

GLOBAL  
EDITION



# FUNDAMENTALS OF FUTURES AND OPTIONS MARKETS

Ninth Edition

John C. Hull



NINTH EDITION  
GLOBAL EDITION

---

# FUNDAMENTALS OF FUTURES AND OPTIONS MARKETS

**John C. Hull**

*Maple Financial Group Professor of Derivatives and Risk Management  
Joseph L. Rotman School of Management  
University of Toronto*



Pearson

---

Harlow, England • London • New York • Boston • San Francisco • Toronto • Sydney • Dubai • Singapore • Hong Kong  
Tokyo • Seoul • Taipei • New Delhi • Cape Town • São Paulo • Mexico City • Madrid • Amsterdam • Munich • Paris • Milan

# Fundamentals of Futures and Options Markets, Global Edition

## Table of Contents

Cover

Title Page

Copyright

Dedication

Contents In Brief

Business Snapshots

Contents

Preface

Chapter 1: Introduction

1.1 Futures Contracts

1.2 History of Futures Markets

1.3 The Over-the-Counter Market

1.4 Forward Contracts

1.5 Options

1.6 History of Options Markets

1.7 Types of Trader

1.8 Hedgers

1.9 Speculators

1.10 Arbitrageurs

1.11 Dangers

Summary

Further Reading

Quiz

Practice Questions

Further Questions

Chapter 2: Futures Markets and Central Counterparties



# **Table of Contents**

- 2.1 Opening and Closing Futures Positions
- 2.2 Specification of a Futures Contract
- 2.3 Convergence of Futures Price to Spot Price
- 2.4 The Operation of Margin Accounts
- 2.5 OTC Markets
- 2.6 Market Quotes
- 2.7 Delivery
- 2.8 Types of Trader and Types of Order
- 2.9 Regulation
- 2.10 Accounting and Tax
- 2.11 Forward vs. Futures Contracts

Summary

Further Reading

Quiz

Practice Questions

Further Questions

## **Chapter 3: Hedging Strategies Using Futures**

- 3.1 Basic Principles
- 3.2 Arguments for and Against Hedging
- 3.3 Basis Risk
- 3.4 Cross Hedging
- 3.5 Stock Index Futures
- 3.6 Stack and Roll

Summary

Further Reading

Quiz

Practice Questions

Further Questions

Appendix: Review of Key Concepts in Statistics and the CAPM

## **Chapter 4: Interest Rates**

- 4.1 Types of Rates
- 4.2 Swap Rates
- 4.3 The Risk-Free Rate

# **Table of Contents**

4.4 Measuring Interest Rates

4.5 Zero Rates

4.6 Bond Pricing

4.7 Determining Zero Rates

4.8 Forward Rates

4.9 Forward Rate Agreements

4.10 Theories of the Term Structure of Interest Rates

Summary

Further Reading

Quiz

Practice Questions

Further Questions

Appendix: Exponential and Logarithmic Functions

## **Chapter 5: Determination of Forward and Futures Prices**

5.1 Investment Assets vs. Consumption Assets

5.2 Short Selling

5.3 Assumptions and Notation

5.4 Forward Price for an Investment Asset

5.5 Known Income

5.6 Known Yield

5.7 Valuing Forward Contracts

5.8 Are Forward Prices and Futures Prices Equal?

5.9 Futures Prices of Stock Indices

5.10 Forward and Futures Contracts on Currencies

5.11 Futures on Commodities

5.12 The Cost of Carry

5.13 Delivery Options

5.14 Futures Prices and Expected Spot Prices

Summary

Further Reading

Quiz

Practice Questions

Further Questions

# **Table of Contents**

## **Chapter 6: Interest Rates Futures**

- 6.1 Day Count and Quotation Conventions
- 6.2 Treasury Bond Futures
- 6.3 Eurodollar Futures
- 6.4 Duration
- 6.5 Duration-Based Hedging Strategies Using Futures
  - Summary
  - Further Reading
  - Quiz
  - Practice Questions
  - Further Questions

## **Chapter 7: Swaps**

- 7.1 Mechanics of Interest Rate Swaps
- 7.2 Day Count Issues
- 7.3 Confirmations
- 7.4 The Comparative-Advantage Argument
- 7.5 Valuation of Interest Rate Swaps
- 7.6 How the Value Changes through Time
- 7.7 Fixed-for-Fixed Currency Swaps
- 7.8 Valuation of Fixed-for-Fixed Currency Swaps
- 7.9 Other Currency Swaps
- 7.10 Credit Risk
- 7.11 Credit Default Swaps
- 7.12 Other Types of Swaps
  - Summary
  - Further Reading
  - Quiz
  - Practice Questions
  - Further Questions

## **Chapter 8: Securitization and the Credit Crisis of 2007**

- 8.1 Securitization
- 8.2 The U.S. Housing Market

# **Table of Contents**

8.3 What Went Wrong?

8.4 The Aftermath

Summary

Further Reading

Quiz

Practice Questions

Further Questions

## **Chapter 9: Mechanics of Options Markets**

9.1 Types of Option

9.2 Option Positions

9.3 Underlying Assets

9.4 Specification of Stock Options

9.5 Trading

9.6 Commissions

9.7 Margin Requirements

9.8 The Options Clearing Corporation

9.9 Regulation

9.10 Taxation

9.11 Warrants, Employee Stock Options, and Convertibles

9.12 Over-the-Counter Options Markets

Summary

Further Reading

Quiz

Practice Questions

Further Questions

## **Chapter 10: Properties of Stock Options**

10.1 Factors Affecting Option Prices

10.2 Assumptions and Notation

10.3 Upper and Lower Bounds for Option Prices

10.4 PutCall Parity

10.5 Calls on a Non-Dividend-Paying Stock

10.6 Puts on a Non-Dividend-Paying Stock

# **Table of Contents**

## 10.7 Effect of Dividends

Summary

Further Reading

Quiz

Practice Questions

Further Questions

## Chapter 11: Trading Strategies Involving Options

### 11.1 Principal-Protected Notes

### 11.2 Strategies Involving a Single Option and a Stock

### 11.3 Spreads

### 11.4 Combinations

### 11.5 Other Payoffs

Summary

Further Reading

Quiz

Practice Questions

Further Questions

## Chapter 12: Introduction to Binomial Trees

### 12.1 A One-Step Binomial Model and a No-Arbitrage Argument

### 12.2 Risk-Neutral Valuation

### 12.3 Two-Step Binomial Trees

### 12.4 A Put Example

### 12.5 American Options

### 12.6 Delta

### 12.7 Determining $u$ and $d$

### 12.8 Increasing the Number of Time Steps

### 12.9 Using DerivaGem

### 12.10 Options on Other Assets

Summary

Further Reading

Quiz

Practice Questions

Further Questions



# **Table of Contents**

Appendix: Derivation of BlackScholesMerton Option Pricing Formula from Binomial Tree

## **Chapter 13: Valuing Stock Options: The BlackScholesMerton Model**

13.1 Assumptions about How Stock Prices Evolve

13.2 Expected Return

13.3 Volatility

13.4 Estimating Volatility from Historical Data

13.5 Assumptions Underlying BlackScholesMerton

13.6 The Key No-Arbitrage Argument

13.7 The BlackScholesMerton Pricing Formulas

13.8 Risk-Neutral Valuation

13.9 Implied Volatilities

13.10 Dividends

Summary

Further Reading

Quiz

Practice Questions

Further Questions

Appendix: The Early Exercise of American Call Options on Dividend-Paying Stocks

## **Chapter 14: Employee Stock Options**

14.1 Contractual Arrangements

14.2 Do Options Align the Interests of Shareholders and Managers?

14.3 Accounting Issues

14.4 Valuation

14.5 Backdating Scandals

Summary

Further Reading

Quiz

Practice Questions

Further Questions

## **Chapter 15: Options on Stock Indices and Currencies**

15.1 Options on Stock Indices

15.2 Currency Options

# **Table of Contents**

15.3 Options on Stocks Paying Known Dividend Yields

15.4 Valuation of European Stock Index Options

15.5 Valuation of European Currency Options

15.6 American Options

Summary

Further Reading

Quiz

Practice Questions

Further Questions

## **Chapter 16: Futures Options and Blacks Model**

16.1 Nature of Futures Options

16.2 Reasons for the Popularity of Futures Options

16.3 European Spot and Futures Options

16.4 PutCall Parity

16.5 Bounds for Futures Options

16.6 A Futures Price as an Asset Providing a Yield

16.7 Blacks Model for Valuing Futures Options

16.8 Using Blacks Model Instead of BlackScholesMerton

16.9 Valuation of Futures Options Using Binomial Trees

16.10 American Futures Options vs. American Spot Options

16.11 Futures-Style Options

Summary

Further Reading

Quiz

Practice Questions

Further Questions

## **Chapter 17: The Greek Letters**

17.1 Illustration

17.2 Naked and Covered Positions

17.3 Greek Letter Calculation

17.4 Delta

17.5 Theta

# **Table of Contents**

17.6 Gamma

17.7 Relationship Between Delta, Theta, and Gamma

17.8 Vega

17.9 Rho

17.10 The Realities of Hedging

17.11 Scenario Analysis

17.12 Extension of Formulas

17.13 Creating Options Synthetically for Portfolio Insurance

17.14 Stock Market Volatility

Summary

Further Reading

Quiz

Practice Questions

Further Questions

## **Chapter 18: Binomial Trees in Practice**

18.1 The Binomial Model for a Non-Dividend-Paying Stock

18.2 Using the Binomial Tree for Options on Indices, Currencies, and Futures  
Contracts

18.3 The Binomial Model for a Dividend-Paying Stock

18.4 Extensions of the Basic Tree Approach

18.5 Alternative Procedure for Constructing Trees

18.6 Monte Carlo Simulation

Summary

Further Reading

Quiz

Practice Questions

Further Questions

## **Chapter 19: Volatility Smiles**

19.1 Foreign Currency Options

19.2 Equity Options

19.3 The Volatility Term Structure and Volatility Surfaces

19.4 When a Single Large Jump Is Anticipated

# **Table of Contents**

Summary

Further Reading

Quiz

Practice Questions

Further Questions

Appendix: Why the Put Volatility Smile Is the Same As the Call Volatility Smile

## **Chapter 20: Value at Risk and Expected Shortfall**

20.1 The VaR and ES Measures

20.2 Historical Simulation

20.3 Model-Building Approach

20.4 Generalization of Linear Model

20.5 Quadratic Model

20.6 Estimating Volatilities and Correlations

20.7 Comparison of Approaches

20.8 Back Testing

Summary

Further Reading

Quiz

Practice Questions

Further Questions

## **Chapter 21: Interest Rate Options**

21.1 Exchange-Traded Interest Rate Options

21.2 Embedded Bond Options

21.3 Blacks Model

21.4 European Bond Options

21.5 Interest Rate Caps

21.6 European Swap Options

21.7 Term Structure Models

Summary

Further Reading

Quiz

Practice Questions

Further Questions

# **Table of Contents**

## **Chapter 22: Exotic Options and Other Nonstandard Products**

22.1 Exotic Options

22.2 Agency Mortgage-Backed Securities

22.3 Nonstandard Swaps

Summary

Further Reading

Quiz

Practice Questions

Further Questions

## **Chapter 23: Credit Derivatives**

23.1 Credit Default Swaps

23.2 Valuation of Credit Default Swaps

23.3 Total Return Swaps

23.4 CDS Forwards and Options

23.5 Credit Indices

23.6 The Use of Fixed Coupons

23.7 Collateralized Debt Obligations

Summary

Further Reading

Quiz

Practice Questions

Further Questions

## **Chapter 24: Weather, Energy, and Insurance Derivatives**

24.1 Weather Derivatives

24.2 Energy Derivatives

24.3 Insurance Derivatives

Summary

Further Reading

Quiz

Practice Questions

Further Question

## **Chapter 25: Derivatives Mishaps and What We Can Learn from Them**

# **Table of Contents**

25.1 Lessons for All Users of Derivatives

25.2 Lessons for Financial Institutions

25.3 Lessons for Nonfinancial Corporations

Summary

Further Reading

Answers to Quiz Questions

Glossary of Terms

DerivaGem Software

Major Exchanges Trading Futures and Options

Table for  $N(x)$  When  $x \geq 0$

Table for  $N(x)$  When  $x < 0$

Index