



# CAIA<sup>®</sup> Level I Study Guide

## September 2019

Chartered Alternative Investment  
Analyst Association<sup>®</sup>

# CAIA Level I Study Guide

## For the September 2019 Exam

### Contents

Introduction to the Level I Program .....	1
Preparing for the Level I Examination .....	2
Level I Examination Topic Weights.....	3
Errata Sheet.....	3
Calculator Policy .....	3
The Level II Examination and Completion of the Program .....	3
CAIA Level I Outline.....	4
<b>Topic 1: Professional Standards and Ethics</b> .....	6
<b>Topic 2: Introduction to Alternative Investments</b> .....	8
<b>Topic 3: Real Assets</b> .....	28
<b>Topic 4: Hedge Funds</b> .....	35
<b>Topic 5: Private Equity</b> .....	39
<b>Topic 6: Structured Products</b> .....	58
<b>Topic 7: Risk Management and Portfolio Management</b> .....	63
Equation Exception List .....	66
Action Words .....	76

## Introduction to the Level I Program

Congratulations on becoming a Chartered Alternative Investment Analyst<sup>SM</sup> (CAIA) Candidate, and welcome to Level I of the CAIA<sup>®</sup> Charter program. The CAIA Charter program is organized by the CAIA Association<sup>®</sup>, which was co-founded by the Alternative Investment Management Association (AIMA) and the Isenberg School Center for International Securities and Derivatives Markets (CISDM). It is the only globally recognized professional designation in the area of alternative investments, the fastest growing segment of the investment industry.

The CAIA curriculum provides breadth and depth by first placing emphasis on understanding alternative asset classes and then by building applications in manager selection, risk management, and asset allocation. In the CAIA Charter program, candidates work through the curriculum to identify and describe various asset classes, risk-return characteristics of each asset class, the role of each class in a diversified portfolio, the role of active management in investment processes, the manager selection method, and risk management.

The business school faculty and industry practitioners who have helped create the CAIA Charter program bring years of experience in the financial services industry. Consequently, the curriculum is consistent with recent advances in the financial industry and reflects findings of applied academic research in the area of investment management.

Passing the Level I examination is an important accomplishment and will require a significant amount of preparation. All candidates will need to study and become familiar with the CAIA Level I curriculum material in order to develop the knowledge and skills necessary to be successful on examination day.

Our study guides are organized to facilitate quick learning and easy retention. Each topic is structured around learning objectives and keywords that define the content that is eligible to be measured on the exam. The learning objectives and keywords are an important way for candidates to organize their study, as they form the basis for examination questions. All learning objectives reflect content in the CAIA curriculum and all exam questions are written to directly address the learning objectives. A candidate who is able to meet all learning objectives in the study guide should be well prepared for the exam. For these reasons, we believe that the CAIA Association has built a rigorous program with high standards, while also maintaining an awareness of the value of candidates' time.

Candidates for the CAIA Level I exam are assumed to have an understanding of the central concepts of quantitative analysis and finance. This includes awareness of the instruments that trade in traditional markets, models used to value these instruments, and the tools and methods used to analyze data. These concepts are typically covered in dedicated undergraduate courses or MBA-level investment and business statistics courses.

## Preparing for the Level I Examination

Candidates should obtain all the reading materials and follow the outline provided in this study guide. The reading materials for the Level I curriculum are:

- *Standards of Practice Handbook*, 11<sup>th</sup> edition, CFA Institute, 2014. ISBN 978-0-938367-85-7.
- *Alternative Investments: CAIA Level I*, 3<sup>rd</sup> edition, Wiley, 2015. ISBN 978-1-119-00336-6 (hardback); ISBN 978-1-119-00338-0 (ePDF); ISBN 978-1-119-00337-3 (ePub).

The learning objectives in this study guide are an important way for candidates to organize their study, as they form the basis for the examination questions. Learning objectives provide guidance on the concepts and keywords that are most important to understanding the CAIA curriculum. Candidates should be able to define all keywords provided, whether or not they are stated explicitly in a learning objective.

The action words used within the learning objectives help candidates determine what they need to learn from the relevant passages and what type of questions they may expect to see on the examination. Note that actual examination questions are not limited in scope to the exact action word used within the learning objectives. For example, the action words "demonstrate knowledge" could result in examination questions that ask candidates to define, explain, calculate, and so forth. A list of action words used within learning objectives is provided in the back of this study guide in the Action Words table.

Candidates should be aware that all equations in the readings are important to understand and that an equation sheet will not be provided on the exam. The equation exception list at the end of this study guide contains equations that serve as exceptions and will be provided if needed to answer a specific question. For example, a question asking candidates to describe the implication of large excess kurtosis can be answered without having access to the kurtosis formula. On the other hand, a question asking candidates to calculate the excess kurtosis of a return series would require the excess kurtosis equation.

### Preparation Time

Regarding the amount of time necessary to devote to the program, we understand that all candidates are different. Therefore, it is nearly impossible to provide guidelines that would be appropriate for everyone. However, based on candidate feedback we estimate that Level I requires 200 hours or more of study.

### Examination Format

The Level I examination, administered twice annually, is a four-hour computer-administered examination that is offered at test centers throughout the world. The Level I examination is composed of 200 multiple-choice questions, fewer than 30% of which will require calculations. For more information, visit the CAIA website at [www.caia.org](http://www.caia.org).

## Level I Examination Topic Weights

Level I Topic	Approximate Exam Weight
Professional Standards and Ethics	15% - 20%
Introduction to Alternative Investments	20% - 25%
Real Assets	10% - 20%
Hedge Funds	10% - 20%
Private Equity	5% - 10%
Structured Products	10% - 15%
Risk Management and Portfolio Management	5% - 10%

## Errata Sheet

Correction notes appear in this study guide to address known errors existing in the assigned readings. Occasionally, additional errors in the readings and learning objectives are brought to our attention and we will then post the errata on the [Curriculum and Study Materials](https://caia.org/content/curriculum-study-tools?qt-curriculum_study_tools_quicktab=0) page of the CAIA website: [https://caia.org/content/curriculum-study-tools?qt-curriculum\\_study\\_tools\\_quicktab=0](https://caia.org/content/curriculum-study-tools?qt-curriculum_study_tools_quicktab=0). It is the responsibility of the candidate to review these errata prior to taking the examination. Please report suspected errata to [curriculum@caia.org](mailto:curriculum@caia.org).

## Calculator Policy

You will need to bring a calculator for the Level I examination. The calculations that candidates are asked to perform range from simple mathematical operations to more complex methods of valuation. The CAIA Association allows candidates to bring into the examination the TI BA II Plus (including the Professional model) or the HP 12C (including the Platinum edition). **No other calculators or any other electronic devices will be allowed in the testing center, and calculators will not be provided at the test center.**

## The Level II Examination and Completion of the Program

A separate study guide is available for the Level II curriculum. As with the Level I examination, the CAIA Association administers the Level II examination twice annually. Upon successful completion of the Level II examination, and assuming that the candidate has met all the Association's membership requirements, the CAIA Association will confer the CAIA Charter upon the candidate. Candidates should refer to the CAIA website, [www.caia.org](http://www.caia.org), for information about examination dates and membership requirements.

## CAIA Level I Outline

### Topic 1: Professional Standards and Ethics

*Standards of Practice Handbook*, 11<sup>th</sup> Edition, CFA Institute, 2014.

- Standard I: Professionalism
- Standard II: Integrity of Capital Markets
- Standard III: Duties to Clients
- Standard IV: Duties to Employers
- Standard V: Investment Analysis, Recommendations, and Actions
- Standard VI: Conflicts of Interest

### Topic 2: Introduction to Alternative Investments

*Alternative Investments: CAIA Level I*, Third Edition, Wiley, 2015. Part One: Introduction to Alternative Investments, Chapters 1 – 9.

- Chapter 1: What is an Alternative Investment?
- Chapter 2: The Environment of Alternative Investments
- Chapter 3: Quantitative Foundations
- Chapter 4: Statistical Foundations
- Chapter 5: Measures of Risk and Performance
- Chapter 6: Foundations of Financial Economics
- Chapter 7: Benchmarking and Performance Attribution
- Chapter 8: Alpha, Beta, and Hypothesis Testing
- Chapter 9: Regression, Multivariate, and Nonlinear Methods

### Topic 3: Real Assets

*Alternative Investments: CAIA Level I*, Third Edition, Wiley, 2015. Part Two: Real Assets, Chapters 10 – 15.

- Chapter 10: Natural Resources and Land
- Chapter 11: Commodity Forward Pricing
- Chapter 12: Commodities: Applications and Evidence
- Chapter 13: Operationally-Intensive Real Assets
- Chapter 14: Liquid and Fixed-Income Real Estate
- Chapter 15: Real Estate Equity Investments

## **Topic 4: Hedge Funds**

*Alternative Investments: CAIA Level I*, Third Edition, Wiley, 2015. Part Three: Hedge Funds, Chapters 16 – 21.

- Chapter 16: Structure of the Hedge Fund Industry
- Chapter 17: Macro and Managed Futures Funds
- Chapter 18: Event-Driven Hedge Funds
- Chapter 19: Relative Value Hedge Funds
- Chapter 20: Equity Hedge Funds
- Chapter 21: Funds of Hedge Funds

## **Topic 5: Private Equity**

*Alternative Investments: CAIA Level I*, Third Edition, Wiley, 2015. Part Four: Private Equity, Chapters 22 – 24.

- Chapter 22: Introduction to Private Equity
- Chapter 23: Equity Types of Private Equity
- Chapter 24: Debt Types of Private Equity

## **Topic 6: Structured Products**

*Alternative Investments: CAIA Level I*, Third Edition, Wiley, 2015. Part Five: Structured Products, Chapters 25 – 28.

- Chapter 25: Introduction to Structuring
- Chapter 26: Credit Risk and Credit Derivatives
- Chapter 27: CDO Structuring of Credit Risk
- Chapter 28: Equity-Linked Structured Products

## **Topic 7: Risk Management Portfolio Management**

*Alternative Investments: CAIA Level I*, Third Edition, Wiley, 2015. Part Six: Risk Management and Portfolio Management, Chapters 29 – 32.

- Chapter 29: Case in Tail Events
- Chapter 30: Investment Process, Operations, and Risk
- Chapter 31: Due Diligence of Fund Managers
- Chapter 32: Portfolio Management, Alpha, and Beta

## Topic I: Professional Standards & Ethics

### Readings

*Standards of Practice Handbook*, 11<sup>th</sup> Edition, CFA Institute, 2014.

### Learning Objectives

#### A.1 Demonstrate knowledge of Standard I: Professionalism.

*For example:*

- State and interpret Standard I with respect to knowledge of the law, independence and objectivity, misrepresentation, and misconduct
- Recognize procedures for compliance with respect to knowledge of the law, independence and objectivity, misrepresentation, and misconduct

#### A.2 Demonstrate knowledge of Standard II: Integrity of Capital Markets.

*For example:*

- State and interpret Standard II with respect to material nonpublic information, and market manipulation
- Recognize procedures for compliance with respect to material nonpublic information

#### A.3 Demonstrate knowledge of Standard III: Duties to Clients.

*For example:*

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

#### A.4 Demonstrate knowledge of Standard IV: Duties to Employers.

*For example:*

- State and interpret Standard IV with respect to loyalty, additional compensation arrangements, and responsibilities of supervisors
- Recognize procedures for compliance with respect to additional compensation arrangements, and responsibilities of supervisors

#### A.5 Demonstrate knowledge of Standard V: Investments Analysis, Recommendations, and Actions.

*For example:*

- State and interpret Standard V with respect to diligence and reasonable basis, communication with clients and prospective clients, and record retention
- Recognize procedures for compliance with respect to diligence and reasonable basis, communication with clients and prospective clients, and record retention



**A.6 Demonstrate knowledge of Standard VI: Conflicts of Interest.**

*For example:*

- State and interpret Standard VI with respect to disclosure of conflicts, priority of transactions, and referral fees
- Recognize procedures for compliance with respect to disclosure of conflicts, priority of transactions, and referral fees

## Topic II: Introduction to Alternative Investments

### Readings

*Alternative Investments: CAIA Level I*, Third Edition, Wiley, 2015. Part One: Introduction to Alternative Investments, Chapters 1 – 9.

#### Chapter 1

What Is an Alternative Investment?

#### Keywords:

absolute return products	institutional-quality investment
absolute return standard	investment
active management	land
active return	lumpy assets
active risk	mezzanine debt
alternative investments	moral hazard
benchmark	operationally focused real assets
benchmark return	passive investing
commodities	private equity
compensation structure	pure arbitrage
distressed debt	real assets
diversifier	real estate
efficiency	regulatory structure
farmland	relative return standard
financial asset	return diversifier
hedge fund	return enhancer
illiquidity	securities structure
incomplete markets	structured products
inefficiency	timberland
information asymmetries	trading structure
infrastructure investments	traditional investments
institutional structure	

#### Learning Objectives

##### 1.1 Demonstrate knowledge of the view of alternative investments by exclusion.

*For example:*

- Recognize characteristics of institutional quality investments

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

*For example:*

- 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, leveraged buyouts, mezzanine debt, and distressed debt)
- Describe structured products (e.g., collateralized debt obligations [CDOs], credit derivatives)

**1.3 Demonstrate knowledge of the concept of structures in investments.**

*For example:*

- Describe how structures help distinguish alternative investments from traditional investments
- Define the five primary types of structures
- Recognize how structures influence various alternative asset types
- Recognize the limits of using structures to categorize alternative investments

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

*For example:*

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

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

*For example:*

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

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

*For example:*

- Recognize factors that contribute to information asymmetries
- Describe the concept of incomplete markets and the effect of incomplete markets on investors
- Recognize the prominence of innovation in alternative investments as compared to traditional investments

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

*For example:*

- Define active management, and contrast active management and passive investing
- Recognize 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, and the roles of return enhancers and return diversifiers in an investment program

## Chapter 2

### The Environment of Alternative Investments

#### Keywords

'40 Act funds	Markets in Financial Instruments Directive (MiFID)
back office operations	master limited partnerships (MLPs)
bid-ask spread	middle office operations
buy side	mutual funds
closed-end mutual fund	partnership agreement
commercial bank	plan sponsor
custodians	primary market
dark pool	prime broker
depositories	private limited partnerships
Depository Trust Company (DTC)	private-placement memoranda
endowment	progressive taxation
family office	proprietary trading
financial data providers	Regulation T margin rule
financial platforms	secondary market
financial software	Section 1256 contracts
foundation	securitization
fourth markets	sell side
front office operations	separately managed accounts
fund administrator	soft dollar arrangement
hedge fund replication	sovereign wealth funds
investment bank	subscription agreement
large dealer banks	systemic risk
liquid alternatives	third markets
management company operating agreement	Undertakings for Collective Investment in Transferable Securities (UCITS)
market making	universal banking
market orders	
market takers	

#### Learning Objectives

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

*For example:*

- Identify buy-side participants, and describe their roles in the alternative investing environment
- Identify sell-side participants (i.e., large dealer banks and brokers), and describe their roles in the alternative investing environment
- Identify outside service providers (e.g., prime brokers, accountants and auditors, attorneys, fund administrators, hedge fund infrastructures, consultants, depositories and custodians, banks), and describe their roles in the alternative investing environment

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

*For example:*

- 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

**2.3 Demonstrate knowledge of the regulatory environment as it applies to alternative investments.**

*For example:*

- Define and explain the concept of systemic risk
- Recognize the four primary forms of hedge fund regulation
- Describe key components of U.S. regulations affecting securities issued to the public (e.g., the '40 Act, the U.S. Securities Act), including exemptions commonly applied to hedge funds
- Describe key components of European regulations affecting hedge funds (e.g., Undertakings for Collective Investment in Transferable Securities [UCITS] directives, Markets in Financial Instruments Directive [MiFID]), and recognize major European regulatory institutions
- Describe key components of hedge fund regulations outside the United States and European Union (e.g., Australia, Brazil, Canada, Japan, Singapore, South Africa, the United Arab Emirates), and recognize major regulatory institutions in these regions

**2.4 Demonstrate knowledge of liquid alternative investments.**

*For example:*

- Define liquid alternative investments
- Recognize the five distinct types of liquid alternative investments
- Describe the factors driving the growth of liquid alternative investments
- Recognize regulatory constraints that affect liquid alternative investments
- Recognize the main reasons that contribute to differences between the returns of private placement vehicles and those of liquid alternatives

**2.5 Demonstrate knowledge of taxation of investments.**

*For example:*

- Recognize income tax conventions (e.g., taxes on capital gains, dividends, interest)
- Recognize non-income tax conventions (e.g., real estate tax, estate tax, value-added tax)
- Recognize how variations in income tax conventions around the world affect investments and investment decisions

## Chapter 3

### Quantitative Foundations

#### Keywords

aggregation of IRRs	log return
borrowing type cash flow pattern	management fees
carried interest	modified IRR
catch-up provision	multiple sign change cash flow pattern
catch-up rate	notional principal
clawback	partially collateralized
compensation scheme	performance-based fee
complex cash flow pattern	point-to-point IRR
continuous compounding	preferred return
deal-by-deal carried interest	reinvestment rate assumption
discrete compounding	return computation interval
dollar-weighted returns	return on notional principal
fully collateralized	scale differences
fund-as-a-whole carried interest	simple interest
hard hurdle rate	since-inception IRR
hurdle rate	soft hurdle rate
incentive fee	time-weighted returns
interim IRR	vesting
internal rate of return (IRR)	waterfall
lifetime IRR	

#### Learning Objectives

##### 3.1 Demonstrate knowledge of return and rate mathematics.

*For example:*

- Define and apply return compounding
- Define and calculate logarithmic returns
- Define and apply the return computation interval
- Aggregate returns over different time intervals
- Define and calculate arithmetic mean log returns and geometric mean returns

##### 3.2 Demonstrate knowledge of returns based on notional principal.

*For example:*

- Recognize and apply the concept of forward contracts
- Define and apply the concepts of notional principal and full collateralization for forward contracts
- Calculate the log return to a fully collateralized derivatives position
- Calculate the log return to a partially collateralized derivatives position

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

*For example:*

- Define and calculate the IRR
- Define and calculate the four types of IRR based on time periods for which cash flows are available (i.e., lifetime, since inception, interim, and point-to-point) and their relationship to valuation of alternative investments

**3.4 Demonstrate knowledge of problems with the use of IRR in alternative investment analysis.**

*For example:*

- Recognize complex cash flow patterns, and discuss their effect on the computation and interpretation of IRRs
- Discuss the challenges (e.g., scale differences) of comparing investments based on IRRs
- Discuss the difficulties of aggregating IRRs
- Discuss the reinvestment assumption inherent in the IRR and how it is addressed by the modified IRR
- Compare and calculate time-weighted and dollar-weighted returns

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

*For example:*

- Explain the distribution of cash waterfall provision of a limited partnership agreement
- Recognize 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
- Discuss and calculate fund-as-a-whole carried interest and deal-by-deal carried interest
- Define and apply clawback provisions
- Compare and apply hard and soft hurdle rates and their sequences of distribution
- Discuss the potential effects of incentive fees on decision-making, and their optionlike nature



<b>Chapter 4</b> Statistical Foundations
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**Keywords**

ARCH	kurtosis
autocorrelation	leptokurtosis
autoregressive	lognormal distribution
beta	mean
conditionally heteroskedastic	mesokurtosis
correlation coefficient	normal distribution
covariance	perfect linear negative correlation
ex ante returns	perfect linear positive correlation
ex post returns	platykurtosis
excess kurtosis	skewness
first-order autocorrelation	Spearman rank correlation
GARCH	standard deviation
heteroskedasticity	variance
homoskedasticity	volatility
Jarque-Bera test	

**Learning Objectives****4.1 Demonstrate knowledge of the characteristics of return distributions.***For example:*

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

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

- Explain the first four raw moments of return distributions
- Explain the central 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

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

*For example:*

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

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

*For example:*

- Define and explain return standard deviation (volatility)
- Describe the properties of return variance and standard deviation
- Calculate return variance and standard deviation

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

*For example:*

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

**4.6 Demonstrate knowledge of time-series return volatility models.**

*For example:*

- Identify various measures used in time-series models (e.g., price levels, price variation, risk)
- Define the concepts of heteroskedasticity and homoskedasticity
- Recognize the key components of the generalized autoregressive conditional heteroskedasticity (GARCH) method
- Describe how the GARCH method is used to model risk evolution through time
- Contrast the GARCH method with the autoregressive conditional heteroskedasticity (ARCH) method

**Chapter 5**

## Measures of Risk and Performance

**Keywords**

average tracking error	semivariance
conditional value-at-risk	Sharpe ratio
drawdown	shortfall risk
information ratio	Sortino ratio
Jensen's alpha	target semistandard deviation
M <sup>2</sup> approach	target semivariance
maximum drawdown	tracking error
Monte Carlo analysis	Treynor ratio
parametric VaR	value at risk
return on VaR (RoVaR)	well-diversified portfolio
semistandard deviation	

**Learning Objectives****5.1 Demonstrate knowledge of measures of financial risk.***For example:*

- Define and calculate semivariance and semistandard deviation
- Describe shortfall risk, target semivariance, and target semistandard deviation
- Define and calculate tracking error
- Describe and calculate drawdown
- Define and interpret value at risk (VaR), and discuss its strengths and weaknesses as a risk measure
- Define and interpret conditional value-at-risk (CVaR)

**5.2 Demonstrate knowledge of methods for estimating value at risk (VaR).***For example:*

- 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)

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

*For example:*

- Define the ratio-based performance measure type
- Define and calculate the Sharpe ratio
- Define and calculate the Treynor ratio
- Recognize and calculate the Sortino ratio, the information ratio, and return on VaR
- Define the risk-adjusted performance measure type

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

*For example:*

- Define the risk-adjusted performance measure type
- Recognize and calculate Jensen's alpha,  $M^2$  (M-squared), and average tracking error

**Correction to reading (*printed version only*):**

Top of page 102, section 5.1.1:

Semivariance includes only the observations with values below the mean.

Should be:

Semivariance's summation includes only the observations with values below the mean.

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Page 110, Section 5.2.7:

In the middle of the subsection: "2. Zero Correlation" change the phrase:

"the VaR of the combination might be the sum of the individual VaRs divided by the square root of 2, or \$141,421"

To

"the VaR of the combination is the square root of the sum of the squared individual VaRs, or \$141,421"

**Chapter 6**

Foundations of Financial Economics

**Keywords**

absolute pricing model	market portfolio
arbitrage	market weight
arbitrage-free model	multifactor models
asset pricing model	naked option
bear spread	omega
binomial tree model	omicron
Black-Scholes call option formula	option collar
bull spread	option combination
capital asset pricing model (CAPM)	option spread
carrying cost	option straddle
cash market	option strangle
collar	protective put
cost-of-carry model	put-call parity relative
covered call	pricing model rho
elasticity	risk reversal
empirical model	semistrong form informational market efficiency
ex ante models	single-factor asset pricing model
ex post model	spot market
excess return	strong form informational market efficiency
Fama-French model	systematic return
Fama-French-Carhart model	systematic risk
financed positions	term structure of forward contracts
forward contract	theoretical model
idiosyncratic return	tradable asset
idiosyncratic risk	weak form informational market efficiency
informational market efficiency	
lambda	

**Learning Objectives**

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

*For example:*

- Define informational market efficiency
- Recognize various forms of informational market efficiency
- Identify factors driving informational market efficiency
- Discuss the differences between informational market efficiency in traditional and alternative asset markets

**6.2 Demonstrate knowledge of single-factor asset pricing models and ex ante pricing.**

*For example:*

- Describe the key characteristics of single-factor asset pricing models
- Recognize the capital asset pricing model (CAPM)
- Describe the key characteristics of ex ante and ex post asset pricing models
- Recognize the distinctions between ex ante asset pricing and ex post asset pricing
- Apply ex ante and ex post pricing in a single-factor framework
- Define systematic and idiosyncratic risk and return

**6.3 Demonstrate knowledge of multifactor and empirical asset pricing models.**

*For example:*

- Apply and interpret equations representing ex ante and ex post forms of multifactor asset pricing models
- Distinguish between theoretically derived and empirically identified return factors
- Describe the steps typically involved in empirical modeling of returns
- Recognize the key components of the Fama-French and Fama-French-Carhart models, and discuss the appropriate application of these models in alternative investing
- Discuss three key issues analysts should consider when using empirical multifactor models

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

*For example:*

- Describe arbitrage-free models
- Discuss applications of arbitrage-free models
- Describe arbitrage-free pricing in spot markets
- Describe hedged and unhedged carry trades
- Define forward contracts, and recognize their uses in hedging
- Recognize and apply cost-of-carry models
- Discuss and apply binomial tree models

**6.5 Demonstrate knowledge of the term structure of forward contracts.**

*For example:*

- Identify the two determinants of forward prices on a risky financial security
- Compare the pricing of forward contracts on financial securities and commodities
- Apply the cost-of-carry model for pricing forward contracts on financial securities

**6.6 Demonstrate knowledge of option exposures.**

*For example:*

- Recognize the key characteristics of long and short positions in an underlying asset
- Recognize the key characteristics of call and put exposures
- Discuss characteristics of option spreads
- Define bull and bear spreads
- Discuss option combinations
- Define and apply the concept of put-call parity

**6.7 Demonstrate knowledge of option pricing models.**

*For example:*

- Recognize and apply the Black-Scholes call-option formula
- Recognize and apply the Black forward option pricing model
- Recognize and apply the currency option pricing model

**6.8 Demonstrate knowledge of option sensitivities.**

*For example:*

- Recognize and describe the five most popular option sensitivities (i.e., delta, vega, theta, rho, and gamma)
- Discuss option sensitivities
- Discuss the uses of option sensitivities in risk management

**Chapter 7**

## Benchmarking and Performance Attribution

**Keywords**

abstract models  
 applied models  
 benchmarking  
 cross-sectional models  
 normative model  
 panel data sets

peer group  
 performance attribution  
 positive model  
 return attribution  
 time-series models

**Learning Objectives****7.1 Demonstrate knowledge of benchmarking and its role in the analysis of risk and return of investments.**

*For example:*

- Define benchmarking in the context of investing
- Recognize various types of benchmarks (i.e., peer returns and index returns)
- Apply the concept of benchmarking
- Discuss considerations in benchmarking (appropriateness of the benchmark selected, statistical significance of performance differences relative to a benchmark, reasons behind performance differences relative to a benchmark)

**7.2 Demonstrate knowledge of various types of asset pricing models.**

*For example:*

- Define normative and positive models, and compare their key characteristics
- Define theoretical and empirical models, and compare their key characteristics
- Define applied and abstract models, and compare their key characteristics
- Describe the advantages and disadvantages of various types of models in the context of alternative investments
- Define cross-sectional and time-series approaches, and compare their key characteristics

**7.3 Demonstrate knowledge of various approaches to performance attribution.**

*For example:*

- Describe the characteristics of single-factor models
- Apply single-factor models to benchmarking
- Interpret the results of single-factor benchmarking analysis
- Discuss multifactor benchmarking

**7.4 Demonstrate knowledge of the limitations of the CAPM approach for analysis of alternative investments.**

*For example:*

- Recognize and describe multiperiod issues in CAPM analysis
- Recognize and describe the limitations of CAPM analysis when applied to non-normal return distributions in alternative investments
- Describe the potential effect of illiquidity on returns of alternative investments



**Chapter 8**

## Alpha, Beta, and Hypothesis Testing

**Keywords**

abnormal return persistence	ex post alpha
alpha	full market cycle
alpha driver	hypotheses
alternative hypothesis	linear risk exposure
asset gatherers	model misspecification
backfill bias	null hypothesis
backfilling	outlier
backtesting	overfitting
beta creep	passive beta driver
beta driver	process drivers
beta expansion	product innovators
beta nonstationarity	p-value
causality	return driver
cherry-picking	selection bias
chumming	self-selection bias
confidence interval	significance level
data dredging	spurious correlation
data mining	survivorship bias
economic significance	test statistic
equity risk premium	type I error
equity risk premium puzzle	type II error
ex ante alpha	

**Learning Objectives****8.1 Demonstrate knowledge of beta and alpha.***For example:*

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

**8.2 Demonstrate knowledge of the concepts of ex ante and ex post alpha.***For example:*

- Define and apply the concept of ex ante alpha, and identify its key characteristics
- Define and apply the concept of ex post alpha, and identify its key characteristics
- Distinguish between ex ante and ex post alpha

**8.3 Demonstrate knowledge of empirical approaches to inferring ex ante alpha from ex post alpha.***For example:*

- Identify the steps involved in estimating ex ante alpha from historical performance
- Discuss challenges to empirical analysis of manager skill

**8.4 Demonstrate knowledge of return attribution.**

*For example:*

- Calculate beta, ex ante, and ex post alpha
- Recognize 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

**8.5 Demonstrate knowledge of ex ante alpha estimation and return persistence.**

*For example:*

- Recognize the characteristics of return persistence
- Define abnormal return persistence
- Discuss attribution of idiosyncratic returns to luck or skill

**8.6 Demonstrate knowledge of return drivers.**

*For example:*

- 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

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

*For example:*

- Identify the four steps of hypothesis testing (i.e., state the hypothesis, formulate an analysis plan, analyze sample data, and interpret results)
- Recognize the components of hypothesis statements (i.e., null hypothesis and alternative hypothesis)
- Describe the process of designing hypothesis tests
- Describe the process of creating test statistics for use in analyzing sample data
- Explain the decision-making process for rejecting or failing to reject the null 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

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

*For example:*

- Recognize 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

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

*For example:*

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

**Chapter 9**

## Regression, Multivariate, and Nonlinear Methods

**Keywords**

conditional correlation	principal components analysis
dependent variable	regression
down market beta	residuals
goodness of fit	rolling window analysis
independent variable	$r$ -squared
intercept	serial correlation
look-back option	simple linear regression
multicollinearity	slope coefficient
multiple regression model	stepwise regression
negative conditional correlation	style analysis
nonlinear exposure	$t$ -statistic
nonstationary	$t$ -test
positive conditional correlation	up market beta

**Learning Objectives****9.1 Demonstrate knowledge of single-factor regression models.***For example:*

- 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
- Evaluate the statistical significance of regression parameter estimates
- Calculate the  $t$ -statistic

**9.2 Demonstrate knowledge of multifactor regression models.***For example:*

- Describe the ex post version of the Fama-French model
- Describe the problem that multicollinearity poses to multifactor regression analysis
- Discuss the selection process of independent variables for multifactor regression analysis and the potential shortcomings to the stepwise regression technique

**9.3 Demonstrate knowledge of dynamic risk exposure models.***For example:*

- Define nonlinear exposure
- Discuss and apply the dummy variable approach to analyzing market-timing strategies
- Discuss the separate regression approach to analyzing market-timing strategies
- Discuss and apply the quadratic approach to analyzing market-timing strategies

**9.4 Demonstrate knowledge of methods for modeling changing correlation.**

*For example:*

- Recognize and describe the concept of conditional correlation
- Describe the rolling window approach to modeling changing correlation

**9.5 Demonstrate knowledge of approaches to analyzing hedge fund returns using multifactor models.**

*For example:*

- Describe how style analysis and asset class groupings can be used to analyze fund performance
- Describe how performance of a fund can be analyzed using returns of funds with similar strategies
- Describe how marketwide factors can be used to analyze performance of a fund
- Describe how specialized market factors can be used in hedge fund replication

**9.6 Demonstrate knowledge of estimating hedge fund performance persistence.**

*For example:*

- Discuss approaches to estimating hedge fund performance persistence

## Topic 3: Real Assets

### Readings

*Alternative Investments: CAIA Level I*, 3<sup>rd</sup> edition, Wiley, 2015. Part Two: Real Assets, Chapters 10 – 15.

#### Chapter 10

Natural Resources and Land

### Keywords

agency risk	natural resources
binomial option pricing	negative survivorship bias
blue top lots	paper lots
cap rate	perpetual option
contagion	political risk
exchange option	pure play
favorable mark	risk-neutral probability
finished lots	rotation
intrinsic option value	selective appraisals
land banking	smoothing
low-hanging-fruit principle	split estate
managed returns	timberland investment management organizations (TIMOs)
market manipulation	time value of an option
model manipulation	

### Learning Objectives

#### 10.1 Demonstrate knowledge of natural resources other than land.

*For example:*

- 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 options should not be immediately exercised
- Describe the relationship between the moneyness of natural resource options and short-term financial risks

#### 10.2 Demonstrate knowledge of land as an alternative asset.

*For example:*

- 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

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

*For example:*

- 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 timberland ownership

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

*For example:*

- Discuss the characteristics of farmland investments
- Calculate the value of farmland based on annual operating income and the cap rate
- Discuss financial analysis of farmland investments
- Discuss factors that affect farmland prices and returns
- Describe farmland as a multiple use option
- Identify methods of obtaining exposure to farmland

**10.5 Demonstrate knowledge of valuation and volatility of real assets.**

*For example:*

- Discuss the smoothing of prices and returns
- Determine the effect of smoothing on observed volatility
- Describe how values and returns are managed
- Discuss how appraisals contribute to smoothing of real asset prices
- Compare smoothed returns with market returns

**10.6 Demonstrate knowledge of historical performance of timber and farmland.**

*For example:*

- Recognize inferences that can be drawn from comparing definable characteristics of timber and farmland investing with their historical stand-alone and portfolio performance

**Chapter 11**

## Commodity Forward Pricing

**Keywords**

backwardation	law of one price
basis	maintenance margin requirement
calendar spread	margin call
contango	marginal market participant
convenience yield	marked-to-market
cost of carry	normal backwardation
crisis at maturity	normal contango
distant contracts	open interest
front month contract	perfectly elastic supply
inelastic supply	rolling contracts
informationally inefficient term structure	storage costs
initial margin	swap

**Learning Objectives****11.1 Demonstrate knowledge of forward and futures contracts.***For example:*

- Describe the trading differences between forward and futures contracts
- Describe and apply the marking-to-market process for futures positions
- Discuss the effect of marking-to-market on counterparty risk
- Recognize the effect of marking-to-market and the time value of money on risk and prices
- Define and calculate initial margin for futures positions
- Define and calculate maintenance margin for futures positions

**11.2 Demonstrate knowledge of the rolling futures positions.***For example:*

- Explain the process of maintaining long-term futures exposures through short-term futures positions
- Discuss the effects of rollover decisions on the returns of long-term futures exposures

**11.3 Demonstrate knowledge of the term structure of forward prices on commodities.***For example:*

- Recognize the cost-of-carry model for commodity futures contracts
- Calculate cost of carry for commodity futures contracts
- Recognize arbitrage-free forward pricing for physical assets
- Calculate arbitrage-free forward prices for physical assets
- Recognize limitations to arbitrage-free forward pricing for physical assets
- Discuss the effect of harvests, supply elasticity, and shifts in supply and demand on the term structure of forward prices



**11.4 Demonstrate knowledge of the concepts of backwardation, normal backwardation, contango, and normal contango.**

*For example:*

- Define and compare backwardated markets and markets in contango
- Discuss backwardation and contango in informationally efficient markets
- Define and compare normal backwardation and normal contango
- Discuss normal backwardation and normal contango in informationally efficient and inefficient markets

**11.5 Demonstrate knowledge of the characteristics of returns on futures and forward contracts.**

*For example:*

- Discuss futures and forward contracts as alpha and beta drivers
- Define the law of one price
- Describe the relationship between ex ante alpha and the shape of the term structure of forward prices
- Discuss informationally inefficient term structures of forward curves
- Define and determine the basis of forward contracts
- Describe calendar spreads, and discuss their risks and returns
- Calculate returns to calendar spread positions

**Chapter 12**

Commodities: Applications and Evidence

**Keywords**

basis risk	nominal price
Bloomberg Commodity Index (BCOM)	production-weighted index
collateral yield	real price
commodity-linked note	Reuters/Jefferies Commodity Research Bureau (CRB) Index
convergence at settlement	roll return
excess return of a futures contract	roll yield
fully collateralized position	spot return
heterogeneous	Standard & Poor's Goldman Sachs Commodity Index (S&P GSCI)
inflation	
inflation risk	
investable index	

**Learning Objectives**

**12.1 Demonstrate knowledge of the diversification benefits of commodities.**

*For example:*

- Explain the sources of potential diversification benefits offered by commodities
- Discuss commodities in the context of equilibrium diversification
- Discuss how market imperfections relate to determining allocations to commodities
- Discuss commodities as a diversifier of inflation risk

**12.2 Demonstrate knowledge of commodities as potential return enhancers.**

*For example:*

- Discuss potential return enhancement from idiosyncratic returns
- Discuss potential return enhancement from systematic returns in efficient markets
- Discuss potential return enhancement from systematic returns in inefficient markets
- Discuss potential return enhancement from providing insurance through commodity futures

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

*For example:*

- Recognize characteristics of physical ownership of commodities
- Recognize investments in commodities through related equity instruments
- Recognize investments in commodities through exchange-traded funds (ETFs)
- Recognize investments in commodities through commodity-linked notes
- Apply option valuation methods to price commodity-linked notes

**12.4 Demonstrate knowledge of commodity investment through futures contracts.**

*For example:*

- Recognize the basis risk and investments in commodities through futures contracts
- Recognize the components of returns to futures positions (i.e., spot return, roll yield, collateral yield, and excess return)
- Describe roll yield for financial and physical commodity futures
- Describe the two interpretations of rolling contracts
- Relate roll yield to the slope of the forward curve
- Discuss convergence and the relationship between futures and spot prices through time
- Calculate the aggregated profit or loss for a futures position
- Recognize rollover strategies and their effect on returns from futures investments
- Recognize the three propositions regarding roll return

**12.5 Demonstrate knowledge of commodity indices.**

*For example:*

- Discuss the process of construction of commodity futures indices
- Discuss the characteristics of commodity indices given by S&P GSCI, BCOM, and CRB

**12.6 Demonstrate knowledge of risks associated with commodity investments.**

*For example:*

- Discuss the effect of event risk on returns from investments in commodities
- Discuss the role of commodities as defensive investments
- Discuss acceptance of commodity investments by institutional investors

**12.7 Demonstrate knowledge of the return characteristics of commodity investments.**

*For example:*

- Recognize inferences that can be drawn from comparing definable characteristics of commodities with their historical investment performance

**Chapter 13**

## Operationally Intensive Real Assets

**Keywords**

brownfield project	midstream operations
double taxation	negative costs
downstream operations	present value of growth opportunities (PVGO)
evergreen funds	privatization
excludable good	public-private partnership
gates	regulatory risk
greenfield project	unbundling
intangible assets	upstream operations
intellectual property	
investable infrastructure	

**Learning Objectives****13.1 Demonstrate knowledge of commodity producers.***For example:*

- Describe how commodity prices affect operating performance of firms that transform natural resources into commodities
- Describe the relationship between commodity prices and equity prices of commodity-producing firms
- Discuss the empirical evidence on the correlation between commodity prices and equity prices of commodity-producing firms

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

- Discuss the structure of master limited partnerships (MLPs) and characteristics of the MLP sector
- Identify the tax characteristics of MLPs
- Discuss valuation of MLPs

**13.3 Demonstrate knowledge of infrastructure as an alternative asset.***For example:*

- Recognize the seven characteristics that distinguish investable infrastructure from other assets
- Contrast economic and social infrastructure
- Discuss the influence of government on infrastructure investments
- Describe investment vehicles for investing in infrastructure
- Discuss the risks and rewards of infrastructure investments

**13.4 Demonstrate knowledge of intellectual property as an alternative asset.***For example:*

- Discuss intellectual property as an investment
- Describe characteristics of intellectual property
- Recognize the factors that contribute to returns of film projects
- Define and apply the simplified model for valuing intellectual property

**Chapter 14**

Liquid and Fixed-Income Real Estate

**Keywords**

amortization	mortgage
balloon payment	mortgage REITs
collateralized mortgage obligations (CMOs)	mortgage-backed securities (MBS)
commercial mortgage loans	negative amortization
commercial mortgage-backed securities	opportunistic real estate
conditional prepayment rate	option adjustable-rate mortgage (option ARM)
core real estate	pass-through MBS
covenants	prepayment option
cross-collateral provision	PSA benchmark
debt service coverage ratio	real estate investment trust (REIT)
equity REITs	recourse
fixed charges ratio	refinancing burnout
fixed-rate mortgage	residential mortgage loans
fully amortized	residential mortgage-backed securities
idiosyncratic prepayment factors	styles of real estate investing
index rate	subprime mortgages
interest coverage ratio	unscheduled principal payments
interest rate cap	value-added real estate
loan-to-value ratio (LTV ratio)	variable-rate mortgage
lumpiness	
margin rate	

**Learning Objectives**

**14.1 Demonstrate knowledge of real estate as an investment.**

*For example:*

- List five common attributes of real estate that encourage its inclusion in investment portfolios
- Discuss heterogeneity, lumpiness, and illiquidity of real estate
- Discuss and contrast core, value-added, and opportunistic real estate investment styles

**14.2 Demonstrate knowledge of residential mortgages in the context of alternative investments.**

*For example:*

- Define mortgages, and differentiate between fixed- and variable-rate mortgages
- Describe characteristics of fixed-rate mortgages, including amortization
- Recognize the determinants of the monthly payment on a mortgage loan
- Calculate monthly payments for fixed-rate and variable-rate mortgages
- Calculate the outstanding mortgage balance
- Describe the prepayment option embedded in fixed-rate mortgages
- Describe characteristics of interest-only mortgages
- Identify and apply the formula for valuation of interest-only mortgages
- Describe characteristics of variable-rate mortgages
- Identify and apply the formula for valuation of variable-rate mortgages
- Describe other variations of mortgages
- Calculate the monthly payments for a mortgage with a balloon payment
- Describe default risk for residential mortgages

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

*For example:*

- Describe characteristics of commercial mortgages
- Identify, describe, and apply financial ratios (i.e., loan-to-value ratio, interest coverage ratio, debt service coverage ratio, and fixed charges ratio) employed in the analysis of commercial mortgages

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

*For example:*

- Discuss residential mortgages and their prepayment options
- Discuss and apply methods of measuring unscheduled prepayment rates
- Describe and apply conditional prepayment rates (CPRs) and the resulting Public Securities Association (PSA) benchmark
- List prepayment factors not associated with changing interest rates
- Identify and describe commercial mortgage-backed securities, and compare and contrast them with residential mortgage-backed securities

**14.5 Demonstrate knowledge of real estate investment trusts (REITs).**

*For example:*

- Define a real estate investment trust (REIT)
- List the key advantages of REITs
- Discuss potential disadvantages of REITs as well as their main income restrictions

**14.6 Demonstrate knowledge of historical performance of mortgage REITs.**

*For example:*

- Recognize inferences that can be drawn from comparing definable characteristics of mortgage REITs with their historical stand-alone and portfolio performance

**Chapter 15**

Real Estate Equity Investments

**Keywords**

after-tax discounting approach	information node
appraisals	NCREIF Property Index (NPI)
backward induction	net lease
closed-end real estate mutual fund	net operating income (NOI)
commingled real state funds	net sale proceeds
comparable sale prices approach	open-end real estate mutual funds
data smoothing	operating expenses
decision node	potential gross income
decision tree	pre-tax discounting approach
depreciation	private equity real estate funds
depreciation tax shield	profit approach
discounted cash flow (DCF) method	real estate development projects
effective gross income	real estate joint ventures
effective tax rate	real estate valuation
equity residual approach	real option
exchange-traded funds (ETFs)	risk premium approach
fixed expenses	stale pricing
FTSE NAREIT US Real Estate Index Series	syndications
gearing	vacancy loss rate
hedonic price index	variable expenses
income approach	

**Learning Objectives**

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

*For example:*

- Describe the processes of developing real estate
- Describe the valuing of real estate development as a string of real options
- Apply a decision tree and backward induction to value real estate development projects

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

*For example:*

- Recognize and apply the discounted cash flow approach (i.e., income approach) to valuing real estate, including the calculation of net operating income and the discount rate
- Discuss the use of comparable sale prices for valuing real estate

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

*For example:*

- 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
- 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

**15.4 Demonstrate knowledge of depreciation of real estate.**

*For example:*

- Describe and apply various methods of depreciation of real estate (i.e., without income taxation, with depreciation disallowed for tax purposes, with economic depreciation allowed for tax purposes, with accelerated depreciation allowed for tax purposes, and with expensing of capital expenditures for tax purposes) in the analysis of returns

**15.5 Demonstrate knowledge of real estate equity risks and returns as represented by real estate indices.**

*For example:*

- Discuss real estate indices based on appraisals
- Identify and describe data smoothing and its major effects
- Discuss real estate indices based on adjusted privately traded prices
- Discuss real estate indices based on market prices

**15.6 Demonstrate knowledge of historical performance of equity REITs.**

*For example:*

- Recognize inferences that can be drawn from comparing definable characteristics of equity REITs with their historical stand-alone and portfolio performance



## Topic 4: Hedge Funds

### Readings

*Alternative Investments: CAIA Level I*, 3<sup>rd</sup> edition, Wiley, 2015. Part Three: Hedge Funds, Chapters 16 – 21.

#### Chapter 16

Structure of the Hedge Fund Industry

### Keywords

absolute return strategies	liquidation bias
annuity view of hedge fund fees	lock-in effect
asymmetric incentive fees	managerial coinvesting
at-the-money incentive fee approximation	managing returns
capacity	massaging returns
classification of hedge fund strategies	multistrategy fund
closet indexer	off-balance-sheet risk
consolidation	opportunistic
convergent strategies	optimal contracting
diversified strategies	option view of incentive fees
equity strategies	participation bias
event-driven strategies	perverse incentive
excessive conservatism	pure asset gatherer
fee bias	relative return product
fund mortality	relative value strategies
fund of funds	representativeness
headline risk	safe harbor
hedge fund program	short volatility exposure
high-water mark	single-manager hedge fund
incentive fee option value	strategy definitions
instant history bias	synthetic hedge funds
investability	

### Learning Objectives

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

*For example:*

- 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
- Recognize events that led to the trend of consolidation within the hedge fund industry

**16.2 Demonstrate knowledge of hedge fund fees.**

*For example:*

- Recognize typical hedge fund fee arrangements
- Calculate annual hedge fund fees
- Describe and apply 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

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

*For example:*

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

**16.4 Demonstrate knowledge of various hedge fund strategies.**

*For example:*

- Identify and describe equity strategies
- Identify and describe event-driven and relative value strategies
- Identify and describe absolute return strategies
- Identify and describe diversified strategies

**16.5 Demonstrate knowledge of hedge fund investment programs.**

*For example:*

- Identify and explain the parameters that may be used in a hedge fund investment program
- Discuss three caveats that relate to the documented hedge fund investment performance and diversification benefits
- Describe the characteristics and potential benefits of opportunistic hedge fund investing

**16.6 Demonstrate knowledge of the market impact of hedge funds.**

*For example:*

- 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 hedge funds during the crisis of 2007

**16.7 Demonstrate knowledge of hedge fund indices.**

*For example:*

- Describe hedge fund indices
- Describe the challenges caused by management and incentive fees in constructing hedge fund indices
- Recognize the challenges of including managed futures in hedge fund indices
- Compare asset-weighted hedge fund indices and equally weighted hedge fund indices
- Discuss the role of the size of the hedge fund universe in the construction of a hedge fund index
- Recognize the concepts of representativeness and data biases (e.g., survivorship, selection, instant history, liquidation) and their effects on hedge fund returns reported by databases
- Recognize the challenges involved in defining hedge fund strategies, and the effect of style drift
- Identify issues that determine investability of hedge fund indices

**Correction to reading (*printed version only*):**

Page 392, second sentence of last paragraph of Section: 16.2.2:

“soft hurdle rate” should be “hard hurdle rate”

## Chapter 17

### Macro and Managed Futures Funds

#### Keywords

black-box model trading	momentum
breakout strategies	Mount Lucas Management (MLM) Index
capacity risk commodity pools	moving average
commodity trading advisers (CTAs)	natural hedger
conditional correlation coefficient	out-of-sample data
counterparty risk	pattern recognition system
countertrend strategies	private commodity pools
degradation	public commodity pools
discretionary fund trading	random walk
event risk	relative strength index (RSI)
exponential moving average	robustness
fundamental analysis	sideways market
global macro funds	simple moving average
in-sample data	slippage
lack of trends risk	systematic fund trading
leverage	technical analysis
liquidity risk	thematic investing
managed account	transparency
managed futures	transparency risk
market microstructure	trend-following strategies
market risk	validation
mean-reverting	weighted moving average
model risk	whipsawing

#### Learning Objectives

##### 17.1 Demonstrate knowledge of major distinctions within the category of macro and managed futures funds.

*For example:*

- Distinguish between discretionary fund trading and systematic fund trading
- Define technical analysis and fundamental analysis, and discuss the reasons for pursuing each

##### 17.2 Demonstrate knowledge of global macro funds.

*For example:*

- Describe the key characteristics of global macro funds
- Be familiar with examples that illustrate the foundation of global macro trading strategies
- Recognize the main risks (i.e., market, event, and leverage) of macro investing

##### 17.3 Demonstrate knowledge of the historical performance of macro investing.

*For example:*

- Recognize inferences that can be drawn from comparing definable characteristics of macro investing with its historical stand-alone and portfolio performance

**17.4 Demonstrate knowledge of managed futures.**

*For example:*

- Describe the key characteristics of managed futures funds
- Discuss regulation, background, and organizational structures (i.e., public commodity pools, private commodity pools, and individually managed accounts) of the managed futures industry

**17.5 Demonstrate knowledge of systematic trading.**

*For example:*

- Identify methods for and issues involved in deriving systematic trading rules
- Recognize key questions to ask when evaluating individual trading strategies
- Describe key components of methods used to validate systematic trading rules and the detection and effects of trading rule degradation

**17.6 Demonstrate knowledge of systematic trading strategies.**

*For example:*

- Describe the characteristics of trend-following strategies
- Define and apply simple moving averages, weighted moving averages, and exponential moving averages
- Define and apply breakout trading rules
- List the conclusions of research on the nature and efficacy of trend-following strategies
- Identify non-trend-following strategies and their trading signals
- Describe the characteristics of relative value strategies

**17.7 Demonstrate knowledge of empirical research on managed futures.**

*For example:*

- Discuss empirical evidence regarding managed futures returns and the downside risk protection offered by managed futures
- Describe the reasons why managed futures might provide superior returns
- Describe the risks of managed futures funds

**17.8 Demonstrate knowledge of historical performance of managed futures and macro funds.**

*For example:*

- Recognize inferences that can be drawn from comparing definable characteristics of managed futures and macro investing with their historical stand-alone and portfolio performance

## Chapter 18

### Event-Driven Hedge Funds

#### Keywords

activist investment strategy	liquidation process
agency costs	long binary call option
agency theory	long binary put option
agent compensation scheme	merger arbitrage
antitrust review	one-off transaction
bankruptcy process	principal-agent relationship
bidding contest	proxy battle
capital structure arbitrage	recovery value
corporate event risk	reorganization process
corporate governance	selling insurance
distressed debt hedge funds	shareholder activism
event-driven	special situation funds
event-driven multistrategy funds	spin-off
financial market segmentation	split-off
financing risk	staggered board seats
Form 13D	stock-for-stock mergers
Form 13F	toehold
Form 13G	traditional merger arbitrage
free rider	wolf pack
interlocking boards	

#### Learning Objectives

##### 18.1 Demonstrate knowledge of the sources of event-driven strategy returns.

*For example:*

- Explain the insurance selling view of event-driven strategy returns
- Explain and apply the binary option view of event-driven strategy returns

##### 18.2 Demonstrate knowledge of activist investing.

*For example:*

- Define activist investing, and identify the components of activist investment strategies
- Identify the various roles in corporate governance
- Identify the five dimensions of shareholder activists and the key players in financial activism
- Discuss agency costs and the conflicts of interest between shareholders and managers
- Recognize and discuss approaches commonly used by activist investors to generate alpha
- Recognize inferences that can be drawn from three types of activist agendas, comparing definable characteristics of activist investing with its historical stand-alone and portfolio performance

**18.3 Demonstrate knowledge of merger arbitrage.**

*For example:*

- Recognize the characteristics of merger arbitrage
- Recognize the characteristics of stock-for-stock mergers
- Discuss and apply traditional merger arbitrage to stock-for-stock mergers
- Discuss the effects of third-party bidders and bidding wars on merger arbitrage
- Describe regulatory risk in the context of merger arbitrage
- Describe financing risk in the context of merger arbitrage
- Recognize inferences that can be drawn from comparing definable characteristics of merger arbitrage with its historical stand-alone and portfolio performance

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

*For example:*

- Distinguish between distressed debt strategies in hedge funds and in private equity
- Identify key components of the bankruptcy process
- Define a naked option position
- Describe the risks and returns of short sales of distressed equities
- Determine the effect of recovery values on annualized returns for a strategy of buying undervalued debt during the bankruptcy process
- Recognize activist approaches to investing in distressed securities
- Describe the characteristics of capital structure arbitrage
- Explain the strategy of buying distressed firms using distressed securities
- Recognize inferences that can be drawn from comparing definable characteristics of distressed securities funds with their historical stand-alone and portfolio performance

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

*For example:*

- Describe key characteristics of event-driven multistrategy funds
- Recognize inferences that can be drawn from comparing definable characteristics of event-driven multistrategy funds with their historical stand-alone and portfolio performance

**Chapter 19**

Relative Value Hedge Funds

**Keywords**

anticipated volatility	marking-to-model
asset-backed securities	modified duration
busted convertibles	moneyness
carry trades	mortgage-backed securities arbitrage
classic convertible bond arbitrage trade	net delta
classic dispersion trade	option-adjusted spread
classic relative value strategy trade	parallel shift
complexity premium	portfolio insurance
components of convertible arbitrage returns	price transparency
convergence	pricing risk
convertible bonds	realized volatility
correlation risk	rebate
correlations go to one	riding the yield curve
delta	rolling down
delta-neutral	short correlation
dilution	short squeeze
duration	sovereign debt
duration-neutral	special stock
dynamic delta hedging	tail risk
effective duration	term structure of interest rates
equity-like convertible	theta
fixed-income arbitrage	variance notional value
gamma	variance swaps
general collateral stocks	vega
hybrid convertibles	vega notional value
implied volatility	vega risk
intercurve arbitrage positions	volatility arbitrage
interest rate immunization	volatility risk
intracurve arbitrage positions	volatility swap
marking-to-market	yield curve

**Learning Objectives**

**19.1 Demonstrate knowledge of relative value strategies.**

*For example:*

- Recognize the relative value strategy, and list four styles of relative value hedge funds
- Describe the classic relative value strategy trade



**19.2 Demonstrate knowledge of convertible bond arbitrage.***For example:*

- 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
- Define, describe, and apply the concept of delta
- Define and describe the concept of gamma and theta
- 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
- Recognize the role complexity plays in making convertible bond arbitrage attractive to some hedge fund managers
- Identify the four reasons that issuers may continue to offer convertible bonds at attractive prices
- Identify the components of convertible arbitrage returns
- Recognize and discuss return drivers and risks of convertible bond arbitrage
- Recognize inferences that can be drawn from comparing definable characteristics of convertible arbitrage funds with their historical stand-alone and portfolio performance

**19.3 Demonstrate knowledge of volatility arbitrage.***For example:*

- Define and describe the concepts of vega and anticipated volatility
- Recognize instruments used by volatility arbitrage funds
- Identify and apply the approach for determining the final payoff of a variance swap and a volatility swap
- Compare the risks of exchange-traded derivatives and over-the-counter (OTC) derivatives
- Recognize the types of volatility arbitrage strategies
- Discuss the characteristics of market-neutral volatility funds
- Recognize the challenges of estimating and forecasting dispersion
- Discuss the characteristics of tail risk strategies and how their performance depends on correlation among assets
- Discuss the characteristics of dispersion trades
- Recognize inferences that can be drawn from comparing definable characteristics of volatility arbitrage funds with their historical stand-alone and portfolio performance

**19.4 Demonstrate knowledge of fixed-income arbitrage.***For example:*

- Discuss duration neutrality, leverage, and liquidity in the context of fixed-income arbitrage
- Recognize types and characteristics of fixed-income arbitrage strategies
- Discuss the risks and returns of sovereign debt in fixed-income arbitrage strategies, and apply the concept of modified duration to bond returns and volatility
- Recognize 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 risks of asset-backed and mortgage-backed securities arbitrage
- Recognize inferences that can be drawn from comparing definable characteristics of fixed-income arbitrage with its historical stand-alone and portfolio performance

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

*For example:*

- Describe key characteristics of relative value multistrategy funds, and recognize inferences that can be drawn from comparing definable characteristics of relative value multistrategy funds with their historical stand-alone and portfolio performance

## Chapter 20

### Equity Hedge Funds

#### Keywords

accounting accrual	mean neutrality
asynchronous trading	multiple-factor scoring models
breadth	net stock issuance
earnings momentum	nonactive bets
earnings surprise	overreacting
equity long/short funds	pairs trading
equity market-neutral funds	post-earnings-announcement drift
Fundamental Law of Active Management (FLOAM)	price momentum
illegal insider trading	providing liquidity
information coefficient	share buyback program
informationally efficient	short interest
issuance of new stock	short-bias funds
legal insider trading	speculation
limits to arbitrage	standardized unexpected earnings
liquidity	taking liquidity
market anomalies	test of joint hypotheses
market impact	underreacting
market maker	uptick rule
	variance neutrality

#### Learning Objectives

##### 20.1 Demonstrate knowledge of sources of return for equity hedge funds.

*For example:*

- Describe the general design of an equity hedge strategy
- 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

##### 20.2 Demonstrate knowledge of market anomalies.

*For example:*

- 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

**20.3 Demonstrate knowledge of the Fundamental Law of Active Management (FLOAM).**

*For example:*

- Calculate and interpret the key components (i.e., breadth and the information coefficient) of the FLOAM
- Describe and determine how the FLOAM can be used to understand changes in the information ratio
- Recognize trade-offs involved in changing or maintaining the information ratio
- Define nonactive bets, and recognize their role in the FLOAM

**20.4 Demonstrate knowledge of approaches to implementing anomaly strategies.**

*For example:*

- Recognize methods for integrating anomalies using factor models
- Define pairs trading, and describe the steps involved in constructing the portfolio
- Discuss the effect of short selling on reducing risk and increasing alpha
- Describe the limits to arbitrage and their effect on market efficiency and investment strategies

**20.5 Demonstrate knowledge of the three major strategies of equity hedge funds.**

*For example:*

- Recognize the mechanics of short selling
- Describe the key characteristics of short-bias hedge funds
- Recognize inferences that can be drawn from comparing definable characteristics of short-bias hedge funds with their historical stand-alone and portfolio performance
- Describe the key characteristics of equity long/short hedge funds
- Recognize inferences that can be drawn from comparing definable characteristics of equity long/short hedge funds with their historical stand-alone and portfolio performance
- Describe the key characteristics of equity market-neutral hedge funds
- Recognize inferences that can be drawn from comparing definable characteristics of equity market-neutral hedge funds with their historical stand-alone and portfolio performance

**20.6 Demonstrate knowledge of risk associated with equity hedge funds.**

*For example:*

- List major types of risk associated with equity hedge funds

**Chapter 21**  
Funds of Hedge Funds

**Keywords**

access	nontraditional bond funds
conservative funds of funds	operational due diligence
diversified funds of funds	seeding funds
fee netting	strategic funds of funds
liquidity facility	unconstrained bond funds
market-defensive funds of funds	

**Learning Objectives**

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

*For example:*

- Define funds of hedge funds
- Recognize how indices can serve as valuable tools in constructing hedge fund portfolios and analyzing portfolio performance
- Describe the functions of funds of hedge funds
- List the benefits to investing in funds of hedge funds
- List the disadvantages to investing in funds of hedge funds
- Evaluate how funds of hedge funds add value
- 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

**21.2 Demonstrate knowledge of investing in multistrategy funds.**

*For example:*

- Evaluate and determine 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

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

*For example:*

- Identify advantages that funds of funds have over direct hedge fund investments
- 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

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

*For example:*

- 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

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

*For example:*

- Contrast liquid alternatives with a private alternative investment vehicle, such as hedge funds, CTAs, and funds of funds
- Discuss areas where UCITS regulation is more strict than that for private placements
- Discuss restrictions on '40 Act funds
- Compare and contrast relative value hedge funds, event-driven hedge funds, and macro and managed futures funds in the context of the regulatory framework for liquid alternative investments
- Discuss why multialternatives are popular as liquid alternatives
- Discuss empirical evidence regarding historical returns of liquid alternatives

**21.6 Demonstrate knowledge of historical performance of funds of hedge funds.**

*For example:*

- Recognize inferences that can be drawn from comparing definable characteristics of market-defensive funds of funds with their historical stand-alone and portfolio performance
- Recognize inferences that can be drawn from comparing definable characteristics of conservative funds of funds with their historical stand-alone and portfolio performance
- Recognize inferences that can be drawn from comparing definable characteristics of strategic funds of funds with their historical stand-alone and portfolio performance
- Recognize inferences that can be drawn from comparing definable characteristics of diversified funds of funds with their historical stand-alone and portfolio performance

## Topic 5: Private Equity

### Readings

*Alternative Investments: CAIA Level I*, 3<sup>rd</sup> edition, Wiley, 2015. Part Four: Private Equity, Chapters 22 - 24.

#### Chapter 22

Introduction to Private Equity

### Keywords

burn rate	middle market
business development companies (BDCs)	negative covenants
buyouts	positive covenants
call option view of private equity	private equity firms
charge-off loans	private equity funds
conversion price	private investments in public equity (PIPE)
conversion ratio	prudent person standard
covenant-lite loans	segmentation
distressed debt investing	story credit
equity kicker	structured PIPEs
equity line of credit	syndicated
haircut	toxic PIPE
incurrence covenants	traditional PIPEs
junk bond	underlying business enterprises
leveraged loans	venture capital (VC)
maintenance covenants	venture capital securities
merchant banking	vintage year

### Learning Objectives

#### 22.1 Demonstrate knowledge of private equity terminology.

*For example:*

- Recognize the structure of private equity funds and investments
- Explain the roles of various entities involved in private equity investments

#### 22.2 Demonstrate knowledge of the major forms of private equity investments that involve direct ownership of equity claims.

*For example:*

- Recognize characteristics of venture capital and its role in business start-ups
- Discuss the prudent person standard in the context of venture capital
- Recognize characteristics of buyouts and the role of debt in these transactions
- Recognize characteristics of merchant banking and the benefits it offers financial institutions

**22.3 Demonstrate knowledge of the major forms of private equity that involve direct ownership of debt securities.**

*For example:*

- Describe mezzanine debt, and explain why it is considered a type of private equity investment
- Discuss distressed debt securities in the context of private equity investing
- Discuss the growth of the distressed debt marketplace
- Explain various types of debt covenants
- Discuss leveraged loans in the context of private equity investing
- Discuss the growth of leveraged loans

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

*For example:*

- Describe business development companies (BDCs)
- Calculate the premium (or discount) of closed-end fund prices
- Recognize 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

**22.5 Demonstrate knowledge of trends and innovations in private equity markets.**

*For example:*

- Discuss secondary markets in the context of private equity
- Describe private investment in public equity (PIPE), and compare it to other private equity investments
- Recognize advantages that PIPEs offer investors
- Recognize and compare various types of PIPEs
- Discuss hedge fund participation in private equity
- Contrast private equity funds and hedge funds



**Chapter 23**

## Equity Types of Private Equity

**Keywords**

20-bagger	expansion stage venture capital
angel investing	first stage venture capital
auction process	golden parachute
business plan	J-curve
buy-and-build strategy	leveraged buyout (LBO)
buy-in management buyout	limited liability
buyout-to-buyout deal	management buy-in (MBI)
capital calls	management buyout (MBO)
club deal	mezzanine venture capital
committed capital	milestone
compound option	second or late-stage venture capital
conglomerates	secondary buyout
early-stage venture capital	seed capital stage
efficiency buyouts	sourcing investments
entrepreneurship stimulators	turnaround strategy
escrow agreement	venture capital fund
exit plan	

**Learning Objectives****23.1 Demonstrate knowledge of the relationships between venture capital and leveraged buyouts.***For example:*

- Recognize the role of venture capital and leveraged buyouts as sources of funding for corporations through their life cycle

**23.2 Demonstrate knowledge of the underlying businesses (portfolio companies) of venture capital.***For example:*

- Recognize characteristics of businesses underlying venture capital investment
- List the types of securities used in venture capital
- Explain why venture capital investing is similar to purchasing a call option
- Describe the role of business plans and exit plans in venture capital investment

**23.3 Demonstrate knowledge of venture capital funds.***For example:*

- Define a venture capital fund
- Recognize how venture capital fund managers raise capital
- Recognize the terms of the partnership agreement of venture capital funds
- Describe typical venture capital fund fee structures
- Calculate venture capital fund fees

**23.4 Demonstrate knowledge of the dynamics of investing in venture capital.**

*For example:*

- Describe the stages of the life cycle of venture capital funds and portfolio companies
- Explain the importance of financing stages in distinguishing among various venture capital funds
- Explain the compound option that is embedded in most venture capital investments
- Discuss the concept of the J-curve in the context of a start-up company

**23.5 Demonstrate knowledge of the risk and return characteristics of venture capital investments.**

*For example:*

- Describe the main risks of venture capital investments (i.e., business risk, liquidity risk, and idiosyncratic risk)
- Describe return persistence and vintage-year diversification as keys to successful venture capital investment
- Recognize inferences that can be drawn from comparing definable characteristics of venture capital investments with their historical stand-alone and portfolio performances

**23.6 Demonstrate knowledge of types of buyout transactions.**

- Distinguish leveraged buyouts (LBOs) from traditional investments
- Describe a management buyout (MBO)
- Contrast a management buy-in (MBI) with a buy-in management buyout, and describe the agency issues of buyouts

**23.7 Demonstrate knowledge of leveraged buyout (LBO) transactions.**

*For example:*

- Describe the structure of LBO funds and the role of various entities involved in LBO transactions
- Describe typical LBO fund fee structures
- Calculate LBO fees
- Describe agency relationships, their associated costs, and their role as a potential source of return to LBO transactions
- Describe general categories of LBO transactions and how they create value
- Discuss the characteristics of portfolio companies of LBO funds
- Explain the appeal of a leveraged buyout to managers and investors of the target firm
- Describe the call-option characteristics embedded in potential payouts of a leveraged buyout
- Apply the constant growth model to the valuation of a leveraged buyout investment
- Describe typical exit strategies of LBOs
- Describe the concept of spillover of corporate governance to the public markets
- Explain auction markets and club deals as alternatives to the single-sourced approach to funding LBO transactions
- Discuss why LBO funds tend to have less risk than venture capital funds

**Chapter 24**  
Debt Types of Private Equity

**Keywords**

absolute priority rule	fulcrum securities
acceleration	intercreditor agreement
blanket subordination	PIK toggle
bridge financing	plan of reorganization
Chapter 11 bankruptcy	springing subordination
Chapter 7 bankruptcy	stretch financing
cramdown	takeout provision
debtor-in-possession financing	weighted average cost of capital

**Learning Objectives**

**24.1 Demonstrate knowledge of mezzanine debt.**

*For example:*

- Describe characteristics of mezzanine debt, including typical exit strategies
- Analyze how mezzanine debt affects company cost of capital
- Calculate the weighted average cost of capital of capital structures that include mezzanine debt
- Compare and contrast mezzanine debt to leveraged loans and high-yield bonds
- Describe seven typical examples of transactions that use mezzanine debt
- Describe types of mezzanine debt investors, and recognize their motivations
- Identify and describe eight characteristics that distinguish mezzanine debt from other types of financing

**24.2 Demonstrate knowledge of distressed debt as a form of private equity investment.**

*For example:*

- Recognize characteristics of distressed debt
- Discuss the supply of distressed debt
- Discuss the demand for distressed debt
- Describe the three typical approaches to distressed debt investment
- Describe two major types of corporate bankruptcy processes
- Identify the various terms and standards that relate to bankruptcy processes
- Discuss business risk in the context of distressed debt investing

## Topic 6: Structured Products

### Readings

*Alternative Investments: CAIA Level I, 3<sup>rd</sup> edition*, Wiley, 2015. Part Five: Structured Products, Chapters 25 – 28.

#### Chapter 25

Introduction to Structuring

### Keywords

attachment point	mezzanine tranche
bull call spread	planned amortization class (PAC) tranches
bull put spread	principal-only (PO)
call option view of capital structure	put option view of capital structure
collateralized debt obligation (CDO)	senior tranche
complete market	sequential-pay collateralized mortgage obligation
contraction risk	state of the world
detachment point	structural credit risk models
equity tranche	structuring
extension risk	targeted amortization class (TAC) tranches
floating-rate tranches	tranche
interest-only (IO)	upper attachment point
inverse floater tranche	
lower attachment point	

### Learning Objectives

#### 25.1 Demonstrate knowledge of financial structuring.

*For example:*

- Discuss the relationship between financial structuring and the capital structure of the corporate form of a business organization

#### 25.2 Demonstrate knowledge of the major types of structuring.

*For example:*

- Describe the capital structure of a typical business enterprise
- Explain how structured products can be used to design a hedge
- Explain the idea behind tranches
- Discuss two examples of tailoring structured products

#### 25.3 Demonstrate knowledge of the primary economic role of structuring.

*For example:*

- State the primary direct motivation of the issuer
- Discuss how market completion is a motivation for structuring
- Define state of the world
- Discuss how structured products are market completers

**25.4 Demonstrate knowledge of collateralized mortgage obligations (CMOs).***For example:*

- Describe the primary difference between CMOs and other investment pools
- Describe sequential-pay CMOs
- Calculate cash flows to the tranches of a sequential-pay CMO
- Define extension and contraction risk
- Identify and describe other types of CMO structures and tranches (i.e., planned amortization class, targeted amortization class, principal-only, and floating rate)
- List the two motivations for structured mortgage products
- Discuss how interest rates and prepayments impact the valuation of a CMO
- Discuss the role of CMOs in the financial crises of 1994 and 2004
- Describe commercial CMOs and their default risk

**25.5 Demonstrate knowledge of the structural approach to credit risk modeling.***For example:*

- Recognize the optionlike nature of structured cash flows
- Recognize the intuition of Merton's structural model
- Apply the call-option and put-option views of capital structure
- Discuss the inherent conflict of interest between stockholders and bondholders
- Define and apply put-call parity
- Describe how the Black-Scholes option pricing model can be used to estimate the value of debt that contains credit risk
- Discuss binomial tree models as an alternative to the Black-Scholes option pricing model
- Discuss advantages and disadvantages of structural credit risk models

**25.6 Demonstrate knowledge of the concept of structuring cash flows using collateralized debt obligations (CDOs).***For example:*

- Define and explain various tranches of a CDO
- Discuss attachment points and detachment points
- Calculate cash flows to different tranches of a CDO in the case of defaults of the underlying instruments
- Define a bull call spread and a bull put spread
- Explain the relationship between option spreads, mezzanine tranches, and other tranches

**Correction to reading (*printed version only*):**

Page 706, Section 25.6.3:

In the first sentence of the third paragraph, the words 'upper' and 'lower' should be reversed, so the sentence should read:

“Thus, the mezzanine tranche in Exhibit 25.5 may be described as a collar with a financed position in the collateral pool, a long position in a put at the upper attachment point, and a short position in a call at the lower attachment point.”

**Chapter 26**

## Credit Risk and Credit Derivatives

**Keywords**

American credit options	funded credit derivatives
assignment	hazard rate
binary options	loss given default
calibrate a model	mark-to-market adjustment
cash settlement	multiname instruments
CDS indices	novation
CDS premium	physical settlement
CDS spread	price revelation
credit default swap (CDS)	probability of default
credit derivatives	recovery rate
credit protection buyer	reduced-form credit models
credit protection seller	referenced asset
credit risk	risk-neutral approach
credit-linked notes (CLNs)	risk-neutral investor
default risk	single-name credit derivatives
derivatives	standard ISDA agreement
European credit options	total return swap
exposure at default	unfunded credit derivatives

**Learning Objectives****26.1 Demonstrate knowledge of credit risk.***For example:*

- Explain the underpinnings of credit risk

**26.2 Demonstrate knowledge of approaches to credit risk modeling.***For example:*

- 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
- Describe and apply the risk-neutral approach to pricing risky debt
- Apply the risk-neutral approach to estimating credit spreads
- Explain what it means to calibrate a model
- List the advantages and disadvantages of the reduced-form model
- Compare structural and reduced-form credit risk models

**26.3 Demonstrate knowledge of credit derivatives markets.**

*For example:*

- List and discuss the three economic roles of credit derivatives
- Recognize the three major methods for grouping credit derivatives
- Describe the four stages of the evolution of credit derivative activity

**26.4 Demonstrate knowledge of credit default swaps.**

*For example:*

- Compare and contrast credit default swaps and total return swaps
- Discuss the standard ISDA agreement as a template for negotiated credit agreements
- Explain and apply 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
- Recognize typical credit default swap market participants and their swap transactions
- Identify and explain five typical motivations for using credit default swaps

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

*For example:*

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

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

*For example:*

- Describe credit default swap index products

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

*For example:*

- 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

**Chapter 27****CDO Structuring of Credit Risk****Keywords**

amortization period	overcollateralization
arbitrage CDOs	ramp-up period
balance sheet CDOs	reference portfolio
bankruptcy remote	reserve account
cash flow CDO	revolving period
cash-funded CDO	risk shifting
collateralized fund obligation (CFO)	single-tranche CDO
copula approach	special purpose vehicle (SPV)
distressed debt CDO	sponsor of the trust
diversity score	subordination
external credit enhancement	synthetic CDO
financial engineering risk	tranche width
internal credit enhancement	weighted average rating factor (WARF)
market value CDO	weighted average spread (WAS)

**Learning Objectives****27.1 Demonstrate knowledge of collateralized debt obligations (CDOs).***For example:*

- Describe the history of CDOs
- Describe the general structure and life cycle of a CDO
- Explain the terminology and details of CDOs

**27.2 Demonstrate knowledge of balance sheet CDOs and arbitrage CDOs.***For example:*

- Discuss the purposes and attributes of balance sheet CDOs
- Discuss the purposes and attributes of arbitrage CDOs
- Describe and apply a typical arbitrage CDO structure
- Analyze the cash flows in a typical arbitrage CDO structure

**27.3 Demonstrate knowledge of the mechanics of and motivations for arbitrage CDOs.***For example:*

- Identify the three direct financial motivations for a manager of an arbitrage CDO

**27.4 Demonstrate knowledge of cash-funded CDOs and synthetic CDOs.***For example:*

- Compare and contrast cash-funded CDOs and synthetic CDOs
- Explain how a cash-funded CDO can be used to reduce required regulatory capital
- Apply a typical cash-funded CDO structure
- Describe the characteristics of synthetic CDOs



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

*For example:*

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

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

*For example:*

- 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

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

*For example:*

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

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

*For example:*

- 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 how CDO credit risk can be modeled

**Chapter 28**

## Equity-Linked Structured Products

**Keywords**

absolute return structured product	participation rate
active option	path-dependent option
analytical	payoff diagram level
Asian option	payoff diagram shape
barrier option	power reverse dual-currency note
boundary condition	principal protected absolute return barrier note
building blocks approach	principal-protected structured product
cash-and-call strategy	quanto option
dynamic hedging	simple option
equity-linked structured products	spread option
exotic option	static hedge
knock-in option	tax deduction
knock-out option	tax deferral
numerical methods	wrapper
overconfidence bias	
partial differential equation approach (PDE approach)	

**Learning Objectives****28.1 Demonstrate knowledge of structured products and types of wrappers.***For example:*

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

**28.2 Demonstrate knowledge of potential tax effects of wrappers.***For example:*

- Describe the tax effects of wrappers
- Apply the equations in the chapter to demonstrate the tax effects of wrappers

**28.3 Demonstrate knowledge of structured products with exotic option features.***For example:*

- Compare and contrast simple options and exotic options
- Explain principal protected structured products
- 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

**28.4 Demonstrate knowledge of examples of global structured products.**

*For example:*

- Discuss the example of a U.S.-based structured product with multiple kinks
- Discuss the example of a France-based structured product with floors
- Discuss the example of a German-based structured product with leverage
- Discuss the example of a U.K.-based absolute return structured product
- Discuss the example of a Swiss-based absolute return structured product
- Discuss the example of a Japan-based structured product based on multiple currencies
- Explain the advantages and disadvantages of liquid structured products

**28.5 Demonstrate knowledge of structured product pricing.**

*For example:*

- Identify the PDE approach to the pricing of structured products
- 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 prices

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

*For example:*

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

**Corrections to reading (*printed version only*):**

Page 772, Section 28.4.2:

The equation:

$$\text{Product} = \text{Underlying Portfolio} + \text{Portfolio of Bear Spreads}$$

Should be:

$$\text{Product} = \text{Underlying Portfolio} + \text{Portfolio of Bear Spreads} - \text{Binary Puts}$$


---

Page 772, Section 28.4.3:

The third sentence in the second paragraph:

The product's double upside protection is capped...

Should be:

The product's upside potential is capped...

Page 773, Section 28.4.4:

The sentence immediately before the equation that begins with "This structured product..."

Should be:

Assuming that an asset reaching an up option barrier (down option barrier) will not finish down (up), this structured product can be replicated as a long straddle position in exotic options (knock-out options):

---

Page 774, Section 28.4.5:

The equation:

$$\text{Product} = \text{At-the-money Call} + \text{At-the-Money Down-and-Out Put} - \text{At-the-Money Put}$$

Should have a doubled position in the At-the-Money Down-and-Out Put:

$$\text{Product} = \text{At-the-money Call} + 2 \text{ At-the-Money Down-and-Out Put} - \text{At-the-Money Put}$$

## Topic 7: Risk Management & Portfolio Management

### Readings

*Alternative Investments: CAIA Level I*, 3<sup>rd</sup> edition, Wiley, 2015. Part Six: Risk Management and Portfolio Management, Chapters 29 – 32.

### Chapter 29

Cases in Tail Events

### Keywords

affinity fraud	painting the tape
anchoring	Ponzi scheme
behavioral biases	restitution
behavioral finance	return on assets (ROA)
circuit breaker	return on equity (ROE)
confirmation bias	spoofing
crowded trade	unwind hypothesis
fraud	window dressing

### Learning Objectives

#### 29.1 Demonstrate knowledge of the effect of market forces in generating hedge fund losses.

*For example:*

- Discuss the collapse of Amaranth Advisors, LLC; the due diligence issues related to it; and lessons learned from the case
- Discuss the collapse of Long-Term Capital Management (LTCM), the due diligence issues related to it, and lessons learned from the case
- Discuss the collapse of Carlyle Capital Corporation, the due diligence issues related to it, and lessons learned from the case
- Discuss the link between declining investment opportunities and use of leverage
- Apply the concepts of return on equity, return on assets, and leverage to evaluate levered investment situations
- Identify and describe behavioral biases and their potential effects on risk taking

#### 29.2 Demonstrate knowledge of the impact of trading technologies in financial crises.

*For example:*

- Discuss how the unwind hypothesis and crowded trades explain the Quant Meltdown of August 2007.
- Discuss how a circuit breaker can help prevent a flash crash.
- Discuss how technical issues at one large market participant can impact the financial markets.

**29.3 Demonstrate knowledge of major fund failures caused by fraud.**

*For example:*

- Discuss the case of Bayou Management, the due diligence issues related to it, and lessons learned from it
- Discuss the case of Bernie Madoff, the due diligence issues related to it, and lessons learned from it
- Discuss the case of Lancer Group, the due diligence issues related to it, and lessons learned from it

**29.4 Demonstrate knowledge of four major lessons from analysis of fund failures.**

*For example:*

- Discuss the lessons that emerge from the analysis of various types of hedge fund failures.

**Chapter 30**

Investment Process, Operations, and Risk

**Keywords**

actual investment strategy	operational activities
business activities	operational errors
business risk	operational fraud
custody	operational risk
fund culture	permitted investment strategies
gaming	position limit
investment activities	risk limits
investment management governance process	rogue trader
investment mandate	slack variable
investment process	stated investment strategy
investment process risk	style drift
investment strategy	synergistic risk effect
market risk in the investment process	

**Learning Objectives**

**30.1 Demonstrate knowledge of investment strategy and process.**

*For example:*

- Contrast a fund’s stated investment strategy and actual investment strategy
- Contrast style drift with operational errors and fraud
- Describe the components and stages of the investment process

**30.2 Demonstrate knowledge of investment process and market risk.**

*For example:*

- Contrast the general and narrower definitions of market risk
- Discuss the causes of investment process risk and how it’s detected
- Describe the relationship between investment process risk and leverage
- Describe how style drift relates to investment process risk
- Discuss potential interactions of market risk with other investment risks

**30.3 Demonstrate knowledge of the three internal fund activities.**

*For example:*

- Define investment activities
- Define operational activities
- Define business activities
- Discuss how these three internal fund activities impact a fund in combination

**30.4 Demonstrate knowledge of operational risk.**

*For example:*

- Discuss the two interpretations of operational risk
- Identify and describe operational errors
- Identify and describe types of agency conflicts
- Identify and describe operational fraud

**30.5 Demonstrate knowledge of methods for controlling the operational risk of an investment.**

*For example:*

- Explain how incentives can increase operational risk
- Discuss how internal control procedures can detect and reduce operational risk
- Explain the importance of valuation procedures and independence in the valuation process
- Define custody, and explain how it relates to operational risk
- Identify and describe the concept of fund culture and how it affects operational risk

**30.6 Demonstrate knowledge of methods for controlling the risk of portfolios with options.**

*For example:*

- Describe how put-call parity can be applied to hedge a position
- Discuss how option sensitivities can be used to analyze and hedge a position or portfolio
- Discuss how options can be used as a bet on volatility



## Chapter 31

### Due Diligence of Fund Managers

#### Keywords

annual volatility	league table
bias blind spot	level 1 assets
chief risk officer	level 2 assets
daily volatility due diligence	level 3 assets
expectation bias	limited liability shield
feeder fund	lockup period
financial firewall	master trust
fund style index	master-feeder structure
hard lockup period	N-sigma event
herd behavior	omega-score
information filtering	shorting volatility
information gathering	side pocket arrangement
investment objective	soft lockup period
key personnel clause	trade allocation

#### Learning Objectives

##### 31.1 Demonstrate knowledge of due diligence evidence and organization.

*For example:*

- Identify evidence for and organization of a due diligence process

##### 31.2 Demonstrate knowledge of the three questions critical to understanding the nature of a manager's investment program.

*For example:*

- Define and describe due diligence processes related to investigation of investment objectives of hedge funds
- Define and describe due diligence processes related to investigation of investment processes of hedge funds
- Define and describe due diligence processes related to investigation of how hedge fund managers add value
- Describe and contrast information gathering and information filtering

##### 31.3 Demonstrate knowledge of the due diligence of hedge fund structures.

*For example:*

- Describe the main issues related to the review of a fund's organization
- Discuss the master trust account structure, and recognize its uses by hedge funds
- Explain the importance of reviewing fund managers' organizational structures
- Discuss separation of duties and how organizational charts can be used to evaluate it
- Recognize the importance of reviewing and documenting regulatory registrations
- Describe evaluation and documentation of outside service providers, including the auditor, attorneys, and the prime broker

**31.4 Demonstrate knowledge of the strategic review of fund managers in the due diligence process.**

*For example:*

- Explain the importance of understanding the markets and securities in which a manager invests
- Discuss the issues related to benchmarking of fund returns
- Describe key considerations in the analysis of managers' competitive advantages and sources of investment ideas
- Describe key considerations in the review of managers' current portfolio positions
- Describe key considerations in the review of the source of investment ideas
- Discuss investment strategy capacity in the context of evaluating structural risk

**31.5 Demonstrate knowledge of the administrative review of funds.**

*For example:*

- Discuss the importance of due diligence on the ethical and legal history of fund employees
- Discuss the reasons for review of employee turnover
- Discuss the ideal organization of investor relations
- Describe the importance of business continuity management

**31.6 Demonstrate knowledge of the procedure for conducting a performance review of a fund manager in the due diligence process.**

*For example:*

- Describe the behavioral biases that can interfere with performance analysis
- Identify and discuss three important questions to ask regarding all assets controlled by the fund manager
- Discuss the analysis of drawdowns
- Identify and discuss the five issues related to the use of past data to predict future performance
- Describe how the analysis of returns can be impacted by the investment horizon
- Discuss issues related to subscriptions, redemptions, and volatility of assets under management
- Describe considerations in the review of the asset manager's process for pricing securities in a portfolio

**31.7 Demonstrate knowledge of the procedure for conducting a portfolio risk review of a fund manager in the due diligence process.**

*For example:*

- Identify and discuss three important risk management questions
- Describe and apply the role of leverage in determining the total risk of a fund
- Discuss the role of the chief risk officer (CRO)

**31.8 Demonstrate knowledge of the procedure for conducting a legal review of a fund manager in the due diligence process.**

*For example:*

- Discuss considerations in the review of the fund structure
- Discuss considerations in the review of the fund fees
- Discuss considerations in the review of the lockup and redemption provisions, including gates and hard and soft lockup periods
- Discuss considerations in the review of the subscription amount
- Discuss the role of the advisory committee

**31.9 Demonstrate knowledge of the procedure for conducting reference checks on service providers and other fund investors.**

*For example:*

- Discuss the process of conducting reference checks on service providers
- Identify key questions to ask when conducting reference checks on other investors

**31.10 Demonstrate knowledge of the procedure for measuring operational risk.**

*For example:*

- Discuss the role of the omega score in measuring operational risk
- Discuss the cost of fund manager due diligence

**Chapter 32**

## Portfolio Management, Alpha, and Beta

**Keywords**

actively managed portfolio	separating alpha and beta
distinguishing alpha and beta	smart beta
enhanced index products	strategic asset allocation decision
index products	tactical asset allocation
new investment model	traditional approach to portfolio allocation
passively managed portfolio	zero-sum game
portable alpha	

**Learning Objectives****32.1 Demonstrate knowledge of smart beta strategies.***For example:*

- Recognize the distinguishing characteristics of smart beta strategies from active alpha-based strategies
- Describe the objectives of smart beta strategies
- Discuss how smart beta strategies can be used in portfolio management

**32.2 Demonstrate knowledge of factors involved in the estimation of alpha and beta.***For example:*

- Discuss the challenges of estimating alpha and beta

**32.3 Demonstrate knowledge of the concept of separating alpha and beta.***For example:*

- Describe the concept of the separation of alpha and beta

**32.4 Demonstrate knowledge of portable alpha.***For example:*

- Demonstrate how to transfer risk with appropriately sized positions in derivatives
- Apply the concept of notional value to determine futures positions designed to transfer risk
- Discuss the application of portable alpha using futures contracts
- Apply the concept of portable alpha to portfolio management
- Discuss challenges with porting alpha

**32.5 Demonstrate knowledge of asset allocation using the concepts of alpha and beta.***For example:*

- Describe the process of traditional asset allocation
- Explain strategic and tactical asset allocation
- Describe the new investment model
- Discuss active risk and active returns for traditional investment products
- Evaluate the proposition that alpha is a zero-sum game

## Equation Exception List

Candidates should be aware that all equations are important to understand and that an equation sheet will not be provided on the exam. The following is a list of equations that serve as exceptions and will be provided if needed to answer a specific question. For example, a question asking candidates to describe the implication of a large kurtosis can be answered without having access to the kurtosis formula. On the other hand, a question asking candidates to calculate the kurtosis of a return series would require the kurtosis equation.

$$R_{fcoll} = \ln(1 + R) + R_f \quad (3.6)$$

$$R_{pcoll} = [l \times \ln(1 + R)] + R_f \quad (3.7)$$

$$\rho_s = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)} \quad (4.18)$$

$$DW = \frac{\sum_{t=2}^T (e_t - e_{t-1})^2}{\sum_{t=1}^T e_t^2} \quad (4.22)$$

$$JB = (n/6)[S^2 + (K^2/4)] \quad (4.36)$$

$$P_o = P_1 N(d) - P_s N(d - v) \quad (6.14)$$

$$\begin{aligned} c &= SN(d_1) - e^{-rT} KN(d_2) \\ d_1 &= [\ln(S/e^{-rT}K)/v] + (v/2) \\ d_2 &= d_1 - v \\ v &= \sigma_s \sqrt{T} \end{aligned} \quad (6.15)$$

$$\begin{aligned} c &= e^{-rT} [FN(d_1) - KN(d_2)] \\ d_1 &= [\ln(F/K)/v] + (v/2) \\ d_2 &= d_1 - v \end{aligned} \quad (6.16)$$

$$\text{Option Price} = e^{-r^*T} S^* N(d_1) - e^{-rT} SN(d_2) \quad (6.17)$$

$$R_{it} - R_f = a_i + \{[b_{i,d} + (D_1 \times b_{i,diff})] \times (R_{mt} - R_f)\} + e_{it} \quad (9.3)$$

$$EMA_t(\lambda) = \lambda P_{t-1} + \lambda(1-\lambda)P_{t-2} + \lambda(1-\lambda)^2 P_{t-3} + \lambda(1-\lambda)^3 P_{t-4} + \dots \quad (17.3a)$$

$$\text{Variance Swap Payoff} = \frac{\text{Vega Notional Value} \times (\text{Realized Variance} - \text{Strike Variance})}{2 \times \sqrt{\text{Strike Variance}}} \quad (19.3)$$

$$\text{Total Accruals} = \Delta CA - \Delta CL - \Delta \text{Cash} + \Delta \text{STDEBT} - \text{D\&A} \quad (20.1)$$

$$\begin{aligned} B(0,1) &= \lambda \times \frac{K \times RR}{(1+r)} + (1-\lambda) \times \frac{K}{(1+r)} \\ &= \frac{K}{(1+r)} (RR \times \lambda + [1-\lambda]) \end{aligned} \quad (26.2)$$

## Action Words

In each of the above learning objectives, action words are used to direct your study focus. Below is a list of all action words used in this study guide, along with definitions and two examples of usage, in a question example and in a description. Should you not understand what is required for any learning objective, we suggest you refer to the table below for clarification.

NOTE: The question examples in this table are NOT sample questions for the current exam.

Term	Definition	Question Example	Example of Term Use
Analyze	Study the interrelations	<p>George has identified an opportunity for a convertible arbitrage reverse hedge. What risks are associated with this hedge?</p> <ul style="list-style-type: none"> <li>A. The convertible may remain overvalued, causing the positive cash flow to harm the position's return profile.</li> <li>B. The short convertible may be called in and the position must be delivered, forcing the hedge to be unwound at an inopportune time.</li> <li>C. The implied volatility may decrease, lowering the bond's value.</li> <li>D. The implied volatility may increase, lowering the bond's value.</li> </ul>	<p>You have to <b>analyze</b> the positions and factors impacting them.</p> <p>Correct Answer: B</p>
Apply	Make use of	<p>Alicia Weeks, CFA, Real Estate Investment Advisor, works in an Asian country where there are no securities laws or regulations. According to CFA Institute Standard I, Fundamental Responsibilities, Alicia:</p> <ul style="list-style-type: none"> <li>A. must adhere to the standards as defined in a neighboring country that has the strictest laws and regulations.</li> <li>B. need not concern herself with ethics codes and standards.</li> <li>C. must adhere to the CFA Institute's codes and standards.</li> <li>D. must adhere to the standards as defined in a neighboring country that has the least strict laws and regulations.</li> </ul>	<p>You have to <b>apply</b> the CFA Institute Standard I to find the correct answer.</p> <p>Correct Answer: C</p>

**CAIA Level I Study Guide, September 2019**

Term	Definition	Question Example	Example of Term Use
Compare	Describe similarities and differences	<p>Which of the following least accurately compares the Sharpe and Treynor ratios?</p> <ul style="list-style-type: none"> <li>• Both ratios contain excess return in the numerator.</li> <li>• Both ratios express a measure of return per unit of some measure of risk.</li> <li>• The Sharpe ratio is based on total risk, while the Treynor ratio is based on systematic risk.</li> <li>• The Sharpe ratio is the inverse of the Treynor ratio.</li> </ul>	<p>You have to <b>compare</b> the three approaches based on their most important similarities and their most important differences</p> <p>Correct Answer: D</p>
Compare and Contrast	Examine in order to note similarities or differences	<p>A comparison of monthly payments and loan balances of the constant payment mortgage with the constant amortization mortgage with the same loan terms will show that:</p> <ol style="list-style-type: none"> <li>A. the initial payment will be the same.</li> <li>B. the payments of the constant payment mortgage are initially greater than those of the constant amortization mortgage, but at some time period the payments of the constant payment mortgage become less.</li> <li>C. the present value of the payment streams of the two loan types are the same.</li> <li>D. the constant payment mortgage loan balance exceeds that of the constant amortization mortgage during the first six months of the loan.</li> </ol>	<p>You have to <b>compare</b> indices to arrive at the answer.</p> <p>Correct Answer: C</p>



CAIA Level I Study Guide, September 2019

Term	Definition	Question Example	Example of Term Use
Contrast	Expound on the differences	<p>Which of the following best characterizes a difference between Value at Risk (VaR) and Modified Value at Risk?</p> <ul style="list-style-type: none"> <li>• Modified VaR is expressed as a percent, while VaR is a dollar value.</li> <li>• Modified VaR uses a user defined confidence interval, while VaR uses a 99% interval.</li> <li>• Modified VaR incorporates non-normality, while traditional VaR assumes normality.</li> <li>• Modified VaR is for a single trading period, while traditional VaR is multiple period.</li> </ul>	<p>You have to <b>contrast</b> the assumptions of the first model to those of the second model so that the differences are clear.</p> <p>Correct Answer: C</p>
Define	State the precise meaning	<p>The interest rate charged by banks with excess reserves at a Federal Reserve Bank to banks needing overnight loans to meet reserve requirements is called the:</p> <ul style="list-style-type: none"> <li>A. prime rate.</li> <li>B. discount rate.</li> <li>C. federal funds rate.</li> <li>D. call money rate.</li> </ul>	<p>You have to <b>define</b>, in this case, the federal funds rate.</p> <p>Correct Answer: C</p>
Describe	Convey an idea or characterize	<p>Which of the following words best describes expected return?</p> <ul style="list-style-type: none"> <li>A. Spread</li> <li>B. Average</li> <li>C. Spread squared</li> <li>D. Average squared</li> </ul>	<p>You need to choose the word that best <b>describes</b> the concept from a list.</p> <p>Correct Answer: B</p>
Discuss	Examine or consider a subject	<p>Discuss the limitations of private equity data.</p>	<p>You have to present a <b>discussion</b> of a set of ideas in a list or paragraph.</p>

CAIA Level I Study Guide, September 2019

Term	Definition	Question Example	Example of Term Use
Distinguish	Separate using differences	<p>Which of the following best distinguishes between the covariance and the correlation coefficient?</p> <ul style="list-style-type: none"> <li>A. The covariance indicates the extent to which two assets move together or apart.</li> <li>B. The correlation coefficient is the expected product of the deviations of two variables.</li> <li>C. The covariance is the square root of the correlation coefficient.</li> <li>D. The correlation coefficient is scaled and bounded between +1 and -1.</li> </ul>	<p>You have to <b>distinguish</b> between risk measurement approaches based on their assumptions regarding the distribution of returns.</p> <p>Correct Answer: D</p>
Explain	Illustrate the meaning	<p>1. Explain why return on assets (ROA) rather than return on equity (ROE) might be the preferred measure of performance in the case of hedge funds.</p> <p>or</p> <p>2. Which of the following best explains risk from the standpoint of investment?</p> <ul style="list-style-type: none"> <li>A. Investors will lose money.</li> <li>B. Terminal wealth will be less than initial wealth.</li> <li>C. Final wealth will be greater than initial wealth.</li> <li>D. More than one outcome is possible.</li> </ul>	<p>1. You have to place a series of thoughts together as an <b>explanation</b> of a term or issue.</p> <p>2. You need to identify the term that best <b>explains</b> a term or issue.</p> <p>Correct Answer: D</p>
Identify	Establish the identity	<p>The investments that have historically performed best during periods of recession are:</p> <ul style="list-style-type: none"> <li>A. commodities.</li> <li>B. treasury bills.</li> <li>C. stocks and bonds.</li> <li>D. gold.</li> </ul>	<p>You have to <b>identify</b> the term that best meets the criterion of the question.</p> <p>Correct Answer: C</p>

**CAIA Level I Study Guide, September 2019**

Term	Definition	Question Example	Example of Term Use
Interpret	Explain the meaning	<p>Your certificate of deposit will mature in one week, and you are considering how to invest the proceeds. If you invest in a 30-day CD, the bank will pay you 4%. If you invest in a 2-year CD, the bank will pay you 6% interest. You should choose the:</p> <ul style="list-style-type: none"> <li>A. 30-day CD, no matter what you expect interest rates to do in the future.</li> <li>B. 2-year CD, no matter what you expect interest rates to do in the future.</li> <li>C. 30-day CD if you expect that interest rates will fall in the future.</li> <li>D. 2-year CD if you expect that interest rates will fall in the future.</li> </ul>	<p>You have to <b>interpret</b> the features of an investment scenario.</p> <p>Correct Answer: D</p>
List	Create a series of items	List the determinants of real interest rates.	You have to differentiate from a <b>list</b> those items that are consistent with the question.
State	Set forth in words or declare	State the main risks faced by distressed securities investors.	You have to present a list or set of sentences that <b>states</b> main ideas.
Understand	Perceive and comprehend nature and significance; grasp meaning	<p>Which of the following would increase the net asset value of a mutual fund share, assuming all other things remain unchanged?</p> <ul style="list-style-type: none"> <li>A. An increase in the number of fund shares outstanding</li> <li>B. An increase in the fund's accounts payable</li> <li>C. A change in the fund's management</li> <li>D. An increase in the value of one of the fund's stocks</li> </ul>	<p>You have to use reasoning to illustrate an <b>understanding</b> of a specific issue.</p> <p>Correct Answer: D</p>

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