Comprehensive Study Guide for Advanced Corporate Finance and Investment Theory

Eshaan Arora

December 9, 2024

Contents

1 Introduction

This study guide is a comprehensive resource covering all topics listed in the provided outline. It includes an in-depth look at financial assets and markets, portfolio theory, trading mechanisms, valuation, risk metrics, behavioral finance, corporate governance, market crises, and various investment vehicles. Mathematical formulas and practical applications are also presented. Following the guide, a practice test is provided for review.

2 Financial Assets and Instruments

2.1 Real vs. Financial Assets

Real Assets:

- Tangible or intangible resources used to produce goods and services.
- Examples: Land, machinery, patents, and real estate.
- Contribute to productive capacity and economic growth directly.

Financial Assets:

- Claims on the income generated by real assets.
- Examples: Stocks, bonds, mortgages, and derivatives.
- Indirectly contribute to economic growth by facilitating capital allocation, liquidity, and risk sharing.

2.2 Types of Financial Assets

- **Equity (Stocks):** Ownership interests in a corporation. Shareholders have residual claims on the firm's assets and profits.
- **Debt Securities (Bonds):** Fixed (or formula-based) income claims issued by corporations, governments, or municipalities. Bondholders are creditors, not owners.
- **Derivatives (Futures, Options, Swaps):** Contracts with payoffs derived from underlying assets. Used for hedging, speculating, or arbitrage.

2.3 Role of Financial Assets

- Provide a means to transfer resources across time and states of the world.
- Promote liquidity: Easier to buy/sell financial claims than real assets.
- Support investment and capital formation by bridging savers and borrowers.

3 Financial Markets and Efficiency

3.1 Primary and Secondary Markets

- **Primary Market:** Issuers sell new securities to investors, raising capital for corporate or governmental projects (e.g., IPOs).
- **Secondary Market:** Existing securities are traded among investors, providing liquidity and continuous price discovery.

3.2 Efficient Market Hypothesis (EMH)

- **Weak Form:** Prices reflect all historical price and volume data.
- **Semi-Strong Form:** Prices reflect all publicly available information.
- **Strong Form:** Prices reflect all information, including private/insider data.

Implications:

- In an efficient market, it is difficult to consistently achieve returns above the market-adjusted average without taking on additional risk.
- Guides active vs. passive investment decisions.

3.3 Liquidity and Resource Allocation

- High liquidity reduces trading costs and risk, encouraging market participation.
- Efficient markets allocate capital to most productive uses, fostering economic growth.

4 Asset Allocation and Portfolio Construction

4.1 Principles of Asset Allocation

- Distribute investments across major asset classes: equities, bonds, real estate, and alternatives (hedge funds, private equity, commodities).
- The goal is to balance expected risk and return to meet investor objectives.

4.2 Diversification and Risk

- Diversification reduces **unsystematic risk** (asset-specific risk), leaving mainly **systematic risk** (market risk) which cannot be eliminated by diversification.
- Variance of a portfolio:

$$\sigma_p^2 = \sum_{i=1}^{n} w_i^2 \sigma_i^2 + \sum_{i \neq j} w_i w_j \sigma_{ij} \tag{1}$$

  where w_i is the weight of asset i, σ_i^2 is its variance, and σ_{ij} is the covariance.

4.3 Active vs. Passive Strategies

- **Active Management:** Attempts to outperform the market via timing and security selection, often incurring higher fees.
- **Passive Management:** Aims to match the market return by tracking an index at low cost.

5 Trading Mechanisms and Market Dynamics

5.1 Trading Terminology

- **Bid Price:** Price at which a trader is willing to buy.
- **Ask (Offer) Price:** Price at which a trader is willing to sell.
- **Bid-Ask Spread:** Difference between ask and bid prices; a measure of liquidity and transaction cost.
- **Market Order:** Executed immediately at the best available price.
- **Limit Order:** Executed only if the market reaches the specified limit price.

5.2 Limit Order Books

- Centralized order books aggregate all limit orders, showing prices and quantities.
- Market liquidity and price discovery arise from continuous matching of bids and asks.
- Displays buy (bid) and sell (ask) orders ranked by price.
- Example of a limit order book:

Price	Quantity (Bid)	Quantity (Ask)
100.50	100	-
100.00	200	150
99.50	-	200

5.3 Margin Trading and Short Selling

- **Margin Trading:** Borrowing money from a broker to purchase securities. Increases potential returns but also increases risk.
- **Margin Call:** Occurs when equity in the account falls below the maintenance margin requirement. Investor must deposit more funds or liquidate positions.
- **Maintenance Margin Trigger (Long Position):**

$$P_{\text{trigger}} = \frac{\text{Loan}}{1 - \text{Maintenance Margin}} \tag{2}$$

- **Short Selling:** Selling borrowed securities, hoping to buy them back at a lower price. If price rises, short seller faces potential unlimited losses.
- **Maintenance Margin Trigger (Short Position):** Similar logic applies, but the trigger price depends on how high the stock can go before equity is insufficient.

6 Risk and Return Metrics

6.1 Key Measures

- **Expected Return:**

$$E(R_p) = \sum_{i=1}^{n} w_i E(R_i) \tag{3}$$

- **Variance and Standard Deviation:**

$$\sigma_p^2 = \sum_{i,j} w_i w_j \text{Cov}(R_i, R_j), \quad \sigma_p = \sqrt{\sigma_p^2} \tag{4}$$

- **Beta:** Measures sensitivity of an asset to market movements.

$$\beta = \frac{\text{Cov}(R_i, R_m)}{\sigma_m^2} \tag{5}$$

- **Alpha:** Excess return relative to a benchmark.

$$\alpha = R_i - [R_f + \beta(R_m - R_f)] \tag{6}$$

- **Sharpe Ratio:** Risk-adjusted return.

$$\text{Sharpe Ratio} = \frac{R_p - R_f}{\sigma_p} \tag{7}$$

- **T-Statistics:** Used to determine if performance is statistically significant. For a series of returns, the t-stat for the Sharpe ratio improves with the square root of the number of periods.

6.2 Systematic vs. Unsystematic Risk

- **Systematic Risk:** Market-wide risk (e.g., recession) not diversifiable.
- **Unsystematic Risk:** Asset-specific risk (e.g., product recall), can be reduced via diversification.

7 Valuation and Yield Analysis

7.1 Equity Valuation

- **Discounted Cash Flow (DCF):**

$$P_0 = \sum_{t=1}^{\infty} \frac{E(CF_t)}{(1+r)^t} \tag{8}$$

- **Multiples:** Price-to-Earnings (P/E), Price-to-Book (P/B) ratios to gauge relative value.

7.2 Bond Valuation

- **Price of a Bond:**

$$P = \sum_{t=1}^{T} \frac{C}{(1+y)^t} + \frac{F}{(1+y)^T} \tag{9}$$

  where C = coupon payment, F = face value, y = yield-to-maturity.

- **Duration:** Sensitivity of bond price to changes in interest rates.

7.3 Option Valuation

- **Intrinsic Value (Call):**

$$\text{IV}_{call} = \max(0, S - K) \tag{10}$$

- **Intrinsic Value (Put):**

$$\text{IV}_{put} = \max(0, K - S) \tag{11}$$

- Time value = Option price - Intrinsic value.

7.4 Tax-Equivalent Yield (TEY)

$$\text{TEY} = \frac{\text{Tax-Free Yield}}{1 - \text{Tax Rate}} \tag{12}$$

8 Derivatives and Option Pricing

8.1 Fundamental Derivative Types

- **Futures/Forwards:** Agreement to buy/sell an asset at a future date at a predetermined price.
- **Options (Calls and Puts):** Right, but not obligation, to buy/sell an underlying asset at a strike price.
- **Swaps:** Exchange of cash flows (e.g., fixed-for-floating interest payments).

8.2 Option Greeks

- **Delta:** Sensitivity of option price to changes in underlying price.
- **Gamma:** Rate of change of delta with respect to underlying price.
- **Vega:** Sensitivity of option price to changes in implied volatility.
- **Theta:** Sensitivity of option price to passage of time (time decay).
- **Rho:** Sensitivity of option price to changes in interest rates.

8.3 Volatility

- **Implied Volatility:** The volatility implied by the market price of the option.
- **Historical Volatility:** Based on past price movements.

9 Behavioral Finance and Market Psychology

9.1 Common Biases

- **Overconfidence:** Investors overestimate their ability or knowledge.
- **Herding:** Following others blindly, leading to bubbles or crashes.
- **Loss Aversion:** Investors dislike losses more than they like equivalent gains.

9.2 Behavior vs. EMH

- Behavioral finance explains market anomalies and deviations from EMH.
- Psychological factors can result in mispricings and persistent inefficiencies.

10 Corporate Governance and Regulation

10.1 Agency Problems

- Conflicts between managers (agents) and shareholders (principals).
- Solutions: Performance-based compensation, board oversight, and monitoring.

10.2 Key Regulations

- **Sarbanes-Oxley Act (2002):** Enhanced corporate responsibility, financial disclosures, and auditor independence.
- **Dodd-Frank Act (2010):** Post-2008 crisis reform to reduce systemic risk and improve financial regulatory oversight.

10.3 Ethical Practices

- Good governance fosters investor confidence and stable financial markets.

11 Market Crises and Securitization

11.1 2008 Financial Crisis

- Triggered by the collapse of the U.S. housing market, subprime mortgage lending, and complex derivatives (e.g., CDOs).
- Systemic failures included poor risk management and misaligned incentives.

11.2 Securitization

- Pooling loans (mortgages, auto loans) into securities sold to investors.
- Increases liquidity and distributes risk, but can lead to opaque risk structures.

11.3 Subprime Mortgages

- High-risk loans to borrowers with poor credit.
- Contributed to massive defaults and contagion in the financial system.

12 Indices, ETFs, and Investment Vehicles

12.1 Stock Indices

- **Price-Weighted Index (e.g., Dow Jones):** Weighted by stock prices.
- **Market-Value Weighted Index (e.g., S&P 500):** Weighted by market capitalization.

12.2 ETFs (Exchange-Traded Funds)

- Trade like stocks, priced continuously.
- Often track indices at lower fees than mutual funds.
- More liquid and tax-efficient relative to many traditional mutual funds.

12.3 Other Vehicles

- **Mutual Funds:** Pooled investments, typically active or passive, priced once per day.
- **Hedge Funds:** Less regulated, often use leverage, short selling, and derivatives; target absolute returns.

13 Practical Applications and Strategy

13.1 Options Strategies

- **Payoff Diagrams:** Graphs showing profit/loss as a function of underlying asset price at expiration.
- **Call Spread, Put Spread, Straddle, Strangle:** Used to profit from or hedge specific market expectations on direction or volatility.

13.2 Hedging Techniques

- Use derivatives (options, futures) or offsetting positions to reduce undesirable risk exposures.
- Example: Holding a stock and buying a put option to limit downside (protective put).

13.3 Integrating Theory and Practice

- Apply CAPM, EMH, and risk-return analysis to evaluate investments.
- Combine quantitative analysis (e.g., valuations, regression) with qualitative insights (industry trends, governance quality).

Practice Test

Multiple Choice Questions (60%)

(Select the single best answer)

1. Which of the following is an example of a financial asset?

   (a) A factory building

   (b) A machine tool

   (c) A corporate bond

   (d) A parcel of land

2. According to the weak form of the EMH, stock prices reflect:

   (a) All information, both public and private.

   (b) All publicly available information.

   (c) All historical price and volume information.

   (d) No information at all.

3. Diversification reduces which type of risk?

   (a) Systematic

   (b) Market

   (c) Unsystematic

   (d) Inflation

4. A limit order is an order to:

   (a) Buy or sell at the current market price.

   (b) Buy or sell at a specified price or better.

   (c) Buy or sell immediately at the bid price.

   (d) Buy or sell only after a margin call.

5. The Sharpe ratio uses which measure of risk?

(a) Beta

(b) Alpha

(c) Standard Deviation

(d) Duration

6. Yield-to-maturity (YTM) on a bond is best described as:

(a) The coupon payment divided by current price.

(b) The discount rate that sets the present value of bond payments equal to price.

(c) The required margin for short selling the bond.

(d) The risk-free rate plus a credit risk premium.

7. Implied volatility is:

(a) Historical volatility based on past returns.

(b) The volatility input that matches the market price of the option.

(c) Another term for variance of the underlying asset.

(d) Irrelevant for option pricing.

8. Which Act was introduced to enhance corporate accountability following major accounting scandals?

(a) Dodd-Frank Act

(b) Securities Act of 1933

(c) Sarbanes-Oxley Act

(d) Glass-Steagall Act

9. Securitization involves:

(a) Buying stock on margin.

(b) Converting pools of loans into tradable securities.

(c) Issuing treasury bills by the government.

(d) Purchasing credit default swaps.

10. An ETF differs from a mutual fund primarily because:

(a) It can only be purchased at the end-of-day NAV.

(b) It trades continuously like a stock.

(c) It must hold strictly bonds.

(d) It is not regulated by any authority.

Short Answer Questions (40%)

1. Explain the difference between systematic and unsystematic risk and give an example of each.

2. Describe the intuition behind the Efficient Market Hypothesis and one potential challenge from behavioral finance.

3. A stock is currently priced at $50. You purchase it on margin with an initial 50% margin. You borrowed the remaining 50% from your broker. If the maintenance margin is 30%, at what stock price will you receive a margin call?

4. Briefly explain the difference between the intrinsic value and time value of an option.

5. How does duration measure a bond's sensitivity to interest rate changes?

6. Provide an example of when an investor might prefer a passive investment strategy over an active one.

7. Outline how securitization contributed to the 2008 financial crisis.