

# CAIA Level I Curriculum Companion



2024

## TOPIC 1 Professional Standards and Ethics

### 1.1.1 Professional Standards of Practice

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

#### **Demonstrate knowledge of Standard I: Professionalism.**

*Including:*

- Interpret Standard I with respect to knowledge of the law, independence and objectivity, misrepresentation, and misconduct
- Identify procedures for compliance with respect to knowledge of the law, independence and objectivity, misrepresentation, and misconduct

#### **Demonstrate knowledge of Standard II: Integrity of Capital Markets.**

*Including:*

- Interpret Standard II with respect to material nonpublic information and market manipulation
- Identify procedures for compliance with respect to material nonpublic information

#### **Demonstrate knowledge of Standard III: Duties to Clients.**

*Including:*

- Interpret Standard III with respect to loyalty, prudence and care, fair dealing, suitability, performance presentation, and preservation of confidentiality
- Identify procedures for compliance with respect to loyalty, prudence and care, fair dealing, suitability, performance presentation, and preservation of confidentiality

#### **Demonstrate knowledge of Standard IV: Duties to Employers.**

*Including:*

- Interpret Standard IV with respect to loyalty, additional compensation arrangements, and responsibilities of supervisors
- Identify procedures for compliance with respect to additional compensation arrangements, and responsibilities of supervisors

#### **Demonstrate knowledge of Standard V: Investments Analysis, Recommendations, and Actions.**

*Including:*

- Interpret Standard V with respect to diligence and reasonable basis, communication with clients and prospective clients, and record retention
- Identify procedures for compliance with respect to diligence and reasonable basis, communication with clients and prospective clients, and record retention

#### **Demonstrate knowledge of Standard VI: Conflicts of Interest.**

*Including:*

- Interpret Standard VI with respect to disclosure of conflicts, priority of transactions, and referral fees
- Identify procedures for compliance with respect to disclosure of conflicts, priority of transactions, and referral fees

## TOPIC 2 Introduction to Alternative Investments

### 2.1.1 Defining Alternative Investments

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of various alternative investment types.**

*Including:*

- Identify characteristics of institutional-quality investments.
- Describe real assets (i.e., commodities, real estate, intellectual property, and infrastructure), and distinguish real assets from financial assets
- Describe hedge funds
- Describe private equity (i.e., venture capital, growth equity, and leveraged buyouts)
- Describe private debt (e.g., direct lending, mezzanine debt, distressed debt, and collateralized debt obligations)

#### Keywords

alternative Investments	institutional-quality investment	traditional investments
Real Assets	Commodities	Real Estate
Land	Timberland	Farmland
Natural Resources	Infrastructure	Hedge Fund
Private Equity	Venture Capital	Leveraged Buyouts (LBOs)
Direct Lending	Distressed Debt	Structured Products

### 2.1.2 The Blurred Lines Between Traditional and Alternative Investments

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the defining characteristics of alternative investments.**

*Including:*

- Understand that the lines between traditional and alternative investments are not distinct and universal
- Identify which categories of investments are generally qualified as traditional, generally qualified as alternative, and which can be placed under both

### 2.1.3 A History of Alternative Investing: The U.S. Case

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the history of alternative investments in the United States.**

*Including:*

- Understand how assets typically held by institutional investors in the US have transformed over time

#### Keywords

prudent person standard

### 2.1.4 Distinguishing Investments by Risk and Return Characteristics

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of how alternative and traditional investments are distinguished by return characteristics.**

*Including:*

- Understand the role of absolute return products as diversifiers
- Define illiquidity
- Discuss the advantages and risks of illiquid investments
- Define efficiency and inefficiency
- Understand the relationship of efficiency and inefficiency to competition and transaction costs
- Explain normal and non-normal distributions and the structures that cause non-normality of returns

#### Keywords

absolute return products	illiquidity	lumpy assets
inefficiency	efficiency	

### 2.1.5 Distinguishing Investments by Methods of Analysis



## Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of how alternative and traditional investments are distinguished by methods of analysis.**

*Including:*

- Identify return computation methods
- Identify statistical methods
- Identify valuation methods
- Identify portfolio management methods

### 2.1.6 Additional Characteristics That Distinguish Alternative Investments

## Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of other characteristics that distinguish alternative investments from traditional investments.**

*Including:*

- Describe regulatory factors and their role in alternative investments
- Define how cash flow claims can be partitioned
- Describe trading strategies and how they determine the investments' characteristics
- Describe compensation structures within alternative investments and their implications
- Discuss institutional factors and their implications in trading
- Explain information asymmetries and their issues within financial analysis and portfolio management
- Explain incomplete markets and their challenges
- Understand the influences of innovation on alternative investments

## Keywords

moral hazard	structuring	regulatory factors
trading strategies	institutional factors	incomplete markets
information asymmetries		

### 2.1.7 Essential Goals of Alternative Investing

## Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the goals of alternative investing.**

*Including:*

- Define active management
- Contrast active management to passive investing
- Understand the role of benchmarks in managing investments
- Define active risk and active return
- Describe the absolute and relative standards for evaluating returns
- Describe the concept of arbitrage
- Contrast pure arbitrage with arbitrage as an active absolute return strategy
- Distinguish between the goal of return enhancement and return diversification in an investment program

## Keywords

active management	passive investing	active return
active risk	benchmark	benchmark return
absolute return standard	relative return standard	pure arbitrage

### 2.1.8 Two Pillars of Alternative Investment Management

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

#### Demonstrate knowledge of the two pillars of alternative investment management

*Including:*

- Understand how empirical analysis is used to determine which new types of assets to include in a portfolio
- Understand how economic reasoning is used to determine which new types of assets to include in a portfolio
- Describe how alternative investment categories can be placed within a 2x2 framework

### 2.2.1 The Participants

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

#### Demonstrate knowledge of the participants in the alternative investing environment.

*Including:*

- Identify buy-side participants (e.g., plan sponsors and foundations)
- Describe the roles of buy-side participants in the alternative investing environment
- Identify sell-side participants (e.g., large dealer banks and brokers)
- Describe the roles of sell-side participants in the alternative investing environment
- Identify outside service providers (e.g., prime brokers and accountants)
- Describe the roles of outside service providers in the alternative investing environment

## Keywords

buy side	plan sponsor	endowment
family office	foundation	private limited partnerships
sovereign wealth funds	separately managed accounts	'40 Act funds
master limited partnerships (MLPs)	mutual funds	sell side
large dealer banks	proprietary trading	back office operations
front office operations	middle office operations	prime broker
fund administrator	custodians	financial platforms
Depository Trust Company (DTC)	commercial bank	universal banking
depositories	investment bank	

### 2.2.2 Alternative Investment Legal Structures

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the legal structures in alternative investing.**

*Including:*

- Describe the role of limited liability in passive investments
- Explain the role of entities (i.e., limited liability companies, corporations), and their purposes in alternative investing
- Describe limited partnership structures
- Identify bankruptcy remote entities (e.g., special purpose vehicles, special purpose entities)
- Explain the difference in bankruptcy remote entities (e.g., special purpose vehicles, special purpose entities)
- Identify the structures of various entities (e.g., master-feeder funds, master trusts) that facilitate investor taxation differences

## Keywords

special purpose entity (SPE)	special purpose vehicle (SPV)	feeder fund
master trust	master-feeder funds	

### 2.2.3 Key Features of Fund Structures

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

## Demonstrate knowledge of the key features of fund structures.

*Including:*

- Identify the four key documents (i.e., private-placement memoranda, partnership agreement, subscription agreement, management company operating agreement) used in establishing and maintaining a hedge fund, private equity fund, or other private partnerships
- Explain the importance and components of a limited partners agreement
- Explain moral hazard and adverse selection
- Describe corporate governance in private funds
- State components of investments objectives, fund size, and fund terms within an LPA
- Explain the role of management fees and expenses in how investments are managed
- Discuss global regulations (e.g., MiFID, MiFID II, AIFMD)
- Identify global fund structures (e.g., FIFs, SICAV, SICAF, ICAV)

### Keywords

private-placement memoranda	management company operating agreement	subscription agreement
adverse selection	qualified majority	limited partnership agreement (LPA)
limited partner advisory committee (LPAC)	partnership agreement	

## 2.2.4 Drawdown Fund Fees and Terms

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

### Demonstrate knowledge of PE-style fund fees and terms.

*Including:*

- Discuss and calculate PE management fees and carried interest
- Understand clawback provisions in PE
- Calculate carried interest and hurdle rates as part of a PE deal
- Explain perverse incentives that can originate from PE hurdle rates
- Explain the GP's contribution to initial PE fund investment
- Explain the key-person provision as part of the LP partnership clause
- Explain termination and divorce of PE-style funds
- Identify other covenants in PE-style funds

### Keywords

Clawback escrow agreement	Hurt money	Key personnel clause
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Good-leaver clause	Bad-leaver clause	
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## 2.2.5 Financial Markets

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the financial markets involved in alternative investments.**

*Including:*

- Define primary capital markets and describe their roles in alternative investments
- Define secondary capital markets and describe their roles in alternative investments
- Define third, fourth, and private markets and describe their roles in alternative investments

### Keywords

primary market	secondary market	limit orders
securitization	bid-ask spread	market making
market orders	market takers	third markets
fourth markets		

## 2.2.6 Regulatory Environment

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the regulatory environment of alternative investments.**

*Including:*

- Discuss the common types of alternative investment fund regulations

### Keywords

systemic risk
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## 2.2.7 Short Selling

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of short-selling processes and mechanics.**

*Including:*

- Explain the mechanics of institutional short selling
- Explain the mechanics of short selling to the short seller
- Identify special situations involving short selling

### Keywords

short selling	substitute dividends	rebate
special stock	dividend irrelevancy	bought in
general collateral stocks	short squeeze	

## 2.3.1 Types of Alternative Investment Funds

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the two main fund structures used for alternative investment funds.**

*Including:*

- Identify the primary characteristics of open-end (aka evergreen) fund structures
- Identify the primary characteristics of drawdown (aka PE-style, closed-end) fund structures
- Contrast open-end funds with drawdown funds
- Explain the role of a high-water mark in an open-end fund structure
- Identify the risks unique to PE and PE fund structures
- Discuss fee differences between PE and hedge funds

### Keywords

gates	interval funds	blind pool equity fund
committed capital	capital calls	

## 2.3.2 Liquid Alternative Investments

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of liquid alternative investments.**

*Including:*

Define liquid alternative investments

- Understand the spectrum of liquid alternative products
- Identify the distinct types of alternative investments
- Describe the factors driving the growth of liquid alternative investments
- State the regulatory constraints that affect liquid alternative investments

- State the main factors that contribute to the differences between the returns of private placement vehicles and those of alternative investments

### Keywords

liquid alternatives	hedge fund replication	closed-end mutual fund
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### 2.3.3 Trend of LP Preference for Direct Investment

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the trend of LP preference for direct investment.**

*Including:*

- Explain the different models of direct investment.
- Understand the drivers for direct investment.
- Identify the most common type of direct investment.

### Keywords

partnership investing	solo investing	co-investment
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### 2.3.4 Co-Investments

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of co-investment.**

*Including:*

- List the three alternative co-investing structures
- Explain the basics of co-investing.
- Identify the investment processes for co-investing.
- Identify advantages of co-investing.
- Identify expected disadvantages of co-investing.

### Keywords

annex fund	top-up fund	bridging
lock-step provision	promote	

### 2.3.5 Challenges in Co-Investing

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the challenges in co-investing.**

*Including:*

- Understand the challenges of co-investing from the LP perspective.
- Understand the challenges of co-investing from the GP perspective.

### 2.3.6 Historical Returns of Co-Investment

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of observations regarding historical returns of co-investment.**

*Including:*

- Interpret evidence on the performance track record of co-investment.
- Identify the specific capabilities that investors must develop to be successful in co-investments.
- Describe the impact that co-investing has on the private equity “J-curve.”

### 2.4.1 Return and Rate Mathematics

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of return and rate mathematics.**

*Including:*

- Distinguish simple from compound interest
- Distinguish discrete from continuous compounding

#### Keywords

continuous compounding

discrete compounding

simple interest

### 2.4.2 Internal Rate of Return

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the internal rate of return (IRR) approach to alternative investment analysis**

Including:

- Understand which alternative investments are likely to use IRR and why this approach may be more suitable than traditional performance metrics
- Solve for the IRR given a series of cash flows and valuation.

### Keywords

internal rate of return (IRR)	interim IRR	since-inception IRR
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## 2.4.3 Problems with Internal Rate of Return

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the problems associated with the internal rate of return (IRR).**

Including:

- Discuss the effect of complex cash flow patterns on the computation and interpretation of IRRs
- Explain challenges of comparing investments based on IRRs
- Discuss the difficulties of aggregating IRRs
- Explain the relationship between IRR and the reinvestment rate assumption

### Keywords

borrowing type cash flow pattern	complex cash flow pattern	aggregation of IRRs
multiple sign change	cash flow pattern	reinvestment rate assumption

## 2.4.4 Modified Internal Rate of Return

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of modified internal rate of return (IRR).**

Including:

- Apply the modified internal rate of return approach
- Identify advantages and disadvantages of modified internal rate of return
- Evaluate time-weighted and dollar-weighted returns

### Keywords



time-weighted returns	modified IRR	dollar-weighted returns
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#### 2.4.5 Other Performance Measures

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of other performance measures associated with illiquid investments.**

*Including:*

- Apply three ratios that can be used as performance measures
- Explain the Public Market Equivalent (PME) method

##### Keywords

distribution to paid-in (DPI) ratio	total value to paid-in (TVPI) ratio	residual value to paid-in (RVPI) ratio
Public Market Equivalent (PME) Method		

#### 2.4.6 Illiquidity, Accounting Conservatism, IRR, and the J-Curve

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of illiquidity, accounting conservatism, IRR, and the J-Curve as they relate to the valuation of alternative investments.**

*Including:*

- Identify how accounting conservatism relates to early fund losses
- Identify the implication of accounting conservatism on deferred recognition of gains
- Interpret the J-Curve

##### Keywords

Financial Accounting Standard (FAS) 157	J-Curve
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#### 2.4.7 Distribution of Cash Waterfall

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the distribution of cash waterfall.**

*Including:*

- Explain the distribution of cash waterfall provision of a limited partnership agreement
- Understand terminology associated with the cash waterfall provision (e.g., carried interest, hurdle rate, catch-up provision, vesting, clawback clause)
- Discuss factors (e.g., management fees, incentive-based fees) to consider in a fund’s compensation structure and the potential effects of decisions regarding compensation structure
- Determine fund-as-a-whole carried interest and deal-by-deal carried interest
- Calculate clawback provisions
- Analyze hard and soft hurdle rates and their sequences of distribution
- Discuss the potential effects of incentive fees on decision-making, and their option like nature

**Keywords**

<b>waterfall</b>	<b>carried interest</b>	<b>catch-up provision</b>
<b>hurdle rate</b>	<b>incentive fee</b>	<b>performance-based fee</b>
<b>preferred return</b>	<b>vesting</b>	<b>clawback</b>
<b>compensation scheme</b>	<b>catch-up rate</b>	<b>management fees</b>
<b>management fee offsets</b>	<b>deal-by-deal carried interest</b>	<b>hard hurdle rate</b>
<b>soft hurdle rate</b>	<b>fund-as-a-whole carried interest</b>	

**2.4.8 Returns Based on Notional Principal**

**Learning Objectives**

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of returns based on notional principal.**

*Including:*

- Understand the challenge of calculating returns on positions with zero value
- Define and apply the concepts of notional principal and full collateralization for forward contracts
- Calculate the log return on a fully collateralized derivatives position
- Calculate the log return on a partially collateralized derivatives position

**Keywords**

<b>notional principal</b>	<b>return on notional principal</b>	<b>fully collateralized</b>
<b>partially collateralized</b>		

**2.5.1 Return Distributions**

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the characteristics of return distributions.**

*Including:*

- Contrast ex ante and ex post return distributions
- Understand the importance of the normal distribution in statistical analysis
- Describe the characteristics of lognormal distributions

### Keywords

ex ante returns	ex post returns	normal distribution
lognormal distribution		

## 2.5.2 Moments of the Distribution

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of moments of return distributions (i.e., mean, variance, skewness, and kurtosis).**

*Including:*

- Explain the first four moments of return distributions
- Explain skewness of return distributions
- Explain kurtosis and excess kurtosis of return distributions
- Describe the characteristics of platykurtic, mesokurtic, and leptokurtic distributions

### Keywords

skewness	kurtosis	excess kurtosis
leptokurtosis	mesokurtosis	platykurtosis

## 2.5.3 Covariance and Correlation

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of various measures of correlation of returns.**

*Including:*

- Demonstrate the importance of correlation in alternative investment portfolio management

- Define and calculate covariance
- Define and calculate correlation coefficient
- Define and calculate the Spearman rank correlation coefficient
- Discuss the role of correlation in portfolio diversification

### Keywords

covariance	correlation coefficient	perfect linear negative correlation
perfect linear positive correlation	Spearman rank correlation	

#### 2.5.4 Beta and Autocorrelation

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of Beta and Autocorrelation.**

*Including:*

- Define and calculate beta in the context of the CAPM
- Define and calculate autocorrelation
- Define and calculate higher-order autocorrelation
- Define and apply the Durbin-Watson test

### Keywords

autocorrelation	first-order autocorrelation
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#### 2.5.5 Interpreting Standard Deviation and Variance

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of standard deviation (volatility) and variance.**

*Including:*

- Explain standard deviation (volatility)
- Describe the properties of variance and standard deviation
- Calculate variance and standard deviation

#### 2.5.6 Testing for Normality

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of methods used to test for normality of distributions.**

*Including:*

- Discuss the three main reasons for non-normality observed in alternative investment returns (i.e., autocorrelation, illiquidity, and nonlinearity) and the effect of each on returns
- Discuss tests for normality that use sample moments
- Apply the Jarque-Bera test

### Keywords

Jarque-Bera test

## 2.6.1 Informational Market Efficiency

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the concept of informational market efficiency.**

*Including:*

- Define informational market efficiency
- Explain various forms of informational market efficiency, including efficient inefficiency
- Identify factors driving informational market efficiency
- Discuss the factors influencing informational efficiency in alternative asset markets

### Keywords

informational market efficiency	semistrong form informational market efficiency	strong form informational market efficiency
weak form informational market efficiency		

## 2.6.2 The Time Value of Money, Prices, and Rates

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the time value of money, prices, and rates.**

*Including:*



- Understand zero-coupon bonds and its present value function
- Calculate interest rates from zero coupon bond prices
- Determine short-term interest rates using the Fisher equation
- Estimate the term structure of interest rates with zero-coupon bonds
- Understand how the bond pricing formula is used to calculate bond yields
- Estimate (i.e. bootstrap) the term structure of interest rates with coupon bonds

### Keywords

anticipated inflation rate	term structure of interest rates	modified Fisher equation
real interest rate	nominal interest rate	Fisher effect or Fisher equation
nominal price	yield to maturity	real price

### 2.6.3 Forward Interest Rates

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of forward interest rates.**

*Including:*

- Define implied forward rates
- Estimate implied forward rates using incremental cash flows
- Calculate implied forward rates with annual compounding
- Explain the term structure of implied forward rates

### Keywords

implied forward rate	term structure of implied forward rates
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### 2.6.4 Arbitrage-Free Models

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of arbitrage-free financial models.**

*Including:*

- Describe arbitrage-free models
- State a key externality of arbitrage activities
- Discuss applications of arbitrage-free models
- Describe arbitrage-free pricing in spot markets

- Describe hedged and unhedged carry trades

### Keywords

arbitrage-free model	relative pricing model	absolute pricing model
spot market	cash market	arbitrage

## 2.6.5 Binomial Tree Models

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of binominal tree models.**

*Including:*

- Understand the mechanics of binomial trees
- Explain the differences between a binomial tree and a recombining binomial tree
- Solve for the value of a call option using a simplified binomial tree and stock prices
- Explain risk-neutral models and when they are appropriate to employ
- State the advantages of binomial tree models

### Keywords

binomial tree	recombining binomial tree	risk-neutral model
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## 2.6.6 Single-Factor Default-Free Bond Models

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of single factor default-free bond models.**

*Including:*

- Define traditional duration
- Interpret duration in the case of a fixed coupon bond
- Determine the duration for a bond portfolio
- Describe how the duration of a long-only bond portfolio can be used to manage interest rate risk
- Identify challenges and solutions for using duration when cash flows are stochastic
- Discuss implications of floating vs. fixed rate duration
- Assess implications of compounding conventions on modified duration
- Explain duration as it relates to the longevity of a zero-coupon bond
- Analyze hedging or immunizing a long-short portfolio with duration through time

- Explain extensions to traditional duration

### Keywords

duration	interest rate immunization	Modified duration
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## 2.6.7 Reduced-Form Modeling of Credit Risk

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of reduced form modeling of credit risk.**

*Including:*

- Identify the difference between structural models and reduced-form models
- Define the three factors that determine the expected credit loss of a credit exposure
- Calculate expected credit loss
- Describe two key characteristics of the risk-neutral modeling approach
- Define risk-neutral probability
- Apply the risk-neutral approach to pricing risky debt
- Apply the risk-neutral approach to estimating credit spreads
- Apply the reduced-form model to determine relative prices of securities
- Explain what it means to calibrate a model
- List the advantages and disadvantages of the reduced-form model
- Contrast structural and reduced-form credit risk models

### Keywords

reduced-form credit models	exposure at default	loss given default
probability of default	risk-neutral approach	risk-neutral investor
hazard rate		

## 2.6.8 Single-Factor Equity Pricing Models

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of single factor equity pricing models.**

*Including:*

- Define an asset pricing model
- Apply a single-factor asset pricing model (e.g., the capital asset pricing model (CAPM))
- Describe ex ante forms of the CAPM and their implications

- Describe ex post forms of the CAPM and their applications

### Keywords

asset pricing model	capital asset pricing model (CAPM)	ex ante models
idiosyncratic return	idiosyncratic risk	systematic return
systematic risk	ex post model	excess return
equity risk premium	single-factor asset pricing model	

## 2.6.9 Single-Factor Models and Regression

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of single-factor regression models.**

*Including:*

- Explain the simple linear regression and single-factor market model
- Explain the use of ordinary least squares to estimate regression parameters
- Describe the problem outliers pose to regression analysis
- Describe the problem autocorrelation poses to regression analysis
- Describe the problem heteroskedasticity poses to regression analysis
- Interpret a regression's goodness of fit
- Apply the statistical significance of regression parameter estimates

### Keywords

dependent variable	independent variable	regression
simple linear regression	intercept	residuals
slope coefficient	goodness of fit	r-squared
t-statistic	t-test	

## 2.6.10 Hypothesis Testing

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of statistical methods for locating alpha.**

*Including:*

- Identify the four steps of hypothesis testing (i.e., state the hypothesis, formulate an analysis plan, analyze sample data, and interpret results)

- Discuss the error of accepting a hypothesis
- Recognize the four common problems with using inferential statistics (i.e., misinterpretation of high p-values, failure to distinguish between statistical significance and economic significance, violation of distributional assumptions, and misinterpretation of level of confidence)
- Define and discuss type I and type II errors in hypothesis testing
- Understand erroneous conclusions with statistical testing

### Keywords

<b>null hypothesis</b>	<b>alternative hypothesis</b>	<b>p-value</b>
<b>confidence interval</b>	<b>test statistic</b>	<b>significance level</b>
<b>type I error</b>	<b>type II error</b>	

## 2.6.11 Sampling and Testing Problems

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of sampling and testing problems.**

*Including:*

- Identify the characteristics of unrepresentative data sets (e.g., selection bias, self-selection bias, survivorship bias) and their effects on test results
- Discuss data mining and data dredging and recognize their effects on test results
- Discuss backtesting and backfilling and recognize their effects on test results
- Discuss cherry-picking and chumming and recognize their effects on test results

### Keywords

<b>selection bias</b>	<b>self-selection bias</b>	<b>survivorship bias</b>
<b>data dredging</b>	<b>data mining</b>	<b>backfill bias</b>
<b>backfilling</b>	<b>backtesting</b>	<b>overfitting</b>
<b>cherry-picking</b>		

## 2.7.1 Forward Contracts Versus Futures Contracts

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of forward and futures contracts.**

*Including:*

- Describe the trading differences between forward and futures contracts



- Apply the marking-to-market process for futures positions
- Discuss the effect of marking-to-market on counterparty risk
- Evaluate the effect of marking-to-market and the time value of money on risk and on prices
- Analyze initial margin for futures positions
- Analyze maintenance margin for futures positions

### Keywords

open interest	marked-to-market	margin call
initial margin	maintenance margin requirement	

## 2.7.2 Foundations of Forward Contracts

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of foundations of forward contracts.**

*Including:*

- Describe the settlement and delivery processes of forward contracts
- Understand the no-arbitrage approach to determining forward prices
- Determine the forward contract price of a zero-coupon default-free bond
- Analyze forward prices and expected spot prices under risk neutrality
- Understand the relationship between forward prices and expected bond rates

### Keywords

forward contract

## 2.7.3 Forward Contracts on Rates

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the impacts of forward contracts on rates.**

*Including:*

- Describe the forward rate agreement (FRA) process
- Understand and apply the relationship between FRAs and implied forward interest rates
- Explain forward rates and their extensions

## Keywords

reference rate	forward rate agreement (FRA)	swap
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### 2.7.4 Forward Contracts on Assets with Benefits and Costs of Carry

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the impact of forward contracts on assets with benefits and costs of carry.**

*Including:*

- Discuss the benefits and costs of carrying (i.e., holding) a cash position and the incorporation of convenience yields and storage costs in cost of carry models
- Calculate the forward price of a commodity
- Discuss four factors that differentiate forward pricing on financial assets with those of physical assets
- Understand challenges involving measuring storage costs and convenience yields
- Discuss the difficulties of short-selling physical assets and the resulting implication to the formula for forward prices
- Calculate forward contracts with non-zero market value

## Keywords

carrying cost	cost-of-carry model	cost of carry
convenience yield	storage costs	marginal market participant

### 2.7.5 Managing Long-Term Futures Exposures

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of managing long-term futures exposures.**

*Including:*

- Discuss futures contracts with different settlement dates
- Understand how rollover decisions alter long-run returns

## Keywords

rolling contracts	distant contracts	front month contract
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## 2.7.6 Option Exposures

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of option exposures.**

*Including:*

- Understand option risk exposure diagrams
- Explain the key characteristics of long and short positions in an underlying asset
- Understand the key characteristics of call and put exposures
- State the key characteristics of protective put exposures
- Discuss characteristics of option spreads (e.g., bull spreads, bear spreads, and ratio spreads)
- Understand the key characteristics of option combinations (e.g., straddles, strangles, and the concept of risk reversals)
- Apply the concepts of option collars and put-call parity

### Keywords

naked option	covered call	protective put
bear spread	bull spread	option spread
option combination	option straddle	option strangle
ratio spreads	option collar	risk reversal
put-call parity		

## 2.7.7 Interest Rate Options

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of interest rate options.**

*Including:*

- Describe an interest rate cap and calculate cap payments
- Describe interest rate floors and calculate floor payments
- Discuss interest rate options and counter-party risk

### Keywords

cap	caplet	interest rate floor
floor	floorlet	

## 2.7.8 Interest Rate Swaps

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of interest rate swaps.**

*Including:*

- Understand simple interest rate swaps
- Identify payers and receivers of interest rate swaps
- Explain how pensions use interest rate swaps
- Understand the mechanics of interest rate swaps
- Describe the initial valuation of an interest rate swap and calculate the expected payments of the swap
- Understand how an existing swap is valued
- Discuss risks in interest rate swaps
- Discuss the global financial crisis of 2007-2009 in the context of swap risk

### Keywords

interest rate swap	swap rate	swap rate curve
swap		

## 2.7.9 Option Pricing Models

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of option pricing models.**

*Including:*

- Understand the concept of an option on a portfolio
- Understand the Black-Scholes call-option formula
- Understand the Black forward option pricing model
- Understand the currency option pricing model

### Keywords

Black-Scholes call option formula
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## 2.7.10 Option Sensitivities

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of option sensitivities.**

*Including:*

- Explain the five most popular option sensitivities (i.e., delta, vega, theta, rho, and gamma)
- Describe option sensitivities such as omicron, lambda, and omega
- Discuss the uses of option sensitivities in risk management

### Keywords

<b>rho</b>	<b>lambda</b>	<b>omicron</b>
<b>delta</b>	<b>omega</b>	<b>gamma</b>
<b>vega</b>	<b>theta</b>	<b>vega risk</b>

## 2.8.1 Measures of Risk

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of measures of risk.**

*Including:*

- Define semivariance, semistandard deviation, downside deviation, semivolatility, and tracking error
- Describe drawdown, shortfall risk, target semivariance, and target semistandard deviation
- Calculate drawdown
- Interpret value at risk (VaR) and conditional value-at-risk (CVaR)
- Discuss the strengths and weaknesses of VaR

### Keywords

<b>semivariance</b>	<b>semistandard deviation</b>	<b>semivolatility</b>
<b>shortfall risk</b>	<b>target semistandard deviation</b>	<b>target semivariance</b>
<b>tracking error</b>	<b>drawdown</b>	<b>maximum drawdown</b>
<b>conditional value-at-risk</b>	<b>value at risk</b>	<b>downside deviation</b>

## 2.8.2 Estimating Value at Risk (VaR)

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

## Demonstrate knowledge of methods for estimating value at risk (VaR).

*Including:*

- Apply a parametric approach to estimate VaR with normally distributed returns or with normally distributed underlying factors
- Describe methods for estimating volatility as an input for VaR calculations
- Describe methods for estimating VaR for leptokurtic positions
- Describe methods for estimating VaR directly from historical data
- Describe how the Monte Carlo analysis can be used to estimate VaR
- Discuss and apply the aggregation of portfolio-component VaRs to determine the VaR for a portfolio under various assumptions (i.e., perfect correlation, zero correlation, and perfect negative correlation)

### Keywords

parametric VaR	Monte Carlo analysis
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## 2.8.3 Benchmarking and Performance Attribution

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of benchmarking and performance attribution.**

*Including:*

- Define benchmarking
- Identify types of benchmarks
- Discuss performance attribution

### Keywords

benchmarking	peer group	performance attribution
return attribution		

## 2.8.4 Ratio-Based Performance Measures

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of ratio-based performance measures used in alternative investment analysis.**

*Including:*

- Describe the two major types of performance measures
- Define Sharpe ratio, Treynor Ratio, Sortino ratio, information ratio, and return on VaR and
- Discuss the properties in using the Sharpe ratio
- Calculate Sharpe Ratio, Treynor ratio, Sortino ratio, information ratio, and return on VaR
- Discuss the properties in using the Treynor ratio

### Keywords

Sharpe ratio	Sortino ratio	Treynor ratio
return on VaR (RoVaR)	information ratio	

## 2.8.5 Risk-Adjusted Return Measures

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of risk-adjusted performance measures used in alternative investment analysis.**

*Including:*

- Define Jensen's Alpha and the M2 (M-Squared) approach
- Calculate Jensen's Alpha and the M2 (M-Squared) approach

### Keywords

Jensen's alpha	M2 approach
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## 2.8.6 Pricing and Historic Data Analysis

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of pricing and historic data analysis.**

*Including:*

- Interpret models of stale prices
- Describe the effect of stale pricing on historic mean returns and volatility
- Calculate the effect of stale pricing on historic mean returns and volatility

### Keywords

stale prices
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## 2.8.7 Appraisals and Price Smoothing

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of valuation and volatility of private assets.**

*Including:*

- Discuss the smoothing of prices and returns
- Determine the effect of smoothing on observed volatility
- Identify the primary ways that returns can be managed
- Discuss how appraisals contribute to smoothing of private asset prices
- Compare smoothed returns with market returns

### Keywords

smoothing	favorable mark	managed returns
model manipulation	selective appraisals	market manipulation

## 2.9.1 Overview of Beta and Alpha

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of beta and alpha.**

*Including:*

- Understand the role of beta in the analysis of traditional and alternative investments
- Understand the role of alpha in the analysis of traditional and alternative investments

### Keywords

Alpha
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## 2.9.2 Return Drivers

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of return drivers.**

*Including:*

- Discuss the classification of assets into beta drivers and alpha drivers



- Discuss the characteristics of beta drivers and their behavior over time
- Discuss passive beta drivers as pure plays on beta
- Discuss the characteristics of alpha drivers
- Discuss product innovators and process drivers

### Keywords

return driver	alpha driver	beta driver
linear risk exposure	equity risk premium puzzle	passive beta driver
process drivers	product innovators	

### 2.9.3 Challenges in Estimating Alpha

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of empirical approaches in estimating alpha.**

*Including:*

- Identify the steps involved in estimating alpha from historical performance
- Discuss how an experiment of a fair casino game can illustrate the challenges to empirical analysis of manager skill

### Keywords

model misspecification

### 2.9.4 Alpha Estimation and Return Persistence

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of alpha estimation and return persistence.**

*Including:*

- Define abnormal return persistence
- Discuss attribution of idiosyncratic returns to luck or skill
- Interpret estimated return persistence

### Keywords

abnormal return persistence

### 2.9.5 Return Attribution, Alpha, and Beta

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of return attribution.**

*Including:*

- Calculate beta, forecasted alpha, and realized alpha
- Discuss the three primary types of model misspecification (i.e., omitted systematic return factors, misestimated betas, and nonlinear risk-return relationships) and their effects on return attribution
- Describe various types of beta nonstationarity (i.e., beta creep, beta expansion, and market timing) and their effects on return attribution
- Discuss how alpha and beta can become commingled

#### Keywords

<b>misestimated betas</b>	<b>omitted (or misidentified) systematic return factors</b>	<b>beta creep</b>
<b>nonlinear risk-return relation error</b>	<b>beta expansion</b>	<b>beta nonstationarity</b>

### 2.9.6 Statistical Issues in Analyzing Alpha and Beta

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of statistical issues in analyzing alpha and beta.**

*Including:*

- Understand the effect of non-normality on the cross-sectional search for alpha
- Identify the potential effects of outliers on reported results
- Describe issues involving biased testing in the search for alpha
- Discuss the challenges of spurious correlation and causality in beta estimation
- Explain three major fallacies of alpha estimation and two major fallacies of beta estimation and the lessons that arise from them

#### Keywords

<b>spurious correlation</b>	<b>causality</b>
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## Topic 3: Real Assets

### 3.1.1 Natural Resources Other Than Land

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of natural resources other than land.**

*Including:*

- Discuss natural resources as an exchange option
- Discuss the concept of moneyness as it pertains to the development of natural resources
- Discuss why some in-the-money development options should not be immediately exercised
- Describe the relationship between the moneyness of natural resource options and short-term financial risks

#### Keywords

natural resources	split estate	pure play
exchange option		

### 3.1.2 Land

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of land as an alternative asset.**

*Including:*

- Define land banking
- Describe the three types of land lots (i.e., paper lots, blue top lots, and finished lots)
- Discuss investment in undeveloped land as a call option
- Apply the binomial option pricing technique for valuing land as a call option
- Describe the risks and returns of investing in land
- Calculate the expected return of land investments

#### Keywords

land banking	blue top lots	finished lots
paper lots	binomial option pricing	risk-neutral probability
negative survivorship bias	entitled lots	broken lots
raw land		

### 3.1.3 Timber and Timberland

## Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of timber and timberland as alternative assets.**

*Including:*

- Discuss the characteristics of timber and timberland
- Discuss the role of timberland investment management organizations (TIMOs)
- Describe the risks and returns of timberland investments
- Identify methods of gaining exposure to timberland
- Explain benefits and disadvantages of timber investment

## Keywords

timberland investment  
management organizations  
(TIMOs)

### 3.1.4 Farmland

## Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of farmland as an alternative asset.**

*Including:*

- Discuss the characteristics of farmland investments
- Calculate the value of farmland based on annual operating income and the cap rate
- Understand the structure of farmland ownership and management
- Discuss supply and demand factors of agricultural products
- Identify three key benefits and three key disadvantages of farmland investment
- Identify methods of obtaining exposure to farmland
- Discuss the value and importance of assets with multiple purposes

## Keywords

cap rate

agency risk

### 3.1.5 Contagion, Price Indices, and Biases

## Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of contagion, price indices, and biases in real estate values.**

*Including:*

- Discuss the reliability of market prices versus appraisal-based data
- Define contagion

### Keywords

Contagion

### 3.1.6 Key Observations Regarding Historical Returns of Timberland and Farmland

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of observations regarding historical returns of timberland and farmland.**

*Including:*

- Summarize the key observations on historical timber and farmland returns that are consistent with economic reasoning.

### 3.2.1 Investing in Commodities without Futures

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of investing in commodities without futures.**

*Including:*

- Discuss disadvantages of direct investment in physical commodities
- Interpret Hotelling's theory
- Explain Julian Simon's argument related to direct commodity returns
- Understand the idiosyncratic risks and two-betas of commodity-related equity returns
- Describe investments in commodities through exchange-traded funds (ETFs)
- Discuss advantages and disadvantages of commodity-linked notes (CLNs)
- Apply option valuation methods to price commodity-linked notes

### Keywords

Hotelling's theory

commodity-linked note

### 3.2.2 The Term Structure of Forward Prices on Commodities

## Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the term structure of forward prices on commodities.**

*Including:*

- Understand the costs of carry for commodities.
- Calculate the costs of carry for commodities.
- Define supply elasticity and how it relates to harvests and shifts in demand.
- Define backwardation and contango with respect to the term structure of forward prices.
- Explain backwardation and contango in relation to cost of carry in a perfect market.
- Explain backwardation and contango in relation to cost of carry in an imperfect market.
- Discuss the basis of forward and futures contracts.
- Interpret calendar spreads on forward contracts.
- Calculate the return on calendar spreads.
- Discuss the risks of a calendar spread.

## Keywords

spoilage cost	inventory shrinkage	perfectly elastic supply
inelastic supply	contango	backwardation
inelastic demand	basis	basis risk
calendar spread		

### 3.2.3 Rolling of Forward and Futures Contracts

## Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of rolling of forward and futures contracts.**

*Including:*

- Discuss why returns on a futures contract can differ from the spot return
- Understand the components of future returns and how they are calculated
- Understand differing interpretations of rolling contracts
- Explain roll yield and how it relates to the slope of a forward curve
- Explain roll yield, carrying costs, and the basis in the context of alpha
- Discuss how the strategy of rolling contracts affects return expectations
- Interpret the impact of rolling contracts on alpha
- Discuss three propositions regarding roll return

## Keywords

collateral yield	fully collateralized position	roll return
roll yield	spot return	

### 3.2.4 Normal Backwardation and Normal Contango

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of normal backwardation and normal contango.**

*Including:*

- Explain normal backwardation
- Explain normal contango
- Interpret normal backwardation and normal contango with respect to the risks and returns of commodities and forward contracts on commodities
- Discuss John Maynard Keynes' argument of normal backwardation
- Discuss commodity forward curves and how they relate to storage costs and inventory variation
- Define the market segmentation hypothesis and how it applies to commodity forward prices
- Interpret option-based models of the forward curve for commodities

#### Keywords

normal backwardation	normal contango	stock-out
working curve	humped curve	volatility asymmetry

### 3.2.5 Commodity Exposure and Diversification

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of commodity exposure and diversification.**

*Including:*

- Summarize why commodity returns may have low correlation with stock and bond prices
- Discuss commodities as diversifiers in a perfect market equilibrium
- Discuss commodities as diversifiers in the presence of market imperfections
- Discuss commodities as diversifiers against unexpected inflation

#### Keywords

inflation risk
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### 3.2.6 Expected Returns on Commodities

### Learning Objectives

Upon completion of this lesson, candidates should be able to: 3.2.6 Expected Returns on Commodities

**Demonstrate knowledge of expected returns on commodities.**

*Including:*

- Interpret empirical evidence on long-run commodity price changes
- Interpret theoretical evidence on expected commodity returns
- Discuss irrelevancy of commodity price expectations to returns on futures contracts

### 3.2.7 Commodity Futures Indices

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of commodity indices.**

*Including:*

- Discuss the process of construction of commodity futures indices
- Discuss the characteristics of commodity indices given by S&P GSCI, BCOM, and CRB
- Discuss production-weighted long only commodity indexes
- Discuss market liquidity-weighted long only commodity indexes
- Discuss tier-weighted long only commodity indices

### Keywords

investable index	production-weighted index	Standard & Poor's GSCI (S&P GSCI)
Bloomberg Commodity Index (BCOM)	Thomson Reuters Core Commodity Research Bureau (CRB) Index	

### 3.2.8 Commodity Risk Attributes

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of commodity risk attributes.**

*Including:*

- Identify four favorable characteristics of commodities with respect to event risks.
- Describe commodities as a defensive investment.
- Discuss institutional investing demand and its effect on commodity prices.

### 3.2.9 Key Observations Regarding Historical Returns of Commodities



### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of observations regarding historical returns of commodities.**

*Including:*

- Summarize the key observations on historical commodity returns that are consistent with economic reasoning

### 3.3.1 Commodity Producers

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of commodity producers.**

*Including:*

- Describe how commodity prices drive the performance of an operating company.
- Describe the empirical evidence between commodity prices and operating firms.
- Discuss the empirical evidence on the correlation between commodity prices and equity prices of commodity-producing firms.

### 3.3.2 MLPs – a Real Assets Liquid Alternative

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of liquid alternative real assets.**

*Including:*

- Describe the structure of master limited partnerships (MLPs) within the MLP sector
- Identify tax characteristics of MLPs
- Discuss valuations and distribution rates of MLPs

### Keywords

<b>downstream operations</b>	<b>upstream operations</b>	<b>midstream operations</b>
<b>unrelated business income tax (UBIT)</b>	<b>double taxation</b>	

### 3.3.3 Infrastructure Overview

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

### **Demonstrate knowledge of infrastructure in the alternative investment space.**

*Including:*

- Describe seven elements that help identify investable infrastructure
- Contrast economic infrastructure and social infrastructure
- Understand the role of public-private partnerships in infrastructure investing
- Discuss the risks and government regulation of infrastructure investing
- Identify the stages of infrastructure investing

#### **Keywords**

<b>investable infrastructure</b>	<b>brownfield project</b>	<b>greenfield project</b>
<b>economic infrastructure</b>	<b>public-private partnership (PPP)</b>	<b>social infrastructure</b>
<b>regulatory risk</b>	<b>regulated pricing</b>	<b>brownfield phase</b>

### **3.3.4 Investing in Infrastructure**

#### **Learning Objectives**

Upon completion of this lesson, candidates should be able to:

### **Demonstrate knowledge of infrastructure in the alternative investment space.**

*Including:*

- Explain infrastructure investment vehicles
- Identify twelve determinants of infrastructure
- Discuss opportunities and allocations of infrastructure investments

#### **Keywords**

**Closed-end infrastructure funds**

### **3.3.5 Intellectual Property Overview**

#### **Learning Objectives**

Upon completion of this lesson, candidates should be able to:

### **Demonstrate knowledge of intellectual property.**

*Including:*

- Identify and discuss characteristics of intellectual property
- Identify six characteristics of real assets and how those relate to intellectual properties
- Understand and apply a simplified model of intellectual property

## Keywords

excludable good	intangible assets	intellectual property
unbundled intellectual property	mature intellectual property	

### 3.3.6 Cash Flows of Intellectual Property

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of cash flows of intellectual property.**

*Including:*

- Discuss film production and its distribution revenues as an alternative investment
- Discuss film production and its distribution expenses as an alternative investment
- Discuss film financing in the context of investment
- Explain the profitability of film investment

## Keywords

negative costs

### 3.3.7 Visual Works of Art and Historical Performance Data

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of historical performance data on visual works of art.**

*Including:*

Discuss the historical performance data of visual works of art

## Keywords

visual works of art

### 3.3.8 R&D and Patents as Unbundled Intellectual Property

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of research and development and patents as unbundled intellectual property.**

*Including:*

- Explain the process of accessing research and development via patents
- Discuss the process of patent acquisition and licensing strategies of patents
- Discuss the enforcement of patent law and various litigation strategies
- Identify patent sale license-back strategies
- Identify patent lending strategies
- Analyze patent sales and pooling
- Discuss risks relevant to investing in patents

**3.4.1 Categories of Real Estate**

**Learning Objectives**

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of categories of real estate.**

*Including:*

- Contrast the private and public ownership of real estate
- Discuss the investment continuum of real estate equity and debt investing
- Understand how allocators access residential real estate investments
- Detail the major property types and subcategories of commercial real estate
- Discuss real estate categorization based on market size
- Understand the challenges of international real estate investments

**Keywords**

residential real estate	Commercial real estate	primary real estate market
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**3.4.2 Advantages, Disadvantages, and Styles of Commercial Real Estate Investments**

**Learning Objectives**

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of advantages, disadvantages, and styles of commercial real estate investments.**

*Including:*

- Discuss seven potential advantages of investing in commercial real estate
- Discuss four potential disadvantages of investing in commercial real estate
- Describe styles of real estate investing
- Understand the core real estate style of investment

- Understand the value-add real estate style of investment
- Understand the opportunistic real estate style of investment
- Describe the attributes of differentiating real estate styles
- Discuss the purposes of real estate style analysis

### Keywords

Core real estate	Value-add real estate	Opportunistic real estate
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### 3.4.3 Real Estate Investment Styles

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the three real estate investment styles.**

*Including:*

- Construct a portfolio that would meet real estate policy objectives by utilizing the three investment styles to add portfolio tilts

### 3.4.4 Private Market CRE Capital Stack

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the investment continuum in private market real estate.**

*Including:*

- Compare the characteristics of first mortgages, A/B structures, second mortgages, mezzanine debt, preferred equity, and common equity
- Describe a fulcrum security
- Describe the purpose of the intercreditor agreement
- Compare the capital stack of a mortgaged fee simple deal to a leveraged asset on a ground lease
- Calculate the total leverage and equity needed for a project on a ground lease

### Keywords

first mortgage	second mortgage	mezzanine debt
equity kicker	preferred equity	common equity
intercreditor agreement	ground lease	Unsubordinated
fee simple		

### 3.4.5 CRE Mortgage Underwriting Considerations

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of commercial mortgages in the context of alternative investments.**

*Including:*

- Describe the analysis of default risk of commercial mortgages
- Identify and apply financial ratios employed in the analysis of commercial mortgage default
- Estimate the effects of leverage on cash-on-cash returns

#### Keywords

<b>covenants</b>	<b>recourse</b>	<b>cross-collateral provision</b>
<b>interest coverage ratio</b>	<b>debt service coverage ratio</b>	<b>debt yield</b>
<b>fixed charges ratio</b>	<b>positive leverage</b>	<b>negative leverage</b>

### 3.4.6 Commercial Mortgages

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of commercial mortgages in the context of alternative investments.**

*Including:*

- Describe characteristics of the different types of commercial real estate mortgages: construction mortgages, mini-perm construction mortgages, transitional mortgages, and permanent mortgages
- Describe characteristics of commercial real estate first mortgages, first mortgage A/B note structures, second mortgages, and stretched first mortgages
- Understand the advantages and disadvantages to both borrower and lender of each type of mortgage

#### Keywords

<b>commercial mortgages</b>	<b>transitional mortgage</b>	<b>construction mortgage</b>
<b>permanent mortgage</b>	<b>mini-perm construction mortgage</b>	<b>stretched first mortgage</b>

### 3.4.7 Private Market CRE Financing Alternatives

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the investment continuum in private market real estate.**

*Including:*

- Compare the characteristics of mezzanine debt, preferred equity, common equity, and ground leases as alternatives for financing real estate projects, and explain the advantages and disadvantages of each
- Describe a fulcrum security

### 3.4.8 Private Market Real Estate Investment Vehicles

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of alternative real estate investment vehicles.**

*Including:*

- Identify and describe private market real estate investment structures and the subcategories of each structure
- Identify and describe the advantages and disadvantages of each investment structure's subcategories
- Identify and describe private equity real estate funds
- Identify and describe commingled real estate funds
- Identify and describe syndications
- Identify and describe joint ventures
- Describe limited partnerships, and apply the concepts of gearing and loan-to-value (LTV) ratios

### Keywords

Gearing	real estate joint ventures	syndications
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### 3.4.9 Liquid Alternatives: Commercial Real Estate

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of liquid alternatives: REITs, REOCs, and ETFs.**

*Including:*

- Define types of real estate investment trusts (REITs)
- List advantages and disadvantages of REITs as an investment
- Contrast private and public REITs

- Define the FTSE NAREIT US Real Estate Index Series
- Contrast the structures of REITs and real estate operating companies (REOCs)
- Describe real estate exchange-traded funds (ETFs)

### Keywords

publicly traded REIT	equity REITs	mortgage REITs
FTSE NAREIT US Real Estate Index Series	Real estate operating companies (REOCs)	Exchange-Traded Funds (ETFs)

### 3.5.1 Real Estate Development

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of real estate development in the context of alternative investments.**

*Including:*

- Calculate a development yield
- Understand the importance of due diligence in formulating assumptions
- Describe the difference between hard and soft costs
- Understand the relationship between the development yield and the market cap rate and how it can affect the development decision

### Keywords

development yield

### 3.5.2 Commercial Real Estate Valuation

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of commercial real estate valuation.**

*Including:*

- Discuss the importance of commercial real estate equity exposures
- Identify the four appraisal assumptions
- Identify the six items that are included in an appraisal report
- Identify and discuss the three common methodologies used in commercial real estate valuations
- Explain the sales comparison approach and when it is most useful
- Explain the cost approach and when it is most useful



- Explain the income approach and the three subcategories of cap rate, discounted cash flow, and gross income multiplier
- Calculate cap rates
- Calculate a gross income multiplier
- Explain the two ways to calculate a reversion cap rate for a discount cash flow valuation
- Describe the NCREIF property index as an appraisal-based index

### Keywords

real estate valuation	comparable sale prices approach	real estate appraisal
cost approach	Direct capitalization	discounted cash flow (DCF)
gross income multiplier (GIM)	NCREIF Property Index (NPI)	

### 3.5.3 Details of the Income Approach to Real Estate Valuation

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of valuation and risks of real estate equity.**

*Including:*

- Apply the discounted cash flow approach (i.e., income approach) to the calculation of net operating income
- Calculate a real estate project's discount rate using the risk premium approach, and use that rate to value the project
- Understand the role of taxes in estimating both the discount rate and the cash flows of a real estate project

### Keywords

reversion cap rate	effective gross income	fixed expenses
potential gross income	variable expenses	vacancy loss rate
net lease	operating expenses	after-tax discounting approach
risk premium approach	equity residual approach	pre-tax discounting approach

### 3.5.4 Illustration of the Income Method of Real Estate Valuation

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the income method of real estate valuation using the discounted cash flow methodology.**

*Including:*

- Calculate the appraised value of an office building using the income approach

### 3.5.5 Public Market Real Estate Investment Vehicles

#### Learning Objectives

- Upon completion of this lesson, candidates should be able to:
  - Demonstrate knowledge of alternative real estate investment vehicles.
  - *Including:*
    - Identify and describe open-end real estate mutual funds
    - Discuss options and futures on real estate indices
    - Identify and describe exchange-traded funds based on real estate indices
    - Identify and describe closed-end real estate mutual funds
    - Discuss equity real estate investment trusts

#### Keywords

open-end real estate mutual funds	stale pricing	exchange-traded funds (ETFs)
closed-end real estate mutual fund		

### 3.5.6 Equity REIT Returns

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of equity REIT returns.**

*Including:*

- Contrast private and public REITs
- Discuss possible illiquidity premiums in public REITs
- Define the FTSE NAREIT US Real Estate Index Series

### 3.5.7 Key Observations Regarding Historical Risks and Returns of Equity REITs

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of historical risks and returns of equity real estate investment trusts (REITs).**

*Including:*

- Summarize the key observations on historical equity REIT returns that are consistent with economic reasoning.

## Topic 4 Private Equity

### 4.1.1 Introduction to Private Equity

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the terms and background of private equity.**

*Including:*

- Discuss private equity as an asset class and private equity strategies
- Understand the relationship between the business life cycle and stages of private equity investing
- Discuss PE fund intermediation and risk.
- Discuss PE fund intermediation around efficient inefficiencies.
- Identify the five primary functions of PE funds.

### 4.1.2 Overview of Pre-IPO Private Equity Investing

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of pre-IPO private equity investing.**

*Including:*

- Describe early-stage venture capital opportunities
- Describe growth equity opportunities as later-stage financing
- Describe buyouts
- Contrast venture capital, growth equity, and buyouts

#### Keywords

venture capital (VC)

### 4.1.3 Venture Capital

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of venture capital.**

*Including:*

- Define venture capital opportunities and venture capitalists.

- Identify securities and goals used in venture capital.
- Discuss the option-like payout of venture capital.
- Discuss the history of venture capital.
- Explain angel investing and other early stages of venture capital.
- Explain first stage, start-up, and other early stage venture capital.
- Explain second and later stages of venture capital.
- Interpret the j-curve for private equity projects.

### Keywords

cash burn rate	convertible preferred stock	angel investing
seed capital stage	second or late-stage venture capital	first stage, start-up stage, and early stage venture capital

#### 4.1.4 Venture Capital Valuations

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of venture capital follow-on financing decisions.**

*Including:*

- Discuss the factors in the decision process for follow-on investments
- Apply the valuation of VC companies based on Total Addressable Market.
- Apply the valuation of VC companies based on operating income.
- Understand the economic rationale for the high discount rates used by venture capitalists.
- Distinguish between pre-money valuation and post-money valuation.
- Discuss venture capital business plans.

### Keywords

growth equity securities	redemption rights	springing board remedy
forced sale remedy	times revenue method	

#### 4.1.5 Growth Equity

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of growth equity.**

*Including:*

- Define growth equity investments and describe growth equity investments

- Discuss protective provisions as a key deal characteristic in growth equity investment
- Discuss redemption rights as a key deal characteristic in growth equity investment
- Explain the valuation of growth equity based on revenue
- Calculate the valuation of growth equity based on revenue

### Keywords

<b>Growth equity securities</b>	<b>Redemption rights</b>	<b>Forced sale remedy</b>
<b>Spring board remedy</b>	<b>Times revenue method</b>	

#### 4.1.6 Buyouts and Leveraged Buyouts

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of buyouts and leveraged buyouts.**

*Including:*

- Explain the buyout strategy
- Contrast the different types of private equity buyouts
- Understand rescue capital and replacement capital as private equity strategies

### Keywords

<b>buyout leveraged buyout (LBO)</b>	<b>management buy-in (MBI)</b>	<b>management buyout (MBO)</b>
<b>buy-in management buyout</b>	<b>secondary buyout</b>	<b>rescue capital</b>
<b>replacement capital</b>		

#### 4.1.7 Buyouts of Private Companies

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of buyouts of private companies.**

*Including:*

- Understand buyout objectives
- Discuss capital structure optimization in buyouts
- Discuss operational efficiency in buyouts

#### 4.1.8 Leveraged Buyouts (LBOs)

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of leveraged buyouts (LBOs).**

*Including:*

- Discuss the history of leveraged buyouts
- Discuss three key economic and agency issues of buyouts
- Describe the evolution of the buyout market
- Identify the categories of LBOs
- Discuss the benefits and appeal of a leveraged buyout to targets
- Calculate projected valuations of an LBO
- Identify LBO exit strategies
- Identify benefits of strong corporate governance principles to the public market

### Keywords

golden parachute	Operational Efficiency buyouts	entrepreneurship stimulators
buy-and-build strategy	turnaround strategy	buyout-to-buyout deal

#### 4.1.9 Merchant Banking

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of merchant banking.**

*Including:*

- Discuss merchant banking practices

### Keywords

merchant banking
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#### 4.1.10 Dynamics of Private Equity Opportunities

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the dynamics of private equity opportunities.**

*Including:*

- Identify implications of winner-take-all markets

- Identify implications of longer time horizons to exits
- Identify three potential reasons for the declining number of public firms in the US
- Discuss competition between private and public ownership structures

### Keywords

unicorn	winner-take-all market
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#### 4.1.11 Exit Strategies for Private Equity Investments

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of exit strategies for private equity and venture capital portfolio company investments.**

*Including:*

- Compare direct listings, special purpose acquisition corporations (SPACs), and initial public offerings (IPOs), including their advantages and disadvantages.
- Compare strategic mergers to financial mergers or secondary buyouts.
- Explain how and when the shares of a SPAC can be described as a default-free convertible bond.

### Keywords

special purpose acquisition company (SPAC)	direct listing	strategic merger
buyout-to-buyout deal	de-SPAC transaction	promote

#### 4.2.1 Overview of Private Equity Investment Programs

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of private equity (PE) funds.**

*Including:*

- Define PE funds
- Discuss the organization structure of PE funds
- Define PE firms
- Discuss PE portfolio companies
- Understand PE investment by institutional investors

#### 4.2.2 Managing Institutional Private Equity Investment Programs

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of Institutional Investor PE fund programs.**

*Including:*

- Describe forms of PE fund intermediation.
- Discuss the life cycle and stages of development of a fund investment programs.
- Interpret the fund J-curve.
- Understand undrawn capital commitments.
- Identify the strategies to mitigate substantial risks in PE.

### Keywords

co-investment	vintage year	reinvestment provision
in-kind distributions	cash flow J-curve	NAV J-Curve
commitment risk		

#### 4.2.3 The LP and GP Relationship Life Cycle

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the limited partner (LP) and general partner (GP) relationship life cycle in private equity.**

*Including:*

- Understand the relationship between LPs and GPs in PE
- Discuss the three phases in LP and GP relationships

#### 4.2.4 Subscription Lines in Private Equity

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of subscription lines in private equity.**

*Including:*

- Identify the benefits and risks to general partners and limited partners when subscription lines are used.
- Apply IRR methodology to determine the change in reported return when subscription lines are used.

### Keywords



subscription line of credit  
(SLOC)

#### 4.2.5 Venture Capital Fund Risks and Returns

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of key determinations of VC fund risks and returns.**

*Including:*

- Discuss access to VC funds as a key to enhanced returns
- Understand diversification as a key to PE risk reduction
- Discuss risk premiums as providing compensation for three main VC risks

#### 4.2.6 Distinctions of Venture Capital and Buyout Managers

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of three key distinctions of VC and buyout managers.**

*Including:*

- Explain roles and distinctions of buyout managers in VC

#### 4.2.7 Leveraged Buyout Funds

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of leveraged buyout (LBO) funds.**

*Including:*

- Contrast LBO funds by target cap size
- Analyze total number, size, and implications of buyout fund fees
- Discuss agency relationships and their role in LBO firms
- Understand LBO auction markets
- Understand benefits and concerns of club deals in LBOs
- Discuss factors driving buyout risks relative to VC risks

### Keywords

auction process

club deal

#### 4.2.8 Private Equity Liquid Alternatives

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of liquid alternatives in the private equity sector.**

*Including:*

- Describe business development companies (BDCs).
- Calculate the premium (or discount) of closed-end fund prices.
- Understand the effect of illiquidity on closed-end fund pricing.
- Discuss the diversification and return-enhancement potential of liquid private equity pools.
- Discuss other liquid investments in private equity.

### Keywords

business development  
companies (BDCs)

#### 4.2.9 Private Investments in Public Equity

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of private investments in public equity (PIPEs).**

*Including:*

- Identify characteristics and types of securities issued through PIPEs
- Understand motivations of buyers and sellers in PIPEs
- Contrast traditional and structured PIPEs
- Explain toxic PIPEs

### Keywords

traditional PIPEs	private investments in public equity (PIPE)	structured PIPEs
toxic PIPE	Equity Line of Credit	

#### 4.2.10 Private Equity Style Fund Secondary Markets and Structures

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of secondary markets and structures within the private equity sector.**

*Including:*

- Discuss the secondary market for PE-style limited partnership interests
- Understand governance issues within publicly traded PE firms
- Contrast PE governance structures

#### 4.2.11 Long-Hold Buyout Funds

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of long-hold buyout funds.**

*Including:*

- Identify the types of funds and assets likely to be held for 15 to 20 years.
- List the benefits and drawbacks of long-hold buyout funds.

##### Keywords

Long-hold private equity funds

## Topic 5 Private Debt

### 5.1.1 Private Credit Strategies

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of private credit strategies.**

*Including:*

- Define private credit and distressed debt
- Discuss funds with a loan-to-own objective
- Discuss fulcrum securities and reorganization

##### Keywords

fulcrum security

loan-to-own investment

### 5.1.2 Credit Risk Analysis and the Bankruptcy Process

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of credit risk analysis and the bankruptcy process.**

*Including:*

- Understand credit ratings, yields, and financial ratios.
- Interpret credit spreads and credit risk.
- Discuss credit risk and its relationship to risk of default.
- Discuss covenants on debt.
- Explain the five ways that covenants can control risk.
- Describe capital structure and the priority of payment.
- Discuss recovery rates.
- Explain distressed debt and how it relates to the bankruptcy process.

### Keywords

credit spread	covenant-lite loans	incurrence covenants
maintenance covenants	negative covenants	indenture
affirmative covenants	recovery rate	unitranche
haircut	Chapter 11 bankruptcy	Chapter 7 bankruptcy
plan of reorganization	blocking position	absolute priority rule
cramdown	debtor-in-possession financing	Default risk
Credit risk		

#### 5.1.3 Bonds and Loans

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of bonds and leveraged loans.**

*Including:*

- Describe the three key differences between bonds and loans
- Understand the basics of leveraged loans
- Discuss growth in leveraged loans
- Explain liquidity and how it relates to the demand for leveraged loans

### Keywords

leveraged loans

#### 5.1.4 Direct Lending

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of direct lending.**

*Including:*

- Discuss the process and implications of direct lending

## Keywords

direct lending

### 5.1.5 Mezzanine Debt

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of mezzanine debt.**

*Including:*

- Identify structures of mezzanine debt.
- Understand how mezzanine debt can lower the weighted average cost of capital.
- Compare mezzanine debt financing to other forms of financing.
- Understand basic examples of mezzanine financing.
- Discuss major types of investors in mezzanine debt.
- Identify characteristics of mezzanine debt.

## Keywords

warrant weighted	average cost of capital	PIK toggle
sponsored lending	bridge financing	stretch financing
intercreditor agreement	acceleration	blanket subordination
springing subordination	takeout provision	

### 5.1.6 Venture Debt

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of venture debt.**

*Including:*

- Describe the characteristics of venture debt.
- Describe the terms of venture debt.
- Explain why a startup firm would issue venture debt in addition to accepting venture capital investments.
- Describe the risks and rewards of venture debt.

## Keywords

## venture debt

### 5.1.7 Distressed Debt

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of distressed debt.**

*Including:*

- Understand the basics of distressed debt.
- Identify the supply of distressed debt capital.
- Identify the demand for distressed debt capital.
- Calculate expected default losses and credit spreads on distressed debt.
- Discuss four broad strategic categories of distressed debt investment.
- Identify risks of investing in distressed debt.

#### Keywords

credit loss rate	Blocking Position	Chapter 7 Bankruptcy
Cramdown	Chapter 11 Bankruptcy	Absolute Priority Rule
Plan of Reorganization	Debtor-in-Possession Financing	

### 5.1.8 Mortgage-Backed Securities

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of mortgage-backed securities.**

*Including:*

- Describe types of mortgage-backed securities
- Discuss prepayment options within residential mortgages
- Discuss and apply methods of measuring unscheduled prepayment rates such as conditional prepayment rates (CPRs) and the resulting Public Securities Association (PSA) benchmark
- Describe prepayment factors not associated with changing interest rates
- Describe commercial mortgage-backed securities as compared with residential mortgage-backed securities

#### Keywords

mortgage-backed securities (MBS)	collateralized mortgage obligations (CMOs)	pass-through MBS
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residential mortgage-backed securities	conditional prepayment rate	PSA benchmark
idiosyncratic prepayment factors	refinancing burnout	commercial mortgage-backed securities

### 5.1.9 Residential Mortgages

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of residential mortgages.**

*Including:*

- Discuss and calculate payments of fixed-rate mortgage
- Discuss and calculate payments of interest-only mortgages
- Discuss and calculate payments of variable-rate mortgages
- Identify and discuss other variations of mortgages and apply balloon payments to mortgage valuation
- Explain default risk in residential mortgages

#### Keywords

fixed-rate mortgage	amortization	variable-rate mortgage
unscheduled principal payments	fully amortized	index rate
prepayment option	interest rate cap	margin rate
negative amortization	balloon payment	subprime mortgages
option adjustable-rate mortgage	prime mortgages	

### 5.1.10 Key Observations Regarding Historical Returns of Mortgage REITs

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of observations regarding historical returns of mortgage REITs**

*Including:*

- Summarize the key observations on historical mortgage REIT returns that are consistent with economic reasoning.

### 5.1.11 Private Credit Performance and Diversification

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of private credit performance and diversification.**

*Including:*

- Discuss diversification and its relationship to private credit performance

### 5.2.1 Overview of Financial Structuring

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the overview of financial structuring.**

*Including:*

- Describe the most common structuring of assets within the corporate form

### Keywords

Structuring

### 5.2.2 Major Types of Structuring

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the major types of structuring.**

*Including:*

- Understand the key elements of a structured product
- Describe hedging with credit derivatives
- Describe structuring with tranches
- Understand how structured products are created

### 5.2.3 The Primary Economic Role of Structuring

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the primary economic role of structuring**

*Including:*

- Understand the economic role of a structured product
- Describe market completion as an economic role



- Understand the concept of a state of the world within structured products
- Describe how structured products can complete the market

#### 5.2.4 Collateralized Mortgage Obligations

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of collateralized mortgage obligations.**

*Including:*

- Describe a simplified collateralized mortgage obligation structure
- Describe sequential pay structuring
- Contrast extension risk with contraction risk as it pertains to structuring
- Apply a sequential pay tranche to a collateralized mortgage obligation
- Describe other types of collateralized mortgage obligations through the structuring of their cash flows
- Understand the motivations behind structuring mortgage products
- Understand how prepayment speeds can change the valuation of collateralized mortgage obligations
- Understand how systematic risk can change the valuation of collateralized mortgage obligations
- Describe default risk within commercial collateralized mortgage obligations

##### Keywords

tranche sequential-pay	collateralized mortgage obligation	contraction risk
extension risk	interest-only (IO)	planned amortization class (PAC) tranches
principal-only (PO)	targeted amortization class (TAC) tranches	floating-rate tranches
inverse floater tranche		

#### 5.2.5 Introduction to Collateralized Debt Obligations

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of collateralized debt obligations.**

*Including:*

- Define a collateralized debt obligation
- Describe the simplified collateralized debt obligation structure and calculate the waterfall of cash flows

- Understand default risk within a collateralized debt obligation and calculate the waterfall of cash flows in the presence of default
- Describe how option collars are similar to the mezzanine tranche of a pool
- Describe mezzanine tranches and option spreads

### Keywords

collateralized debt obligation (CDO)	equity tranche	mezzanine tranche
senior tranche	attachment point	detachment point
lower attachment point	upper attachment point	bull call spread
bull put spread		

## 5.2.6 Overview of CDO Variations

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of collateralized debt obligations (CDOs).**

*Including:*

- Describe credit-related motivations for CDOs
- Describe investor motivations for CDOs
- Describe the general structure and life cycle of a CDO
- Explain the terminology and details of CDOs

### Keywords

bankruptcy remote	ramp-up period	revolving period
sponsor of the trust	reference portfolio	weighted average rating factor (WARF)
amortization period	arbitrage CDOs	balance sheet CDOs
diversity score	tranche width	weighted average spread (WAS)

## 5.2.7 Balance Sheet CDOs and Arbitrage CDOs

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of balance sheet CDOs and arbitrage CDOs.**

*Including:*

- Describe three goals for issuing balance sheet CDOs and the balance sheet CDO structure

- Discuss the purposes and attributes of arbitrage CDOs

### 5.2.8 Mechanics of and Motivations for An Arbitrage CDO

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the mechanics of and motivations for arbitrage CDOs.**

*With particular emphasis on:*

- Describe and apply a typical arbitrage CDO structure
- Analyze the cash flows in a typical arbitrage CDO structure
- Understand the waterfall of an arbitrage CDO
- Identify the three direct financial motivations for a manager of an arbitrage CDO

### 5.2.9 Cash-Funded CDOs Versus Synthetic CDOs

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of cash-funded CDOs and synthetic CDOs.**

*Including:*

- Contrast cash-funded CDOs and synthetic CDOs
- Explain how a cash-funded CDO can be used to reduce required regulatory capital
- Calculate the amount of freed-up regulatory capital by using a CDO trust to securitize and sell a portfolio of commercial loans
- Describe the characteristics of synthetic CDOs

#### Keywords

cash-funded CDO	synthetic CDO
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### 5.2.10 Cash Flow CDOs Versus Market Value CDOs

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of cash flow and market value CDOs.**

*Including:*

- Describe the characteristics of cash flow CDOs
- Describe the characteristics of market value CDOs

## Keywords

cash flow CDO	market value CDO
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### 5.2.11 Other Types of CDOs

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of new developments in CDOs.**

*Including:*

- Describe distressed debt CDOs
- Describe hedge fund CDOs
- Describe single-tranche CDOs

## Keywords

distressed debt CDO	collateralized fund obligation (CFO)	single-tranche CDO
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### 5.3.1 Risks of CDOs

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the risks of CDOs.**

*Including:*

- Recognize the risk of the underlying collateral
- Recognize the financial engineering risk
- Discuss the implications of high correlations among the underlying assets
- Define risk shifting and discuss its implications for CDOs
- Describe other risks inherent in CDOs
- Describe how CDO credit risk can be modeled

## Keywords

risk shifting	financial engineering risk
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### 5.3.2 Value at Risk for Managed Futures

### Learning Objectives

Upon completion of this lesson, candidates should be able to: 3.2 Credit Enhancements

**Demonstrate knowledge of credit risk and enhancement of CDOs.**

*Including:*

- Define and discuss subordination as an internal credit enhancement
- Discuss and apply overcollateralization
- Describe excess spread as an internal credit enhancement
- Discuss reserve accounts as a credit enhancement
- Describe external credit enhancements to CDOs

### Keywords

subordination	internal credit enhancement	overcollateralization
reserve account	external credit enhancement	

### 5.3.3 Structural Model Approach to Credit Risk

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the structural model approach to credit risk.**

*Including:*

- Describe Merton's structural model using the option-like nature (both call options and put options) of traditional corporate securities
- Describe the inherent conflict of interest that exists between shareholders and bondholders
- Understand the mechanics of Merton's structural model and apply the model to value the firm's debt as well as put options on the firm's assets
- Calculate the value of risky debt with Black-Scholes option pricing model
- Understand how binomial trees can be used to value structured products

### Keywords

structural credit risk models

### 5.3.4 Credit Derivatives Markets

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of credit derivatives markets.**

*Including:*

- Discuss the three economic roles of credit derivatives
- Identify the three major methods for grouping credit derivatives
- Describe the four stages of the evolution of credit derivative activity

### Keywords

credit derivatives	derivatives	single-name credit derivatives
multiname instruments	funded credit derivatives	unfunded credit derivatives

### 5.3.5 Credit Default Swaps

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of credit default swaps.**

*Including:*

- Contrast credit default swaps and total return swaps
- Discuss the standard ISDA agreement as a template for negotiated credit agreements
- Explain the mechanics of credit default swaps
- Explain the mark-to-market adjustment when valuing credit default swap contracts
- Explain three methods for unwinding credit default swap transactions
- Identify typical credit default swap market participants and their swap transactions
- Explain five typical motivations for using credit default swaps

### Keywords

credit default swap (CDS)	credit protection buyer	credit protection seller
total return swap	CDS premium	CDS spread
standard ISDA agreement	cash settlement	physical settlement
referenced asset	mark-to-market adjustment	assignment
novation		

### 5.3.6 CDS Index Products

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of credit default swap indices.**

*Including:*

- Describe credit default swap index products

## Keywords

CDS indices

### 5.3.7 Other Credit Derivatives

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of credit options and credit-linked notes.**

*Including:*

- Contrast credit default swaps and credit options
- Identify the terms of credit call and credit put options
- Explain the credit put option on a bond
- Explain call options on credit default swaps
- Describe credit-linked notes

## Keywords

American credit options	binary options	European credit options
credit-linked notes (CLNs)		

### 5.3.8 Five Key Risks of Credit Derivatives

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the five key risks of credit derivatives.**

*Including:*

- Discuss the risks of excessive credit exposure using off-balance-sheet derivatives, pricing risk of over-the-counter derivatives, and liquidity risk of over-the-counter derivatives
- Discuss the counterparty risk of over-the-counter credit default swaps and the basis risk of credit default swaps

## Topic 6 Hedge Funds

### 6.1.1 Distinguishing Hedge Funds

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the distinguishing features of hedge funds and their growth and concentration over time.**

*Including:*

- Identify and describe the three primary elements of hedge funds.
- Recognize the six investment flexibilities offered by hedge funds.
- Discuss the reasons for hedge fund industry growth and concentration.

### 6.1.2 Hedge Fund Fees

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of hedge fund fees.**

*Including:*

- Recognize typical hedge fund fee arrangements
- Calculate annual hedge fund fees
- Describe and apply hedge fund fees under different high-water marks (HWMs) and hurdle rates
- Discuss the potential effects of incentive fees on hedge fund manager behavior
- Recognize and apply the annuity view of hedge fund fees
- Recognize and apply the option view of incentive fees and its implications on manager behavior
- Describe the empirical evidence regarding hedge fund fees and managerial behavior

#### Keywords

high-water mark	asymmetric incentive fees	managerial coinvesting
optimal contracting	excessive conservatism	perverse incentive
annuity view of hedge fund fees	option view of incentive fees	incentive fee option value
at-the-money incentive fee approximation	closet indexer	pure asset gatherer
lock-in effect	managing returns	massaging returns

### 6.1.3 Hedge Fund Classification

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of various types of hedge funds.**

*Including:*

- List hedge fund strategies
- Contrast single-manager hedge funds, funds of funds, and multistrategy funds



## Keywords

multistrategy fund

fund mortality

### 6.1.4 Hedge Fund Returns and Asset Allocation

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of hedge fund returns and asset allocation.**

*Including:*

- Discuss the process of analyzing a hedge fund program
- Identify strategies grouped by systemic risk
- Discuss equity strategies in hedge funds
- Discuss event-driven and relative value strategies in hedge funds
- Discuss event risk and volatility strategies in hedge funds
- Discuss event risk and insurance-type strategies in hedge funds
- Discuss absolute return strategies in hedge funds
- Discuss diversified fund strategies in hedge funds

## Keywords

absolute return strategies

diversified strategies

equity strategies

event-driven strategies

relative value strategies

off-balance-sheet risk

short volatility exposure

convergent strategies

relative return product

### 6.1.5 Evaluating a Hedge Fund Investment Program

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the process of evaluating a hedge fund investment program.**

*Including:*

- Identify the program parameters of hedge fund investments
- Discuss various research findings regarding hedge fund performance
- Explain the approach and benchmarks of opportunistic hedge fund investing

### 6.1.6 Investing in Multistrategy Funds

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

## Demonstrate knowledge of investing in multistrategy funds.

*Including:*

- Evaluate fee-related advantages of multistrategy funds
- Evaluate flexibility and transparency in the context of multistrategy funds
- Evaluate potential advantages related to manager selection and operational risk management by funds of funds

### Keywords

fee netting

## 6.1.7 Research on Hedge Funds Impact on Financial Markets

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of research studies on whether hedge funds adversely affect the financial markets.**

*Including:*

- Discuss the evidence regarding the market impact of hedge funds during the Asian currency crisis of 1997
- Discuss the evidence regarding the market impact of quantitative hedge funds during the crisis of 2007

### Keywords

headline risk

## 6.1.8 Hedge Fund Indices

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of hedge fund indices.**

*Including:*

- Describe hedge fund indices
- Understand the structure of management and incentive fees on individual hedge funds as well as on hedge fund indices
- Understand managed futures hedge funds
- Contrast asset weighted hedge fund indices and equally weighted hedge fund indices

- Recognize the size of the hedge fund universe
- Understand representativeness and data biases in hedge funds
- Understand and apply strategy definition and style drift
- Discuss index investability of hedge funds

### Keywords

fee bias	instant history bias or backfill bias	liquidation bias
participation bias	strategy definitions	style drift
synthetic hedge funds	investability	representativeness

## 6.2.1 Macro and Managed Futures Strategies

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of macro and managed futures strategies.**

*Including:*

- Contrast discretionary and systemic trading
- Contrast and discuss fundamental and technical analysis

### Keywords

capacity	counterparty risk	black-box model trading
discretionary fund trading	systematic fund trading	

## 6.2.2 Global Macro

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of global macro.**

*Including:*

- Define global macro trading strategies
- Understand global macro strategies based on foreign exchange
- Understand global macro strategies based on sovereign bonds
- Understand global macro strategies based on economic policy
- Understand global macro strategies based on thematic investing
- Understand global macro strategies based on both micro and macro economic changes
- Identify primary risks of macro investing

## Keywords

global macro funds	thematic investing	event risk
market risk		

### 6.2.3 Managed Futures

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of managed futures.**

*Including:*

- Describe futures contracts
- Understand the structure of the managed futures industry
- Define the purpose of the managed futures industry
- Explain the organization and regulation of the managed futures industry
- Discuss three ways to access managed futures

## Keywords

managed futures	commodity pool operator (CPO)	futurization
commodity pools	private commodity pools	public commodity pools
commodity trading advisers (CTAs)		

### 6.2.4 Systematic Trading

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of systematic trading.**

*Including:*

- Understand systematic trading rules
- Identify three key questions in evaluating a systematic trading system
- Understand validation and the potential degradation of systematic trading rules
- Explain various systematic trading strategies
- Calculate simple moving averages in systematic trading strategies
- Calculate weighted and exponential moving averages in systematic trading strategies
- Interpret moving average strategies
- Discuss breakout strategies

## Keywords

slippage	in-sample data	out-of-sample data
robustness	validation	degradation
mean-reverting	momentum	moving average
random walk	trend-following strategies	systematic trading strategies
simple moving average	weighted moving average	exponential moving average
whipsawing	sideways market	breakout strategies

### 6.2.5 Analysis of Trend Following Strategies

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of Trend Following Strategies.**

*Including:*

- Analyze trend-following strategies as being long volatility
- Analyze non-trend-following strategies as pattern recognition systems
- Discuss relative value strategies and technical analysis

## Keywords

countertrend strategies	relative strength index (RSI)	pattern recognition system
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### 6.2.6 Core Dimensions of Managed Futures Investment Strategies

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the core dimensions of managed futures investment strategies.**

*Including:*

- Discuss fundamental and technical data sources as core managed futures strategies
- Discuss systematic and discretionary implementation styles as core managed futures strategies
- Discuss a strategy focus as core managed futures strategies
- Discuss time horizon as core managed futures strategies

## Keywords

multistrategy CTAs
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## 6.2.7 Systematic Futures Portfolio Construction

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of systematic futures portfolio construction.**

*Including:*

- Identify the four core decisions of a futures trading system
- Discuss data processing in futures portfolio construction
- Understand position sizing and calculate the number of futures contracts to hold to meet portfolio objectives
- Explain market allocation in futures portfolio construction
- Discuss trading execution in futures portfolio construction

### Keywords

<b>volatility targeting</b>	<b>capital at risk</b>	<b>point value</b>
<b>futures contract dollar risk</b>	<b>equal dollar risk allocation</b>	<b>equal risk contribution</b>
<b>market capacity weighting</b>	<b>alpha decay</b>	

## 6.2.8 Core Benefits of Managed Futures for Investors

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of various core benefits of managed futures for investors.**

*Including:*

- Identify and discuss the eight benefits of managed futures for investors

## 6.2.9 Evidence on Managed Futures Returns

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of evidence on managed futures returns.**

*Including:*

- Discuss evidence on alpha generation from managed futures strategies
- Discuss evidence on downside risk protection offered from managed futures strategies
- Explain mechanical managed futures indices
- Discuss why managed futures may provide superior returns
- Discuss six potential risks of managed futures funds

- Understand managed accounts and the platforms of managed futures funds used to create a diversified portfolio of CTAs
- Discuss the structure of multi-manager funds
- Discuss the structure of managed futures products with managed accounts
- Explain the structure of managed futures products with platforms

### Keywords

natural hedger	capacity risk	model risk
transparency risk	lack of trends risk	liquidity risk

## 6.2.10 Benefits of Managed Futures Funds

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of benefits of managed futures funds.**

*Including:*

- Discuss research examining the benefits of managed futures funds.
- Identify sources of return for managed futures funds.
- Summarize the key observations on historical macro and systematic diversified fund returns that are consistent with economic reasoning.

## 6.3.1 The Sources of Most Event Strategy Returns

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the sources of most event strategy returns.**

*Including:*

- Define corporate event risk
- Understand event strategies as selling insurance
- Discuss event strategy returns through the lens of binary options
- Understand event strategies as binary call options

### Keywords

event-driven	corporate event risk	selling insurance
long binary call option	long binary put option	

## 6.3.2 Activist Investing

## Learning Objectives

Upon completion of this lesson, candidates should be able to:

### Demonstrate knowledge of activist investing.

*Including:*

- Understand the relationship between corporate governance and activist investing.
- Define proxy battle.
- Identify and explain the five dimensions of shareholder activists.
- Identify strategies of shareholder activists.
- Explain agency theory and why managers are not viewed as maximizing shareholder wealth.
- Discuss consequences of misalignment between shareholders and managers.
- Understand corporate governance battles.
- Discuss the activist agenda including CEOs, compensation, and boards of directors.
- Discuss the activist agenda including capital structure and dividend policy issues.
- Discuss the activist agenda including mergers and divestitures.
- Summarize the key observations on historical activist fund returns that are consistent with economic reasoning.

## Keywords

corporate governance	shareholder activism	proxy battle
free rider	agency theory	principal-agent relationship
agency costs	agent compensation scheme	staggered board seats
interlocking boards	spin-off	split-off

### 6.3.3 Merger Arbitrage

## Learning Objectives

Upon completion of this lesson, candidates should be able to:

### Demonstrate knowledge of merger arbitrage.

*Including:*

- Identify the different types of corporate mergers.
- Discuss apply a stock-for-stock merger arbitrage deal.
- Discuss third-party bidders and bidding wars.
- Understand the risks of merger arbitrage.
- Identify regulatory risk within the context of mergers.
- Identify financing risk within the context of mergers.
- Summarize the key observations on merger arbitrage fund returns that are consistent with economic reasoning.



## Keywords

merger arbitrage	stock-for-stock mergers	traditional merger arbitrage
cash-for-stock mergers	bidding contest	antitrust review
financing risk		

### 6.3.4 Distressed Securities Funds

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of distressed securities hedge funds.**

*Including:*

- Define distressed debt hedge funds.
- Explain the bankruptcy process.
- Discuss short sales of equity as writing naked call options.
- Discuss the process of searching for distressed undervalued securities.
- Explain the process for estimating returns from undervalued securities.
- Understand activist investors in distressed securities.
- Explain capital structure arbitrage.
- Discuss the process of buying a firm using distressed securities.
- Summarize the key observations on distressed returns that are consistent with economic reasoning.

## Keywords

distressed debt hedge funds	bankruptcy process	liquidation process
reorganization process	one-off transaction	recovery value
capital structure arbitrage	financial market segmentation	

### 6.3.5 Event-Driven Multistrategy Funds

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of event-driven multistrategy funds.**

*Including:*

- Define event-driven multistrategy funds
- Summarize the key observations on event-driven multi-strategy fund returns that are consistent with economic reasoning

## Keywords

special situation funds

event-driven multistrategy  
funds

### 6.3.6 Overview of Relative Value Strategies

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of relative value strategies.**

*Including:*

- Understand the relative value strategy
- Describe the classic relative value strategy trade

## Keywords

Convergence

### 6.3.7 Convertible Bond Arbitrage

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of convertible bond arbitrage.**

*Including:*

- Define and describe the classic convertible bond arbitrage trade.
- Define convertible bonds and apply the unbundling approach for pricing convertible bonds.
- Define busted, hybrid, and equity-like convertibles.
- Apply the concept of delta, gamma, and theta and how they relate to the convertible arbitrage position.
- Explain and determine the effects of gamma and volatility on the profitability of a delta-neutral position.
- Discuss short selling in the context of convertible arbitrage.
- Understand the role of a complexity premium to convertible bond arbitrage.
- Identify the four reasons that issuers may continue to offer convertible bonds at attractive prices.
- Understand the specifics of delta hedging, including the potential profit on a delta-hedged position.
- Discuss return drivers and risks of convertible bond arbitrage.

- Summarize the key observations on historical convertible arbitrage returns that are consistent with economic reasoning.

### Keywords

delta-neutral	classic convertible bond arbitrage trade	convertible bonds
implied volatility	busted convertibles	realized volatility
complexity premium	equity-like convertible	hybrid convertibles
dilution	moneyness	components of convertible arbitrage returns
dynamic delta hedging	net delta	

### 6.3.8 Volatility Arbitrage

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

#### Demonstrate knowledge of volatility arbitrage.

*Including:*

- Understand the volatility arbitrage strategies.
- Explain instruments used by volatility arbitrage funds.
- Calculate the payoffs to variance swaps.
- Discuss risks contained in over-the-counter traded instruments relative to exchange-traded derivatives.
- Discuss volatility arbitrage strategies.
- Understand market-neutral volatility funds.
- Understand and apply the challenges of estimating dispersion.
- Explain tail risk strategies.
- Understand the dispersion trade.
- Explain profit and loss on dispersion trades.
- Summarize the key observations on relative value volatility funds returns that are consistent with economic reasoning.

### Keywords

volatility arbitrage	price transparency	anticipated volatility
pricing risk	correlation risk	volatility risk
variance swaps	tail risk	variance notional value
portfolio insurance	vega notional value	volatility swap
marking-to-market	short correlation	marking-to-model

### 6.3.9 Fixed-Income Arbitrage

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of fixed-income arbitrage.**

*Including:*

- Understand the core of fixed-income arbitrage strategies.
- Describe types and characteristics of fixed-income arbitrage strategies
- Apply the concept of modified duration to bond returns and volatility.
- Describe the characteristics of asset-backed and mortgage-backed securities strategies.
- Discuss and determine the effects of prepayment risk and option-adjusted spreads on asset-backed and mortgage-backed securities strategies.
- Analyze the five risks of asset-backed and mortgage-backed securities arbitrage.
- Summarize the key observations on fixed-income arbitrage returns that are consistent with economic reasoning.

#### Keywords

fixed-income arbitrage	intraday arbitrage positions	carry trades
option-adjusted spread	intercurve arbitrage positions	sovereign debt
duration-neutral		

### 6.3.10 Relative Value Multistrategy Funds

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of relative value multistrategy funds.**

*Including:*

- Discuss the rationale of relative value multistrategy funds.
- Summarize the key observations on multistrategy fund returns that are consistent with economic reasoning.

### 6.4.1 Commonalities of Equity Hedge Funds

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of commonalities between equity hedge funds.**

*Including:*

- Discuss commonalities of equity hedge funds

### Keywords

equity long/short funds	equity market-neutral funds	short-bias funds
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#### 6.4.2 Sources of Return

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of sources of return for equity hedge funds.**

*Including:*

- Discuss providing liquidity as a source of return for equity hedge funds
- Discuss providing informational efficiency as a source of return for equity hedge funds
- Discuss the process of using factor analysis to enhance returns for equity hedge funds

### Keywords

speculation	taking liquidity	providing liquidity
market maker	asynchronous trading	informationally efficient
overreacting	short interest	underreacting

#### 6.4.3 Market Anomalies

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of market anomalies.**

*Including:*

- Define market anomalies
- Discuss how market efficiency tests are tests of joint hypotheses
- Identify issues involved in predicting persistence of market anomalies
- Describe and apply accounting accruals as potential predictors of ex ante alpha
- Define price momentum and recognize its potential role in generating ex ante alpha
- Define earnings momentum and recognize its potential role in generating ex ante alpha
- Define net stock issuance and recognize its potential role in generating ex ante alpha
- Define insider trading and recognize its potential role in generating ex ante alpha

### Keywords

market anomalies	accounting accrual	price momentum
earnings momentum	earnings surprise	standardized unexpected earnings
post-earnings-announcement drift	net stock issuance	illegal insider trading
legal insider trading		

#### 6.4.4 Implementing Anomaly Strategies

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of implementing anomaly strategies.**

*Including:*

- Understand the process of integrating anomalies using factor models
- Understand the process of integrating anomalies using pairs trading
- Contrast short selling and reducing risk with and increasing alpha
- Discuss the limits to arbitrage

##### Keywords

pairs trading	multiple-factor scoring models	market impact
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#### 6.4.5 The Three Equity Strategies

##### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of various (three) equity strategies.**

*Including:*

- Define the mechanics of short selling.
- Understand the basics of short-bias funds.
- Summarize the key observations on historical short bias fund returns that are consistent with economic reasoning.
- Understand the basics of equity long/short funds.
- Summarize the key observations on historical equity long/short fund returns that are consistent with economic reasoning.
- Discuss the basics of equity market-neutral funds.
- Summarize the key observations on historical equity market neutral fund returns that are consistent with economic reasoning.
- Understand equity hedge fund risks.

## Keywords

uptick rule	mean neutrality	variance neutrality
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## Topic 7 Digital Assets

### 7.1.1 Distributed Ledger Technology & Blockchains

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of distributed ledgers and blockchain technology.**

*Including:*

- Explain how a simple distributed ledger works
- Describe how blockchains offer immutable data storage
- Compare the different types of blockchains
- Understand the infrastructure of a decentralized network
- Illustrate how transactions are added and verified on a blockchain
- Explain the double spending problem and how modern blockchains solve it
- Compare consensus mechanisms PoW, PoS, and DPoS
- Describe how SHA-256 hashing works in a PoW system
- Understand how blockchains can update with hard and soft forks
- Understand the blockchain trilemma and the compromises of different systems
- Explain the advantages of a decentralized system

## Keywords

distributed ledger technology	node	blockchain
immutable data	consensus mechanisms	decentralized network
mempool	digital wallet	elliptic curve digital signature algorithm (ECDSA)
Proof of Work (PoW)	SHA-256	Proof of Stake (PoS)

### 7.1.2 Smart Contracts & DeFi

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of how smart contracts are used to build decentralized finance applications.**

*Including:*

- Explain how smart contracts execute within a virtual machine

- Describe how third-party code is deployed on a blockchain
- Explain how dApps are created and connected to smart contracts
- Explain how assets can be tokenized in digital form
- Compare fungible and non-fungible tokens (NFTs)
- Discuss examples of common services in decentralized finance
- Describe how a DAO (decentralized autonomous organization) operates

### Keywords

smart contracts	Layer 1 blockchains	Layer 2 solutions
tokens	Non-Fungible Token	decentralized finance (DeFi)
oracles	decentralized application (dApp)	

### 7.1.3 An Introduction to Bitcoin

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the history and design of Bitcoin.**

*Including:*

- Discuss the relevance and influence global economic conditions had on the creating and timing of Bitcoin
- Explain the original motivations cited in the Bitcoin whitepaper for creating a decentralized currency
- Understand the unspent transaction output model
- Explain the process of a Bitcoin transaction
- Discuss Bitcoin's monetary policy
- Analyze the effect of Bitcoin's monetary policy on the value of Bitcoin
- Explain the Bitcoin mining

### Keywords

Satoshi's	unspent transaction output (UTXO) model	hash rate
51% attack		

### 7.1.4 An Introduction to Ethereum

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the history and design of Ethereum.**



*Including:*

- Discuss the history/creation of Ethereum
- Contrast the Ethereum blockchain with the Bitcoin blockchain
- Explain smart contracts
- Describe the Ethereum Virtual Machine
- Understand the origins of Ethereum Classic
- Evaluate the decision to hard fork the Ethereum blockchain following the DAO hack
- Explain gas
- Distinguish between native and non-native tokens
- Contrast fungible from non-fungible tokens
- Understand the Proof of Stake (PoS) consensus mechanism
- Evaluate the decision for the Ethereum blockchain to transition from Proof of Work (PoW) to PoS
- Describe staking
- Assess the value proposition of Ethereum

### Keywords

Ethereum Virtual Machine (EVM)	decentralized autonomous organization (DAO)	Ethereum Classic
gas (gwei)	ERC-20 tokens	ERC-721 tokens
Validators		

## 7.1.5 Payments and Tokens

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of Payments & Token Currencies.**

*Including:*

- Distinguish between the four major digital asset categories
- Understand the major applications of digital payments, including stablecoins, CBDCs, and credit cards
- Evaluate the role of stablecoins within the digital asset ecosystem
- Discuss the current state of central bank digital currencies
- Contrast fungible and non-fungible tokens
- Discuss the various types of tokens and their use cases

### Keywords

stablecoins	central bank digital currencies (CBDCs)	parametric insurance
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staking	fungible tokens	DeFi tokens
security tokens	governance tokens	utility tokens
non-fungible tokens	Metaverse	

### 7.1.6 DeFi and Web3.0

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of Decentralized Finance and Web3.0.**

*Including:*

- Understand the major applications of decentralized finance (DeFi) and DAOs
- Describe decentralized exchanges
- Explain the role of blockchain oracles
- Contrast DeFi lending and borrowing with traditional financial lending and borrowing
- Discuss DeFi insurance
- Understand yield farming
- Understand the applications of Web 3.0 and its interactions with other applications, including gaming, social media, and financial services

#### Keywords

decentralized exchanges (DEXs)	oracle	parametric insurance
yield farming	staking	Metaverse
Web 3.0		

### 7.1.7 Digital Assets in Institutional Portfolios

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of institutional investment in digital assets.**

*Including:*

- Summarize the roles of digital assets in institutional investment portfolios
- Discuss methods institutional investors can follow when starting a digital assets allocation
- Discuss the potential innovations in blockchain technology that could impact institutional investors in the coming years

### 7.1.8 Due Diligence of Digital Assets

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

## **Demonstrate knowledge of institutional due diligence practices for digital assets.**

*Including:*

- Understand due diligence areas of focus unique to digital asset fund investments
- Distinguish between liquid and illiquid market crypto investments
- Describe the various liquid market crypto investment options

### **7.1.9 Digital Asset Valuation Methods**

#### **Learning Objectives**

Upon completion of this lesson, candidates should be able to:

#### **Demonstrate knowledge of valuation methods for digital assets.**

*Including:*

- Understand why traditional valuation methods may not apply to digital assets
- Explain the stock-to-flow model
- Evaluate bitcoin using the addressable market model
- Evaluate bitcoin using the stock-to-flow model
- Recommend which types of digital assets are suitable for evaluation with the stock-to-flow model
- Explain the cost-of-production model
- Evaluate bitcoin using the cost-of-production model
- Recommend which types of digital assets are suitable for evaluation with the cost-of-production model
- Explain the discounted cash flow model and price multiples
- Recommend which types of digital assets are suitable for evaluation with the discounted cash flow model and/or price multiples
- Explain Metcalfe's law
- Evaluate bitcoin using Metcalfe's law

### **7.1.10 Risks and Challenges for Digital Asset Investors**

#### **Learning Objectives**

Upon completion of this lesson, candidates should be able to:

#### **Demonstrate knowledge of cryptocurrency and blockchain technology risks.**

*Including:*

- Distinguish between risks related to blockchain technology and risks related to digital assets
- Evaluate liquidity risk of digital assets
- Assess counterparty risk in digital assets
- Assess systemic risk in cryptocurrencies
- Discuss technology/coding risk
- Discuss obsolescence risk
- Analyze governance factors

- Understand the 51% attack
- Understand how future issuance influences inflation
- Explain the issue of scalability
- Evaluate interoperability risk
- Discuss the risk of fraud, hacks, and other scams

## Topic 8 Additional Strategies

### 8.1.1 Overview of Funds of Funds

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the basic elements and consideration of Fund of Funds.**

*Including:*

- Describe the four functions of fund of funds management.
- List the benefits to investing in funds of hedge funds.
- List the disadvantages to investing in funds of hedge funds.
- Evaluate how fund of fund managers add value.

#### Keywords

Operational due diligence

### 8.1.2 Private Equity Funds of Funds

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of funds-of-funds in the private markets.**

*Including:*

- Understand fees charged by PE-style funds of funds.
- Discuss the value of information and control in PE-style funds of funds.
- Understand diversification and intermediation of PE-style funds of funds.
- Explain access, selection skills, and expertise for PE-style funds of funds.

#### Keywords

private equity funds of funds  
(PE FoFs)

blind pool

### 8.1.3 Private Equity Funds of Funds Investment Process

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the process of investing in PE fund of funds.**

*Including:*

- Recognize the varying investment objectives of PE funds of funds (FoF).
- Compare and contrast PE fund of funds and secondary fund of funds.
- Describe the process for constructing a portfolio of PE funds.

#### Keywords

Primary Fund of Funds

Secondary Fund of Funds

### 8.1.4 Private Equity Funds of Funds Investment

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of investing in PE fund of funds.**

*Including:*

- List the benefits of investing in PE FoF.
- List the disadvantages of investing in PE FoF.
- Describe the factors driving the PE FoF market.

### 8.1.5 Private Equity Funds of Funds Historical Returns

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of observations regarding historical returns of PE fund of funds.**

*Including:*

- Summarize the key observations on PE fund of fund returns that are consistent with economic reasoning.
- Understand the performance of buyout fund of funds managers against portfolios of direct funds.
- Understand the performance of VC fund of funds managers against portfolios of direct funds.

#### Keywords

## Return dispersion

### 8.1.6 Overview of Funds of Hedge Funds

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the benefits and costs of diversification in hedge fund investing.**

*Including:*

- Define funds of hedge funds.
- Understand the benefits and costs of diversification.
- Discuss and determine the relationship between the number of funds in a portfolio and the level of diversification.
- Describe the process for identifying funds for an institutional portfolio or a fund of funds.

### 8.1.7 Investing in Funds of Hedge Funds

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the process of investing in funds of hedge funds.**

*Including:*

- Identify advantages that funds of funds have over direct hedge fund investments
- Understand funds of hedge funds as diversified pools
- Discuss empirical evidence regarding fund of funds returns and the potential for reduced biases in reported performance
- Recognize the varying investment objectives of funds of hedge funds
- Describe how funds of funds can act as venture capitalists

#### Keywords

Liquidity facility

Seeding funds

### 8.1.8 Investing in Portfolios of Single Hedge Funds

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of building a portfolio of single hedge funds.**

*Including:*

- Contrast the fees associated with a fund of funds with those of a portfolio of single hedge funds.

- Discuss costs associated with hedge fund due diligence and minimum investment sizes.

### 8.1.9 Multialternatives and Other Hedge Fund Liquid Alternatives

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of multialternatives and other hedge fund liquid alternatives.**

*Including:*

- Contrast liquid alternatives with more typical private placements
- Understand the UCITS framework for liquid alternative
- Discuss investments restrictions on '40 Act funds
- Describe the availability of liquid alternative strategies
- Understand multialternatives as liquid alternatives

#### Keywords

nontraditional bond funds

unconstrained bond funds

### 8.1.10 Key Observations Regarding Historical Returns of Funds of Funds

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of observations regarding historical returns of hedge funds of funds.**

*Including:*

- Summarize the key observations on hedge fund of funds returns that are consistent with economic reasoning.

#### Keywords

market-defensive funds of funds

conservative funds of funds

diversified funds of funds

strategic funds of funds

### 8.2.1 Structured Products and Six Types of Wrappers

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of structured products and types of wrappers.**

*Including:*

- Describe equity-linked structured products
- Define a wrapper
- Describe the six types of wrappers

### Keywords

equity-linked structured products	wrapper
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## 8.2.2 Four Potential Tax Effects of Wrappers

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of potential tax effects of wrappers.**

*Including:*

- Describe the tax effects of wrappers
- Calculate the pre-tax and after-tax return of fully taxed investments
- Calculate the after-tax return of tax-deferred wrappers
- Calculate the after-tax return on a wrapper that offers both tax deduction and tax deferral

### Keywords

tax deferral	tax deduction
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## 8.2.3 Structured Products with Exotic Option Features

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of structured products with exotic option features.**

*Including:*

- Compare and contrast simple options and exotic options
- Understand how simple call and put options can be combined to provide principal protection
- Define the participation rate
- Illustrate how a cash-and-call strategy is related to put-call parity
- Identify path-dependent options and binary options
- Describe and apply barrier, knock-in, and active options
- Describe the characteristics of in versus out and up versus down barrier options
- Define spread options and look-back options
- Define a quanto option



## Keywords

exotic option	simple option	principal-protected structured product
structured product without exotic options	participation rate	cash-and-call strategy
Asian option	path-dependent option	active option
barrier option	knock-in option	knock-out option
spread option	look-back option	quanto option

### 8.2.4 Popular Structured Product Types

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of popular structured products types.**

*Including:*

- Discuss absolute return and principal protected absolute return barrier notes

## Keywords

absolute return structured product	principal protected absolute return barrier note
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### 8.2.5 The EUSIPA Classification

#### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of the EUSIPA classification.**

*Including:*

- Define EUSIPSA and explain its role in the structured products market
- Describe capital protected structured products
- Describe yield enhancement structured products
- Describe participation structured products
- Describe leverage structured products

## Keywords

EUSIPA	EUSIPA Derivative Map	yield enhancement structured products
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capital protection structured products	leverage structured products	participation structured products
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## 8.2.6 Global Structured Product Cases

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of global structured product cases.**

*Including:*

- Understand the components within a US-based structured product with multiple kinks
- Understand the components within a German-based structured product with leverage
- Understand the components within a Japan-based structured product based on multiple currencies

### Keywords

power reverse dual-currency note

## 8.2.7 Structured Product Valuation

### Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of structured product valuation.**

*Including:*

- Understand how a structured product can be valued using dynamic hedging
- Discuss the advantages of the simulation approach over the PDE approach
- Contrast the PDE approach and the building blocks approach
- Explain the two principles of payoff diagram shapes and levels
- Discuss the evidence on structured product price

### Keywords

dynamic hedging	boundary condition	building blocks approach
partial differential equation approach (PDE approach)	static hedge	numerical methods for derivative pricing
payoff diagram shape	payoff diagram level	overconfidence bias

## 8.2.8 Motivations of Structured Products

## Learning Objectives

Upon completion of this lesson, candidates should be able to:

**Demonstrate knowledge of motivations of structured products.**

*Including:*

- Identify investor motivations for including structured products in a portfolio
- Discuss tax-related motivations for investors
- Discuss the motivations of issuers of structured products