to changing conditions

Shareholder wealth maximization

- Focuses on increasing the market value of the firm's common stock reflecting intrinsic value
- Market value is determined by the present value of expected future cash flows to shareholders
- Financial decisions should aim to increase the present value of these cash flows (positive NPV projects)
- Implications for financial decision-making
- Evaluating investment opportunities based on their potential to generate positive net present value (NPV)
- Considering the trade-off between risk and return when making financial decisions balancing potential rewards and downside
- Balancing short-term and long-term objectives to ensure sustainable value creation avoiding myopic decisions
- Aligning managerial incentives with shareholder interests through compensation (stock options) and governance structures (board oversight)

Short-term vs long-term financial management

- Short-term financial management
- Focuses on managing current assets and liabilities over a period of up to one year
- Ensures the firm has sufficient liquidity to meet its short-term obligations avoiding default
- Involves decisions related to working capital management, such as inventory control and accounts receivable management (credit policies)
- Aims to minimize the cost of short-term financing (commercial paper, lines of credit) while maintaining adequate liquidity
- Long-term financial management
- Focuses on making decisions that affect the firm's long-term financial health and value creation over multiple years
- Involves capital budgeting decisions, such as evaluating and selecting long-term investment projects (capital expenditures)
- Determines the optimal capital structure, balancing the use of debt (bonds, loans) and equity financing (common stock, retained earnings)
- Develops long-term financial plans and strategies to support the firm's growth and competitive advantage (mergers and acquisitions, international expansion)

1.2 Forms of Business Organization

Businesses come in various forms, each with unique characteristics. Sole proprietorships offer simplicity and control, partnerships allow for shared expertise, and corporations provide limited liability and easier capital raising. These structures impact how businesses operate, manage finances, and handle risks.

Understanding the pros and cons of each business form is crucial for entrepreneurs and investors. Sole proprietorships and partnerships offer flexibility but expose owners to personal liability. Corporations provide liability protection and longevity but face more complex regulations and potential conflicts between shareholders and management.

Forms of Business Organization

Forms of business organization

- Sole proprietorships
 - Business owned and operated by a single individual
 - No legal distinction exists between the owner and the business (owner assumes all risks and liabilities)
- Partnerships
 - Business owned and operated by two or more individuals who share management responsibilities and profits
 - General partnerships: all partners share equal management responsibilities and have unlimited liability for business debts and obligations
 - Limited partnerships: some partners have limited liability and restricted management roles (limited partners), while others maintain full liability and control (general partners)
- Corporations
 - Separate legal entities distinct from their owners (shareholders)
 - Owned by shareholders who purchase stock in the company, representing ownership interest
 - Managed by a board of directors elected by shareholders and officers appointed by the board to handle day-to-day operations

Advantages vs disadvantages of business structures

- Sole proprietorships
 - Advantages
 - Easy and inexpensive to form (minimal legal formalities and costs)
 - Owner maintains complete control over all business decisions
 - Owner receives all profits generated by the business
 - Disadvantages
 - Unlimited personal liability for business debts and legal obligations (personal assets at risk)
 - Difficulty raising significant capital due to limited resources of a single owner

- Limited life span (business ends with the owner's death, incapacitation, or decision to close)
- Partnerships
- Advantages
 - Easy to form with minimal legal formalities
 - Shared management responsibilities and expertise among partners
 - Potential for increased capital investment from multiple partners' contributions
- Disadvantages
 - Unlimited personal liability for general partners (personal assets at risk)
 - Potential for conflicts and disagreements among partners regarding management and decision-making
 - Complex decision-making process due to the need for partner consensus
- Corporations
- Advantages
 - Limited liability protection for shareholders (personal assets shielded from business liabilities)
 - Easier to raise substantial capital through the sale of stock to investors
 - Perpetual existence (can outlive its founders and continue operations indefinitely)
- Disadvantages
 - More expensive and complex to form and maintain (legal and regulatory requirements)
 - Double taxation of corporate income (taxed at corporate level and again on shareholder dividends)
 - Potential for conflicts between shareholders and management regarding strategic direction and decision-making

Limited liability in business

- Limited liability
- Legal protection that shields owners' personal assets from business debts and legal obligations
- Owners' financial risk is limited to the amount they have invested in the business
- Significance for business owners and investors
 - Encourages investment by reducing personal financial risk (investors more likely to provide capital)
 - Allows for the separation of personal and business finances (personal assets not at risk)
 - Enables businesses to raise capital more easily by offering ownership shares to a larger pool of investors

Business structures and financial management

- Sole proprietorships
 - Owner has complete control over all financial decisions (budgeting, investments, pricing)

- Simplified financial management due to lack of separation between personal and business finances
- Partnerships
- Financial decisions require agreement and consensus among partners
- Profits and losses are shared among partners based on their ownership percentages or partnership agreement terms
- Corporations
- Board of directors and officers make financial decisions on behalf of shareholders (budgeting, investments, dividends)
- Shareholders' influence on financial decisions is limited to electing board members and voting on major corporate actions (mergers, acquisitions)
- Strict financial reporting and record-keeping requirements mandated by law (annual reports, financial statements)
- Ability to raise significant capital through the sale of stock and bonds to investors

1.3 Agency Theory and Corporate Governance

Agency theory explores the complex relationship between shareholders and managers in corporations. It highlights potential conflicts of interest arising from the separation of ownership and control, such as moral hazard and adverse selection.

Corporate governance mechanisms aim to align manager and shareholder interests, reducing agency costs. These include board oversight, executive compensation plans, shareholder activism, and the market for corporate control. Effective governance promotes transparency and accountability in corporate decision-making.

Agency Theory and Corporate Governance

Agency theory and shareholder relationships

- Agency theory examines the relationship between principals (shareholders) and agents (managers) in a company
- Shareholders are the owners of the company but delegate day-to-day control to managers
- Managers have a fiduciary duty to act in the best interests of the shareholders
- Separation of ownership and control can lead to potential conflicts of interest
- Managers may have different goals and risk preferences than shareholders
- Information asymmetry exists as managers have access to more company information than shareholders (financial statements, strategic plans)

Potential agency problems in corporations

- Moral hazard occurs when managers take excessive risks or shirk their responsibilities
- Managers may undertake projects that benefit them personally but not the shareholders (empire building, lavish perks)

- Managers may focus on short-term gains at the expense of long-term profitability (earnings management, cutting R&D)
- Adverse selection arises when shareholders lack complete information when hiring managers
- Managers may misrepresent their skills or intentions during the selection process (inflated resumes, hidden agendas)
- Free cash flow problem happens when managers misuse excess cash for personal benefit
- Managers may spend on unnecessary acquisitions or pet projects instead of returning cash to shareholders (dividends, share buybacks)

Corporate governance for shareholder protection

- Corporate governance encompasses the rules, practices, and processes that direct and control a company
- Aims to align the interests of managers with those of shareholders
- Promotes transparency, accountability, and fairness in corporate decision-making (financial reporting, executive compensation)
- Effective corporate governance helps reduce agency costs
- Monitoring costs are incurred by shareholders to oversee management behavior (board of directors, auditors)
- Bonding costs are incurred by managers to signal their commitment to shareholder interests (performance-based pay, equity ownership)
- Residual losses occur when managers' decisions still deviate from shareholder interests despite monitoring and bonding (value-destroying mergers, excessive risk-taking)

Mechanisms of corporate governance

- Board of directors oversees management and protects shareholder interests
- Consists of internal (executive) and external (non-executive) members
- Independent directors have no material relationship with the company and provide objective oversight (Warren Buffett on Coca-Cola's board)
- Board committees focus on specific governance issues (audit committee, compensation committee)
- Executive compensation plans align manager incentives with shareholder interests
- Base salary provides a fixed level of compensation
- Performance-based bonuses tie pay to short-term company performance (revenue growth, profitability targets)
- Stock options and restricted stock grants link compensation to long-term stock price performance (vesting schedules, holding periods)
- Clawback provisions allow the company to recoup compensation if misconduct is discovered (Enron scandal)

- Shareholder activism involves investors actively engaging with management to influence corporate decisions
- Shareholders can vote on important matters (board appointments, executive compensation)
- Institutional investors can exert significant influence due to their large holdings (CalPERS, BlackRock)
- Market for corporate control disciplines poorly performing managers through the threat of takeovers
- Hostile takeovers can replace ineffective management teams (Carl Icahn's takeover of TWA)
- Managers may be incentivized to perform well to avoid being replaced (hostile bid defense strategies)

1.4 Financial Markets and the Firm

Financial markets play a crucial role in capital provision for firms. They offer various avenues for raising funds, including primary markets for new securities and secondary markets for trading existing ones. Understanding these markets is key to grasping how companies access capital.

Market efficiency impacts financial decision-making by influencing security prices and the cost of capital. The efficient market hypothesis suggests prices reflect all available information, affecting how firms approach financing choices and investment decisions. This concept shapes strategies for raising funds and managing risk.

Financial Markets and Capital Provision

Types of financial markets

- Primary markets enable firms to raise capital directly from investors through initial public offerings (IPOs) for equity and bond issuance for debt
- Secondary markets facilitate the trading of previously issued securities, provide liquidity for investors, and help determine the market value of securities (stock exchanges)
- Money markets offer short-term debt securities with maturities less than one year, such as Treasury bills, commercial paper, and certificates of deposit, providing short-term funding for firms
- Capital markets include long-term debt (bonds) and equity securities, providing long-term funding for firms through instruments like stocks, corporate bonds, and government bonds

Capital access through markets

- Debt financing involves issuing bonds in the primary market, where firms receive funds from investors and promise to repay principal and interest, with bonds having a maturity date and regular coupon payments, and debt holders having priority over equity holders in case of bankruptcy
- Equity financing entails issuing shares of stock through an IPO in the primary market, with firms selling ownership stakes to investors, equity holders having a residual claim on the firm's assets and earnings, and dividends paid at the discretion of the firm's management
- Factors influencing the choice between debt and equity include the cost of capital, financial flexibility, ownership and control considerations, and tax implications (interest expense deductibility)

Market Efficiency and Financial Decision-Making

Market efficiency concept

- Efficient market hypothesis (EMH) suggests that market prices reflect all available information, with three forms of market efficiency: weak, semi-strong, and strong
- Implications of market efficiency include the difficulty in consistently outperforming the market, the importance of diversification to manage risk, and the use of market prices as a benchmark for financial decisions
- Limitations of the EMH include behavioral biases and market anomalies (overreaction), the existence of information asymmetry, and the potential for market inefficiencies in the short run

Financial markets vs cost of capital

- Cost of capital is the weighted average cost of capital (WACC), calculated as:
$$WACC = w_d r_d (1 - t) + w_e r_e$$
- w_d : proportion of debt in the capital structure
- r_d : cost of debt
- t : corporate tax rate
- w_e : proportion of equity in the capital structure
- r_e : cost of equity
- Impact of financial markets on the cost of capital: market interest rates affect the cost of debt, while market risk premium and firm-specific risk affect the cost of equity
- In efficient markets, securities are priced to reflect their risk, and firms cannot consistently lower their cost of capital by exploiting market inefficiencies
- Firms should strive to optimize their capital structure to minimize WACC, as a lower cost of capital increases the net present value of projects

Unit 2 – Financial Markets and Institutions

2.1 Overview of Financial Markets

Financial markets are the backbone of modern economies. They connect savers with borrowers, allowing for efficient allocation of capital and promoting economic growth. These markets also provide mechanisms for price discovery and offer liquidity to investors.

There are different types of financial markets, including primary and secondary markets, as well as money, capital, and derivative markets. The concept of market efficiency is crucial, suggesting that prices reflect available information to varying degrees, impacting investment strategies and market behavior.

Overview of Financial Markets

Role of financial markets

- Facilitate the transfer of funds between savers (individuals or entities with excess funds to invest) and borrowers (individuals or entities in need of funds for investment or consumption)
- Enable the efficient allocation of capital by directing funds towards the most productive and profitable investments, promoting economic growth and development
- Provide a mechanism for price discovery where prices of financial assets are determined by the interaction of supply and demand, reflecting the collective opinions and expectations of market participants
- Offer liquidity to investors, allowing them to easily buy and sell financial assets, reducing the risk of holding illiquid assets

Primary vs secondary markets

- Primary markets involve the issuance of new securities where companies or governments raise capital by selling securities (IPOs, bond issuances) to investors
- Secondary markets facilitate the trading of existing securities among investors, providing liquidity (stock exchanges, bond markets)

Types of financial markets

- Money markets deal with short-term, highly liquid, and low-risk financial instruments with maturities of less than one year (Treasury bills, commercial paper, certificates of deposit) used for short-term borrowing and lending
- Capital markets involve long-term financial instruments with maturities of more than one year, including both equity (stocks) and debt (bonds) securities, used for long-term financing and investment (stock markets, corporate bond markets)
- Derivative markets trade financial instruments whose value is derived from an underlying asset, used for hedging, speculation, and risk management (futures, options, swaps), enabling market participants to transfer and manage risks

Concept of market efficiency

- Market efficiency refers to the degree to which market prices reflect all available information

- Three forms of market efficiency: 1. Weak form: prices reflect all historical information 2. Semi-strong form: prices reflect all publicly available information 3. Strong form: prices reflect all public and private information
- Implications of market efficiency suggest that in an efficient market, it is difficult to consistently outperform the market, and active investment strategies may not provide superior returns compared to passive strategies, as market prices are considered to be fair and unbiased estimates of an asset's intrinsic value
- Anomalies (patterns or events that contradict the efficient market hypothesis) and behavioral finance (the study of how psychological factors influence investor behavior and market outcomes) challenge the concept of perfect market efficiency

2.2 Types of Financial Institutions

Financial institutions are the backbone of the modern economy, facilitating the flow of money and providing essential services. From commercial banks to investment funds, these entities play crucial roles in managing deposits, offering loans, and enabling investments.

Each type of institution serves unique functions. Commercial banks handle everyday transactions, while investment banks assist in capital raising. Insurance companies protect against risks, and non-bank institutions like mutual funds offer alternative investment options, enhancing market efficiency and liquidity.

Types of Financial Institutions

Types of financial institutions

- Commercial banks
 - Accept deposits from customers in checking and savings accounts
 - Provide loans to individuals (mortgages, auto loans) and businesses (working capital, equipment financing)
 - Offer additional services like foreign exchange, safe deposit boxes, and wealth management
- Investment banks
 - Assist companies in raising capital through issuing securities (IPOs, bond offerings)
 - Provide financial advisory services for mergers and acquisitions (M&A) transactions
 - Facilitate trading of securities (stocks, bonds, derivatives) on behalf of clients
- Insurance companies
 - Provide protection against financial losses due to various risks (death, disability, property damage)
 - Offer life, health, property (homeowners), and casualty (auto) insurance products
 - Invest premiums collected from policyholders in financial markets to generate returns
- Non-bank financial institutions
 - Include mutual funds, pension funds, and hedge funds
 - Provide alternative investment options (diversified portfolios, retirement plans) and specialized financial services (lending, leasing)

- Play a significant role in the financial system alongside traditional banks by enhancing market efficiency and liquidity

Functions of banks and insurers

- Commercial banks
 - Act as financial intermediaries between depositors and borrowers by accepting deposits and making loans
 - Facilitate payment services through checks, debit cards, wire transfers, and electronic funds transfers (EFT)
 - Offer additional services such as foreign exchange (currency conversion), safe deposit boxes, and financial planning
- Investment banks
 - Underwrite and distribute new securities offerings like initial public offerings (IPOs) and bond issues
 - Provide research and analysis on securities (stocks, bonds) and market trends to inform investment decisions
 - Offer wealth management and investment advisory services to high-net-worth clients (private banking)
- Insurance companies
 - Help individuals and businesses manage risks by pooling premiums from a large group of policyholders
 - Pay out claims to policyholders in the event of covered losses (accidents, illnesses, property damage)
 - Provide financial stability and support economic growth through long-term investments of collected premiums

Services of investment funds

- Mutual funds
 - Pool money from multiple investors to invest in a diversified portfolio of securities (stocks, bonds, money market instruments)
 - Offer professional management by experienced fund managers who make investment decisions on behalf of the fund
 - Provide liquidity as investors can easily buy or sell shares in the fund at the current net asset value (NAV)
- Pension funds
 - Manage retirement contributions from employees and employers to provide income in retirement
 - Invest funds in a mix of assets (stocks, bonds, real estate) to generate returns and ensure sufficient assets for future pension payouts
 - Can be structured as defined benefit plans (guaranteed payouts based on salary and years of service) or defined contribution plans (employee-directed investments)
- Hedge funds

- Private investment vehicles that employ various strategies (long/short equity, arbitrage, global macro) to generate high returns
- Cater to sophisticated investors such as institutions (endowments, foundations) and high-net-worth individuals
- Often have more flexible investment mandates and use leverage (borrowed money) and derivatives (options, futures) to amplify returns

Role of non-bank institutions

- Provide alternative sources of financing and investment opportunities
- Offer credit to individuals and businesses through specialized lending products (auto loans, equipment leases)
- Invest in a wide range of assets, including stocks, bonds, real estate, and commodities (precious metals, agricultural products)
- Enhance market efficiency and liquidity
- Facilitate the flow of capital between savers and borrowers by matching those with excess funds to those in need of financing
- Contribute to price discovery by actively trading securities and help allocate resources effectively
- Foster competition and innovation in the financial sector
- Develop new financial products and services to meet evolving customer needs (mobile banking, robo-advisors)
- Encourage traditional banks to improve their offerings and pricing to remain competitive
- Complement the role of traditional banks in the economy
- Fill gaps in the market by serving niche segments (startups, low-income households) or providing specialized services (factoring, trade finance)
- Help diversify the financial system and reduce systemic risks by spreading capital across a wider range of institutions and markets

2.3 Central Banks and Monetary Policy

Central banks are the backbone of a nation's financial system. They manage monetary policy, regulate banks, and act as lenders of last resort. Their primary goal is to maintain price stability and promote economic growth through various tools and strategies.

These institutions wield significant influence over interest rates, inflation, and economic growth. However, they face challenges like time lags, global interconnectedness, and balancing multiple objectives. Effective communication is crucial for central banks to maintain credibility and shape market expectations.

Central Banks and Their Role in the Economy

Role of central banks

- Conduct monetary policy to maintain price stability (low and stable inflation) and promote economic growth

- Act as a lender of last resort providing liquidity to the financial system during crises (financial turmoil, bank runs)
- Regulate and supervise the banking system ensuring stability and integrity (setting capital requirements, conducting stress tests)
- Manage the country's foreign exchange reserves and implement exchange rate policy (intervening in currency markets)
- Issue and manage the national currency (designing and distributing banknotes and coins)
- Serve as the government's banker and financial agent (managing government accounts, issuing government debt)

Tools for monetary policy

- Open market operations involve buying or selling government securities (Treasury bills, bonds) in the open market influencing money supply and interest rates
- Reserve requirements set the minimum amount of reserves banks must hold against deposits affecting their lending capacity
- Discount rate is the interest rate at which central banks lend to commercial banks influencing the cost of borrowing
- Forward guidance and communication provide information about future policy intentions shaping market expectations and behavior

Impact of monetary policy

- Interest rates
- Expansionary monetary policy lowers interest rates encouraging borrowing and spending stimulating economic activity
- Contractionary monetary policy raises interest rates discouraging borrowing and spending cooling down the economy
- Inflation
- Monetary policy aims to maintain price stability keeping inflation low and stable (2% target)
- Excessive money supply growth can lead to higher inflation while insufficient growth can result in deflation (falling prices)
- Economic growth
- Monetary policy supports economic growth by creating favorable financial conditions boosting aggregate demand (consumption, investment)
- Effectiveness may be limited by factors like the zero lower bound on interest rates and the transmission mechanism (how policy affects the real economy)

Challenges in monetary policy

- Time lags and uncertainty
- Monetary policy actions take time to affect the economy making it difficult to assess impact in real-time

- Economic data and forecasts are subject to uncertainty complicating policy decisions
- Global economic interconnectedness means domestic monetary policy is influenced by external factors (global financial conditions, exchange rate movements)
- Balancing multiple objectives
- Central banks face trade-offs between price stability, economic growth, and financial stability
- Achieving an appropriate balance is challenging especially during economic stress or crisis (recession, financial instability)
- Effective communication and credibility
- Central banks need to communicate policies and intentions clearly to maintain credibility and influence market expectations
- Inconsistent or unclear communication undermines the effectiveness of monetary policy

2.4 Financial Regulation and Ethics

Financial regulation aims to protect investors and maintain market integrity. It ensures fair markets through disclosure requirements and prevents fraud through enforcement. Regulatory bodies like the SEC, Fed, FDIC, and CFTC oversee different aspects of the financial system.

Key regulations include the Securities Act of 1933, Securities Exchange Act of 1934, and Dodd-Frank Act. These laws require transparency, prohibit insider trading, and promote financial stability. Ethics in finance is crucial for maintaining trust and protecting stakeholders.

Financial Regulation

Objectives of financial regulation

- Protects investors and maintains market integrity by
- Ensuring fair and transparent markets through disclosure requirements and oversight
- Preventing fraud, manipulation, and insider trading through enforcement actions
- Promotes financial stability by
- Reducing systemic risk through prudential regulation and supervision
- Preventing financial crises and contagion effects through early intervention and resolution mechanisms
- Enhances public confidence in the financial system by
- Fostering trust in financial institutions and markets through effective regulation and supervision
- Encouraging participation and investment by providing a level playing field and protecting investor rights

Key regulatory bodies

- Securities and Exchange Commission (SEC)
- Regulates securities markets and enforces federal securities laws (Securities Act of 1933, Securities Exchange Act of 1934)

- Oversees stock exchanges (NYSE, NASDAQ), broker-dealers, and investment advisors
- Federal Reserve System (Fed)
- Conducts monetary policy by setting interest rates and controlling money supply
- Supervises banks and promotes financial stability by acting as lender of last resort
- Federal Deposit Insurance Corporation (FDIC)
- Insures deposits in banks and thrift institutions up to \$250,000 per account
- Examines and supervises financial institutions for safety and soundness to prevent bank failures
- Commodity Futures Trading Commission (CFTC)
- Regulates the derivatives markets, including futures (commodities, currencies), options, and swaps
- Protects market participants from manipulation, abusive practices, and fraud by enforcing the Commodity Exchange Act

Regulations for financial markets

- Securities Act of 1933
- Requires registration of securities offerings with the SEC and disclosure of material information through prospectuses
- Prohibits misrepresentation and fraudulent activities in the sale of securities (primary market)
- Securities Exchange Act of 1934
- Established the SEC and empowered it to regulate securities markets and market participants
- Requires periodic reporting by public companies (10-K, 10-Q) and prohibits insider trading (secondary market)
- Dodd-Frank Wall Street Reform and Consumer Protection Act (2010)
- Introduced sweeping reforms in response to the 2008 financial crisis to promote financial stability and protect consumers
- Established the Consumer Financial Protection Bureau (CFPB) to regulate consumer financial products and services
- Imposed stricter capital and liquidity requirements on financial institutions to enhance their resilience
- Basel Accords (Basel I, II, and III)
- International regulatory framework for banks developed by the Basel Committee on Banking Supervision
- Sets minimum capital requirements based on risk-weighted assets and promotes sound risk management practices

Ethics in Finance Industry

Ethics in finance industry

- Maintaining trust and confidence is crucial because

- Ethical conduct preserves the integrity of financial markets by ensuring fair and transparent practices
- Unethical behavior erodes public trust and can lead to market instability (2008 financial crisis)
- Protecting stakeholders is a key responsibility of financial professionals who
- Have a fiduciary duty to act in the best interests of their clients (retail investors, institutional investors)
- Must ensure fair treatment of investors, depositors, and borrowers to prevent exploitation and discrimination
- Preventing financial misconduct is essential to mitigate risks and avoid negative consequences such as
- Significant financial losses for investors and financial institutions due to fraud, insider trading, and manipulation
- Reputational damage that can lead to loss of clients, decreased market share, and regulatory sanctions
- Promoting long-term sustainability is a strategic imperative because
- Ethical behavior contributes to the long-term stability and growth of the financial industry by building trust and confidence
- Short-term gains from unethical practices are unsustainable and ultimately destructive (Enron, WorldCom scandals)
- Complying with professional codes of conduct is mandatory for financial professionals who are
- Bound by ethical codes set by industry associations that outline standards of integrity, competence, and diligence
- Required to adhere to the CFA Institute Code of Ethics and Standards of Professional Conduct (for CFA charterholders)

Unit 3 – Time Value of Money

3.1 Future Value and Compounding

Money grows over time through compounding. Future value calculations help us understand how investments can grow, considering factors like interest rates and time periods.

Compounding frequency impacts growth. More frequent compounding leads to higher returns. For a series of cash flows, we calculate the future value of each payment and sum them up.

Future Value and Compounding

Concept of future value

- Future value (FV) represents the value of an investment or cash flow at a specific point in the future
- Takes into account the time value of money which states that money available today is worth more than the same amount in the future due to its potential to earn interest (compounding)
- Importance in financial decision-making
- Helps investors and businesses determine the potential growth of their investments over time (retirement planning, capital budgeting)
- Allows for comparison of different investment opportunities by projecting their future values (stocks, bonds, real estate)
- Enables financial planning and goal setting by estimating the future value of savings or investments (college fund, down payment for a house)

Calculation of single sum future value

- The future value formula for a single sum: $FV = PV * (1 + r)^n$
- FV = Future Value
- PV = Present Value (the initial investment or principal)
- r = Annual interest rate (expressed as a decimal)
- n = Number of compounding periods (usually years)
- To calculate the future value, multiply the present value by the compounding factor $(1 + r)^n$
- Example: If you invest \$1,000 (PV) at an annual interest rate of 5% ($r = 0.05$) for 3 years ($n = 3$), the future value would be: $\$FV = \$1,000 * (1 + 0.05)^3 = 1,157.63$
- The compounding factor $(1 + r)^n$ represents the growth of the initial investment over the given time period
- As the interest rate (r) or the number of compounding periods (n) increases, the future value also increases

Impact of compounding frequency

- Compounding frequency refers to how often interest is calculated and added to the principal within a year
- Common compounding frequencies include annual, semi-annual, quarterly, monthly, and daily
- More frequent compounding leads to a higher future value, as interest is earned on the previously accumulated interest more often (compound interest)
- The future value formula with different compounding frequencies: $FV = PV * (1 + \frac{r}{m})^{n * m}$
- m = Number of compounding periods per year
- Example: If you invest \$1,000 at an annual interest rate of 5%, compounded monthly ($m = 12$) for 3 years ($n = 3$), the future value would be: $FV = \$1,000 * (1 + \frac{0.05}{12})^{3 * 12} = 1,161.18$
- The more frequent the compounding, the greater the difference between the future value and the value calculated using annual compounding

Future value of cash flow series

- When dealing with a series of cash flows, each cash flow must be treated separately and their future values added together
- Steps to solve problems involving the future value of a series of cash flows: 1. Identify the individual cash flows and their respective timings (amount, frequency, and duration) 2. Calculate the future value of each cash flow using the appropriate formula, considering the time period and interest rate 3. Sum up the future values of all cash flows to determine the total future value of the series
- Example: If you invest \$1,000 at the end of each year for 3 years, at an annual interest rate of 5%, the future value of the series would be:
 - FV of first cash flow: $\$1,000 * (1 + 0.05)^2 = 1,102.50$
 - FV of second cash flow: $\$1,000 * (1 + 0.05)^1 = 1,050.00$
 - FV of third cash flow: 1,000
 - Total future value of the series: $\$1,102.50 + \$1,050.00 + \$1,000 = 3,152.50$
- The future value of a cash flow series is useful for analyzing investments with regular contributions (annuities, savings plans) or projects with multiple cash inflows (rental income, dividends)

3.2 Present Value and Discounting

The time value of money is a crucial concept in finance that recognizes a dollar today is worth more than a dollar tomorrow. It forms the basis for calculating present value, which determines the current worth of future cash flows, essential for making informed financial decisions.

Present value calculations are applied in various financial contexts, from evaluating investments to valuing bonds and stocks. Understanding how to discount future cash flows to their present value equivalents enables investors and financial managers to compare different investment opportunities and make sound financial choices.

Time Value of Money

Concept of present value

- Present value (PV) represents the current worth of a future sum of money or stream of cash flows, given a specified rate of return
- Calculates the amount that must be invested today to grow to a specific future value at a given interest rate
- Fundamental concept in financial analysis enables comparison of cash flows occurring at different points in time
- Money has time value due to inflation, opportunity cost, and risk factors
- A dollar received today holds more value than a dollar received in the future
- Applied in various financial contexts (capital budgeting, bond and stock valuation, loan and mortgage calculations, retirement planning)

Present value of single sums

- Formula for calculating present value of a single sum: $PV = \frac{FV}{(1+r)^n}$
- PV represents Present Value
- FV represents Future Value
- r represents discount rate (or interest rate) per period
- n represents number of periods
- Discount rate signifies required rate of return or opportunity cost of capital
- Converts future cash flows into their present value equivalents
- Example: \$1,000 expected in 5 years with a 5% annual discount rate yields a present value of 783.53 ($PV = \frac{1,000}{(1+0.05)^5}$)

Present value of cash flows

- Series of future cash flows requires discounting each cash flow to its present value and summing them to find total present value
- Formula for calculating present value of equal cash flows (annuity): $PV = PMT \times \frac{1 - (1+r)^{-n}}{r}$
- PV represents Present Value
- PMT represents payment amount per period
- r represents discount rate (or interest rate) per period
- n represents number of periods
- Series of unequal cash flows involves discounting each cash flow individually using the single sum formula and summing: $PV = \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \dots + \frac{CF_n}{(1+r)^n}$
- CF_t represents cash flow at time t

Applications in financial decisions

- Net Present Value (NPV) evaluates profitability of investments or projects 1. Discount all future cash inflows and outflows to their present values 2. Sum the discounted cash flows 3. Positive NPV indicates a profitable investment; negative NPV suggests rejecting the investment
- Bond valuation utilizes present value concepts
- Bond price equals the present value of future cash flows (coupon payments and face value) discounted at the yield to maturity
- Stock valuation models (Dividend Discount Model) estimate intrinsic value using present value
- Calculates present value of expected future dividends to determine fair value of a stock
- Loan and mortgage calculations involve present value to determine loan amount, monthly payments, or interest rates

3.3 Annuities and Perpetuities

Annuities and perpetuities are crucial financial tools for managing regular payments over time. They come in different forms, each with unique calculations for future and present values. Understanding these concepts is key for making informed decisions about investments, loans, and long-term financial planning.

Ordinary annuities, annuities due, and perpetuities each have specific formulas for calculating their values. These formulas help determine the worth of payment streams, whether they're finite or ongoing indefinitely. Mastering these calculations is essential for evaluating various financial products and opportunities.

Annuities

Ordinary annuities vs annuities due

- Annuities involve series of equal payments made at regular intervals (monthly, quarterly, annually)
- Ordinary annuities have payments occurring at the end of each period
- Rent payments made at the end of each month
- Interest payments on bonds paid semi-annually
- Annuities due have payments occurring at the beginning of each period
- Lease payments made at the beginning of each month
- Insurance premiums paid at the start of the coverage period

Future and present value of ordinary annuities

- Future Value of an Ordinary Annuity (FVOA) calculates the sum of all payments at a future date
- $FVOA = PMT \times \frac{(1+r)^n - 1}{r}$
- PMT represents periodic payment amount
- r denotes interest rate per period
- n indicates number of periods
- Assumes payments grow at the given interest rate

- Present Value of an Ordinary Annuity (PVOA) determines the value of all future payments discounted to the present
- $PVOA = PMT \times \frac{1 - \frac{1}{(1+r)^n}}{r}$
- Discounts each future payment back to the present using the interest rate
- Useful for valuing annuities, loans, or leases

Future and present value of annuities due

- Future Value of an Annuity Due (FVAD) calculates the sum of all payments at a future date
- Each payment grows for one additional period compared to an ordinary annuity
- $FVAD = FVOA \times (1 + r)$
- Multiplies FVOA by $(1 + r)$ to account for the extra period of growth
- Present Value of an Annuity Due (PVAD) determines the value of all future payments discounted to the present
- Each payment is discounted one period less compared to an ordinary annuity
- $PVAD = PVOA \times (1 + r)$
- Multiplies PVOA by $(1 + r)$ to account for payments occurring at the beginning of each period

Perpetuities

Perpetuities and present value calculation

- Perpetuities are annuities that continue forever with no end date
- Preferred stock dividends expected to be paid indefinitely
- Endowment funds that provide ongoing income to organizations
- The Present Value of a Perpetuity (PVP) calculates the value of all future perpetual payments discounted to the present
- $PVP = \frac{PMT}{r}$
- Assumes payments occur at the end of each period (ordinary perpetuity)
- Divides the periodic payment by the interest rate
- For a perpetuity due (payments at the beginning of each period), the formula is adjusted:
- $PVP_{due} = \frac{PMT}{r} \times (1 + r)$
- Multiplies the ordinary perpetuity formula by $(1 + r)$

3.4 Loan Amortization

Loan amortization is a crucial concept in personal finance, showing how loans are repaid over time. It breaks down each payment into principal and interest, revealing how the loan balance decreases with each installment. Understanding amortization helps borrowers make informed decisions about loan terms and repayment strategies.

Creating an amortization schedule involves calculating periodic payments and tracking the loan balance. This process illuminates how interest and principal portions change over time, with interest typically front-loaded. Factors like interest rates and loan terms significantly impact the amortization process, affecting both monthly payments and total interest paid.

Loan Amortization

Components of loan amortization

- Loan amortization involves repaying a loan through regular payments over a specified period
- Each payment consists of principal and interest portions
- Principal reduces the outstanding loan balance
- Interest is the cost of borrowing based on the remaining balance and interest rate (APR)
- Amortization typically uses equal periodic payments (monthly, quarterly) throughout the loan term
- As the loan is repaid, a larger portion of each payment goes towards principal, while the interest portion decreases (front-loaded interest)

Creation of amortization schedules

- An amortization schedule shows the breakdown of each loan payment into principal and interest
- Displays the remaining loan balance after each payment
- Creating an amortization schedule: 1. Determine the loan amount, interest rate (APR), and repayment period (term) 2. Calculate the periodic payment using the formula: $Payment = \frac{P * r * (1 + r)^n}{(1 + r)^n - 1}$
- P = loan amount (principal)
- r = periodic interest rate (annual rate divided by number of payments per year)
- n = total number of payments (term) 3. For each payment period, calculate the interest portion by multiplying the remaining balance by the periodic interest rate 4. Subtract the interest portion from the total payment to determine the principal portion 5. Subtract the principal portion from the remaining balance to update the loan balance for the next period

Calculation of outstanding loan balances

- The outstanding balance is the remaining amount owed at a specific point in time
- Calculating the outstanding balance: 1. Determine the number of payments made up to the given point 2. Use the amortization schedule to identify the remaining balance after the last payment made
- Alternatively, use the formula: $OutstandingBalance = P * \frac{(1 + r)^n - (1 + r)^p}{(1 + r)^n - 1}$
- P = loan amount (principal)
- r = periodic interest rate
- n = total number of payments (term)
- p = number of payments made so far

Impact of loan terms on amortization

- Interest rate affects the cost of borrowing and allocation of payments between principal and interest
- Higher rates lead to higher periodic payments and more interest paid (mortgage, car loan)
- Lower rates result in lower periodic payments and more principal paid (student loan, personal loan)
- Repayment period influences the periodic payment amount and total interest paid over the loan term
- Longer terms have lower periodic payments but higher total interest (30-year mortgage)
- Shorter terms have higher periodic payments but lower total interest (15-year mortgage)
- Borrowers can compare loan terms to find a balance between affordable periodic payments and total interest costs
- Amortization calculators help visualize the impact of different terms (Bankrate, NerdWallet)

Unit 4 – Risk and Return

4.1 Measuring Risk and Return

Measuring risk and return is crucial for making informed investment decisions. Investors use expected return calculations to estimate potential gains, while standard deviation quantifies risk. These metrics help evaluate individual assets and entire portfolios, guiding allocation strategies.

Understanding risk aversion and tolerance is key to crafting suitable investment plans. Risk-averse individuals prefer safer options, while risk-tolerant investors may seek higher returns through riskier assets. Balancing risk and return is essential for achieving financial goals.

Risk and Return Measurements

Expected return and deviation calculation

- Expected return
- Calculates weighted average of possible returns based on their probabilities
- Uses formula

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

where P_i represents probability of each possible return and R_i represents each possible return

- Example: Investment with 50% chance of 10% return and 50% chance of 5% return has expected return of 7.5% ($0.5 * 10\% + 0.5 * 5\%$)

- Standard deviation
- Quantifies dispersion of returns around the expected return
- Calculated using formula

$$\sigma = \sqrt{\sum_{i=1}^n p_i (R_i - E(R))^2}$$

- Higher standard deviation indicates greater variability and risk
- Portfolio expected return
- Determines weighted average of individual asset expected returns in a portfolio
- Applies formula

$$E(R_p) = \sum_{i=1}^n w_i E(R_i)$$

where w_i represents weight of each asset and $E(R_i)$ represents expected return of each asset

- Example: Portfolio with 60% stocks (expected return 10%) and 40% bonds (expected return 5%) has expected return of 8% ($0.6 * 10\% + 0.4 * 5\%$)
- Portfolio standard deviation
- Accounts for individual asset standard deviations and correlations between assets

- Uses formula

$$\sigma_p = \sqrt{\sum_{i=1}^n w_i^2 \sigma_i^2 + 2 \sum_{i=1}^{n-1} \sum_{j=i+1}^n w_i w_j \sigma_i \sigma_j \rho_{ij}}$$

where σ_i represents standard deviation of each asset and ρ_{ij} represents correlation coefficient between assets i and j

- Diversification can reduce portfolio standard deviation when assets are not perfectly positively correlated

Risk aversion and tolerance concepts

- Risk aversion
 - Describes preference for lower risk investments when expected returns are equal
 - Risk-averse investors demand higher expected returns to compensate for taking on more risk
 - Example: Given choice between two investments with same expected return, risk-averse investor will choose the one with lower risk
- Risk tolerance
 - Measures willingness to accept higher risk in pursuit of potentially higher returns
 - Factors such as age, income, and investment goals influence an individual's risk tolerance
 - Example: Young investor with long investment horizon may have higher risk tolerance than retiree relying on portfolio income
 - Impact on investment decisions
 - Risk-averse investors gravitate towards lower-risk investments like bonds and cash equivalents
 - Risk-tolerant investors are more likely to hold higher-risk assets such as stocks and derivatives
 - Asset allocation should align with individual risk preferences and financial objectives

Types of Risk and Risk-Return Tradeoff

Systematic vs unsystematic risk

- Systematic risk (market risk)
 - Affects the entire market or economy and cannot be diversified away
 - Examples include interest rate changes, inflation, and political events
 - Investors must accept systematic risk as inherent to investing in the market
- Unsystematic risk (firm-specific risk)
 - Unique to individual companies or industries and can be reduced through diversification
 - Examples include management changes, labor strikes, and product recalls
 - Holding a well-diversified portfolio minimizes exposure to unsystematic risk
 - Implications for investors

- Diversification is effective in mitigating unsystematic risk but not systematic risk
- Investors should prioritize managing systematic risk through asset allocation and risk management strategies
- Understanding the distinction between systematic and unsystematic risk is crucial for constructing a resilient portfolio

Risk-return tradeoff analysis

- Positive relationship between risk and expected return
- Higher risk investments generally offer the potential for higher returns
- Lower risk investments typically provide lower expected returns
- Example: Stocks have historically offered higher returns than bonds but with greater volatility
- Risk-return tradeoff
- Investors must strike a balance between the desire for higher returns and their tolerance for risk
- Optimal portfolio depends on individual risk preferences and investment goals
- Example: Conservative investor may favor a portfolio with 80% bonds and 20% stocks, while an aggressive investor may hold 80% stocks and 20% bonds
- Capital Asset Pricing Model (CAPM)
- Describes the relationship between systematic risk and expected return for individual assets
- Formula: $E(R_i) = R_f + \beta_i(E(R_m) - R_f)$ where R_f represents risk-free rate, β_i represents asset's sensitivity to systematic risk, and $E(R_m)$ represents expected return of the market portfolio
- Assets with higher beta values are expected to have higher returns to compensate for their greater systematic risk

4.2 Portfolio Theory and Diversification

Modern portfolio theory revolutionized investing by emphasizing diversification to maximize returns while minimizing risk. It introduced the concept of efficient portfolios, which offer the best risk-return tradeoffs based on an investor's risk tolerance.

Mean-variance optimization and the efficient frontier are key tools in portfolio construction. By analyzing expected returns, variances, and correlations between assets, investors can create portfolios that balance risk and return effectively, tailoring their choices to individual goals and risk preferences.

Portfolio Theory and Diversification

Principles of modern portfolio theory

- Framework for constructing and selecting portfolios maximizes expected return for a given risk level
- Assumes investors are risk-averse prefer lower risk for a given return level
- Measures risk by the variance or standard deviation of portfolio returns
- Diversification spreads investments across different assets or asset classes reduces overall portfolio risk

- Works because asset returns are not perfectly correlated do not move in the same direction or magnitude simultaneously
- Combining assets with low or negative correlations reduces the impact of individual asset volatility on the overall portfolio
- Benefits of diversification:
 - Reduces unsystematic risk specific to individual assets or companies (idiosyncratic risk)
 - Smooths out portfolio returns over time losses in some assets may be offset by gains in others
 - Potentially achieves higher risk-adjusted returns compared to investing in a single asset or a poorly diversified portfolio (efficient portfolios)

Mean-variance optimization for portfolios

- Quantitative approach to constructing efficient portfolios based on expected returns, variances, and covariances of assets
- Main inputs for mean-variance optimization:
 - Expected returns for each asset based on historical data or forward-looking estimates
 - Variances of each asset's returns measuring individual risk
 - Covariances or correlations between pairs of assets measuring how returns move together
- Optimization process finds portfolio weights that: 1. Minimize portfolio variance for a given expected return level, or 2. Maximize expected return for a given variance level
- Uses mathematical optimization techniques like quadratic programming
- Output is a set of efficient portfolios each representing a different combination of expected return and risk
- Investors select the portfolio that best aligns with their risk tolerance and return objectives

Efficient frontier in portfolio selection

- Graphical representation of the set of efficient portfolios obtained through mean-variance optimization
- Each point represents a portfolio with the highest expected return for a given risk level, or lowest risk for a given expected return level
- Portfolios below the efficient frontier are suboptimal have lower expected returns for the same risk or higher risk for the same expected return
- Shape depends on expected returns, variances, and covariances of assets under consideration
- Generally concave with diminishing marginal returns to risk as the portfolio moves up the frontier
- Implications for portfolio selection:
 - Investors should only consider portfolios on the efficient frontier offer the best risk-return tradeoffs
 - Optimal portfolio depends on investor's risk tolerance represented by a risk aversion coefficient or utility function

- Higher risk tolerance investors select portfolios further up the efficient frontier, lower risk tolerance investors choose portfolios closer to the minimum-variance portfolio

Correlation impact on portfolio risk

- Measures the degree to which returns of two assets move together over time
- Correlation coefficients range from -1 (perfect negative correlation) to +1 (perfect positive correlation), with 0 indicating no correlation
- Impact on portfolio risk and return:
 - Assets with low or negative correlations provide greater diversification benefits returns tend to offset each other, reducing overall portfolio risk
 - Assets with high positive correlations offer less diversification returns tend to move in the same direction, amplifying portfolio risk
- When constructing portfolios, investors should include assets with low or negative correlations to maximize diversification benefits
- Combine assets from different asset classes (stocks and bonds), sectors (technology and healthcare), or geographies (U.S. and international markets)
- As the number of assets in a portfolio increases, the impact of individual asset correlations on portfolio risk decreases due to the averaging effect of diversification
- However, marginal benefits of diversification diminish as the number of assets grows portfolio becomes more exposed to systematic risk factors that affect all assets

4.3 Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model (CAPM) is a key tool in finance for estimating expected returns and assessing risk. It links an asset's expected return to its systematic risk, measured by beta, and the market risk premium.

CAPM helps investors and companies make informed decisions about investments and capital allocation. While it has limitations, CAPM remains widely used for estimating cost of equity, valuing assets, and understanding the risk-return tradeoff in financial markets.

Capital Asset Pricing Model (CAPM)

Assumptions and limitations of CAPM

- Assumes investors are rational and risk-averse, seeking to maximize returns while minimizing risk
- Assumes markets are perfectly competitive and efficient, with all information readily available and reflected in asset prices
- Assumes investors can borrow and lend at the risk-free rate (government bond yields)
- Assumes all investors have the same information and expectations about asset returns and risk
- Assumes there are no transaction costs (brokerage fees) or taxes that impact investment decisions
- Limited by the fact that real-world markets may not always be perfectly efficient (market anomalies, bubbles)

- Limited by the assumption that investors always behave rationally, which may not be the case (emotional investing)
- Relies on historical data to estimate parameters, which may not accurately predict future performance (past returns do not guarantee future results)
- Assumes a single-period time horizon, which may not reflect the reality of long-term investing (multiple holding periods)
- Does not account for unsystematic risk or company-specific factors (management quality, competitive advantage)

Calculating expected return with CAPM

- CAPM equation: $E(R_i) = R_f + \beta_i(E(R_m) - R_f)$
- $E(R_i)$: Expected return of asset i (individual stock)
- R_f : Risk-free rate (10-year U.S. Treasury bond yield)
- β_i : Beta coefficient of asset i , measuring its sensitivity to market movements
- $E(R_m)$: Expected return of the market portfolio (S&P 500 index)
- Risk-free rate (R_f) represents the return an investor can earn without taking on any risk (default risk of government bonds)
- Market risk premium ($E(R_m) - R_f$) quantifies the additional return investors demand for bearing market risk (equity risk premium)
- Beta coefficient (β_i) captures the extent to which an asset's returns are influenced by overall market fluctuations (systematic risk)

Beta coefficient and systematic risk

- Beta coefficient (β_i) measures the systematic risk of an asset, which cannot be eliminated through diversification (market risk)
- Interpretation of beta values:
 - $\beta = 1$: Asset moves in perfect sync with the market (average risk)
 - $\beta > 1$: Asset amplifies market movements and is more volatile (aggressive stocks)
 - $0 < \beta < 1$: Asset is less responsive to market changes and is less volatile (defensive stocks)
 - $\beta = 0$: Asset's returns are uncorrelated with the market (risk-free assets)
 - $\beta < 0$: Asset moves in the opposite direction of the market (inverse ETFs)
- Higher beta values imply higher systematic risk exposure and, consequently, higher expected returns to compensate investors for the added risk (risk-return tradeoff)

CAPM for cost of equity estimation

- Cost of equity capital represents the required rate of return for a company's equity investors (shareholders)
- CAPM provides a framework to estimate the cost of equity capital:

- $K_e = R_f + \beta_e(E(R_m) - R_f)$

- K_e : Cost of equity capital (required return for shareholders)

- R_f : Risk-free rate (10-year U.S. Treasury bond yield)

- β_e : Beta coefficient of the company's equity (stock)

- $E(R_m)$: Expected return of the market portfolio (S&P 500 index)

- The estimated cost of equity capital is a crucial input for various corporate finance decisions: 1.

Capital budgeting: Determining the hurdle rate for accepting or rejecting investment projects (NPV, IRR)

2. Valuation: Discounting future cash flows to estimate the intrinsic value of a company or project (DCF analysis) 3. Capital structure: Determining the optimal mix of debt and equity financing to minimize the

weighted average cost of capital (WACC)

4.4 Systematic and Unsystematic Risk

Risk in investing comes in two flavors: systematic and unsystematic. Systematic risk affects the entire market and can't be avoided, while unsystematic risk is specific to individual companies or industries and can be reduced through diversification.

Diversification is key to managing risk in your investment portfolio. By spreading your investments across different assets, sectors, and regions, you can minimize the impact of company-specific risks. However, remember that diversification can't protect you from market-wide risks.

Types of Risk and Diversification

Systematic vs unsystematic risk

- Systematic risk (market risk, undiversifiable risk)
- Affects entire market or economy
- Cannot be eliminated through diversification
- Sources:
 - Changes in interest rates (Federal Reserve raising rates)
 - Inflation eroding purchasing power (rising consumer prices)
 - Political events like elections or policy changes (new tax laws)
 - Economic downturns such as recessions (2008 financial crisis)
- Unsystematic risk (specific risk, diversifiable risk)
- Affects individual companies or industries
- Can be reduced or eliminated through diversification
- Sources:
 - Management decisions impacting company performance (poor strategic choices)
 - Labor strikes disrupting production (auto worker walkouts)
 - Product recalls damaging reputation and sales (defective pharmaceuticals)

- Technological changes making products obsolete (rise of smartphones)

Diversifiable risk elimination

- Diversifiable risk can be reduced or eliminated by investing in variety of assets
- Achieved through portfolio diversification spreading risk across multiple investments
- Involves selecting assets with low or negative correlation (stocks and bonds)
- Aims to balance portfolio's overall risk and return for optimal performance
- Example: Investing in both domestic and international stocks from various sectors

Market risk impact on returns

- Market risk factors are macroeconomic variables affecting asset returns
- Interest rates influencing borrowing costs and investment attractiveness (10-year Treasury yield)
- Inflation impacting purchasing power and asset values (Consumer Price Index)
- GDP growth indicating economic health and corporate profits (quarterly GDP reports)
- Exchange rates affecting international investments and trade (USD/EUR rate)
- Changes in market risk factors lead to fluctuations in asset prices
- Positive or negative impact depending on asset and risk factor
- Systematic risk cannot be eliminated but impact can be managed
- Example: Rising interest rates negatively impacting bond prices

Diversification for risk reduction

- Diversification strategies: 1. Investing in different asset classes (stocks, bonds, real estate, commodities) 2. Investing in various sectors or industries (technology, healthcare, energy) 3. Investing in different geographical regions (US, Europe, emerging markets) 4. Investing in assets with low or negative correlation (gold and stocks)
- Diversification can significantly reduce unsystematic risk
- Spreads risk across multiple assets reducing impact of individual fluctuations
- Effectiveness depends on level of diversification and asset correlation
- Example: Owning 30 stocks instead of 1 reduces company-specific risk
- Limitations of diversification
- Does not eliminate systematic risk affecting entire market
- Over-diversification may lead to reduced returns (owning too many assets)

Unit 5 – Bond Valuation

5.1 Bond Characteristics and Types

Bonds are financial instruments that come in various forms, each with unique characteristics. They offer investors fixed income and play a crucial role in diversifying portfolios. Understanding bond types and features is essential for making informed investment decisions.

Key bond traits include par value, coupon rate, and maturity date. Different types like government, corporate, and municipal bonds cater to various risk appetites. Special features such as callable and convertible options add complexity but can provide additional benefits to investors.

Bond Characteristics

Key characteristics of bonds

- Par value (face value or principal) represents the amount the bondholder receives at maturity, typically \$1,000 per bond
- Coupon rate expresses the annual interest rate paid on the bond's par value as a percentage and determines the periodic coupon payments calculated using the formula
$$\text{Coupon Payment} = \text{Par Value} \times \text{Coupon Rate}$$
- Maturity date marks the end of the bond's life when the bond issuer repays the par value to the bondholder, ranging from a few months to several decades

Bond Types

Types of bonds

- Government bonds issued by national governments or agencies (U.S. Treasury bills, notes, and bonds) are generally considered low-risk investments
- Corporate bonds issued by companies to raise capital for various purposes offer higher yields but carry higher risk compared to government bonds, with the issuer's creditworthiness affecting the bond's risk and yield
- Municipal bonds issued by state and local governments to fund public projects (highways, schools) generally have lower yields compared to corporate bonds due to potential federal, state, and local tax exemptions on interest income

Callable vs convertible bonds

- Callable bonds give the issuer the right to redeem the bond before maturity at a predetermined price, exposing investors to reinvestment risk if called early but offering higher yields to compensate for this risk
- Convertible bonds allow bondholders to convert the bond into a specified number of shares of the issuer's common stock, providing the potential to benefit from stock price appreciation but typically offering lower yields compared to non-convertible bonds
- Zero-coupon bonds do not make periodic coupon payments but are issued at a discount to par value and redeemed at par value upon maturity, with the difference between the purchase price and par value

representing the investor's return

Bond indentures and covenants

- Bond indenture serves as a legal contract between the bond issuer and bondholders, specifying the terms and conditions of the bond such as coupon rate, maturity date, and any special features (call provisions, conversion rights)
- Covenants are provisions within the bond indenture that protect bondholder interests through positive covenants requiring the issuer to take certain actions (maintain insurance coverage, provide financial reports) and negative covenants prohibiting the issuer from taking certain actions (issuing additional debt, selling key assets), with covenant violations potentially leading to default and immediate repayment demands from bondholders

5.2 Bond Pricing and Yields

Bond valuation and yields are key concepts in fixed income investing. They help investors understand how bonds are priced and what returns they can expect. These tools are essential for making informed decisions in the bond market.

Calculating bond prices involves discounting future cash flows. Yield to maturity measures the total return if a bond is held to maturity. The inverse relationship between bond prices and yields is crucial for understanding market dynamics and investment strategies.

Bond Valuation and Yields

Bond price calculation

- Bond price calculation formula: $P = \frac{C}{(1+r)^1} + \frac{C}{(1+r)^2} + \dots + \frac{C}{(1+r)^n} + \frac{F}{(1+r)^n}$
- P represents the bond price, the present value of all future cash flows
- C denotes the coupon payment, the periodic interest payment made to bondholders (semi-annual for most bonds)
- r is the periodic interest rate, calculated by dividing the yield to maturity by the number of periods per year (2 for semi-annual coupon payments)
- n represents the total number of periods until the bond matures (20 for a 10-year bond with semi-annual coupons)
- F is the face value (par value) of the bond, the amount paid to the bondholder at maturity (\$1,000 for most corporate bonds)
- Bond pricing based on the present value of future cash flows discounts each cash flow back to its present value using the yield to maturity as the discount rate
- Coupon payments are the regular interest payments made to bondholders, typically semi-annually (every 6 months)
- Face value is the amount paid to the bondholder at maturity, also known as the par value or principal (\$1,000 for most corporate bonds)

Yield to maturity determination

- Yield to maturity (YTM) is the total return expected on a bond if held until maturity, expressed as an annual percentage rate
- Assumes all coupon payments are reinvested at the same YTM rate, although reinvestment rates may vary over time
- YTM calculation involves solving for r in the bond price formula, which requires trial and error or the use of a financial calculator (HP-12C or TI BA II Plus)
- Goal is to find the discount rate that equates the present value of all future cash flows to the current bond price
- Factors affecting YTM include: 1. Current bond price: Higher prices lead to lower YTM, while lower prices result in higher YTM 2. Coupon rate: Higher coupon rates generally lead to higher YTM, all else being equal 3. Time to maturity: Longer maturities typically result in higher YTM due to increased interest rate risk 4. Face value: The amount paid to the bondholder at maturity (\$1,000 for most corporate bonds)

Bond price vs yield relationship

- Bond prices and yields have an inverse relationship, meaning they move in opposite directions
- When bond prices rise, yields fall, as investors are willing to accept lower returns for the same cash flows
- When bond prices fall, yields rise, as investors demand higher returns to compensate for the lower price
- Reasons for the inverse relationship:
 - Fixed coupon payments: As bond prices change, the fixed coupon payments represent a different percentage of the bond's price (higher price = lower yield, lower price = higher yield)
 - Opportunity cost: Higher yields on newly issued bonds make existing bonds with lower yields less attractive, causing their prices to fall as investors sell them to buy the new, higher-yielding bonds

Current yield and yield to call

- Current yield is the annual coupon payment divided by the bond's current price, expressed as a percentage
- Formula: $CurrentYield = \frac{AnnualCouponPayment}{CurrentBondPrice}$
- Provides a simple measure of the bond's annual income return, but does not consider capital gains or losses from price changes
- Example: A bond with a \$60 annual coupon and a current price of \$950 has a current yield of 6.32% (\$60 / \$950)
- Yield to call (YTC) is the yield earned by a bond if it is called (redeemed) by the issuer before maturity
- Relevant for callable bonds, which give the issuer the right to redeem the bond at a specified call price on or after a specific date

- YTC calculation is similar to YTM but uses the call date and call price instead of the maturity date and face value
- Example: A 10-year bond with a 6% coupon, a current price of \$1,050, and a call price of \$1,020 in 5 years has a YTC of 4.97%
- Implications for bond investors:
 - Current yield is a useful metric for comparing the income generated by different bonds, especially for investors focused on regular income
 - YTC is important to consider when investing in callable bonds, as it may differ from the YTM if the bond is called before maturity, impacting the investor's total return

5.3 Term Structure of Interest Rates

Interest rates vary based on time to maturity, forming the term structure. This concept is crucial for understanding how different securities are priced and how economic expectations impact the financial markets.

Three main theories explain the term structure: expectations, liquidity preference, and market segmentation. The yield curve's shape offers insights into economic outlook, while spot and forward rates help in pricing various financial instruments.

Term Structure of Interest Rates

Theories of interest rate structure

- Expectations theory proposes interest rates reflect market participants' expectations about future interest rates, with long-term rates being an average of current and expected future short-term rates (Treasury bills, commercial paper)
- Liquidity preference theory suggests investors prefer short-term securities (certificates of deposit) and demand a premium for holding long-term securities (corporate bonds), resulting in higher long-term rates due to the liquidity premium
- Market segmentation theory argues different investors have distinct investment horizons and preferences, with supply and demand in each maturity segment (short-term, intermediate-term, long-term) determining the interest rates for that segment

Yield curve shape and implications

- Normal yield curve has long-term rates higher than short-term rates, indicating expectations of economic growth and rising interest rates
- Upward sloping curve suggests a favorable economic outlook (expansion)
- Inverted yield curve occurs when short-term rates exceed long-term rates, suggesting expectations of economic slowdown and falling interest rates
- Downward sloping curve may signal an impending recession
- Flat yield curve shows similar short-term and long-term rates, implying uncertainty about future economic conditions and interest rates
- Horizontal curve indicates a transitional phase in the economy

Spot rates and forward rates

- Spot rates represent interest rates for borrowing or lending money for a specific period, starting immediately, and are used to price zero-coupon bonds (Treasury STRIPS)
- Forward rates are interest rates for borrowing or lending money for a specific period, starting at a future date, and are implied by the term structure of spot rates
- Relationship between spot rates and forward rates: 1. Long-term spot rates are a geometric average of current and expected future short-term forward rates 2.
$$(1 + R_n)^n = (1 + R_1) \times (1 + f_2) \times \dots \times (1 + f_n)$$
- R_n : n-period spot rate
- R_1 : one-period spot rate
- f_i : forward rate for period i

Limitations of expectations theories

- Pure expectations theory assumes investors are risk-neutral and have no preference for maturity, ignoring the potential impact of liquidity preferences on interest rates (term premium)
- May not fully explain the observed shape of the yield curve
- Liquidity premium theory assumes investors are risk-averse and prefer short-term securities, accounting for the liquidity premium in long-term rates
- May overstate the importance of liquidity preferences in determining interest rates
- Both theories have limitations:
 - They do not consider the impact of market segmentation on interest rates (institutional investors, pension funds)
 - They assume investors have homogeneous expectations about future interest rates, which may not always be the case

5.4 Credit Ratings and Bond Risks

Credit ratings and bond risks are crucial concepts in finance. They help investors gauge the safety and potential returns of bond investments. Understanding these factors is key to making informed decisions in the bond market.

Credit rating agencies play a vital role in assessing bond issuers' creditworthiness. They provide ratings that impact bond yields and prices. Meanwhile, investors must navigate various risks, including interest rate, credit, and liquidity risks, to optimize their bond portfolios.

Credit Ratings and Bond Risks

Role of credit rating agencies

- Assess the creditworthiness of bond issuers (Moody's, Standard & Poor's, Fitch)
- Evaluate ability and willingness of issuers to meet financial obligations
- Assign credit ratings to bond issuers and individual bond issues

- Provide investors with independent assessment of credit risk
- Help investors make informed decisions about risk-return trade-off of investing in bonds
- Conduct extensive research and analysis to determine credit ratings
- Examine financial statements, management quality, industry trends, macroeconomic factors
- Monitor issuers and update ratings as necessary to reflect changes in creditworthiness

Interpretation of credit ratings

- Expressed as letter grades (AAA, AA, A, BBB, etc.)
- Higher ratings indicate lower credit risk and higher likelihood of timely repayment
- Lower ratings indicate higher credit risk and greater possibility of default
- Have direct impact on bond yields
- Bonds with higher credit ratings generally offer lower yields due to lower risk
- Bonds with lower credit ratings typically offer higher yields to compensate investors for increased risk
- Changes in credit ratings can affect bond prices and yields
- Upgrades in credit ratings can lead to increased demand and higher bond prices (lower yields)
- Downgrades in credit ratings can result in decreased demand and lower bond prices (higher yields)

Types of bond risks

- Interest rate risk: risk that changes in interest rates will affect bond prices and yields
- When interest rates rise, bond prices generally fall, and vice versa
- Longer-term bonds more sensitive to interest rate changes than shorter-term bonds
- Credit risk: risk that bond issuer will default on obligations or experience deterioration in creditworthiness
- Default risk refers to possibility that issuer will fail to make interest or principal payments
- Credit spread risk refers to risk that yield spread between bond and benchmark (Treasury bonds) will widen due to changes in issuer's creditworthiness
- Liquidity risk: risk that investor may not be able to buy or sell bond quickly or at fair price
- Bonds with lower trading volumes or less frequent issuance may have higher liquidity risk
- During market stress or uncertainty, liquidity risk can increase, making it more difficult to transact in bonds

Duration for interest rate sensitivity

- Measure of bond's sensitivity to changes in interest rates
- Expressed in years, takes into account bond's coupon payments, yield, maturity
- Bonds with longer durations more sensitive to interest rate changes than bonds with shorter durations

- Modified duration estimates percentage change in bond's price for 1% change in interest rates
- Calculated as: $ModifiedDuration = \frac{Duration}{1 + Yield}$
- Example: if bond has modified duration of 5 and interest rates rise by 1%, bond's price expected to fall by ~5%
- Portfolio managers use duration to manage interest rate risk in bond portfolios
- Adjusting duration of portfolio can help align portfolio's sensitivity to interest rate changes with manager's expectations or risk tolerance
- Immunization strategies aim to match duration of bond portfolio with investor's investment horizon to minimize interest rate risk

Unit 6 – Stock Valuation

6.1 Common and Preferred Stock Features

Stocks are a fundamental part of finance, representing ownership in companies. Common stock offers potential for growth and voting rights, while preferred stock provides steady income and higher priority in liquidation. Understanding these differences is crucial for investors.

Both types of stocks come with unique benefits and drawbacks. Common stock allows for greater participation in a company's success, while preferred stock offers more stability. Factors like company performance, market conditions, and investor sentiment influence stock values.

Common and Preferred Stock

Characteristics of stock types

- Common stock
 - Represents ownership in a company grants the holder a proportional share of the company's assets and profits
 - Voting rights for shareholders allows them to participate in corporate decision-making (electing board of directors, approving mergers)
 - Potential for capital appreciation and dividends if the company performs well, leading to higher stock prices and possible dividend payouts
 - Lower priority in liquidation and dividend payments common stockholders are last in line to receive assets and dividends after creditors and preferred stockholders
- Preferred stock
 - Hybrid security with characteristics of both stocks and bonds combines ownership features with fixed-income attributes
 - Fixed dividend payments provide a steady stream of income, similar to bond interest payments
 - Higher priority in liquidation and dividend payments compared to common stock preferred stockholders have a greater claim on assets and dividends
 - Generally no voting rights preferred stockholders usually do not have a say in corporate governance matters

Rights of stockholders

- Common stockholders
 - Right to vote on corporate matters (electing board of directors, approving mergers) allows shareholders to influence company decisions
 - Right to receive dividends, if declared by the board of directors entitles shareholders to a portion of the company's profits
 - Right to share in the company's assets upon liquidation, after creditors and preferred stockholders are paid gives common stockholders a claim on remaining assets

- Preferred stockholders
- Right to receive fixed dividend payments before common stockholders ensures a consistent income stream
- Higher claim on assets in the event of liquidation compared to common stockholders provides greater security
- Potential for cumulative dividends (if stated) allows for the accumulation of unpaid dividends to be paid in the future
- Potential for participating dividends (if stated) grants the right to receive additional dividends beyond the fixed rate
- Potential for convertibility to common stock (if convertible preferred stock) offers the option to convert preferred shares into common shares at a predetermined ratio

Benefits and drawbacks of stocks

- Benefits of investing in common stock
- Potential for capital appreciation as the company grows and becomes more profitable stock price may increase, leading to higher returns
- Opportunity to participate in the company's success through dividend payments shareholders can benefit from the company's profitability
- Voting rights allow shareholders to have a say in corporate governance gives investors a voice in major decisions
- Drawbacks of investing in common stock
- Higher risk compared to preferred stock and bonds stock prices are more volatile and sensitive to market fluctuations
- No guaranteed dividend payments dividends are at the discretion of the board of directors and may be reduced or eliminated
- Lower priority in liquidation and dividend payments common stockholders are last in line to receive assets and dividends
- Benefits of investing in preferred stock
- Consistent, fixed dividend payments provide a reliable income stream
- Lower risk compared to common stock preferred stock prices are generally less volatile
- Higher priority in liquidation and dividend payments offers greater protection for investors
- Drawbacks of investing in preferred stock
- Limited potential for capital appreciation preferred stock prices are less likely to increase significantly
- Generally no voting rights preferred stockholders have limited influence over corporate decisions
- Callable feature may limit the upside potential if the company decides to redeem the shares the issuer can repurchase the stock at a predetermined price

Factors influencing stock value

- Factors influencing common stock value
 - Company's financial performance (revenue growth, profitability) strong financials attract investors and drive up stock prices
 - Industry trends and market conditions favorable industry outlook and market sentiment can boost stock values
 - Investor sentiment and expectations positive investor perception and confidence in the company's future prospects can increase demand for the stock
 - Dividend policy and growth prospects consistent dividend payouts and expected future growth make the stock more attractive
- Factors influencing preferred stock value
 - Credit rating of the issuing company higher credit ratings indicate lower risk and make the preferred stock more desirable
 - Prevailing interest rates lower interest rates make preferred stocks more appealing compared to fixed-income alternatives
 - Yield spread between preferred stock and other fixed-income securities a higher yield spread can attract investors seeking better returns
 - Liquidity of the preferred stock higher trading volume and ease of buying and selling can positively impact the stock's value
 - Presence of special features (callability, convertibility) these features can affect the stock's value and investor demand

6.2 Dividend Discount Models

Dividend discount models help investors estimate a stock's true value by calculating the present value of future dividends. These models assume a stock's worth equals all future dividend payments discounted to today, helping determine if it's undervalued or overvalued compared to its market price.

The constant growth model assumes dividends grow at a steady rate forever, while multi-stage models account for different growth phases. Though useful, these models have limitations, like only applying to dividend-paying stocks and relying on accurate future estimates.

Dividend Discount Models

Purpose of dividend discount models

- Estimate intrinsic value of a stock based on present value of expected future dividends
- Intrinsic value is true value based on fundamental analysis (company's financial health, growth prospects)
- Assumes stock value equals sum of all future dividend payments discounted to present (time value of money)
- Determine if stock is undervalued, overvalued, or fairly valued compared to current market price

- Undervalued: intrinsic value higher than market price, may be good investment opportunity (buy low)
- Overvalued: intrinsic value lower than market price, may not be good investment (sell high)
- Help investors make informed decisions about buying, holding, or selling a stock based on its fundamental value

Application of constant growth model

- Constant growth dividend discount model (Gordon Growth Model) assumes company's dividends grow at constant rate indefinitely
- Formula: $P_0 = \frac{D_1}{r-g}$
- P_0 : present value of stock (intrinsic value)
- D_1 : expected dividend per share next period
- r : required rate of return (discount rate)
- g : constant growth rate of dividends
- Steps to apply constant growth model: 1. Estimate expected dividend per share for next period (D_1) based on company's dividend history and future outlook 2. Determine required rate of return (r) considering investor's risk preferences and market conditions (risk-free rate, equity risk premium) 3. Estimate constant growth rate of dividends (g) using company's historical dividend growth and future expectations (sustainable growth rate) 4. Plug values into formula to calculate intrinsic value of stock (P_0) 5. Compare intrinsic value to current market price to assess if stock is undervalued, overvalued, or fairly valued

Multi-stage model for stock valuation

- Multi-stage dividend discount model used when company's dividends expected to grow at different rates over different periods
- Two-stage model assumes:
 - Initial period of high dividend growth (supernormal growth)
 - Subsequent period of stable, constant dividend growth (steady-state growth)
- Formula for two-stage model:

$$P_0 = \sum_{t=1}^n \frac{D_t}{(1+r)^t} + \frac{P_n}{(1+r)^n}$$

- P_0 : present value of stock (intrinsic value)
- D_t : expected dividend per share in year t
- r : required rate of return (discount rate)
- n : number of years in supernormal growth period
- P_n : terminal value of stock at end of supernormal growth period, calculated using constant growth model: $P_n = \frac{D_{n+1}}{r-g}$
- Steps to apply multi-stage model: 1. Estimate expected dividends per share for each year during supernormal growth period based on company's growth prospects 2. Determine required rate of return (

r) and length of supernormal growth period (n) considering company's competitive advantages and industry lifecycle 3. Estimate constant growth rate (g) for stable growth period using long-term economic growth and inflation expectations 4. Calculate terminal value (P_n) using constant growth model 5. Discount expected dividends and terminal value to present to determine intrinsic value (P_0)

Limitations of dividend discount models

- Dividends only source of value: assumes only cash flows investors receive are dividends, ignores potential capital gains from selling stock
- Constant dividend growth: assumes dividends grow at constant rate forever, may not be realistic for many companies (business cycles, competition)
- Accurate estimation of inputs: relies on accurate estimates of future dividends, required rate of return, and growth rates, which can be challenging to predict (uncertainty, market volatility)
- Sensitivity to inputs: intrinsic value highly sensitive to changes in input variables, particularly required rate of return and growth rates (small changes can lead to large differences in valuation)
- Applicable only to dividend-paying stocks: can only be used to value stocks that pay dividends, limiting usefulness for non-dividend-paying companies (growth stocks, startups)
- Use in conjunction with other valuation methods (discounted cash flow, relative valuation) and consider limitations and assumptions when making investment decisions

6.3 Price-Earnings Approach

The price-earnings (P/E) ratio is a crucial tool for stock valuation, comparing a company's market price to its earnings per share. It helps investors gauge a stock's relative value, with higher ratios suggesting growth potential and lower ratios indicating possible undervaluation.

Calculating the P/E ratio involves dividing the stock's price by its earnings per share. While useful for comparing companies within an industry or to the broader market, the P/E ratio has limitations. It doesn't account for debt, growth potential, or market sentiment, which can impact its accuracy.

Price-Earnings (P/E) Ratio

Price-earnings ratio for stock valuation

- Widely used valuation metric for stocks compares current market price to earnings per share (EPS)
- Helps investors determine relative value of a stock
- Higher P/E ratio suggests investors willing to pay more for each dollar of earnings (growth stocks like Amazon)
- Lower P/E ratio may indicate stock is undervalued or investors less optimistic about growth prospects (value stocks like Procter & Gamble)
- Used to compare valuation of a stock to industry peers (tech sector) and broader market (S&P 500)

Calculation of P/E ratio

- Divide current market price per share by earnings per share to calculate P/E ratio
- Stock trading at \$50 per share with EPS of \$5 has P/E ratio of 10 ($\$50 \div \5)

- Earnings per share (EPS) calculated by dividing company's net income by number of outstanding shares

$$EPS = \frac{\text{Net Income}}{\text{Number of Outstanding Shares}}$$

- P/E ratio can be calculated using either trailing twelve months (TTM) earnings or projected future earnings

Interpretation of P/E ratios

- Compare company's P/E ratio to industry peers to determine relative valuation
- Higher P/E ratio compared to peers may suggest company is overvalued or has higher growth expectations (Netflix vs traditional media companies)
- Lower P/E ratio compared to peers may indicate company is undervalued or has lower growth prospects (Ford vs Tesla)
- Compare P/E ratio to broader market (S&P 500) to assess valuation relative to overall market
- Different industries may have different average P/E ratios due to unique characteristics and growth prospects
- Technology companies often have higher P/E ratios than utility companies (Microsoft vs Duke Energy)

Limitations of P/E approach

- Does not account for company's debt, which can impact financial health and growth prospects
- Based on historical or projected earnings, which may not accurately reflect future performance
- Changes in accounting policies, one-time events (asset sales), or economic conditions can distort earnings and affect P/E ratio
- Does not consider company's growth potential or sustainability of earnings
- High P/E ratio may be justified if company expected to grow earnings significantly in future (Amazon in early years)
- Can be influenced by market sentiment and may not always reflect intrinsic value of company
- Comparing P/E ratios across different industries or sectors may not be meaningful due to differences in characteristics and growth prospects (tech vs utilities)

6.4 Market Efficiency and Behavioral Finance

Market efficiency and behavioral finance are key concepts in understanding how financial markets operate. These ideas challenge traditional assumptions about investor rationality and market pricing, offering insights into why markets may not always behave as expected.

Behavioral finance explains why investors sometimes make irrational decisions, leading to market anomalies. By recognizing common biases like overconfidence and herding, investors can make more informed choices and potentially avoid costly mistakes in their financial decision-making.

Market Efficiency

Forms of market efficiency

- Weak form efficiency
 - Prices reflect all past price and trading volume data
 - Technical analysis of historical data cannot generate abnormal returns consistently
 - Example: Analyzing stock price charts (candlestick patterns) to predict future prices
- Semi-strong form efficiency
 - Prices incorporate all publicly available information, including historical data and fundamental information (financial statements, economic reports)
 - Fundamental analysis using public information cannot yield excess returns consistently
 - Example: Analyzing a company's earnings reports and industry trends to select stocks
- Strong form efficiency
 - Prices reflect all public and private (insider) information
 - No investor can consistently earn abnormal returns, even with access to insider information
 - Example: Insider trading laws prohibit trading on material non-public information

Implications of efficient markets

- For investors:
 - Challenging to consistently beat the market and generate abnormal returns
 - Passive investing strategies (index funds, ETFs) may outperform active management
 - Diversifying investments helps reduce unsystematic (company-specific) risk
 - Example: Investing in a broad market index fund (S&P 500) instead of selecting individual stocks
- For financial managers:
 - Market value of a company reflects its intrinsic value in an efficient market
 - Focus on maximizing shareholder value through positive NPV investment projects
 - Timing the issuance of securities (bonds, stocks) is less critical, as prices rapidly adjust to new information
 - Example: Evaluating a project's NPV using the company's cost of capital as the discount rate

Behavioral Finance

Concepts in behavioral finance

- Combines insights from psychology and economics to understand investor behavior and market anomalies
- Bounded rationality: Investors have limited cognitive resources and time for decision-making

- Heuristics: Mental shortcuts used to simplify complex investment decisions (rule of thumb)
- Framing: The way information is presented influences investor choices
- Prospect theory: Investors are loss-averse and make decisions based on potential gains and losses relative to a reference point
- These concepts help explain why investors may make suboptimal decisions and how behavioral biases can lead to market inefficiencies and mispricing

Behavioral biases and market effects

- Overconfidence bias
- Investors overestimate their skills and the precision of their predictions
- Leads to excessive trading, risk-taking, and underestimating the role of luck
- Example: Overtrading and holding undiversified portfolios
- Confirmation bias
- Investors seek information that confirms their preexisting beliefs and disregard conflicting evidence
- Causes investors to hold losing positions too long, reinforcing their views
- Example: Ignoring negative news about a stock they own
- Herding behavior
- Investors mimic the actions of others, leading to market trends and bubbles
- Prices can deviate significantly from fundamental values
- Example: Dot-com bubble of the late 1990s
- Anchoring bias
- Investors rely too heavily on an initial piece of information (anchor) when making decisions
- Causes underreaction to new information that contradicts the anchor
- Example: Basing stock valuation on outdated earnings figures
- Disposition effect
- Investors sell winning investments prematurely and hold losing investments too long
- Leads to suboptimal portfolio performance and tax inefficiencies
- Example: Selling a stock after a small gain but holding a losing stock, hoping for a rebound

Unit 7 – Capital Budgeting

7.1 Capital Budgeting Process and Techniques

Capital budgeting is a crucial process for evaluating and selecting long-term investments that align with a company's goals. It involves analyzing potential projects, determining which will yield the best returns, and efficiently allocating limited resources to maximize shareholder value.

The capital budgeting process includes generating investment proposals, analyzing and evaluating them, selecting the best options, and implementing and monitoring chosen investments. Key techniques used include Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period, and Profitability Index (PI).

Capital Budgeting Overview

Importance of capital budgeting

- Evaluates and selects long-term investments aligning with company's strategic goals
- Analyzes potential projects or investments
- Determines investments yielding the most return over applicable period
- Crucial for several reasons
- Allocates limited resources efficiently
- Ensures selected investments align with company objectives
- Maximizes shareholder value
- Supports long-term financial planning and decision-making

Steps in capital budgeting

1. Generating investment proposals - Identifies potential investment opportunities - Gathers relevant information and data
2. Analyzing and evaluating investment proposals
 - Estimates cash flows associated with each investment - Assesses risk and uncertainty - Applies appropriate capital budgeting techniques
3. Selecting investments based on evaluation results - Compares investment alternatives
 - Chooses projects meeting or exceeding company's required rate of return
4. Implementing and monitoring selected investments - Executes chosen projects - Tracks progress and performance - Makes necessary adjustments based on changes in circumstances

Capital Budgeting Techniques

Techniques for capital budgeting

- Net Present Value (NPV)
- Calculates present value of project's future cash inflows and outflows

- Considers time value of money
- Positive NPV indicates profitable investment
- Internal Rate of Return (IRR)
- Represents discount rate making NPV of project equal to zero
- Measures project's expected rate of return
- Projects with IRR higher than required rate of return considered acceptable
- Payback Period
- Determines length of time required to recover initial investment
- Does not consider time value of money or cash flows beyond payback period
- Shorter payback periods generally preferred (1-3 years)
- Profitability Index (PI)
- Measures ratio of present value of future cash inflows to initial investment
- PI greater than 1 indicates profitable investment
- Useful for ranking projects when capital is limited

Application of budgeting techniques

- Gather relevant data for investment project
- Initial investment cost
- Expected cash inflows and outflows
- Project duration (5-10 years)
- Required rate of return (10-15%)
- Calculate NPV
- Discount future cash flows using required rate of return
- Subtract initial investment from sum of discounted cash flows
-

$$NPV = \sum_{t=1}^n \frac{CF_t}{(1+r)^t} - InitialInvestment$$

- Calculate IRR
- Set NPV equation equal to zero and solve for discount rate
- Compare IRR to required rate of return
- Calculate Payback Period
- Determine number of periods required to recover initial investment
- Calculate Profitability Index

- Divide present value of future cash inflows by initial investment
- $PI = \frac{\text{Present Value of Future Cash Inflows}}{\text{Initial Investment}}$
- Make investment decisions based on results of applied techniques
- Consider company's strategic goals and risk tolerance
- Select projects with positive NPVs, IRRs exceeding required rate of return, and/or high PIs (>1.2)

7.2 Net Present Value and Internal Rate of Return

Net Present Value (NPV) and Internal Rate of Return (IRR) are crucial tools for evaluating investment opportunities. NPV calculates the present value of future cash flows, while IRR determines the rate that makes NPV zero. Both help assess project profitability.

These methods have strengths and limitations. NPV is generally more reliable, measuring absolute value in dollars. IRR provides a percentage return but can be misleading for comparing projects. Understanding both helps make informed investment decisions.

Net Present Value (NPV)

Net present value calculation

- NPV sums all future cash flows discounted to present value
- Discounting accounts for time value of money (a dollar today is worth more than a dollar in the future)
- Discount rate represents required rate of return or cost of capital (hurdle rate)
- NPV formula:

$$NPV = \sum_{t=0}^n \frac{CF_t}{(1+r)^t}$$

- CF_t cash flow at time t
- r discount rate
- n number of periods
- Calculating NPV involves: 1. Determine expected cash flows for each period (inflows and outflows) 2. Choose appropriate discount rate (based on risk and opportunity cost) 3. Discount each cash flow to present using discount rate 4. Sum all discounted cash flows and subtract initial investment

NPV rule for investment decisions

- NPV rule: accept project if NPV positive, reject if NPV negative
- Positive NPV indicates project generates returns greater than cost of capital (creates value)
- Negative NPV suggests insufficient returns to cover cost of capital (destroys value)
- When comparing mutually exclusive projects, choose project with highest positive NPV
- NPV assumes cash flows reinvested at discount rate, which may not always be realistic (reinvestment rate assumption)

Internal Rate of Return (IRR)

Internal rate of return determination

- IRR is discount rate that makes NPV of project equal to zero
- Represents expected rate of return generated by project (breakeven rate)
- IRR formula:

$$0 = \sum_{t=0}^n \frac{CF_t}{(1 + IRR)^t}$$

- Calculating IRR involves: 1. Set NPV equation equal to zero 2. Solve for discount rate (IRR) using trial and error or financial calculator
- IRR assumes cash flows reinvested at project's IRR, which may not always be realistic

NPV vs IRR in capital budgeting

- Both NPV and IRR evaluate financial viability of investment projects
- NPV measures absolute value in monetary terms (dollars), IRR measures rate of return (percentage)
- NPV generally considered more reliable because:
 - Accounts for time value of money
 - Assumes cash flows reinvested at cost of capital, more realistic
 - IRR may give inconsistent results when comparing mutually exclusive projects with different:
 - Cash flow patterns (timing of inflows and outflows)
 - Project sizes (scale of investment)
 - When NPV and IRR conflict, prioritize NPV
- Use both methods with other factors like strategic fit and risk when making capital budgeting decisions

7.3 Payback Period and Profitability Index

The payback period and profitability index are crucial tools for evaluating investment projects. The payback period measures how quickly an investment can be recovered, while the profitability index compares the present value of future cash flows to the initial investment.

Both methods have their strengths and weaknesses. The payback period is simple but ignores long-term profitability, while the profitability index considers the time value of money but assumes projects are divisible. Understanding these tools helps make informed investment decisions.

Payback Period

Payback period calculation

- Determines the length of time required to recover the initial investment in a project
- Calculated by dividing the initial investment by the annual cash inflow (*Initial Investment ÷ Annual Cash Inflow*)

- For projects with uneven cash flows, calculate the cumulative cash inflow for each year until it equals or exceeds the initial investment
- The year in which this occurs is the payback period (3 years for a project with cash inflows of \$10,000, \$15,000, and \$20,000 and an initial investment of \$40,000)

Payback period pros and cons

- Advantages include simplicity, quick assessment of liquidity and risk, and preference for projects with fast cash inflow generation (Project A with a 2-year payback vs. Project B with a 4-year payback)
- Disadvantages include disregard for cash flows beyond the payback period, lack of consideration for the time value of money, and failure to measure overall profitability
- May result in suboptimal investment decisions (choosing a project with a shorter payback but lower total cash inflows)

Profitability Index

Profitability index computation

- Calculates the ratio of the present value of future cash inflows to the initial investment ($PV \text{ of Future Cash Inflows} \div \text{Initial Investment}$)
- Present value is determined using an appropriate discount rate (10% discount rate for a project with \$100,000 in future cash inflows and a \$75,000 initial investment results in a PI of 1.33)
- A PI greater than 1 indicates a profitable project, with higher PIs being more attractive (Project A with a PI of 1.5 vs. Project B with a PI of 1.2)

Project ranking with PI

- When capital is constrained, projects should be ranked by their PI and selected in descending order until the capital budget is exhausted
- Allows for comparison of projects with varying initial investments and cash inflows (Project A with a \$50,000 investment and a PI of 1.8 vs. Project B with a \$100,000 investment and a PI of 1.6)
- Maximizes the total net present value for the given capital constraint
- Limitations include the assumption that projects are divisible and can be partially invested in, and potential disregard for project interdependencies or strategic considerations

7.4 Capital Rationing and Risk Analysis in Capital Budgeting

Capital rationing is a crucial concept in finance where companies face limited funds for investment projects. This constraint forces businesses to prioritize and select the most beneficial opportunities, balancing potential growth with financial limitations.

To tackle capital rationing, firms use techniques like the profitability index and internal rate of return. These methods help rank projects based on their financial merits, ensuring optimal allocation of scarce resources and maximizing shareholder value.

Capital Rationing

Concept of capital rationing

- Refers to the limitation of funds available for investment projects due to financial constraints
- Occurs when a company has more profitable investment opportunities than available capital (cash, debt capacity)
- Forces the company to prioritize and select the most beneficial projects based on their financial merits
- Implications of capital rationing include inability to invest in all profitable projects, potential loss of future growth opportunities (market share, competitive advantage), and increased importance of project selection and resource allocation to maximize shareholder value

Techniques for capital allocation

- Profitability index (PI) method calculates the ratio of the present value of future cash inflows to the initial investment, with projects ranked based on their PI and higher PI projects given priority
- Formula: $PI = \frac{\text{Present Value of Future Cash Inflows}}{\text{Initial Investment}}$
- Example: Project A with PI of 1.5 would be prioritized over Project B with PI of 1.2
- Internal rate of return (IRR) method determines the discount rate that makes the net present value (NPV) of a project equal to zero, with projects prioritized based on higher IRRs
- IRR is compared to the required rate of return or cost of capital (hurdle rate) to assess project attractiveness
- Example: Project A with IRR of 20% would be preferred over Project B with IRR of 15% if the cost of capital is 12%
- Combination of NPV and PI methods involves first ranking projects based on their positive NPV and then using PI to prioritize resource allocation among the positive NPV projects
- Ensures that only value-creating projects are considered and optimizes the allocation of limited funds
- Example: Among projects with positive NPV, those with higher PI would receive funding priority

Risk Analysis in Capital Budgeting

Types of investment risks

- Business risk arises from uncertainty in the projected cash flows due to changes in market conditions (demand, price), competition, or technological advancements
- Financial risk arises from the use of debt financing, which magnifies the variability of returns to shareholders (financial leverage)
- Liquidity risk refers to the difficulty in converting the investment into cash without significant loss of value (illiquid assets)
- Political and regulatory risk stems from changes in government policies, regulations (taxes, tariffs), or political instability that may affect the project's viability

Risk analysis in capital budgeting

- Sensitivity analysis assesses the impact of changes in key variables (revenue, costs) on the project's profitability, helping identify the most critical variables that affect the project's success
- Provides a range of possible outcomes based on variations in input variables (best case, worst case)
- Example: Analyzing the impact of a 10% change in sales volume on the project's NPV
- Scenario analysis evaluates the project's performance under different sets of assumptions or scenarios (base case, best case, worst case), helping understand the potential outcomes and their likelihood of occurrence
- Example: Developing scenarios based on different market growth rates and analyzing their impact on the project's IRR
- Monte Carlo simulation is a computerized technique that generates multiple random scenarios based on probability distributions of input variables, providing a more comprehensive view of project risk by considering the interrelationships among variables
- Helps in estimating the probability distribution of the project's NPV or IRR
- Example: Running 1,000 simulations to determine the likelihood of the project achieving a target NPV

Unit 8 – Cost of Capital

8.1 Components of Cost of Capital

The cost of capital is a crucial concept in finance, representing the minimum return a company must earn to satisfy investors. It serves as a benchmark for evaluating investment opportunities and making financial decisions. Understanding this concept is essential for maximizing shareholder value.

Companies use the cost of capital to determine which projects to pursue and how to finance them. It comprises the costs of debt, preferred stock, and common equity, weighted based on their proportions in the company's capital structure. Calculating these components involves various formulas and models, such as CAPM and DGM.

Cost of Capital

Importance of cost of capital

- Represents the minimum rate of return a company must earn on investments to satisfy investors (shareholders, bondholders)
- Serves as a benchmark to evaluate investment opportunities and make financial decisions
- Projects generating returns above the cost of capital create value for the company (positive net present value)
- Projects with returns below the cost of capital destroy value and should be avoided (negative net present value)
- Helps determine the optimal capital structure by minimizing the overall cost of financing

Components of cost of capital

- Cost of debt represents the interest rate paid on borrowed funds adjusted for tax deductibility of interest expenses
- Cost of preferred stock refers to the dividends paid to preferred stockholders expressed as a percentage of the preferred stock's market price
- Cost of common equity is the required rate of return for common stockholders estimated using models such as CAPM or DGM
- Weighted average cost of capital (WACC) combines the costs of debt, preferred stock, and common equity weighted based on their proportions in the company's capital structure (debt-to-equity ratio)

Calculation of capital costs

- Cost of debt formula: $\frac{\text{Interest rate} \times (1 - \text{Tax rate})}{\text{Market price of debt}}$
- Cost of preferred stock formula: $\frac{\text{Annual preferred dividend}}{\text{Market price of preferred stock}}$
- Cost of common equity using CAPM: $\text{Risk-free rate} + \beta \times (\text{Market risk premium})$
- Risk-free rate represents the return on government securities with no default risk (Treasury bills)
- Beta measures a stock's sensitivity to market movements (volatility)

- Market risk premium is the difference between the expected return on the market portfolio and the risk-free rate (S&P 500 return minus Treasury bill rate)

- Cost of common equity using DGM:
 $\frac{\text{Expected dividend per share}}{\text{Current market price per share}} + \text{Expected dividend growth rate}$

Risk vs cost of capital

1. Higher risk is associated with higher required returns for investors to compensate for the increased uncertainty
2. Cost of debt is generally lower than the cost of equity because: - Debt holders have a prior claim on a company's assets and earnings (seniority) - Interest payments are tax-deductible, reducing the effective cost of debt (tax shield)
3. Cost of preferred stock is typically higher than the cost of debt but lower than the cost of common equity since: - Preferred stockholders have a higher claim on assets and earnings than common stockholders (preference) - Preferred dividends are not tax-deductible, increasing the effective cost
4. Cost of common equity is the highest among the three components because: - Common stockholders bear the highest risk as residual claimants on a company's assets and earnings (subordination) - Higher risk requires a higher rate of return to compensate common stockholders (risk-return tradeoff)

8.2 Weighted Average Cost of Capital (WACC)

The Weighted Average Cost of Capital (WACC) is a crucial financial metric that blends the costs of a company's various funding sources. It's the minimum return a firm must earn on investments to satisfy all capital providers, balancing debt's tax benefits with equity's flexibility.

WACC calculation involves weighing each capital source by its market value proportion. It's used as a benchmark for investment decisions, helping companies determine if projects will create or destroy value. The optimal capital structure minimizes WACC, maximizing firm value.

Weighted Average Cost of Capital (WACC)

Weighted average cost of capital

- Represents the overall cost of financing for a company by considering the costs of all sources of capital (debt, preferred stock, and common equity)
- Calculated by weighting each source of capital by its proportion in the capital structure based on market values, not book values
- Expressed as a percentage or rate and represents the minimum rate of return a company must earn on its investments to satisfy all capital providers (creditors and shareholders)

Calculation of WACC components

- WACC formula: $WACC = w_d r_d (1 - t) + w_p r_p + w_e r_e$
- w_d , w_p , and w_e are the weights of debt, preferred stock, and common equity, respectively
- r_d , r_p , and r_e are the costs of debt, preferred stock, and common equity, respectively
- t is the corporate tax rate

- Calculate weights by determining market values of debt, preferred stock, and common equity and dividing each component by total market value of firm's capital
- Cost of debt (r_d) is yield to maturity on company's debt, adjusted for tax deductibility of interest payments using $(1 - t)$
- Cost of preferred stock (r_p) is preferred dividend divided by market price of preferred stock
- Cost of common equity (r_e) can be estimated using Capital Asset Pricing Model (CAPM) or Dividend Growth Model (DGM)

WACC as minimum return requirement

- Represents opportunity cost of investing in a company as investors expect to earn a return that compensates them for the risk they take
- Companies should only invest in projects that offer a return higher than WACC to avoid destroying shareholder value
- Used as discount rate for evaluating investment opportunities to determine net present value (NPV) and internal rate of return (IRR) of projects

Capital structure vs WACC

- Capital structure refers to mix of debt and equity financing used by a company
- Changes in capital structure can affect WACC: 1. Increasing debt proportion initially lowers WACC due to tax benefits and lower cost of debt, but excessive debt increases financial risk and cost of equity, leading to higher WACC 2. Increasing equity proportion reduces financial risk but may increase WACC due to higher cost of equity
- Optimal capital structure minimizes WACC by balancing benefits and costs of debt and equity financing to maximize firm value by minimizing cost of financing

8.3 Marginal Cost of Capital

The marginal cost of capital is crucial for evaluating new investment projects. It represents the cost of raising additional funds, helping firms determine if a project's returns exceed financing costs. This concept is key for making smart capital budgeting decisions.

Unlike the weighted average cost of capital, which looks at existing financing, the marginal cost focuses on new capital. By constructing a marginal cost schedule, firms can see how costs change as they raise more money, guiding them in choosing the best financing options for projects.

Marginal Cost of Capital

Marginal cost of capital concept

- Marginal cost of capital (MCC) represents the cost of raising an additional dollar of capital for a firm
- Calculated as the weighted average cost of the last dollar of new capital raised (debt or equity)
- MCC plays a crucial role in capital budgeting decisions for evaluating investment projects
- Determines the required rate of return for assessing the feasibility of new projects

- Projects generating returns higher than the MCC are considered viable and create value for the firm (positive NPV)

Weighted average vs marginal cost

- Weighted average cost of capital (WACC) represents the overall cost of a firm's existing capital structure
- Calculated using the proportions and costs of debt and equity already in the firm's capital structure (historical)
- Marginal cost of capital (MCC) focuses on the cost of raising new or additional capital for the firm
- Reflects the cost of the next dollar of capital raised, which may differ from the existing WACC (forward-looking)
- MCC is more relevant for evaluating new investment projects as it represents the current cost of raising incremental capital needed for financing the project

Construction of marginal cost schedule

- A marginal cost of capital schedule shows the cost of raising additional capital at different levels of financing for a firm
- Steps to construct an MCC schedule: 1. Identify the firm's available financing options (debt, preferred stock, common stock) 2. Determine the cost of each financing option:
 - Cost of debt: $k_d = \frac{\text{Interest}}{\text{Net proceeds}} \times (1 - t)$, where t is the marginal tax rate
 - Cost of preferred stock: $k_p = \frac{\text{Preferred dividends}}{\text{Net proceeds}}$
 - Cost of common stock: $k_s = \frac{D_1}{P_0} + g$ (dividend growth model) or $k_s = R_f + \beta(R_m - R_f)$ (CAPM) 3. Arrange the financing options in ascending order of their respective costs (cheapest to most expensive)
- 4. Determine the amount of capital that can be raised from each financing source (debt capacity, stock issuance) 5. Calculate the weighted average cost for each incremental level of financing (MCC at different capital levels)
- The resulting MCC schedule shows the cost of capital for different levels of capital raised by the firm

Application in investment evaluation

- Compare the internal rate of return (IRR) of an investment project with the marginal cost of capital (MCC)
- If $IRR > MCC$, the project is feasible and should be accepted (generates returns above financing cost)
- If $IRR < MCC$, the project is not feasible and should be rejected (returns insufficient to cover financing cost)
- Use the net present value (NPV) method with MCC as the discount rate for project cash flows
- Calculate the present value of the project's cash flows using the MCC as the discount rate
- If $NPV > 0$, the project is feasible and creates value for the firm (positive net value)
- If $NPV < 0$, the project is not feasible and should be rejected (destroys value)

- MCC helps ensure that the firm invests in projects that generate returns higher than the cost of raising additional capital to finance them

8.4 Applying Cost of Capital in Decision Making

Cost of capital plays a crucial role in capital budgeting and project valuation. It sets the minimum required return for investments, helping companies decide which projects to pursue. By comparing a project's expected returns to the cost of capital, firms can determine if it will create or destroy shareholder value.

Changes in cost of capital significantly impact investment decisions. A higher cost of capital makes fewer projects viable, while a lower cost opens up more opportunities. Companies must regularly update their cost of capital to ensure investment choices align with current market conditions and shareholder expectations.

Capital Budgeting and Project Valuation

Role of cost of capital

- Represents minimum required rate of return for company's investments
- Reflects riskiness of company's cash flows and opportunity cost of investing in project (bonds, stocks)
- Serves as benchmark to evaluate profitability and feasibility of investment projects
- Projects with returns exceeding cost of capital create value for shareholders (positive NPV)
- Projects with returns below cost of capital destroy shareholder value (negative NPV)
- Helps allocate limited financial resources to most promising investment opportunities
- Ensures company invests in projects that generate sufficient returns to compensate investors for risk they bear (risk-return tradeoff)

Cost of capital for NPV

- Net present value (NPV) is sum of project's discounted future cash flows minus initial investment
- NPV formula:

$$NPV = \sum_{t=1}^n \frac{CF_t}{(1+r)^t} - InitialInvestment$$

- CF_t : Cash flow at time t (revenue, expenses)
- r : Discount rate (cost of capital)
- n : Project's life span (years)
- Discounting future cash flows using cost of capital accounts for time value of money and project's riskiness
- Time value of money: \$1 today is worth more than \$1 in future due to earning potential (interest, investments)
- Riskiness: Higher risk projects require higher returns to compensate investors (startup vs established company)
- Positive NPV indicates project generates returns above cost of capital, creating value for company

- Example: NPV of \$100,000 means project is expected to increase company's value by \$100,000
- Negative NPV suggests project's returns are insufficient to compensate for risk, destroying value
- Example: NPV of -\$50,000 means project is expected to decrease company's value by \$50,000

Cost of capital as hurdle rate

- Hurdle rate is minimum acceptable rate of return for investment project
- Often set equal to company's cost of capital (WACC)
- Compare project's internal rate of return (IRR) to hurdle rate to assess profitability
- IRR is discount rate that sets project's NPV equal to zero (breakeven point)
- If $IRR > \text{Hurdle rate}$, project is expected to create value and should be accepted
- Example: IRR of 15% vs hurdle rate of 10% means project generates returns above required rate
- If $IRR < \text{Hurdle rate}$, project is not expected to generate sufficient returns and should be rejected
- Example: IRR of 8% vs hurdle rate of 12% means project fails to meet minimum required return
- Using cost of capital as hurdle rate ensures company only invests in projects that meet or exceed its required rate of return
- Aligns investment decisions with shareholders' expectations (maximizing shareholder value)

Impact of Cost of Capital Changes on Investment Decisions

Impact of cost of capital changes

- Increase in cost of capital leads to higher discount rate, reducing present value of future cash flows 1. Reassess investment decisions and prioritize projects with higher returns 2. Some projects that were previously viable may become unprofitable due to higher required rate of return
- Example: Project with IRR of 12% becomes unviable if cost of capital increases from 10% to 14%
- Decrease in cost of capital results in lower discount rate, increasing present value of future cash flows 1. Projects that were previously rejected may become viable as required rate of return decreases
- Example: Project with IRR of 9% becomes viable if cost of capital decreases from 11% to 8% 2. Company may have opportunity to invest in broader range of projects and expand investment portfolio
- Changes in cost of capital can be caused by various factors
- Shifts in market interest rates (Federal Reserve monetary policy)
- Changes in company's capital structure (debt-to-equity ratio)
- Variations in perceived riskiness of company or its industry (economic conditions, competition)
- Regularly reviewing and updating cost of capital is crucial for making informed investment decisions and adapting to changing market conditions
- Ensures investment decisions align with current financial realities and shareholder expectations

Unit 9 – Capital Structure Decisions

9.1 Capital Structure Theories

Capital structure theories explore how firms choose between debt and equity financing. The Modigliani-Miller theorem suggests a firm's value is unaffected by its financing mix under perfect market conditions. This challenges traditional views on the importance of debt-equity ratios.

Other theories consider real-world factors. The trade-off theory balances tax benefits of debt against bankruptcy costs. The pecking order theory proposes firms prefer internal funds, then debt, and lastly equity due to information asymmetry concerns.

Modigliani-Miller Theorem and Trade-Off Theory

Modigliani-Miller theorem implications

- Modigliani-Miller (MM) theorem asserts a firm's value is unaffected by its capital structure choice between debt and equity financing
- Assumes idealized conditions of perfect capital markets, absence of taxes, transaction costs, and bankruptcy costs
- Implies the weighted average cost of capital (WACC) stays constant irrespective of the debt-to-equity ratio (leverage)
- MM Proposition I: The market value of a levered firm equals the market value of an unlevered firm with identical assets and cash flows
- $V_L = V_U$, where V_L represents the value of a levered firm and V_U represents the value of an unlevered firm (no debt)
- MM Proposition II: The cost of equity rises linearly with the debt-to-equity ratio due to increased financial risk for equity holders
- $r_E = r_0 + (r_0 - r_D) \times (D/E)$, where r_E denotes the cost of equity, r_0 denotes the cost of equity for an unlevered firm, r_D denotes the cost of debt, and D/E represents the debt-to-equity ratio
- Implications suggest capital structure decisions are irrelevant in perfect markets, challenging traditional views on the importance of debt and equity mix

Trade-off theory of capital structure

- Trade-off theory posits firms balance the tax benefits of debt financing against the costs of potential financial distress to arrive at an optimal capital structure
- Benefits of debt include tax deductibility of interest payments, creating a tax shield that increases cash flow
- Costs of debt encompass financial distress costs, such as direct bankruptcy costs (legal and administrative fees) and indirect costs (loss of customers, suppliers, and employees)
- Firms should take on additional debt until the marginal tax benefit equals the marginal cost of financial distress at the optimal point
- Key assumptions of the trade-off theory:

- Presence of corporate taxes and potential bankruptcy costs in imperfect markets
- Firms have a target debt-to-equity ratio they aim to maintain
- Firms adjust their capital structure over time to converge towards the target ratio (dynamic trade-off)
- Implies a moderate level of debt is optimal, as excessive debt increases the likelihood of financial distress and reduces firm value

Pecking Order Theory and Comparison of Capital Structure Theories

Pecking order theory in financing

- Pecking order theory argues firms follow a hierarchy of financing preferences based on the principle of least effort or resistance
- Hierarchy of financing sources: internal funds (retained earnings) > debt financing > equity financing
- Firms prioritize internal financing and only resort to external financing when necessary, issuing debt before considering equity
- Equity issuance is the last resort due to the perceived information asymmetry between managers and outside investors
- Managers possess inside information about the firm's prospects and may time equity issues when shares are overvalued
- Investors interpret equity issues as a signal of overvaluation, leading to a decline in share price (negative signaling effect)
- Implications of the pecking order theory:
 - Firms do not have a specific target debt-to-equity ratio, as financing decisions are driven by the availability of internal funds and the need for external financing
 - Profitable firms with ample retained earnings tend to have lower debt ratios, as they can finance investments internally
 - High-growth firms may have higher debt ratios, as their investment needs exceed internally generated funds, requiring debt financing

Comparison of capital structure theories

- Modigliani-Miller theorem:
 - Based on perfect capital market assumptions, including no taxes or bankruptcy costs
 - Argues capital structure is irrelevant to firm value, as investors can replicate any capital structure through personal borrowing or lending
- Trade-off theory:
 - Incorporates taxes and bankruptcy costs, recognizing the tax benefits and financial distress costs of debt
 - Suggests an optimal capital structure that maximizes firm value by balancing the marginal tax benefits and marginal bankruptcy costs
- Pecking order theory:

- Focuses on information asymmetry between managers and investors and the resulting signaling effects of financing decisions
- Proposes a financing hierarchy based on the principle of least effort, with a preference for internal funds and debt over equity
- Key differences among the theories:
 - MM theorem assumes perfect markets, while trade-off and pecking order theories acknowledge market imperfections (taxes, bankruptcy costs, information asymmetry)
 - Trade-off theory implies a target debt-to-equity ratio, while pecking order theory suggests financing decisions are driven by the availability of internal funds and the need for external financing
 - Pecking order theory emphasizes the role of information asymmetry and signaling effects in financing decisions, while trade-off theory focuses on the tax benefits and financial distress costs of debt

9.2 Optimal Capital Structure

Finding the right mix of debt and equity is crucial for companies. It's all about balancing the benefits of cheaper debt with the flexibility of equity. Get it right, and you'll minimize costs while maximizing value.

Factors like industry norms, company size, and economic conditions all play a role. Debt offers tax benefits but increases risk. Equity is safer but more expensive. The goal? Minimize the overall cost of capital and boost shareholder value.

Optimal Capital Structure

Optimal capital structure fundamentals

- Optimal capital structure represents the ideal mix of debt and equity financing that maximizes a firm's value while minimizing its cost of capital
- Achieving the optimal capital structure is essential for firms because it:
 - Minimizes the weighted average cost of capital (WACC), lowering the overall cost of financing
 - Maximizes the value of the firm, increasing shareholder wealth
 - Enhances the firm's ability to invest in value-creating projects, supporting growth and expansion
 - Improves the firm's financial stability and flexibility, reducing the risk of financial distress

Factors of capital structure

- Industry characteristics and norms influence capital structure decisions
 - Capital-intensive industries (manufacturing) often have higher debt ratios due to the need for significant investments in property, plant, and equipment
 - Industries with stable cash flows (utilities) can support more debt because of their predictable revenue streams
- Firm-specific factors play a crucial role in determining the optimal capital structure
 - Size and age of the firm: larger and more established firms often have better access to debt financing

- Growth opportunities and investment needs: high-growth firms may rely more on equity to fund expansion
- Profitability and cash flow stability: profitable firms with stable cash flows can support higher debt levels
- Asset tangibility: firms with more tangible assets (real estate) can use them as collateral for debt financing
- Macroeconomic factors impact the availability and cost of different financing options
- Interest rates: higher interest rates make debt financing more expensive
- Tax rates and tax shields: higher corporate tax rates increase the value of the tax shield provided by debt financing
- Inflation rates: high inflation can erode the real value of debt obligations over time
- Agency costs arise from conflicts of interest between different stakeholders
- Conflicts between shareholders and managers: managers may pursue projects that benefit them personally rather than maximizing shareholder value
- Conflicts between shareholders and bondholders: shareholders may take on riskier projects, potentially harming bondholders' interests

Debt vs equity financing

- Debt financing offers several benefits
- Tax deductibility of interest payments creates a tax shield, reducing the effective cost of debt
- Lower cost compared to equity, as debt holders have a prior claim on the firm's assets and cash flows
- Maintains ownership and control for existing shareholders, as debt financing does not dilute equity ownership
- However, debt financing also carries costs
- Increased financial risk and potential for bankruptcy if the firm is unable to meet its debt obligations
- Restrictive covenants imposed by debt holders can reduce the firm's flexibility in making strategic decisions
- Agency costs between shareholders and bondholders may arise if shareholders pursue riskier projects
- Equity financing provides unique advantages
- No fixed obligations or financial risk, as equity holders are residual claimants on the firm's cash flows
- Provides a permanent source of capital, as equity does not have a maturity date
- Signals confidence in the firm's prospects, as investors are willing to become part-owners of the company
- Nonetheless, equity financing also has its drawbacks
- Higher cost compared to debt, as equity holders require a higher return to compensate for the additional risk they bear

- Dilution of ownership and control for existing shareholders, as new equity issues reduce their proportional ownership
- Agency costs between shareholders and managers may occur if managers pursue their own interests rather than those of shareholders

WACC in capital structure

- WACC represents the minimum return a company must earn on its existing assets to satisfy its creditors, owners, and other providers of capital
- The formula for calculating WACC is: $WACC = (E/V) * R_e + (D/V) * R_d * (1 - T_c)$
- E represents the market value of the firm's equity
- D represents the market value of the firm's debt
- V equals $E + D$, representing the total market value of the firm's financing
- R_e is the cost of equity
- R_d is the cost of debt
- T_c represents the corporate tax rate
- WACC serves as the discount rate for evaluating investment projects and determining the firm's value
- Optimal capital structure is achieved when WACC is minimized, and the firm's value is maximized
- Changes in capital structure, such as altering the mix of debt and equity, affect WACC and, consequently, the firm's value
- Firms should strive to find the right balance between debt and equity to optimize their capital structure and minimize WACC, taking into account the various factors and costs associated with each financing option

9.3 Leverage and Financial Risk

Financial leverage is a double-edged sword in corporate finance. It involves using debt to fund operations and investments, which can amplify both gains and losses for shareholders. The impact on firm performance depends on economic conditions and the company's ability to manage debt.

Understanding financial leverage is crucial for assessing a company's risk profile. Higher leverage increases financial risk, making firms more vulnerable to economic downturns and interest rate fluctuations. However, it can also boost returns during favorable periods, making it a key consideration in capital structure decisions.

Financial Leverage and Risk

Financial leverage and firm performance

- Financial leverage refers to using debt financing in a firm's capital structure to fund operations and investments
- Debt financing includes borrowing money through loans (bank loans), bonds (corporate bonds), or other debt instruments (commercial paper)
- Financial leverage impacts a firm's risk and return:

- Increases the variability of returns to shareholders amplifies potential gains and losses
- Amplifies potential losses during economic downturns (recessions) increases risk of financial distress and bankruptcy
- Magnifies potential returns to shareholders during favorable economic conditions (expansions) allows firms to undertake projects without diluting ownership
- Provides tax benefits through interest expense deductibility reduces taxable income

Financial risk and leverage relationship

- Financial risk is the additional risk a firm faces due to using debt financing in its capital structure
- Arises from the obligation to make fixed interest and principal payments regardless of financial performance
- Increases the variability of earnings available to shareholders after meeting debt obligations
- Higher levels of financial leverage lead to higher financial risk for the firm
- As the proportion of debt in the capital structure increases (debt-to-equity ratio), financial risk increases
- Firms with high financial leverage are more vulnerable to economic downturns (reduced demand) and interest rate fluctuations (higher borrowing costs)

Operating and financial leverage metrics

- Degree of Operating Leverage (DOL) measures the sensitivity of a firm's operating income to changes in sales volume
- Formula: $DOL = \frac{\text{Percentage change in operating income}}{\text{Percentage change in sales}}$
- Interpretation: A DOL of 2 means a 1% change in sales will result in a 2% change in operating income
- High DOL indicates a larger proportion of fixed costs (rent, salaries) relative to variable costs
- Degree of Financial Leverage (DFL) measures the sensitivity of a firm's earnings per share (EPS) to changes in operating income
- Formula: $DFL = \frac{\text{Percentage change in EPS}}{\text{Percentage change in operating income}}$
- Interpretation: A DFL of 1.5 means a 1% change in operating income will result in a 1.5% change in EPS
- High DFL indicates a larger proportion of debt in the capital structure relative to equity

Leverage effects on EPS and ROE

- Earnings per Share (EPS) is affected by changes in financial leverage
- Increasing financial leverage can lead to higher EPS during periods of growth and profitability (positive operating income)
- However, higher leverage also amplifies the negative impact on EPS during economic downturns (negative operating income)
- Return on Equity (ROE) measures the profitability of a firm relative to shareholder's equity

• Formula: $ROE = \frac{Net\ income}{Shareholder's\ equity}$

- Increasing financial leverage can boost ROE by increasing the net income generated per unit of shareholder's equity (equity multiplier effect)
- However, excessive leverage can also increase the risk of financial distress and lower ROE during challenging times (inability to meet debt obligations)
- Firms must balance the potential benefits of higher leverage (higher returns) with the increased financial risk (greater volatility)
- Optimal leverage levels vary depending on factors such as industry (capital intensity), business cycle (economic conditions), and firm-specific characteristics (cash flow stability)

9.4 Capital Structure in Practice

Capital structure decisions are crucial for firms, balancing financial flexibility, growth, taxes, and control. Practical considerations include a company's stage, industry dynamics, and market signaling. Industry norms and benchmarking against peers guide these choices, impacting financial ratios and firm valuation.

Real-world examples illustrate diverse approaches. Apple's cash-rich strategy contrasts with Tesla's growth-driven debt, while GE's divestment reduced complexity. These decisions significantly affect key metrics like ROE, WACC, and EPS, ultimately influencing a company's overall value and stock price.

Capital Structure in Practice

Practical considerations for capital structure

- Firm's financial flexibility enables raising capital in the future and maintaining a good credit rating
- Firm's growth stage and industry dynamics impact capital structure decisions (startup vs. mature company, stable vs. cyclical industry)
- Tax considerations include interest tax shield benefits of debt and potential tax implications for investors
- Ownership and control considerations involve dilution of ownership with equity financing and debt covenants and restrictions
- Signaling effects to the market: debt issuance may signal confidence in future cash flows, while equity issuance may signal overvaluation of stock

Industry norms in capital structure

- Industry average debt-to-equity ratios guide firms to maintain ratios similar to industry peers, as deviating significantly may raise concerns
- Industry-specific risks and characteristics influence capital structure (capital-intensive industries may require higher debt levels, highly competitive industries may favor lower debt levels)
- Benchmarking against successful competitors involves analyzing capital structures of industry leaders and identifying best practices to adapt to the firm's context

Real-world capital structure examples

- Apple's large cash holdings and minimal debt allow for strategic acquisitions and investments and provide financial flexibility during market downturns
- Tesla's high debt levels to fund growth enabled rapid expansion of production capacity but increased financial risk and vulnerability to economic shocks
- General Electric's divestment of GE Capital reduced overall debt levels and financial complexity, allowing focus on core industrial businesses (aviation, power, renewable energy)

Impact of capital structure decisions

- Return on equity (ROE): higher debt levels can amplify ROE in favorable conditions, but excessive debt can lead to financial distress and lower ROE
- Weighted average cost of capital (WACC): optimal capital structure minimizes WACC, and lower WACC increases firm value, all else being equal
- Earnings per share (EPS): debt financing can boost EPS if return on invested capital exceeds interest rate, while equity financing may dilute EPS in the short term
- Firm valuation multiples: debt levels affect enterprise value multiples (EV/EBITDA), and optimal capital structure can maximize firm value and stock price

Unit 10 – Dividend Policy

10.1 Dividend Types and Policies

Dividends are a way companies share profits with shareholders. They come in various forms, like cash, stock, or property. Companies must balance paying dividends with reinvesting in growth, which impacts their appeal to different investors.

Dividend policies affect a company's financial strategy and investor perception. High, stable payouts attract income-seekers but limit growth funds. Low, unstable dividends prioritize flexibility but may deter some investors. Each approach has its pros and cons.

Dividend Types and Characteristics

Types of dividends

- Cash dividends represent the most common form of dividend payment where a company distributes a portion of its earnings to shareholders in the form of cash (quarterly or annually)
- Stock dividends involve issuing additional shares of stock to existing shareholders in proportion to their current holdings, which increases the number of outstanding shares without affecting the company's cash balance or retained earnings (5% stock dividend)
- Property dividends are non-cash assets distributed to shareholders, such as inventory, real estate, or securities of another company, and are relatively uncommon (distribution of a subsidiary's shares)

Features of dividend policies

- Dividend payout ratio measures the proportion of earnings paid out as dividends, calculated as dividends per share divided by earnings per share, with higher ratios indicating a greater proportion of earnings being distributed to shareholders (60% payout ratio)
- Dividend stability refers to the consistency of dividend payments over time, with companies often striving for stable or steadily increasing dividends to signal financial strength and predictability to investors (25 years of consecutive dividend increases)

Dividend Policies and Their Impact

Impact of dividend policies

- High payout ratios and stable dividends attract income-seeking investors and support share price stability but may limit funds available for reinvestment and growth (utilities sector)
- Low payout ratios and unstable dividends signal a company's prioritization of growth opportunities and financial flexibility but may be less attractive to income-seeking investors (technology startups)
- Stock dividends do not directly increase shareholder wealth but may signal confidence in the company's future prospects and increase liquidity by making shares more affordable (2-for-1 stock split)

Evaluation of dividend payouts

1. Regular cash dividends provide a steady income stream for shareholders and signal financial strength and stability but reduce funds available for reinvestment and growth and create expectations for future dividend payments (quarterly dividends)
2. Special or one-time dividends allow companies to distribute excess cash without committing to future payouts and signal confidence in the company's financial position but may be viewed as a lack of investment opportunities and create uncertainty about future dividend payments (dividend from sale of assets)
3. Stock dividends and stock splits increase the number of outstanding shares and liquidity, making shares more affordable for smaller investors, but do not directly increase shareholder wealth and may be viewed as a cosmetic change by some investors (3-for-2 stock split)

10.2 Factors Affecting Dividend Policy

Dividend policy is a crucial aspect of corporate finance, balancing shareholder returns with growth opportunities. Companies must consider profitability, cash flow, industry norms, and financial leverage when deciding on dividends. Legal constraints, contractual obligations, and market expectations also play key roles.

Growth prospects significantly impact dividend decisions. Companies must weigh reinvesting earnings against shareholder payouts, considering cost of capital and long-term objectives. Shareholder preferences, including tax considerations and signaling effects, further shape dividend policies, influencing investor attraction and retention.

Factors Influencing Dividend Policy

Factors in dividend policy decisions

- Profitability and cash flow
- Consistent earnings and stable cash flows support regular dividend payments to shareholders
- Volatile or insufficient earnings and cash flows may limit a company's ability to pay dividends (startups, cyclical industries)
- Growth opportunities and capital requirements
- High growth companies may retain earnings to fund expansion projects, reducing dividends (tech companies)
- Mature companies with fewer investment opportunities may pay higher dividends to shareholders (utilities, consumer staples)
- Industry norms and competitor practices
- Companies often align their dividend policies with industry peers to remain competitive
- Deviating from industry norms may affect investor perception and stock valuation (higher or lower than expected)
- Financial leverage and debt covenants
- High debt levels may restrict dividend payments to maintain financial flexibility and meet obligations

- Debt covenants may impose limitations on dividend payouts to protect creditors' interests (maximum payout ratios)

Constraints on dividend policy

- Legal constraints
- Dividends can only be paid from legally distributable reserves, such as retained earnings
- Certain jurisdictions may impose additional restrictions on dividend payments (capital maintenance rules)
- Contractual obligations
- Bond indentures or loan agreements may include dividend restriction clauses to protect lenders
- Violation of these clauses could lead to default or accelerated debt repayment (debt-to-equity ratios)
- Market expectations
- Investors often expect a consistent or growing dividend stream from established companies
- Failing to meet market expectations may negatively impact stock prices and investor confidence
- Changes in dividend policy should be carefully communicated to manage expectations (dividend cuts, suspensions)

Growth prospects and dividend policy

- Reinvestment of earnings
- Growing companies may prioritize reinvesting earnings in profitable projects to fuel expansion
- Retaining earnings reduces the funds available for dividend payments to shareholders (Amazon, Netflix)
- Cost of capital and financing decisions
- If the cost of external financing is high, companies may rely more on retained earnings for growth
- Paying dividends may necessitate raising additional capital, affecting the capital structure (debt vs. equity)
- Balancing growth and shareholder returns
- Companies must strike a balance between funding growth initiatives and providing shareholder returns
- A well-designed dividend policy should align with the company's long-term strategic objectives (sustainable growth)

Shareholder preferences in dividends

- Clientele effect
- Different investor groups may have varying preferences for dividends vs. capital gains (retirees, growth investors)

- Companies may attract specific investor clienteles based on their dividend policies (income funds, growth funds)
- Tax treatment of dividends
- In some jurisdictions, dividends may be taxed at a higher rate than capital gains, influencing investor preferences
- Tax-sensitive investors may prefer lower dividend payouts and higher capital gains (tax-deferred accounts)
- Signaling effect
- Dividend changes can signal management's confidence in future prospects to the market
- Initiating or increasing dividends may convey positive information about the company's financial health (Apple, Microsoft)
- Shareholder activism and pressure
- Influential shareholders may push for higher dividends or share repurchases to boost returns
- Companies may need to balance these demands with their long-term financial strategies (hedge funds, institutional investors)

10.3 Stock Repurchases and Stock Splits

Stock repurchases and splits are key tools companies use to manage their capital structure and share price. These strategies can impact shareholder value, financial statements, and market perception, often signaling management's confidence in the company's future.

Understanding these mechanisms is crucial for investors and financial managers. While repurchases directly return cash to shareholders, splits aim to increase liquidity. Both can affect stock prices and market sentiment, though their long-term impact on company value is debated.

Stock Repurchases

Mechanics of stock repurchases

- Stock repurchases occur when a company buys back its own shares from the market
- Reduces the number of outstanding shares in circulation
- Increases the ownership stake of remaining shareholders
- Impact on financial statements when a company repurchases shares:
 - Cash on the balance sheet decreases by the amount spent on the repurchase
 - Treasury stock account increases, representing the value of repurchased shares
 - Retained earnings decrease by the amount spent on the repurchase
 - Earnings per share (EPS) increases due to fewer outstanding shares (

$$EPS = \frac{NetIncome}{NumberofOutstandingShares}$$
- Companies can execute stock repurchases through various methods:
 - Open market repurchases: Buying back shares on the open market at current prices (most common)

- Tender offers: Offering to buy back shares from shareholders at a specified price, usually at a premium (fixed-price tender offer)
- Privately negotiated transactions: Buying back shares directly from specific shareholders (often large institutional investors)

Stock repurchases vs cash dividends

- Both stock repurchases and cash dividends return cash to shareholders
- Both can signal management's confidence in the company's future prospects and financial health
- Tax treatment differs:
 - Dividends are taxed as ordinary income in the year received
 - Capital gains from stock repurchases may be taxed at a lower rate and deferred until shares are sold
- Stock repurchases offer more flexibility in timing and execution compared to recurring dividends
- Dividends are paid to all shareholders, while stock repurchases allow shareholders to choose whether to participate by selling shares
- Motivations for stock repurchases:
 - Signaling undervaluation: Buying back shares when management believes stock is undervalued by the market
 - Deploying excess cash when lacking attractive investment opportunities
 - Offsetting dilution from employee stock options and equity-based compensation
- Motivations for cash dividends:
 - Providing steady income to shareholders (often quarterly)
 - Attracting investors seeking regular cash flows (income-oriented investors)
 - Signaling consistent profitability and financial stability

Stock Splits

Process of stock splits

- In a stock split, a company increases its number of outstanding shares while proportionately reducing the price per share
- Example: In a 2-for-1 stock split, number of shares doubles and price per share is halved
- If 1 million shares at \$100 per share, after 2-for-1 split: 2 million shares at \$50 per share
- Stock splits do not directly change the company's market capitalization (Number of shares $\times$ Price per share) or intrinsic shareholder value
- Stock splits can increase stock liquidity by making shares more affordable to a broader base of investors
- Splits are often viewed positively, perceived as management's confidence in future growth prospects
- Reverse stock splits reduce outstanding shares and increase price per share

- Typically done to meet minimum exchange listing requirements or attract institutional investors

Signaling effects in market perception

- Stock repurchases:
 - Positive signal: Conveys management's belief that shares are undervalued and repurchases are the best use of cash
 - Negative signal: May suggest lack of profitable investment opportunities or attempt to artificially inflate EPS
- Stock splits:
 - Positive signal: Reflects management's confidence in continued growth and desire to broaden investor base
 - Neutral signal: Some view splits as cosmetic changes without impact on company fundamentals
- Market perception and investor behavior:
 - Repurchase and split announcements often trigger positive short-term stock price reactions
 - Behavioral biases can lead to irrational preferences for lower-priced stocks or stocks with split history
 - Empirical evidence shows repurchases and splits associated with positive short-term abnormal returns
 - Long-term performance is mixed, suggesting company fundamentals ultimately drive shareholder value

10.4 Dividend Policy Theories

Dividend policy theories explore how companies distribute profits to shareholders. Three key theories offer different perspectives: dividend irrelevance, bird-in-the-hand, and tax preference. Each theory considers factors like market efficiency, investor risk perception, and tax implications.

Understanding these theories helps explain why companies choose different dividend strategies. While some firms prioritize regular payouts, others focus on reinvesting profits or using share buybacks. These choices can significantly impact investor returns and company valuation.

Dividend Policy Theories

Theories of dividend policy

- Dividend Irrelevance Theory
 - Proposed by Merton Miller and Franco Modigliani (MM) assumes perfect capital markets
 - Argues dividend policy does not affect firm value or cost of capital in perfect market conditions
- Bird-in-the-Hand Theory
 - Suggests investors prefer current dividends over potential future capital gains due to lower perceived risk
 - Implies higher dividend payouts may increase stock price and lower the cost of capital
- Tax Preference Theory

- Considers tax disadvantages of dividends compared to capital gains in many tax systems
- Proposes investors may prefer lower dividend payouts to minimize personal tax liabilities
- Suggests lower dividend payouts may increase overall shareholder wealth by reducing tax burden

Dividend irrelevance in perfect markets

- Perfect capital market assumptions include:
- No transaction costs for buying or selling securities
- No taxes on dividends or capital gains
- No information asymmetry between managers and investors (efficient market hypothesis)
- Investors are rational and have homogeneous expectations about future earnings and growth
- No agency costs or conflicts of interest between managers and shareholders (alignment of interests)
- Under these idealized assumptions, MM argue that:
- Firm value is determined solely by its investment policy and underlying earnings power
- Dividend policy is a residual decision made after funding all profitable investment opportunities
- Investors can create "homemade dividends" by selling shares if cash distributions are needed

Bird-in-the-hand theory implications

- Investors view cash dividends as less risky than potential future capital gains
- Dividends represent a tangible "bird in the hand," while capital gains are uncertain "two in the bush"
- Regular dividend payments are often seen as a sign of financial stability and management confidence
- Investor preference implications:
- Investors may exhibit a preference for stocks with higher and more consistent dividend payouts
- Increased demand for high-dividend stocks may drive up their prices (dividend clientele effect)
- Risk perception implications:
- Investors may perceive companies with high and stable dividends as less risky investments
- This lower perceived risk may lead to a lower required rate of return by investors
- A lower required rate of return may reduce the firm's overall cost of capital

Tax preference impact on dividends

- Many tax systems levy higher taxes on dividend income compared to capital gains
- This tax disadvantage may make high-dividend stocks less attractive to taxable investors
- Investors may prefer companies that retain earnings for future growth rather than paying dividends
- Shareholder wealth impact:
- Lower dividend payouts may increase net shareholder wealth by minimizing investor tax liabilities

- Retained earnings can be reinvested in the company, potentially generating higher pre-tax returns
- Dividend policy choice impact:
- Companies may opt to pay lower dividends to maximize after-tax shareholder wealth
- Managers may prioritize investing in profitable projects over paying dividends (residual policy)
- Share repurchases may be used as a tax-advantaged alternative to distribute excess cash (\$AAPL, \$MSFT)

Unit 11 – Working Capital Management

11.1 Working Capital Cycle and Policies

Working capital management is crucial for a company's financial health. It's about balancing current assets and liabilities to keep operations running smoothly. Without enough working capital, a business might struggle to pay bills or miss growth opportunities.

The working capital cycle shows how long it takes to turn inventory into cash. Companies aim for a shorter cycle to generate cash faster. Different policies, from aggressive to conservative, offer trade-offs between risk and profitability in managing working capital.

Working Capital and Its Management

Importance of working capital

- Represents the difference between a company's current assets (cash, accounts receivable, inventory) and current liabilities (accounts payable, short-term debt)
- Essential for meeting short-term financial obligations and maintaining smooth operations
- Ensures ability to pay bills, maintain inventory, and extend credit to customers
- Insufficient working capital can lead to liquidity problems, missed opportunities (business expansion), and potential bankruptcy

Components of working capital cycle

- Also known as the cash conversion cycle, represents the time taken to convert investments in inventory and resources into cash from sales
- Inventory days: Average number of days to sell inventory
- Accounts receivable days: Average number of days to collect payments from customers
- Accounts payable days: Average number of days to pay suppliers
- Calculated as: *Inventory days + Accounts receivable days – Accounts payable days*
- Shorter cycle indicates faster cash generation, while longer cycle may lead to increased financing requirements and liquidity risk (inability to meet short-term obligations)

Working Capital Policies and Trade-offs

Types of working capital policies

- Strategies employed to manage current assets and liabilities
- Aggressive policy:
 - Minimizes investment in current assets (inventory, accounts receivable)
 - Maximizes use of short-term financing (accounts payable, short-term debt)
 - Higher risk but potentially higher returns due to reduced carrying costs and increased cash availability

- Moderate policy:
 - Balances investment in current assets and use of short-term financing
 - Maintains moderate levels of inventory, accounts receivable, and accounts payable
 - Moderate risk and returns, balancing liquidity and profitability
- Conservative policy:
 - Maintains higher levels of current assets (inventory, accounts receivable)
 - Relies less on short-term financing and more on long-term funds
 - Lower risk but potentially lower returns due to increased carrying costs and reduced cash availability

Risk vs profitability in working capital

- Balancing trade-off between liquidity risk and profitability
- Liquidity risk: 1. Risk of insufficient cash or liquid assets to meet short-term obligations 2. Higher current asset levels reduce liquidity risk but may lower profitability
- Profitability: 1. Ability to generate profits from operations 2. Lower current asset levels and higher short-term financing usage can increase profitability but may raise liquidity risk
- Optimal balance depends on industry, business model, and risk tolerance
- Effective management involves continuously monitoring and adjusting current asset and liability levels to maintain desired risk-profitability balance

11.2 Cash and Marketable Securities Management

Cash and liquidity management are crucial for businesses to maintain financial stability and seize opportunities. Companies hold cash for transactions, precautions, and speculation, while also utilizing marketable securities as near-cash assets to earn higher returns.

The cash conversion cycle measures the time between cash outflows and inflows, impacting liquidity efficiency. Cash budgeting techniques help forecast and manage cash flows, while short-term investment options like T-bills and commercial paper allow businesses to balance safety, liquidity, and yield for excess funds.

Cash and Liquidity Management

Motives for cash holdings

- Transaction motive
 - Holds cash to cover routine business expenses (payroll, rent, utilities)
 - Ensures smooth day-to-day operations without disruptions
- Precautionary motive
 - Maintains cash reserves as a safety net for unforeseen expenses (equipment breakdowns, lawsuits)
 - Provides financial stability during uncertain times (economic downturns, natural disasters)
- Speculative motive

- Keeps cash available to capitalize on profitable opportunities (discounted inventory purchases, acquisitions)
- Allows flexibility to act quickly when favorable investments arise
- Marketable securities serve as near-cash assets
- Highly liquid short-term investments convertible to cash within a year (Treasury bills, money market funds)
- Earn higher returns than cash while maintaining liquidity for future needs

Cash conversion cycle impact

- Cash conversion cycle *CCC* measures time between cash outflows for inventory and cash inflows from sales
- Formula: $CCC = DIO + DSO - DPO$
- *DIO*: Days Inventory Outstanding, average time to sell inventory
- *DSO*: Days Sales Outstanding, average collection period for accounts receivable
- *DPO*: Days Payable Outstanding, average payment period for accounts payable
- Shorter *CCC* indicates more efficient liquidity management
- Faster inventory turnover reduces carrying costs and obsolescence risk
- Quicker collection of accounts receivable improves cash flow and reduces bad debt
- Longer payment terms with suppliers allows more time to generate cash from sales
- Longer *CCC* may strain liquidity and increase financing costs
- Slow-moving inventory ties up cash and may require markdowns to sell
- Delayed customer payments create cash flow gaps and may lead to write-offs
- Shorter payment terms with suppliers require cash outflows before generating sales

Cash budgeting techniques

- Cash budget projects expected cash inflows and outflows over a defined period
- Identifies potential cash surpluses for investment or cash deficits requiring financing
- Allows proactive management of liquidity to avoid shortfalls or idle cash
- Steps to create a cash budget: 1. Estimate expected cash receipts from various sources (sales, investments, loans) 2. Estimate expected cash disbursements for various purposes (expenses, loan payments, dividends) 3. Calculate net cash flow by subtracting cash disbursements from cash receipts 4. Determine ending cash balance by adding net cash flow to beginning cash balance
- Sensitivity analysis tests impact of changes in assumptions on cash budget outcomes
- Identifies potential risks (lower sales, higher expenses) and opportunities (faster collections, cheaper financing)
- Prepares contingency plans for various scenarios to ensure adequate liquidity

Short-term investment options

- Criteria for evaluating short-term investments:
- Safety minimizes risk of default or loss of principal (government-backed securities, insured deposits)
- Liquidity enables quick conversion to cash without significant loss of value (money market funds)
- Yield maximizes return on investment while balancing safety and liquidity (commercial paper)
- Treasury bills *T – bills* are short-term government securities maturing within a year
- Backed by full faith and credit of the U.S. government, considered risk-free assets
- Sold at a discount from face value, difference represents interest earned at maturity
- Commercial paper is unsecured short-term debt issued by corporations to fund operations
- Higher yields than *T – bills* due to slightly higher default risk of corporations vs. government
- Typically issued by large, creditworthy companies to minimize risk for investors
- Certificates of deposit *CDs* are time deposits with fixed maturity dates and interest rates
- FDIC insurance up to \$250,000 per depositor per bank eliminates risk of loss
- Early withdrawal penalties incentivize holding *CDs* to maturity to earn stated return
- Money market funds invest in a diversified portfolio of short-term, high-quality debt securities
- Provides liquidity by allowing investors to withdraw funds on demand
- Offers higher yields than bank accounts while maintaining stable \$1 per share net asset value

11.3 Inventory Management

Inventory management is crucial for businesses to balance costs and meet customer demand. It involves tracking raw materials, work-in-progress, finished goods, and maintenance supplies. Effective management optimizes stock levels, minimizes costs, and ensures smooth operations.

Key concepts include economic order quantity, reorder points, and inventory control systems. Just-in-time techniques and ABC classification help businesses streamline processes and focus on high-value items. Understanding these principles is essential for efficient inventory management.

Inventory Management

Types of inventory in production

- Raw materials inventory
- Unprocessed materials used to create finished products (lumber, steel, plastics)
- Serve as inputs for the production process
- Must be purchased and stored until needed for production
- Work-in-progress (WIP) inventory
- Partially completed products in various stages of the production process

- Represents the value of materials, labor, and overhead incurred but not yet turned into finished goods
- Ties up capital and requires storage space until completion
- Finished goods inventory
- Completed products ready for sale to customers
- Represents the final output of the production process
- Must be stored and managed until sold and delivered to customers
- Maintenance, repair, and operating (MRO) inventory
- Supplies and materials used to support production but not directly incorporated into finished products (spare parts, lubricants, cleaning supplies)
- Ensures smooth operation of production equipment and facilities
- Requires regular monitoring and replenishment to avoid production disruptions

Economic order quantity calculation

- Economic order quantity (EOQ)
- Optimal order quantity that minimizes total inventory costs
- Balances the trade-off between ordering costs and holding costs
- Formula: $EOQ = \sqrt{\frac{2DS}{H}}$
- D = Annual demand in units
- S = Fixed cost per order (setup costs, transportation costs)
- H = Annual holding cost per unit (storage, insurance, opportunity cost)
- Reorder point (ROP)
- Inventory level at which a new order should be placed to prevent stockouts
- Considers lead time and safety stock to ensure continuous supply
- Formula: $ROP = (Daily\ demand \times Lead\ time) + Safety\ stock$
- Daily demand = Average number of units sold per day
- Lead time = Time between placing an order and receiving the inventory
- Safety stock = Extra inventory held to prevent stockouts due to unexpected demand or supply delays

Inventory control system analysis

- Periodic inventory system
- Inventory levels are reviewed and orders placed at fixed intervals (weekly, monthly)
- Benefits: simplicity, less frequent ordering, suitable for low-value items
- Costs: higher average inventory levels, increased risk of stockouts
- Perpetual inventory system

- Inventory levels are continuously monitored and updated with each transaction
- Benefits: real-time inventory tracking, lower risk of stockouts, better decision-making
- Costs: higher setup and maintenance costs for technology and systems
- ABC inventory classification
- Categorizes inventory items based on their value and importance
- 1. A items: high value, critical to production (20% of items, 80% of value)
- 2. B items: moderate value, less critical (30% of items, 15% of value)
- 3. C items: low value, least critical (50% of items, 5% of value)
- Benefits: focuses management attention on high-value items, optimizes inventory control efforts
- Costs: time and resources required for classification and differentiated management

Just-in-time inventory techniques

- Just-in-time (JIT) inventory management
- Production and inventory strategy that aims to minimize inventory holding costs by receiving materials just as they are needed
- Key principles:
 1. Pull system: production is triggered by customer demand, not forecasts
 2. Small, frequent deliveries from suppliers
 3. Continuous improvement to reduce waste and inefficiencies (lean manufacturing)
- Benefits:
 - Lower inventory holding costs
 - Reduced space requirements
 - Improved cash flow
- Challenges:
 - Requires strong supplier relationships and reliable deliveries
 - Increased risk of stockouts if supply chain disruptions occur (natural disasters, labor strikes)
 - Higher transportation costs due to frequent deliveries

11.4 Accounts Receivable Management

Accounts receivable management is crucial for maintaining healthy cash flow and minimizing financial risks. It involves setting credit policies, evaluating customer creditworthiness, and implementing effective collection strategies. These practices help businesses balance sales growth with financial stability.

Optimal credit terms and discounts play a key role in managing accounts receivable. By carefully considering payment periods and early payment incentives, companies can accelerate cash collection while maintaining strong customer relationships. This approach helps optimize working capital and improve overall financial performance.

Accounts Receivable Management

Importance of credit policy

- Set of guidelines that determine how a company extends credit to customers
- Manages risk associated with offering credit by setting clear expectations and limits
- Ensures consistent treatment of customers across the organization
- Impacts the level of accounts receivable and cash flow by controlling credit extension
- Key components of a credit policy include
 - Credit limits for each customer based on their creditworthiness
 - Payment terms specifying the due date for invoices (Net 30, Net 60)
 - Discounts for early payment to incentivize faster collection
 - Collection procedures outlining steps to recover overdue accounts
- A well-designed credit policy balances the goal of increasing sales through credit extension with the need to minimize bad debt expenses from uncollectible accounts

Evaluating customer creditworthiness

- Assessment of a customer's ability and willingness to pay based on financial health and payment history
- Financial ratios evaluate a customer's liquidity, solvency, and profitability
- Liquidity ratios measure ability to meet short-term obligations (current ratio, quick ratio)
- Solvency ratios assess long-term financial stability (debt-to-equity ratio, interest coverage ratio)
- Profitability ratios indicate the customer's overall financial performance (net profit margin, return on assets)
- Credit scoring models assign a numerical score based on factors like
 - Payment history and timeliness of past payments
 - Credit utilization or the proportion of available credit being used
 - Length of credit history and established track record
 - Types of credit used such as revolving credit (credit cards) or installment loans (mortgages)
- Higher credit scores indicate lower risk and greater likelihood of timely payment, while lower scores suggest potential payment issues

Optimal credit terms and discounts

- Credit terms specify the payment period and any discounts for early payment
- Common payment terms range from Net 30 to Net 90 days
- Early payment discounts incentivize faster payment (2/10 Net 30 offers a 2% discount if paid within 10 days, otherwise due in 30 days)

- Factors to consider when setting credit terms include
- Industry norms and typical terms offered by competitors
- Competitive landscape and the need to match or exceed rival terms
- Customer relationships and negotiating power of key accounts
- Offering discounts for early payment can improve cash flow by accelerating collection
- Trade-off between the cost of the discount and the benefit of faster payment must be evaluated
- Discount percentage and time period should be set to optimize the balance between cost and benefit

Collection strategies for cash flow

- Collection strategies aim to recover outstanding receivables and minimize bad debt write-offs
- Proactive strategies to prevent overdue accounts include
- Clearly communicating payment terms and expectations upfront
- Sending timely and accurate invoices to avoid confusion
- Following up with customers before the due date as a reminder
- Reactive strategies for overdue accounts escalate in severity 1. Phone calls and email reminders to prompt payment 2. Escalating the matter to a collection agency for additional pressure 3. Legal action as a last resort for significantly overdue accounts
- Aging schedule categorizes accounts receivable by days outstanding (current, 1-30 days, 31-60 days, etc.)
- Helps prioritize collection efforts on the oldest accounts first
- Identifies potential bad debt accounts that may require write-offs
- Bad debt expense is the amount of uncollectible receivables written off during a period
- Estimated using historical data or a percentage of credit sales
- Minimizing bad debt expense improves profitability and cash flow

11.5 Short-term Financing

Short-term financing is crucial for businesses to manage cash flow and meet immediate financial needs. From trade credit to secured loans, companies have various options to access funds quickly, each with its own costs and benefits.

Calculating effective annual rates helps businesses compare financing options accurately. By optimizing their mix of short-term financing sources, companies can balance costs, flexibility, and risk to support their operations and growth strategies effectively.

Sources and Considerations for Short-term Financing

Sources of short-term financing

- Trade credit

- Accounts payable involve purchasing goods or services on credit and paying suppliers at a later date
- Delaying payments to suppliers provides additional working capital by extending the payment period (net 30, net 60)
- Short-term loans
- Bank loans are direct borrowings from financial institutions for a specific term and interest rate
- Commercial paper is an unsecured promissory note issued by large corporations to raise short-term funds (maturity less than 270 days)
- Factoring involves selling accounts receivable to a third party at a discount to receive immediate cash
- Lines of credit
- Revolving credit allows borrowers to draw funds, repay, and redraw up to a predetermined limit (credit cards)
- Non-revolving credit provides a fixed amount of funds that cannot be redrawn once repaid (term loans)
- Secured financing
- Inventory financing uses a company's inventory as collateral to secure a loan
- Accounts receivable financing involves borrowing against outstanding invoices or using them as collateral (invoice discounting)

Costs vs benefits of financing options

- Trade credit
- Cost: Forgoing early payment discounts offered by suppliers for prompt payment (2/10 net 30)
- Benefit: Flexibility in payment timing allows companies to manage cash flow and working capital needs
- Short-term loans
- Cost: Interest expenses paid on borrowed funds increase the overall cost of financing
- Benefit: Quick access to funds helps companies meet immediate cash flow needs or take advantage of opportunities
- Lines of credit
- Cost: Commitment fees charged for maintaining the credit line and interest expenses on borrowed funds
- Benefit: Flexibility in borrowing and repayment allows companies to manage fluctuations in cash flow (seasonal businesses)
- Secured financing
- Cost: Collateral requirements tie up assets and higher interest rates compared to unsecured financing
- Benefit: Access to funds for companies with limited credit history or lower credit scores

Calculating and Optimizing Short-term Financing

Calculation of effective annual rates

- EAR formula: $EAR = (1 + \frac{r}{m})^m - 1$
- r : Nominal annual interest rate represents the stated interest rate before considering compounding
- m : Number of compounding periods per year reflects how often interest is calculated and added to the principal
- Example: A loan with a 6% nominal annual interest rate compounded monthly 1. Plug in the values: $EAR = (1 + \frac{0.06}{12})^{12} - 1$ 2. Calculate: $EAR = 1.005^{12} - 1 = 0.0616$ 3. Express as a percentage: $EAR = 0.0616 = 6.16\%$

Optimal mix of financing sources

- Assess the company's cash flow requirements
- Seasonal or cyclical needs arise from fluctuations in business activity (retail during holidays, agriculture during harvest)
- Working capital management involves optimizing the balance between current assets and liabilities
- Consider the costs and benefits of each financing option
- Interest rates and fees directly impact the cost of borrowing and should be minimized
- Flexibility and repayment terms affect a company's ability to manage cash flow and adapt to changing circumstances
- Evaluate the company's credit profile and collateral availability
- Credit history and score determine a company's access to financing and the terms offered by lenders
- Assets available for secured financing, such as inventory or accounts receivable, can expand borrowing options
- Determine the optimal mix based on cost, flexibility, and risk
- Diversify funding sources to manage risk by not relying too heavily on a single financing option (bank loans, commercial paper)
- Prioritize lower-cost options while maintaining flexibility to ensure the company can meet its obligations and grow

Unit 12 – Financial Statement Analysis

12.1 Financial Statements Overview

Financial statements are the backbone of understanding a company's financial health. They provide a comprehensive view of a firm's assets, liabilities, income, and cash flows, allowing stakeholders to assess its performance and make informed decisions.

These statements are interconnected, painting a complete picture of a company's finances. By analyzing the balance sheet, income statement, and cash flow statement together, investors, creditors, and managers can gain valuable insights into a firm's profitability, liquidity, and overall financial stability.

Financial Statements Overview

Components of financial statements

- Balance Sheet
 - Snapshot of a company's financial position at a specific point in time (December 31, 2022)
 - Reports the company's assets, liabilities, and equity
 - Assets represent resources owned by the company that have future economic benefits (cash, inventory, equipment)
 - Liabilities represent obligations or debts owed by the company to outside parties (accounts payable, loans)
 - Equity represents the residual interest in the assets after deducting liabilities, belonging to the company's owners (common stock, retained earnings)
- Income Statement
 - Reports a company's financial performance over a specific period (fiscal year, quarter)
 - Measures the company's profitability by comparing revenue earned to expenses incurred
 - Revenue represents income generated from the sale of goods or services (product sales, service fees)
 - Expenses represent costs incurred to generate revenue (salaries, rent, materials)
 - Net Income represents the difference between revenue and expenses, indicating the company's bottom-line profitability
- Cash Flow Statement
 - Presents the inflows and outflows of cash during a specific period (month, year)
 - Categorizes cash flows into three main activities
 1. Operating Activities represent cash flows from the company's core business operations (cash receipts from customers, cash payments to suppliers)
 2. Investing Activities represent cash flows related to the acquisition or disposal of long-term assets (purchase of equipment, sale of investments)

3. Financing Activities represent cash flows related to raising or repaying capital (issuing stock, repaying loans)

Interconnectedness of financial reports

- The three financial statements are interrelated and provide a comprehensive view of a company's financial health
- Net Income from the Income Statement flows into the Balance Sheet as part of Retained Earnings in the Equity section, linking profitability to financial position
- Changes in Balance Sheet accounts (assets, liabilities) are reflected in the Cash Flow Statement, showing how transactions impact cash balances
- The Cash Flow Statement reconciles the change in cash balance from the beginning to the end of the period, tying together the Income Statement and Balance Sheet

Users of financial information

- Investors
 - Utilize financial statements to assess a company's financial health and make informed investment decisions (buy, hold, sell)
 - Analyze key financial ratios to evaluate the company's performance and risk
 - Profitability ratios measure the company's ability to generate profits (net profit margin, return on equity)
 - Liquidity ratios assess the company's ability to meet short-term obligations (current ratio, quick ratio)
 - Solvency ratios evaluate the company's ability to meet long-term debts (debt-to-equity ratio, interest coverage ratio)
- Creditors
 - Rely on financial statements to assess a company's ability to repay its debts (loans, bonds)
 - Analyze liquidity and solvency ratios to determine the company's creditworthiness and set appropriate interest rates and loan terms
- Management
 - Uses financial statements for internal decision-making and strategic planning (budgeting, resource allocation)
 - Monitors the company's financial performance over time and identifies areas for improvement (cost reduction, revenue growth)

Interpretation of financial elements

- Balance Sheet
 - Higher assets relative to liabilities indicate a stronger financial position and lower financial risk
 - A balanced mix of short-term assets (cash, inventory) and long-term assets (property, equipment) is desirable to meet both immediate and future needs

- A balanced mix of short-term liabilities (accounts payable) and long-term liabilities (loans) is preferable to avoid excessive short-term financial pressure
- Income Statement
 - Increasing revenue and net income over time suggest growth and improved profitability (year-over-year, quarter-over-quarter)
 - Analyzing trends in expenses can help identify areas for cost control and efficiency improvements (reducing administrative costs, optimizing production processes)
 - Comparing revenue and expense growth rates provides insights into the company's ability to manage costs as it grows
- Cash Flow Statement
 - Positive cash flows from operating activities are crucial for long-term sustainability, indicating the company's ability to generate cash from its core business
 - Significant investing activities (capital expenditures) can provide insights into the company's growth strategies and future capacity
 - Significant financing activities (issuing stock, repaying debt) can shed light on the company's capital structure decisions and financial flexibility

12.2 Ratio Analysis

Liquidity and solvency ratios are crucial tools for assessing a company's financial health. These metrics help gauge a firm's ability to meet short-term obligations and long-term commitments, providing insights into its financial stability and risk profile.

Profitability and market ratios offer a window into a company's efficiency and investor appeal. These measures evaluate a firm's ability to generate profits and its attractiveness to investors, helping stakeholders make informed decisions about the company's performance and potential.

Liquidity and Solvency Ratios

Liquidity ratios for short-term obligations

- Liquidity ratios gauge a company's capacity to settle short-term liabilities using current assets (cash, inventory, receivables)
- Current ratio = $\frac{\text{Current assets}}{\text{Current liabilities}}$
 - Reveals how many times current assets can cover current liabilities
 - Higher ratio implies better liquidity (2:1 is generally considered good)
- Quick ratio (Acid-test ratio) = $\frac{\text{Cash} + \text{Marketable securities} + \text{Accounts receivable}}{\text{Current liabilities}}$
 - Excludes less liquid assets like inventories and prepaid expenses
 - Provides a more stringent assessment of liquidity than current ratio (1:1 is typically acceptable)
- Interpreting liquidity ratios involves comparing them to industry norms and rivals and examining trends to spot changes in liquidity
- A declining current ratio may signal potential difficulties in meeting short-term obligations

- Consistently high quick ratio suggests efficient management of current assets and liabilities

Solvency ratios for financial stability

- Solvency ratios assess a company's ability to meet long-term commitments and its reliance on debt financing
- Debt-to-equity ratio = $\frac{\text{Total debt}}{\text{Total equity}}$
- Compares the amount of debt financing to equity financing
- Higher ratio indicates greater financial risk and leverage (generally should not exceed 2:1)
- Interest coverage ratio = $\frac{\text{Earnings before interest and taxes (EBIT)}}{\text{Interest expense}}$
- Measures a company's ability to make interest payments on outstanding debt
- Higher ratio suggests better capacity to meet interest obligations (3:1 or higher is desirable)
- Interpreting solvency ratios
- High debt-to-equity ratio may signal increased financial risk and difficulty securing additional financing
- Low interest coverage ratio may indicate challenges in servicing debt and higher risk of default
- Solvency ratios help creditors and investors gauge a company's financial stability and long-term viability

Profitability and Market Ratios

Profitability ratios for efficiency evaluation

- Profitability ratios measure a company's ability to generate profits relative to its revenue, assets, or equity
- Gross profit margin = $\frac{\text{Gross profit}}{\text{Net sales}}$
- Calculates the percentage of revenue left after deducting cost of goods sold
- Higher margin indicates better pricing power and cost control (varies by industry)
- Operating profit margin = $\frac{\text{Operating income}}{\text{Net sales}}$
- Measures the percentage of revenue remaining after deducting operating expenses
- Reflects a company's operational efficiency and ability to generate profits from core business activities
- Return on equity (ROE) = $\frac{\text{Net income}}{\text{Average shareholders' equity}}$
- Assesses the profitability generated from shareholders' invested capital
- Higher ROE indicates better efficiency in generating profits from equity (15-20% is generally considered good)
- Interpreting profitability ratios involves comparing them to industry benchmarks and historical performance and analyzing trends to identify improvements or declines in profitability
- Consistently high gross profit margin suggests a competitive advantage in pricing or production efficiency

- Declining operating profit margin may indicate rising costs or intensifying competition

Market ratios for investor attractiveness

- Market ratios relate a company's stock price to its financial performance and cash flows to assess valuation and investor appeal
- Price-to-earnings (P/E) ratio = $\frac{\text{Market price per share}}{\text{Earnings per share}}$
- Shows how much investors are willing to pay for each dollar of earnings
- Higher P/E ratio suggests higher growth expectations or potential overvaluation (varies by industry and market conditions)
- Dividend yield = $\frac{\text{Annual dividends per share}}{\text{Market price per share}}$
- Measures the cash return to investors in the form of dividends
- Higher yield may attract income-oriented investors (typically 2-5% is considered attractive)
- Interpreting market ratios
- Comparing P/E ratio to industry peers and market averages helps assess relative valuation and growth prospects
- Dividend yield should be considered in the context of a company's dividend policy, payout ratio, and growth opportunities
- Market ratios help investors make informed decisions based on a company's valuation and potential returns

12.3 DuPont Analysis

The DuPont Analysis Framework breaks down a company's return on equity into profit margin, asset turnover, and financial leverage. This powerful tool helps investors and managers understand how different aspects of a business contribute to its overall financial performance.

By examining each component, companies can identify strengths and weaknesses in their operations. Comparing these metrics with industry peers reveals areas for improvement and competitive advantages, making DuPont analysis a valuable technique for financial assessment and strategic planning.

DuPont Analysis Framework

Components of DuPont analysis framework

- Decomposes return on equity (ROE) into three main components profit margin, asset turnover, and financial leverage
- Identifies sources of company's ROE and how each component contributes to overall financial performance provides insights into operational efficiency, asset utilization, and financial leverage
- Compares companies within the same industry identifies areas for improvement

Calculation of DuPont analysis elements

- Profit margin measures proportion of revenue converted into net income calculated as
 $\text{Profit Margin} = \frac{\text{Net Income}}{\text{Revenue}}$ higher margins indicate better profitability and cost control

- Asset turnover measures how efficiently a company uses assets to generate revenue calculated as

$$\text{Asset Turnover} = \frac{\text{Revenue}}{\text{Average Total Assets}}$$
higher ratios suggest more effective asset utilization
- Financial leverage measures extent to which a company uses debt to finance assets calculated as

$$\text{Financial Leverage} = \frac{\text{Average Total Assets}}{\text{Average Shareholders' Equity}}$$
higher leverage indicates greater reliance on debt financing

Analyzing and Comparing DuPont Components

Impact of components on ROE

- Changes in profit margin increasing margins through cost reduction (lean manufacturing) or pricing strategies (premium pricing) improves ROE decreasing margins may indicate declining profitability need for operational improvements (process optimization)
- Changes in asset turnover improving turnover by generating more revenue from existing assets (inventory management) increases ROE declining turnover may suggest inefficient asset utilization need for better asset management (just-in-time inventory)
- Changes in financial leverage increasing leverage can amplify ROE but also increases financial risk (higher interest expenses) decreasing leverage reduces financial risk but may limit growth opportunities (reduced capital for expansion)

Comparison of companies using DuPont analysis

- Comparing profit margins higher margins relative to industry peers may indicate competitive advantage (brand loyalty) or superior cost management (economies of scale) lower margins may suggest pricing pressures (intense competition) or operational inefficiencies (high overhead costs)
- Comparing asset turnover higher turnover relative to industry peers may indicate more efficient asset utilization (lean manufacturing) and better inventory management (vendor managed inventory) lower turnover may suggest need for improvements in asset management (asset tracking) or sales strategies (targeted marketing)
- Comparing financial leverage higher leverage relative to industry peers may indicate more aggressive financing strategy (leveraged buyouts) and higher financial risk (increased bankruptcy risk) lower leverage may suggest more conservative approach to financing (equity financing) and potentially lower growth prospects (limited access to capital)

12.4 Cash Flow Analysis

Cash flow statements reveal a company's financial pulse, showing how money moves in and out. They're divided into three key categories: operating, investing, and financing activities. Each category offers unique insights into a company's financial health and decision-making.

Understanding cash flow statements is crucial for assessing a company's liquidity, solvency, and overall financial well-being. By comparing cash flows to net income, calculating free cash flow, and analyzing trends across companies, investors can make informed decisions about a company's financial strength and future prospects.

Cash Flow Statement Categories

Categories of cash flows

- Operating activities involve cash inflows and outflows directly related to the core business operations
 - Cash received from customers for goods or services sold
 - Cash paid to suppliers for inventory or raw materials
 - Cash paid to employees for salaries and wages
 - Interest payments on loans or bonds
 - Income tax payments to government authorities
- Investing activities encompass cash flows associated with the acquisition or disposal of long-term assets
 - Purchase of property, plant, and equipment (factories, machinery)
 - Sale of long-term investments (stocks, bonds)
 - Loans made to other companies or collected from borrowers
 - Acquisition of other businesses or subsidiaries
- Financing activities include cash flows related to raising or repaying capital, including equity and debt
 - Issuing new shares of stock to investors
 - Repurchasing outstanding shares from shareholders
 - Paying dividends to stockholders
 - Borrowing money from banks or issuing corporate bonds
 - Repaying principal amounts of loans or bonds

Interpreting and Analyzing Cash Flow Statements

Interpretation of cash flow statements

- Liquidity refers to a company's ability to meet short-term obligations and maintain smooth operations
- Positive cash flows from operating activities indicate strong liquidity and sufficient cash to cover current liabilities
- Negative operating cash flows may signal difficulty in paying suppliers, employees, or creditors
- Solvency assesses a company's ability to meet long-term financial obligations and sustain the business
- Positive operating cash flows and sufficient cash reserves support long-term solvency
- Negative investing or financing cash flows may raise concerns about future solvency if not offset by operating cash inflows
- Overall financial health can be gauged by analyzing the consistency and balance of cash flows across categories

- Consistent positive operating cash flows suggest a healthy, profitable business generating cash internally
- Balanced cash inflows and outflows across operating, investing, and financing activities indicate effective management of resources and sustainable growth

Net income vs operating cash flows

- Net income is based on accrual accounting, which recognizes revenues and expenses when earned or incurred, regardless of cash timing
- Revenues are recorded when goods are shipped or services provided, even if cash is not yet collected
- Expenses are recognized when incurred, even if cash has not been paid
- Cash flows from operating activities reflect actual cash inflows and outflows during the period
- Only includes transactions that involve cash changing hands
- Excludes non-cash items like depreciation or amortization
- Potential red flags arise when there are significant discrepancies between net income and operating cash flows
- Consistently higher net income compared to operating cash flows may indicate aggressive revenue recognition (recording sales before cash receipt) or delayed expense recognition (postponing cash payments)
- Consistently lower net income compared to operating cash flows may suggest poor expense management (overspending) or unsustainable cash generation (relying on one-time cash inflows)

Free cash flow implications

- Free cash flow *FCF* represents the cash available after funding operations and necessary capital expenditures
- $FCF = \text{Cashflows from operating activities} - \text{Capitalexpenditures}$
- Measures excess cash generated by the business that can be used for discretionary purposes
- High free cash flow provides flexibility for future growth, capital investments, and shareholder returns
- Invest in expansion projects, new product development, or strategic acquisitions
- Increase dividend payments or initiate share repurchase programs to return cash to shareholders
- Reduce reliance on external financing sources like debt or equity issuance
- Low or negative free cash flow may limit a company's ability to pursue growth opportunities or maintain existing assets
- Insufficient cash to fund capital expenditures or expansion initiatives internally
- Increased dependence on debt or equity financing to sustain operations, leading to higher interest expenses or ownership dilution
- Potential strain on future profitability and shareholder returns if cash generation does not improve

Cash flow comparisons across companies

- Comparative analysis involves evaluating cash flow metrics and trends across companies within the same industry
- Cash flow from operations to net income ratio measures the proportion of earnings converted into cash
- Free cash flow to net income ratio assesses the percentage of profits translated into discretionary cash
- Cash flow per share quantifies the cash generated for each outstanding share of common stock
- Financial strength can be assessed by comparing the level and consistency of operating cash flows
- Higher and more stable operating cash flows indicate greater financial stability and resilience
- Lower dependence on external financing (debt or equity) suggests better overall financial health
- Financial flexibility is determined by the amount of free cash flow and cash reserves available
- Higher free cash flow provides more options for investments, debt repayment, or shareholder returns
- Larger cash balances offer a buffer against economic downturns, competitive threats, or unexpected expenses (lawsuits, natural disasters)

Unit 13 – Introduction to Portfolio Theory

13.1 Modern Portfolio Theory

Modern Portfolio Theory revolutionized investing by focusing on risk-return tradeoffs. It suggests that rational investors seek to maximize returns for a given level of risk, assuming efficient markets and normally distributed returns.

The theory emphasizes diversification to reduce risk while maintaining returns. It introduces concepts like the efficient frontier and portfolio optimization, helping investors balance risk and return based on their individual risk tolerance.

Modern Portfolio Theory

Principles of Modern Portfolio Theory

- Investors are rational and risk-averse
- Aim to maximize returns for a given level of risk (risk tolerance)
- Prefer lower risk for a given level of return (risk-return tradeoff)
- Returns of assets are normally distributed
- Asset returns adequately described by mean and standard deviation (statistical measures)
- Investors have access to the same information and make decisions based on the same time horizon
- Level playing field for all investors (efficient market hypothesis)
- Markets are efficient
- Asset prices reflect all available information (stock prices, economic data)
- Not possible to consistently outperform the market (beat the market)

Risk-return relationship in portfolios

- Risk measured by standard deviation of returns
- Higher standard deviation indicates higher risk (volatility)
- Return measured by expected return of the portfolio
- Higher expected return associated with higher risk (risk premium)
- Investors must balance risk and return based on their risk tolerance
- Risk-averse investors prefer lower risk and willing to accept lower returns (bonds)
- Risk-seeking investors willing to take on higher risk for potential of higher returns (stocks)
- Efficient frontier represents set of optimal portfolios offering highest expected return for given level of risk
- Graphical representation of risk-return tradeoff (portfolio optimization)

Calculation of portfolio metrics

- Expected return of a portfolio ($E(R_p)$) is weighted average of expected returns of individual assets
-

$$E(R_p) = \sum_{i=1}^n w_i E(R_i)$$

- w_i is weight of asset i in portfolio (asset allocation)
- $E(R_i)$ is expected return of asset i (historical returns)
- Standard deviation of a portfolio (σ_p) measures portfolio's risk
-

$$\sigma_p = \sqrt{\sum_{i=1}^n \sum_{j=1}^n w_i w_j \sigma_{ij}}$$

- w_i and w_j are weights of assets i and j in portfolio
- σ_{ij} is covariance between returns of assets i and j (correlation)
- Covariance measures how returns of two assets move together
- Positive covariance indicates returns move in same direction (stocks and bonds)
- Negative covariance indicates returns move in opposite directions (gold and stocks)

Diversification for risk reduction

- Diversification involves investing in variety of assets to reduce risk
- Spreading investments across different asset classes (stocks, bonds, real estate), sectors (technology, healthcare, energy), and geographic regions (US, Europe, Asia)
- Unsystematic risk (diversifiable risk) can be reduced through diversification
- Unsystematic risk specific to individual assets or companies
- Examples include management risk (poor leadership), financial risk (high debt), and default risk (bankruptcy)
- Systematic risk (market risk) cannot be eliminated through diversification
- Systematic risk affects entire market or economy
- Examples include interest rate risk (rising rates), inflation risk (rising prices), and political risk (war, tariffs)
- A well-diversified portfolio can help minimize impact of unsystematic risk on overall portfolio performance
- Holding 20-30 stocks from different sectors and regions (index fund)

13.2 Efficient Frontier and Optimal Portfolios

Efficient frontier and optimal portfolios are key concepts in portfolio management. They help investors find the best mix of assets that maximize returns while minimizing risk. Understanding these ideas is crucial for making smart investment choices.

The efficient frontier shows the best possible portfolios, while optimal portfolios are tailored to an investor's goals. By using tools like the Capital Allocation Line and including risk-free assets, investors can fine-tune their portfolios for better performance.

Efficient Frontier and Optimal Portfolios

Efficient frontier in portfolio management

- Graphical representation of optimal portfolios offering highest expected return for given risk level or lowest risk for given expected return level
- Efficient portfolios cannot be outperformed by other portfolios without increasing risk or decreasing expected return
- Helps investors identify best portfolios maximizing returns while minimizing risk (Sharpe ratio)
- Provides benchmark for evaluating investment portfolio performance
- Allows informed decisions about asset allocation and portfolio diversification (stocks, bonds, real estate)

Characteristics of optimal portfolios

- Optimal portfolio is on efficient frontier and best suits investor's risk tolerance and investment goals
- Maximizes expected return for given risk tolerance level
- Minimizes risk for desired expected return level
- Achieves highest possible Sharpe ratio measuring risk-adjusted returns
- Influenced by investor's risk tolerance, investment time horizon, liquidity needs, market conditions, and economic outlook (risk aversion, long-term goals, short-term cash needs)

Capital Allocation Line and optimal portfolios

- Capital Allocation Line (CAL) represents combinations of risk-free asset and risky portfolio
- Y-intercept represents risk-free rate of return (Treasury bills)
- Slope determined by Sharpe ratio of risky portfolio
- Optimal portfolio is tangency point between CAL and efficient frontier
- Highest possible Sharpe ratio
- Best combination of risk-free asset and risky portfolio for given risk tolerance
- CAL shifts upward when including risk-free assets, increasing expected return for given risk level

Risk-free assets for optimal portfolios

- Risk-free assets offer guaranteed return with zero risk (government bonds, certificates of deposit)
- Benefits of including risk-free assets: 1. Adjust overall portfolio risk and return 2. Provide stable and predictable component 3. Enhance diversification by reducing exposure to market volatility
- Impact on Capital Allocation Line:
- Inclusion shifts CAL upward, increasing expected return for given risk level
- Optimal portfolio changes as risk-free rate changes, affecting tangency point between CAL and efficient frontier
- Allows investors to tailor portfolios to individual risk preferences and investment objectives

13.3 Asset Allocation Strategies

Asset allocation is the cornerstone of investment strategy. It involves dividing your portfolio among different asset classes to balance risk and reward. The goal is to maximize returns while minimizing risk, based on your personal financial situation and goals.

There are two main approaches: strategic and tactical. Strategic allocation sets long-term targets, while tactical makes short-term adjustments. Factors like risk tolerance, objectives, and time horizon shape these decisions. Regular rebalancing keeps your portfolio on track.

Asset Allocation Strategies

Strategic vs tactical asset allocation

- Strategic asset allocation
- Long-term investment approach focusing on investor's risk tolerance, goals, and investment timeline
- Sets target percentages for each asset class (stocks, bonds, cash)
- Reviewed and rebalanced periodically (annually) to maintain desired allocation
- Tactical asset allocation
- Short-term strategy aiming to capitalize on market opportunities or reduce risks
- Temporarily deviates from strategic allocation targets
- Requires active management and market timing decisions (overweighting sectors, underweighting regions)

Factors in allocation decisions

- Risk tolerance
- Investor's ability and willingness to tolerate potential investment losses
- Higher risk tolerance enables greater allocation to riskier assets (equities, commodities)
- Investment objectives
- Specific goals such as preserving capital, generating income, or growing wealth

- Allocation should match investor's objectives (income-focused, growth-oriented)
- Time horizon
- Duration investor plans to hold the investment portfolio
- Longer time horizons allow higher exposure to riskier assets (retirement savings)
- Market conditions
- Prevailing economic environment, interest rates, and market valuations
- May influence short-term tactical allocation decisions (defensive positioning)
- Liquidity needs
- Investor's need to access funds from the portfolio
- Greater liquidity requirements may necessitate larger cash or short-term holdings (emergency funds)

Rebalancing for portfolio targets

- Rebalancing
- Adjusting portfolio's asset mix back to target allocation percentages
- Required due to divergences in asset prices over time (stock market gains)
- Importance of rebalancing
- Maintains intended risk profile of the portfolio
- Prevents portfolio from drifting significantly from desired asset allocation
- Helps manage overall portfolio volatility (selling high, buying low)
- Rebalancing strategies 1. Periodic rebalancing on a fixed schedule (quarterly, annually) 2. Threshold-based rebalancing when allocation deviates by a set percentage (5% bands)

Asset allocation strategy comparison

- Static asset allocation
- Advantages
- Straightforward to implement and maintain over time
- Appropriate for investors with consistent risk profile and long-term goals
- Disadvantages
- May miss out on near-term market opportunities
- Potentially lower returns vs more active management approaches
- Lifecycle (target-date) funds
- Advantages
- Automatically shifts asset allocation as investor nears target end date (retirement)
- Streamlines investment decisions for the individual investor

- Disadvantages
- Standardized approach may not match every investor's unique circumstances
- Typically charge higher fees than self-directed portfolios
- Dynamic asset allocation
- Advantages
- Flexibility to adapt to evolving market conditions
- Potential to generate higher returns by capitalizing on market inefficiencies
- Disadvantages
- Demands active management skill and market timing ability
- Incurs greater transaction costs and management fees
- Introduces complexity and potential for manager mistakes

13.4 Performance Evaluation

Evaluating portfolio performance is crucial for investors to assess their investment strategies. Key measures like the Sharpe ratio, Treynor ratio, and Jensen's alpha help compare risk-adjusted returns across different portfolios and benchmarks.

However, historical returns have limitations and can't predict future performance. Active management evaluation faces challenges in separating skill from luck and accounting for style drift. Benchmark portfolios provide essential reference points for assessing relative performance.

Portfolio Performance Evaluation

Portfolio performance measures

- Sharpe ratio measures risk-adjusted return of a portfolio by comparing excess return to standard deviation
- Calculated as: $(R_p - R_f)/\sigma_p$ where R_p = portfolio return, R_f = risk-free rate, and σ_p = portfolio standard deviation
- Higher Sharpe ratio indicates better risk-adjusted performance (S&P 500, Berkshire Hathaway)
- Treynor ratio measures risk-adjusted return relative to systematic risk (beta)
- Calculated as: $(R_p - R_f)/\beta_p$ where R_p = portfolio return, R_f = risk-free rate, and β_p = portfolio beta
- Higher Treynor ratio indicates better risk-adjusted performance relative to market risk (Apple, Amazon)
- Jensen's alpha measures portfolio's excess return above the expected return based on its beta
- Calculated as: $\alpha_p = R_p - [R_f + \beta_p(R_m - R_f)]$ where α_p = Jensen's alpha, R_p = portfolio return, R_f = risk-free rate, β_p = portfolio beta, and R_m = market return
- Positive alpha indicates outperformance, while negative alpha indicates underperformance (Fidelity Magellan Fund, PIMCO Total Return Fund)

Limitations of historical returns

- Past performance does not guarantee future results as market conditions and investment strategies may change over time
- Historical data may not capture all relevant risk factors that could impact future returns
- Survivorship bias can lead to overestimation of average fund performance as failed or merged funds are often excluded from historical data
- Short-term performance can be heavily influenced by luck or market timing rather than skill (dotcom bubble, 2008 financial crisis)

Role of benchmark portfolios

- Benchmark portfolios serve as a reference point for evaluating a portfolio's performance
- Commonly used benchmarks include market indices (S&P 500, MSCI World), style-specific indices (Russell 1000 Growth, MSCI Emerging Markets), and custom benchmarks tailored to a portfolio's investment mandate
- Benchmarks should be relevant to the portfolio's investment style and objectives, investable and replicable, and widely recognized and accepted by investors
- Performance metrics like alpha and tracking error are often calculated relative to a benchmark to assess outperformance or deviation from the benchmark

Challenges in active management evaluation

- Separating skill from luck is difficult as short-term outperformance may be due to chance rather than investment skill
- Requires long-term track record and statistical significance to assess skill
- Accounting for style drift when portfolio managers deviate from their stated investment style over time
- Makes it difficult to compare performance to a static benchmark
- Evaluating risk-adjusted returns is crucial as active managers may take on additional risk to generate higher returns
- Risk-adjusted metrics (Sharpe ratio, information ratio) are needed to assess risk-return tradeoff
- Comparing performance across different market environments as manager skill may be more evident in certain conditions (high volatility, market downturns)
- Evaluating performance across various market cycles provides a more comprehensive assessment

Unit 14 – Derivatives and Risk Management

14.1 Types of Derivatives: Forwards, Futures, Options, and Swaps

Derivatives are financial instruments that derive their value from underlying assets. They come in four main types: forwards, futures, options, and swaps. Each type has unique characteristics, allowing investors to hedge risks, speculate on price movements, or engage in arbitrage opportunities.

Understanding derivatives is crucial for managing financial risks and enhancing investment strategies. While they offer benefits like customization and leverage, derivatives also carry risks such as counterparty default and complex pricing. Mastering these instruments can provide valuable tools for financial management.

Types of Derivatives

Types of derivative contracts

- Forwards
 - Customized contract between two parties to buy or sell an asset at a specified future date and price agreed upon today
 - Traded over-the-counter (OTC) directly between counterparties without going through an exchange
 - No standardization in contract terms such as size, expiration date, or underlying asset
 - Higher counterparty risk since there is no clearing house to guarantee the transaction
- Futures
 - Standardized contract to buy or sell an asset at a predetermined future date and price
 - Traded on organized exchanges like the Chicago Mercantile Exchange (CME) or Intercontinental Exchange (ICE)
 - Highly regulated and transparent with standardized contract terms and public pricing
 - Lower counterparty risk due to the presence of clearing houses that act as intermediaries
- Options
 - Contract giving the holder the right, but not the obligation, to buy (call option) or sell (put option) an underlying asset at a specified price (strike price) on or before a certain date (expiration date)
 - Traded on exchanges like the Chicago Board Options Exchange (CBOE) or OTC
 - Buyer pays a premium to the seller upfront for this right, which is the maximum potential loss for the buyer
- Swaps
 - Agreement between two parties to exchange cash flows or liabilities from two different financial instruments over a specified period

- Typically involve exchanging a fixed rate for a floating rate (interest rate swap), or cash flows in different currencies (currency swap)
- Traded OTC and customized to suit the needs of the counterparties
- Used to hedge interest rate risk, currency risk, or other types of financial risk

Characteristics of derivative types

- Forwards
 - Binding contract with terms tailored to the specific needs of the parties involved
 - No upfront payment required, with the entire transaction settling at the end of the contract
 - Physical delivery of the underlying asset or cash settlement are both possible
 - Expose parties to counterparty risk, as there is no clearing house to guarantee the transaction
- Futures
 - Binding contract with standardized terms such as contract size, expiration dates, and minimum price fluctuations (tick size)
 - Requires an initial margin payment and daily marking-to-market to settle gains or losses
 - Settled daily until the end of the contract, with final settlement on the expiration date
 - Usually cash-settled, but physical delivery is possible for some contracts like commodities
- Options
 - Non-binding for the buyer, who has the right but not the obligation to exercise; binding for the seller if the buyer exercises
 - Call options give the right to buy the underlying asset, while put options give the right to sell
 - Buyer pays a premium upfront, which is the maximum potential loss; no further payments required
 - American options can be exercised anytime before expiration, while European options can only be exercised at expiration
- Swaps
 - Parties agree to exchange cash flows at specified intervals (quarterly, semi-annually, or annually)
 - No upfront payment required, but sometimes a small fee is paid to compensate for differences in the value of the cash flows
 - Settled periodically over the life of the contract, which can range from a few months to several years
 - Notional principal is not exchanged; only the cash flows based on the principal are exchanged

Applications of derivatives

- Hedging
 - Derivatives can be used to reduce exposure to various financial risks, such as price fluctuations (commodity prices), interest rate changes, or currency movements

- Example: A company can use currency forwards to lock in an exchange rate for future foreign currency transactions (accounts payable or receivable), minimizing currency risk
- Speculation
 - Derivatives allow traders to take positions on the future direction of market prices without actually owning the underlying asset
 - Speculators aim to profit from price movements by buying derivatives they believe are undervalued or selling those they believe are overvalued
 - Example: A trader can buy call options on a stock, expecting the price to rise and profiting from the increased value of the options
- Arbitrage
 - Derivatives can be used to exploit price discrepancies in different markets or between related assets
 - Arbitrageurs aim to profit from these discrepancies while taking minimal risk by simultaneously buying and selling the mispriced assets
 - Example: If the price of a stock futures contract diverges from the underlying stock price, an arbitrageur can buy the cheaper asset and sell the more expensive one, profiting from the price difference

Advantages vs disadvantages of derivatives

- Forwards
 - Advantages: Customizable terms to suit specific needs, no upfront costs, can be used for hedging or speculation
 - Disadvantages: Counterparty risk, lack of liquidity due to OTC nature, no price transparency
- Futures
 - Advantages: Standardized contracts leading to high liquidity, price transparency, lower counterparty risk due to clearing houses
 - Disadvantages: Requires initial margin and daily mark-to-market settlements, limited customization
- Options
 - Advantages: Flexibility (right, but not obligation to exercise), limited downside risk for buyers, can be used for hedging, speculation, or income generation (selling options)
 - Disadvantages: Upfront premium cost, time decay of option value (theta), complex pricing models (Black-Scholes)
- Swaps
 - Advantages: Can be used to manage interest rate or currency risk, no upfront costs, customizable terms to match cash flows
 - Disadvantages: Counterparty risk, lack of liquidity due to OTC nature, complex valuation and documentation requirements

14.2 Options Valuation and Strategies

Option pricing models are essential tools for valuing financial derivatives. The binomial and Black-Scholes models provide frameworks for calculating option prices based on key inputs like asset price, strike price, and volatility.

Several factors influence option prices, including the underlying asset price, strike price, time to expiration, volatility, and interest rates. Understanding these factors helps investors analyze and construct various option strategies to manage risk and potentially enhance returns.

Option Pricing Models

Binomial and Black-Scholes option pricing

- Binomial option pricing model assumes the underlying asset moves up or down by a fixed percentage in discrete time steps, creating a binomial tree of possible price paths
- Option value is calculated by working backward through the tree, discounting the expected payoff at each node
- Black-Scholes-Merton (BSM) model assumes the underlying asset follows a geometric Brownian motion in continuous time
- Uses a partial differential equation to determine the option price based on key inputs: current underlying asset price (S_0), strike price (K), time to expiration (T), risk-free interest rate (r), and volatility (σ)
- Call option price formula: $C = S_0 N(d_1) - Ke^{-rT} N(d_2)$
- Put option price formula: $P = Ke^{-rT} N(-d_2) - S_0 N(-d_1)$
- $d_1 = \frac{\ln(\frac{S_0}{K}) + (r + \frac{\sigma^2}{2})T}{\sigma\sqrt{T}}$ and $d_2 = d_1 - \sigma\sqrt{T}$
- $N(x)$ represents the cumulative standard normal distribution function

Factors Influencing Option Prices

Key factors in option pricing

- Underlying asset price (S_0) directly impacts option prices
- Higher S_0 increases call option price and decreases put option price
- Strike price (K) sets the price at which the option can be exercised
- Higher K decreases call option price and increases put option price
- Time to expiration (T) affects option prices due to uncertainty and time decay
- Longer T generally increases both call and put option prices
- Time decay (theta) accelerates as expiration approaches, eroding option value
- Volatility (σ) measures the uncertainty of the underlying asset's returns
- Higher σ increases both call and put option prices (options on stocks like Tesla vs. utility companies)
- Risk-free interest rate (r) influences the present value of the strike price

- Higher r increases call option prices and decreases put option prices

Option Strategies

Construction of option strategies

- Covered call: long the underlying asset and short a call option on the same asset
- Limits upside potential but provides downside protection and generates income from the call premium (suitable for investors with a neutral to slightly bullish outlook)
- Protective put: long the underlying asset and long a put option on the same asset
- Provides downside protection at the cost of the put premium (acts as an insurance policy)
- Straddle: long a call and a put option with the same strike price and expiration date
- Profits from significant price movements in either direction (bullish or bearish)
- Maximum loss limited to the total premium paid
- Spreads involve simultaneously buying and selling options with different strike prices or expiration dates
 1. Bull spread: long a lower strike call and short a higher strike call (or long a lower strike put and short a higher strike put)
 2. Bear spread: short a lower strike call and long a higher strike call (or short a lower strike put and long a higher strike put)
 3. Profits from moderate price movements in the desired direction with limited risk and reward (credit spreads vs. debit spreads)

Risk-return analysis of options

- Evaluate the maximum profit, maximum loss, and breakeven points for each strategy
- Breakeven points occur when the underlying asset price equals the strike price plus (minus) the premium paid (received) for calls (puts)
- Consider the impact of different market scenarios on the strategy's performance
- Bullish, bearish, or neutral market conditions (straddle performs best in highly volatile markets)
- High or low volatility environments (high volatility favors long option positions)
- Analyze the strategy's sensitivity to changes in the underlying asset price, time to expiration, and volatility using Greeks
- Delta: change in option price per unit change in the underlying asset price (delta hedging)
- Gamma: change in delta per unit change in the underlying asset price (high gamma indicates high sensitivity to price changes)
- Theta: change in option price per unit of time decay (short options benefit from time decay)
- Vega: change in option price per unit change in volatility (long options have positive vega)

14.3 Financial Risk Management Techniques

Financial risks can wreak havoc on businesses and investments. From market fluctuations to credit defaults, understanding these risks is crucial. This section breaks down the main types of financial risks and introduces key risk management techniques.

Derivatives like futures, options, and swaps are powerful tools for mitigating financial risks. We'll explore how these instruments work and their applications in hedging against various risks. We'll also dive into evaluating risk management strategies and the trade-offs involved.

Types of Financial Risks and Risk Management Techniques

Types of financial risks

- Market risk involves potential losses due to changes in market prices or rates (interest rates, foreign exchange rates, commodity prices)
- Credit risk arises from a counterparty's failure to meet its obligations, including default risk and settlement risk
- Liquidity risk is the inability to meet short-term financial obligations or sell assets quickly at fair prices, encompassing funding liquidity risk and market liquidity risk
- Operational risk stems from inadequate or failed internal processes, people, systems, or external events, covering legal risk, compliance risk, and reputational risk

Derivatives for risk mitigation

- Futures contracts are standardized agreements to buy or sell an underlying asset at a predetermined price and date, used to hedge against price fluctuations and lock in future prices (oil futures, currency futures)
- Options contracts grant the buyer the right, but not the obligation, to buy (call) or sell (put) an underlying asset at a predetermined strike price on or before the expiration date, allowing hedging against adverse price movements while maintaining the potential for gains (stock options, commodity options)
- Swaps involve exchanging cash flows based on a specified notional amount, with interest rate swaps exchanging fixed-rate and floating-rate interest payments to manage interest rate risk, and currency swaps exchanging principal and interest payments in different currencies to manage foreign exchange risk (USD/EUR swap, LIBOR swap)

Evaluating and Implementing Risk Management Strategies

Effectiveness of risk management techniques

- Hedge ratios determine the proportion of exposure hedged relative to the total exposure, with the optimal hedge ratio minimizing the variance of the combined position (exposure + hedge)
- Basis risk arises when the price of the hedging instrument does not move in perfect correlation with the price of the hedged item due to differences in quality, location, or delivery dates (crude oil futures vs. gasoline prices)
- Counterparty risk is the possibility that the other party in a derivatives contract will fail to fulfill its obligations, mitigated through collateral requirements, netting agreements, and diversification of counterparties

Trade-offs in risk management strategies

- Hedging costs include transaction costs (commissions, bid-ask spreads, margin requirements) and opportunity costs (potential gains foregone by hedging)

- Risk reduction benefits encompass lower volatility of cash flows and firm value, as well as reduced likelihood of financial distress and bankruptcy
- Cost-benefit analysis compares the expected costs of hedging with the expected benefits of risk reduction, considering the firm's risk tolerance, financial resources, and strategic objectives when deciding on the appropriate level of risk management (airlines hedging fuel costs, exporters hedging currency risk)

14.4 Corporate Risk Management Policies

Corporate risk management is a crucial aspect of financial strategy, protecting assets and enhancing shareholder value. It involves identifying, measuring, and mitigating various risks, from market fluctuations to operational issues. Effective policies can smooth cash flows, reduce capital costs, and improve decision-making.

Evaluating risk management practices is essential for ensuring their effectiveness and alignment with company goals. This involves reviewing frameworks, assessing processes, and analyzing risk profiles. Good practices integrate with strategic planning, adapt to changes, and balance risk-taking with mitigation to support long-term objectives.

Corporate Risk Management Policies

Importance of risk management

- Risk management is essential in corporate finance as it helps safeguard the firm's assets, cash flows, and shareholder value
- Effective risk management can reduce the impact of negative events on the firm's financial performance (market downturns, currency fluctuations)
- It can also help the firm seize opportunities by taking well-calculated risks (expanding into new markets, launching new products)
- Risk management adds to firm value by:
 - Decreasing the variability of cash flows and earnings (smoothing out financial performance)
 - Reducing the cost of capital by managing risks (lower interest rates on debt, higher credit ratings)
 - Improving the firm's reputation and credibility among stakeholders (investors, customers, regulators)
 - Allowing the firm to make better-informed strategic decisions (mergers and acquisitions, capital investments)

Components of risk management policy

- Risk identification
 - Involves recognizing and categorizing potential risks facing the firm
 - Includes financial risks (market risk, credit risk, liquidity risk) and non-financial risks (operational risk, strategic risk, reputational risk)
- Market risk: fluctuations in interest rates, exchange rates, commodity prices
- Credit risk: counterparty default, credit rating downgrades

- Liquidity risk: inability to meet short-term obligations, funding shortages
- Operational risk: system failures, human errors, fraud
- Strategic risk: changes in competitive landscape, technological disruptions
- Reputational risk: negative publicity, loss of customer trust
- Risk measurement
 - Quantifies the potential impact and likelihood of identified risks
 - Uses various tools and techniques, such as:
 1. Value-at-risk (VaR): estimates potential losses over a given time horizon at a certain confidence level
 2. Stress testing: assesses the impact of extreme but plausible scenarios on the firm's financial position
 3. Scenario analysis: evaluates the firm's performance under different hypothetical situations
- Risk mitigation
 - Develops strategies to reduce or eliminate the impact of identified risks
 - Includes:
 - Risk avoidance: exiting high-risk activities or markets
 - Risk transfer: purchasing insurance, using derivatives to hedge exposures
 - Risk sharing: diversifying investments, forming joint ventures
 - Risk acceptance: retaining risks within the firm's risk appetite and tolerance levels

Board's role in risk oversight

- The board of directors is responsible for:
 - Establishing the overall risk appetite and tolerance levels for the firm (how much risk the firm is willing to take)
 - Approving risk management policies and ensuring their alignment with the firm's strategic objectives (long-term goals, competitive positioning)
 - Overseeing the implementation and effectiveness of risk management practices (monitoring performance, reviewing audit reports)
- Senior management is responsible for:
 - Developing and implementing risk management policies and procedures (establishing risk limits, setting risk budgets)
 - Regularly monitoring and reporting on the firm's risk exposures and mitigation efforts (risk dashboards, key risk indicators)
 - Fostering a strong risk culture throughout the organization (training employees, promoting risk awareness)

Evaluating Corporate Risk Management Practices

Effectiveness of risk practices

- Assessing the effectiveness of risk management practices involves:
 - Reviewing the firm's risk management framework and governance structure (roles and responsibilities, reporting lines)
 - Evaluating the adequacy and accuracy of risk identification, measurement, and mitigation processes (data quality, model validation)
 - Analyzing the firm's risk profile and its alignment with the stated risk appetite and tolerance levels (risk concentrations, limit breaches)
- Effective risk management practices should be:
 - Integrated with the firm's strategic planning and decision-making processes (risk-adjusted performance metrics, capital allocation)
 - Regularly reviewed and updated to reflect changes in the business environment and the firm's risk profile (emerging risks, regulatory changes)
 - Supported by robust data, analytics, and reporting capabilities (risk data aggregation, predictive modeling)
- Alignment with strategic objectives can be evaluated by:
 - Assessing whether risk management practices support the achievement of the firm's long-term goals (growth targets, profitability objectives)
 - Analyzing the balance between risk-taking and risk mitigation in the context of the firm's strategic priorities (innovation versus stability)
 - Ensuring that risk management is not a mere compliance exercise but a value-adding function (enabling better decision-making, optimizing risk-return trade-offs)