Guide d'étude
Examen IFM: Investment and Financial Markets
Society of Actuaries (SOA)

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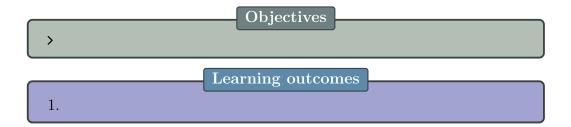# Table des matières

Préliminaire

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Objectives

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Learning outcomes

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Sujets à l'étude

1 Mean-Variance Portfolio Theory (10% à 15%)

Information

Objective

The Candidate will understand the assumptions of mean-variance portfolio theory and its principal results.

Learning outcomes

The Candidate will be able to :

a) Explain the mathematics and summary statistics of portfolios.

> ❯ Calculate the risk and return of an asset, given appropriate inputs.
>
> ❯ Calculate the risk and expected return of a portfolio of many risky assets, given
>
> – the expected return,
>
> – volatility, and
>
> – correlation of returns of the individual assets.

b) Perform mean-variance analysis.

> ❯ Understand the mean-standard deviation diagram and the resulting efficient market frontier.
>
> ❯ Calculate the optimal portfolio and determine the location of the capital market line.
>
> ❯ Understand how portfolio risk can be reduced through diversification across multiple securities or across multiple asset classes.

Résumés des chapitres

5. Mean-Variance Portfolio Theory

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2   Asset Pricing Models (5% à 10%)

Information

> ### Objective
>
> The Candidate will understand different methods for the valuation of asset portfolios and explain their appropriateness in different situations.

> ### Learning outcomes
>
> The Candidate will be able to :
>
> a) Explain the Capital Asset Pricing Model (CAPM).
>
> > › Recognize the assumptions and properties of CAPM.
> >
> > › Calculate the required return on a particular asset, a portfolio or a project using CAPM.
>
> b) Explain factor models.
>
> > › Recognize the assumptions of a factor model for security returns.
> >
> > › Identify the expected return, factors, factor betas, and firm-specific components of a security from its factor equation.
> >
> > › Calculate the required return on a particular asset, a portfolio or a project using a single-factor and a multi-factor model.

> ### Related lessons ASM
>
> › 6. Capital Asset Pricing Model (CAPM)
>
> › 7. Cost of Capital

> 8. Behavioral Finance and Multifactor Models

> Capital Asset Pricing Model

Capital Asset Pricing Model

> The CAPM is a formula for calculating the expected return of a security based on its systematic risk.

$$r_i = r_f + \ (r_m - r_f)$$

– For example,

Résumés des chapitres

6. Capital Asset Pricing Model (CAPM)

>

7. Cost of Capital

>

8. Behavioral Finance and Multifactor Models

>

3 Market Efficiency and Behavioral Finance (5% à 10%)

Information

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Objective

The Candidate will understand the notion of efficient markets and explain why market participants may make irrational systematic errors, leading to market inefficiencies.

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Learning outcomes

The Candidate will be able to :

a) Explain the three forms of the efficient market hypothesis (EMH).

> › Understand the definition of efficient markets, and distinguish between the strong, semi-strong, and weak versions of the EMH.
>
> › Identify empirical evidence for or against each form of the EMH.

b) Explain the main findings of behavioral finance.

> › Identify empirical examples of market anomalies that show results contrary to the EMH.
>
> › Understand how asset prices, especially in times of uncertainty and high volatility, can deviate significantly from their fundamental values.

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Résumés des chapitres

4. Efficient Markets Hypothesis (EMH)

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4 Investment Risk and Project Analysis (10% à 15%)

Information

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Objective

The Candidate will understand different ways to measure investment risk and conduct project analysis using advanced techniques used in capital budgeting.

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Learning outcomes

The Candidate will be able to :

a) Discuss the advantages and disadvantages of different measures of investment risk.

> - Understand the properties, advantages, and disadvantages of the following investment risk measures :
>
>   – variance,
>
>   – semi-variance,
>
>   – Value-at-Risk (VaR), and
>
>   – Tail Value-at-Risk (TVaR).
>
> - Calculate the risk measures listed above in order to compare investment opportunities.

b) Conduct risk analysis.

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> Understand the following methods to conduct risk analysis :
>
> – sensitivity analysis,
>
> – break-even analysis,
>
> – scenario analysis, and
>
> – Monte-Carlo simulation.
>
> Use a decision tree to model future outcomes and analyze real options embedded in a project.

Related lessons ASM

> 2. Project Analysis
> 3. Monte Carlo Simulation
> 30. Real Options

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Résumés des chapitres

2. Project Analysis

>

3. Monte Carlo Simulation

>

30. Real Options

>

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5   Capital Structure (10%)

Information

> **Objective**
>
> The Candidate will understand the factors that a company has to consider when deciding its capital structure.

> **Learning outcomes**
>
> The Candidate will be able to :
>
> a) Explain different methods to raise capital.
>
> > › Understand the two main forms of financing :
> >   - equity issues and
> >   - debt issues.
> > › Understand the process by which a company raises capital including
> >   - venture capital,
> >   - IPOs,
> >   - additional issues, and
> >   - private placement.
>
> b) Describe the effect of capital structure on a company.

> Calculate the effect from changes in capital structure on a company's overall value, equity beta, cost of debt, cost of equity, and weighted-average cost of capital, assuming the two Modigliani and Miller propositions hold.

> Understand the effect of corporate tax and costs of financial distress, including the threat of bankruptcy, on the capital structure of a company.

> Understand the role of agency costs and asymmetric information in affecting a company's array of financing choices.

Related lessons ASM

> 9. Capital Structure

> 10. The Effect of Taxes on Capital Structure

> 11. Other Factors Affecting Optimal Debt-Equity Ratio

> 12. Equity Financing

> 13. Debt Financing

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Résumés des chapitres

9. Capital Structure

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10. The Effect of Taxes on Capital Structure

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11. Other Factors Affecting Optimal Debt-Equity Ratio

> ❯

12. Equity Financing

> ❯

13. Debt Financing

> ❯

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6 Introductory Derivatives—Forwards and Futures (5% à 10%)

Information

Objective

The Candidate will understand how forward contracts and futures contracts can be used in conjunction with the underlying asset in a risk management context.

Learning outcomes

The Candidate will be able to :

a) Describe the characteristics and terms of the main derivatives instruments (including forwards and futures).

> › Distinguish between long and short positions for both assets (including short selling of stocks) and derivatives on assets.
>
> › Recognize the transaction costs affecting profit calculations for both assets and derivatives on assets (including commissions and bid-ask spread).

b) Describe the characteristics and terms relating to both forward contracts and prepaid forward contracts.

> Define and recognize the following terms relating to the timing of stock purchases : outright purchase, fully leveraged purchase, prepaid forward contract, and forward contract.

> Determine payoffs and profits for both long and short positions on forward contracts.

> Calculate prices for both forward contracts and prepaid forward contracts on stocks with no dividends, continuous dividends, and discrete dividends.

> Construct a synthetic forward from the underlying stock and a risk-free asset and identify arbitrage opportunities when the synthetic forward price is different from the market forward price.

c) Describe the characteristics and terms relating to both futures contracts and the associated margin accounts.

> Define and recognize the following terms relating to the mark-to-market process : Marking to market, margin balance, maintenance margin, and margin call.

> Evaluate an investor's margin balance based on changes in asset values.

Related lessons ASM

> 1. Introduction to Derivatives

> 14. Forwards

> 15. Variations on the Forward Concept

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>

Résumés des chapitres

1. Introduction to Derivatives

> What is a derivative

– **Derivative** : Financial « instrument » whole value is determined by the price of something else.

– For example, if I'm a farmer and I strike a deal such that if the price of corn drops below 3\$, a client will pay me 1\$ but that if it goes above 3\$ I will pay the client 1\$;

This way, I'm insured against the risk of my corn dropping and he's insured against the risk of the price shooting up—the risk is reduced for the both of us.

– If I were just an investor and not the farmer himself, I could speculate on what the price will be in which case the derivative would be a **bet** and not an insurance ;

– As such *the use* of the contrat, and not the contract itself, determines whether it's **risk-reducing** ;

> An overview of financial markets

– Trading of financial assets ;

– Usually with stock and bond trades, the buyer and seller have no continuing obligations but that is not the case with derivatives ;

– So there's a *clearinghouse* to manage the transaction ;

– For large sellers and buyers, they can do *over-the-counter (OTC)* trading ;

> The role of financial markets

> The use of derivatives

> Buying and short-selling financial assets

14. Forwards

>

15. Variations on the Forward Concept

>

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7 General Properties of Options (10% à 15%)

Information

> **Objective**
>
> The Candidate will understand how call options and put options can be used in conjunction with the underlying asset in a risk management context.

> **Learning outcomes**
>
> The Candidate will be able to :
>
> a) Explain the cash flow characteristics and terms relating to various options.

> Define and recognize the following terms relating to option classification :
> - call and put options,
> - expiration date,
> - strike price,
> - moneyness,
> - and option style.
> Calculate the payoff and profit on both long and short positions with respect to both call and put options.
> Calculate the payoffs on exotic options :
> - Asian (arithmetic and geometric),
> - barrier,
> - compound,
> - gap, and
> - exchange.
> Calculate the payoffs on exotic options :
> - lookback,
> - chooser,
> - shout,
> - rainbow, and
> - forward start.

b) Apply option strategies in a risk management context.

> Recognize that a long put can be used as an insurance strategy for a long stock position and a long call can be used as an insurance strategy for a short stock position.

> Understand how the following option strategies can be used as tools to manage financial risk or speculate on price or volatility :

  – option spreads (bull, bear, ratio),

  – collar,

  – straddle,

  – strangle, and

  – butterfly spread.

> Evaluate the payoff and profit of the option strategies described above.

c) Explain the general properties of options that affect option prices.

> Apply put-call parity to European options on stocks with

  – no dividends,

  – continuous dividends,

  – discrete dividends,

  – currencies, and

  – bonds.

> Compare options with respect to term-to-maturity and strike price.

> Identify factors affecting the early exercise of American options and the situations where the values of European and American options are the same.

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Résumés des chapitres

16. Options

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17. Option Strategies

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18. Put-Call Parity

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8 Binomial Pricing Models (10%)

Information

Objective

The Candidate will understand how binomial trees can be used to approximate the prices of both European and American call and put options on various underlying assets.

Learning outcomes

The Candidate will be able to :

a) Explain the concept of no arbitrage and the risk-neutral approach to valuing derivatives securities.

> › Understand the concept of no arbitrage when comparing actual and synthetic calls, or when comparing actual and synthetic puts.
>
> › Understand the concepts underlying the risk-neutral approach to valuing derivatives securities in the context of the Binomial Option Pricing Model.

b) Use the Binomial Option Pricing Model to calculate the value of European and American call and put options, along with the value of Asian and barrier options.

> › Price options under a one-period binomial model on a stock with no dividends.
>
> › Extend the binomial model to multi-period settings for pricing both European and American call and put options.
>
> › Extend the binomial model to other underlying assets, including stock indices with continuous dividends, currencies, and futures contracts.

> 19. Comparing Options
> 20. Binomial Trees—Stock, One Period
> 21. Binomial Trees—General
> 22. Binomial Trees : Understanding Early Exercice of Options

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Résumés des chapitres

19. Comparing Options

>

20. Binomial Trees—Stock, One Period

>

21. Binomial Trees—General

>

22. Binomial Trees : Understanding Early Exercice of Options

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9 Black-Scholes Option Pricing Model (10% à 15%)

Information

Objective

The Candidate will understand how the Black-Scholes Formula can be used to form the prices of European call and put options on various underlying assets.

Learning outcomes

The Candidate will be able to :

a) Explain the properties of the lognormal distribution and its applicability to option pricing.

> › Calculate lognormal-based probabilities and percentiles for stock prices.
>
> › Calculate lognormal-based means and variances of stock prices.
>
> › Calculate lognormal-based conditional expectations of stock prices given that options expire in-the-money.

b) Explain the Black-Scholes Formula.

- > Recognize the assumptions underlying the Black-Scholes model.
- > Estimate a stock's historical volatility from past stock price data.
- > Use the Black-Scholes Formula to value European calls and puts on stocks with no dividends, stock indices with continuous dividends, stocks with discrete dividends, currencies, and futures contracts.
- > Generalize the Black-Scholes Formula to value
  - – gap calls,
  - – gap puts
  - – exchange options,
  - – chooser options, and
  - – forward start options.

Related lessons ASM

- > 23. Modeling Stock Prices with the Lognormal Distribution
- > 24. The Black-Scholes Formula
- > 27. Asian, Barrier, and Compound Options

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Résumés des chapitres

23. Modeling Stock Prices with the Lognormal Distribution

- >

24. The Black-Scholes Formula

>

27. Asian, Barrier, and Compound Options

>

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10 Option Greeks and Risk Management (10% à 15%)

Information

> ### Objective
>
> The Candidate will understand the importance of Option Greeks and risk management techniques in forming hedged asset portfolios that include positions in both options and the underlying asset.

> ### Learning outcomes
>
> The Candidate will be able to :
>
> a) Explain the calculation and use of option price partial derivatives.
>
> > › Compute and interpret Option Greeks, including Delta, Gamma, Theta, Vega, Rho, and Psi.
> >
> > › Compute the elasticity, Sharpe ratio, and risk premium for both an individual option (call or put) and a portfolio consisting of both options of multiple types and the underlying stock.
> >
> > › Approximate option prices using Delta, Gamma, and Theta.
>
> b) Explain how to control risk by using options in a hedging context.
>
> > › Perform delta hedging by calculating the quantities of option units and stock shares to hold, and whether those positions should be long or short.
> >
> > › Perform gamma hedging by calculating the quantities of option units (of various types) and stock shares to hold, and whether those positions should be long or short.

c) Apply options and other derivatives in the context of actuarial-specific risk management.

> Understand how life insurers use derivatives to hedge long-term risks from the asset portfolio.

> Understand how P and C insurers use derivatives to hedge short-term risks from the liability portfolio.

> Understand how investment guarantees can be formed from equity-linked insurance and annuities.

> Understand how options are employed in both pension funding and asset/liability management.

Related lessons ASM

> 25. The Black-Scholes Formula : Greeks

> 26. Delta Hedging

> 31. Actuarial Applications of Options

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Résumés des chapitres

25. The Black-Scholes Formula : Greeks

>

26. Delta Hedging

>

31. Actuarial Applications of Options

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