

PART I

LEARNING OBJECTIVES,
SUMMARY OVERVIEW,
AND PROBLEMS

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DERIVATIVE MARKETS AND INSTRUMENTS

LEARNING OUTCOMES

The candidate should be able to:

- define a derivative and distinguish between exchange-traded and over-the-counter derivatives;
- contrast forward commitments with contingent claims;
- define forward contracts, futures contracts, options (calls and puts), swaps, and credit derivatives and compare their basic characteristics;
- determine the value at expiration and profit from a long or a short position in a call or put option;
- describe purposes of, and controversies related to, derivative markets;
- explain arbitrage and the role it plays in determining prices and promoting market efficiency.

SUMMARY OVERVIEW

This first reading on derivatives introduces you to the basic characteristics of derivatives, including the following points:

- A derivative is a financial instrument that derives its performance from the performance of an underlying asset.
- The underlying asset, called the underlying, trades in the cash or spot markets and its price is called the cash or spot price.
- Derivatives consist of two general classes: forward commitments and contingent claims.
- Derivatives can be created as standardized instruments on derivatives exchanges or as customized instruments in the over-the-counter market.
- Exchange-traded derivatives are standardized, highly regulated, and transparent transactions that are guaranteed against default through the clearinghouse of the derivatives exchange.

- Over-the-counter derivatives are customized, flexible, and more private and less regulated than exchange-traded derivatives, but are subject to a greater risk of default.
- A forward contract is an over-the-counter derivative contract in which two parties agree that one party, the buyer, will purchase an underlying asset from the other party, the seller, at a later date and at a fixed price they agree upon when the contract is signed.
- A futures contract is similar to a forward contract but is a standardized derivative contract created and traded on a futures exchange. In the contract, two parties agree that one party, the buyer, will purchase an underlying asset from the other party, the seller, at a later date and at a price agreed on by the two parties when the contract is initiated. In addition, there is a daily settling of gains and losses and a credit guarantee by the futures exchange through its clearinghouse.
- A swap is an over-the-counter derivative contract in which two parties agree to exchange a series of cash flows whereby one party pays a variable series that will be determined by an underlying asset or rate and the other party pays either a variable series determined by a different underlying asset or rate or a fixed series.
- An option is a derivative contract in which one party, the buyer, pays a sum of money to the other party, the seller or writer, and receives the right to either buy or sell an underlying asset at a fixed price either on a specific expiration date or at any time prior to the expiration date.
- A call is an option that provides the right to buy the underlying.
- A put is an option that provides the right to sell the underlying.
- Credit derivatives are a class of derivative contracts between two parties, the credit protection buyer and the credit protection seller, in which the latter provides protection to the former against a specific credit loss.
- A credit default swap is the most widely used credit derivative. It is a derivative contract between two parties, a credit protection buyer and a credit protection seller, in which the buyer makes a series of payments to the seller and receives a promise of compensation for credit losses resulting from the default of a third party.
- An asset-backed security is a derivative contract in which a portfolio of debt instruments is assembled and claims are issued on the portfolio in the form of tranches, which have different priorities of claims on the payments made by the debt securities such that prepayments or credit losses are allocated to the most-junior tranches first and the most-senior tranches last.
- Derivatives can be combined with other derivatives or underlying assets to form hybrids.
- Derivatives are issued on equities, fixed-income securities, interest rates, currencies, commodities, credit, and a variety of such diverse underlyings as weather, electricity, and disaster claims.
- Derivatives facilitate the transfer of risk, enable the creation of strategies and payoffs not otherwise possible with spot assets, provide information about the spot market, offer lower transaction costs, reduce the amount of capital required, are easier than the underlyings to go short, and improve the efficiency of spot markets.
- Derivatives are sometimes criticized for being a form of legalized gambling and for leading to destabilizing speculation, although these points can generally be refuted.
- Derivatives are typically priced by forming a hedge involving the underlying asset and a derivative such that the combination must pay the risk-free rate and do so for only one derivative price.
- Derivatives pricing relies heavily on the principle of storage, meaning the ability to hold or store the underlying asset. Storage can incur costs but can also generate cash, such as dividends and interest.

- Arbitrage is the condition that two equivalent assets or derivatives or combinations of assets and derivatives sell for different prices, leading to an opportunity to buy at the low price and sell at the high price, thereby earning a risk-free profit without committing any capital.
- The combined actions of arbitrageurs bring about a convergence of prices. Hence, arbitrage leads to the law of one price: Transactions that produce equivalent results must sell for equivalent prices.

PROBLEMS

1. A derivative is *best* described as a financial instrument that derives its performance by:
 - A. passing through the returns of the underlying.
 - B. replicating the performance of the underlying.
 - C. transforming the performance of the underlying.
2. Derivatives are similar to insurance in that both:
 - A. have an indefinite life span.
 - B. allow for the transfer of risk from one party to another.
 - C. allow for the transformation of the underlying risk itself.
3. A beneficial opportunity created by the derivatives market is the ability to:
 - A. adjust risk exposures to desired levels.
 - B. generate returns proportional to movements in the underlying.
 - C. simultaneously take long positions in multiple highly liquid fixed-income securities.
4. Compared with exchange-traded derivatives, over-the-counter derivatives would *most likely* be described as:
 - A. standardized.
 - B. less transparent.
 - C. more transparent.
5. Exchange-traded derivatives are:
 - A. largely unregulated.
 - B. traded through an informal network.
 - C. guaranteed by a clearinghouse against default.
6. The clearing and settlement process of an exchange-traded derivatives market:
 - A. provides a credit guarantee.
 - B. provides transparency and flexibility.
 - C. takes longer than that of most securities exchanges.
7. Which of the following statements *best* portrays the full implementation of post-financial-crisis regulations in the OTC derivatives market?
 - A. Transactions are no longer private.
 - B. Most transactions need to be reported to regulators.
 - C. All transactions must be cleared through central clearing agencies.
8. A characteristic of forward commitments is that they:
 - A. provide linear payoffs.
 - B. do not depend on the outcome or payoff of an underlying asset.
 - C. provide one party the right to engage in future transactions on terms agreed on in advance.

9. In contrast to contingent claims, forward contracts:
 - A. have their prices chosen by the participants.
 - B. could end in default by either party.
 - C. can be exercised by physical or cash delivery.
10. Which of the following statements *best* describes the payoff from a forward contract?
 - A. The buyer has more to gain going long than the seller has to lose going short.
 - B. The buyer profits if the price of the underlying at expiration exceeds the forward price.
 - C. The gains from owning the underlying versus owning the forward contract are equivalent.
11. Which of the following statements regarding the settlement of forward contracts is correct?
 - A. Contract settlement by cash has different economic effects from those of a settlement by delivery.
 - B. Non-deliverable forwards and contracts for differences have distinct settlement procedures.
 - C. At cash settlement, when the long party acquires the asset in the market, it effectively pays the forward price.
12. A futures contract is *best* described as a contract that is:
 - A. standardized.
 - B. subject to credit risk.
 - C. marked to market throughout the trading day.
13. Which of the following statements explains a characteristic of futures price limits? Price limits:
 - A. help the clearinghouse manage its credit exposure.
 - B. can typically be expanded intra-day by willing traders.
 - C. establish a band around the final trade of the previous day.
14. Which of the following statements describes an aspect of margin accounts for futures?
 - A. The maintenance margin is always less than the initial margin.
 - B. The initial margin required is typically at least 10% of the futures price.
 - C. A margin call requires a deposit sufficient to raise the account balance to the maintenance margin.
15. Which of the following factors is shared by forwards and futures contracts?
 - A. Timing of profits
 - B. Flexible settlement arrangements
 - C. Nearly equivalent profits by expiration
16. Which of the following derivatives is classified as a contingent claim?
 - A. Futures contracts
 - B. Interest rate swaps
 - C. Credit default swaps
17. In contrast to contingent claims, forward commitments provide the:
 - A. right to buy or sell the underlying asset in the future.
 - B. obligation to buy or sell the underlying asset in the future.
 - C. promise to provide credit protection in the event of default.
18. Which of the following derivatives provide payoffs that are non-linearly related to the payoffs of the underlying?
 - A. Options
 - B. Forwards
 - C. Interest-rate swaps

19. An interest rate swap is a derivative contract in which:
 - A. two parties agree to exchange a series of cash flows.
 - B. the credit seller provides protection to the credit buyer.
 - C. the buyer has the right to purchase the underlying from the seller.
20. Forward commitments subject to default are:
 - A. forwards and futures.
 - B. futures and interest rate swaps.
 - C. interest rate swaps and forwards.
21. A swap is:
 - A. more like a forward than a futures contract.
 - B. subject to simultaneous default by both parties.
 - C. based on an exchange of two series of fixed cash flows.
22. A plain vanilla interest rate swap is also known as:
 - A. a basis swap.
 - B. a fixed-for-floating swap.
 - C. an overnight indexed swap.
23. The notional principal of a swap is:
 - A. not exchanged in the case of an interest rate swap.
 - B. a fixed amount whenever it is matched with a loan.
 - C. equal to the amount owed by one swap party to the other.
24. Which of the following derivatives is *least likely* to have a value of zero at initiation of the contract?
 - A. Futures
 - B. Options
 - C. Forwards
25. The buyer of an option has a contingent claim in the sense that the option creates:
 - A. a right.
 - B. an obligation.
 - C. a linear payoff with respect to gains and losses of the underlying.
26. Which of the following options grants the holder the right to purchase the underlying prior to expiration?
 - A. American-style put option
 - B. European-style call option
 - C. American-style call option
27. A credit derivative is a derivative contract in which the:
 - A. clearinghouse provides a credit guarantee to both the buyer and the seller.
 - B. seller provides protection to the buyer against the credit risk of a third party.
 - C. the buyer and seller provide a performance bond at initiation of the contract.
28. The junior and senior tranches of an asset-backed security:
 - A. have equivalent expected returns.
 - B. have claims on separate underlying portfolios.
 - C. may be differentially impacted by prepayments or credit losses.
29. In a declining interest rate environment, compared with a CMO's Class A tranche, its Class C tranche will be repaid:
 - A. earlier.
 - B. at the same pace.
 - C. later.

30. For a given CDO, which of the following tranches is *most likely* to have the highest expected return?
 - A. Equity
 - B. Senior
 - C. Mezzanine
31. Which of the following derivatives allows an investor to pay the return on a stock index and receive a fixed rate?
 - A. Equity swap
 - B. Stock warrant
 - C. Index futures contract
32. Which of the following is *most likely* the underlying of a plain vanilla interest rate swap?
 - A. 180-day Libor
 - B. 10-year US Treasury bond
 - C. Bloomberg Barclay's US Aggregate Bond Index
33. Currency swaps are:
 - A. rarely used.
 - B. commonly used to manage interest rate risk.
 - C. executed by two parties making a series of interest rate payments in the same currency.
34. Which of the following statements regarding commodity derivatives is correct?
 - A. The primary commodity derivatives are futures.
 - B. Commodities are subject to a set of well-defined risk factors.
 - C. Commodity traders and financial traders today are distinct groups within the financial world.
35. Compared with the underlying spot market, derivative markets are *more likely* to have:
 - A. greater liquidity.
 - B. higher transaction costs.
 - C. higher capital requirements.
36. Which of the following characteristics is *least likely* to be a benefit associated with using derivatives?
 - A. More effective management of risk
 - B. Payoffs similar to those associated with the underlying
 - C. Greater opportunities to go short compared with the spot market
37. Which of the following statements *best* represents information discovery in the futures market?
 - A. The futures price is predictive.
 - B. Information flows more slowly into the futures market than into the spot market.
 - C. The futures market reveals the price that the holder of the asset can take to avoid uncertainty.
38. The derivative markets tend to:
 - A. transfer liquidity from the broader financial markets.
 - B. not reflect fundamental value after it is restored in the underlying market.
 - C. offer a less costly way to exploit mispricing in comparison to other free and competitive financial markets.
39. Which of the following statements *most likely* contributes to the view that derivatives have some role in causing financial crashes?
 - A. Derivatives are the primary means by which leverage and related excessive risk is brought into financial markets.
 - B. Growth in the number of investors willing to speculate in derivatives markets leads to excessive speculative trading.

- C. Restrictions on derivatives, such as enhanced collateral requirements and credit mitigation measures, in the years leading up to crashes introduce market rigidity.
- 40. In contrast to gambling, derivatives speculation:
 - A. has a positive public image.
 - B. is a form of financial risk taking.
 - C. benefits the financial markets and thus society.
- 41. Derivatives may contribute to financial contagion because of the:
 - A. centrally cleared nature of OTC derivatives.
 - B. associated significant costs and high capital requirements.
 - C. reliance by derivatives speculators on large amounts of leverage.
- 42. The complex nature of derivatives has led to:
 - A. reliable financial models of derivatives markets.
 - B. widespread trust in applying scientific principles to derivatives.
 - C. financial industry employment of mathematicians and physicists.
- 43. Which of the following is *most likely* to be a destabilizing consequence of speculation using derivatives?
 - A. Increased defaults by speculators and creditors
 - B. Market price swings resulting from arbitrage activities
 - C. The creation of trading strategies that result in asymmetric performance
- 44. The law of one price is *best* described as:
 - A. the true fundamental value of an asset.
 - B. earning a risk-free profit without committing any capital.
 - C. two assets that will produce the same cash flows in the future must sell for equivalent prices.
- 45. Arbitrage opportunities exist when:
 - A. two identical assets or derivatives sell for different prices.
 - B. combinations of the underlying asset and a derivative earn the risk-free rate.
 - C. arbitrageurs simultaneously buy takeover targets and sell takeover acquirers.

For questions 46–49, consider a call option selling for \$4 in which the exercise price is \$50

- 46. Determine the value at expiration and the profit for a *buyer* if the price of the underlying at expiration is \$55.
 - A. \$5
 - B. \$1
 - C. -\$1
- 47. Determine the value at expiration and the profit for a *buyer* if the price of the underlying at expiration is \$48.
 - A. -\$4
 - B. \$0
 - C. \$2
- 48. Determine the value at expiration and the profit for a *seller* if the price of the underlying at expiration is \$49.
 - A. \$4
 - B. \$0
 - C. -\$1

49. Determine the value at expiration and the profit for a *seller* if the price of the underlying at expiration is \$52.
- A. -\$2
 - B. \$5
 - C. \$2

For questions 50–52, consider the following scenario

Suppose you believe that the price of a particular underlying, currently selling at \$99, is going to increase substantially in the next six months. You decide to purchase a call option expiring in six months on this underlying. The call option has an exercise price of \$105 and sells for \$7.

50. Determine the profit if the price of the underlying six months from now is \$99.
- A. \$6
 - B. \$0
 - C. -\$7
51. Determine the profit if the price of the underlying six months from now is \$112.
- A. \$7
 - B. \$0
 - C. -\$3
52. Determine the profit if the price of the underlying six months from now is \$115.
- A. \$0
 - B. \$3
 - C. -\$3

For questions 53–55, consider the following scenario

Suppose you believe that the price of a particular underlying, currently selling at \$99, is going to decrease substantially in the next six months. You decide to purchase a put option expiring in six months on this underlying. The put option has an exercise price of \$95 and sells for \$5.

53. Determine the profit for you if the price of the underlying six months from now is \$100.
- A. \$0
 - B. \$5
 - C. -\$5
54. Determine the profit for you if the price of the underlying six months from now is \$95.
- A. \$0
 - B. \$5
 - C. -\$5
55. Determine the profit for you if the price of the underlying six months from now is \$85.
- A. \$10
 - B. \$5
 - C. \$0