

## STUDY SESSION

# 13

## Derivatives

**T**his study session introduces key valuation concepts and models for forward commitments (forwards, futures, swaps) and contingent claims (options). Option coverage includes the “Greeks,” which measure the effects on value of small changes in underlying asset value, time, volatility, and the risk-free rate.

### READING ASSIGNMENTS

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|-------------------|---|
| <b>Reading 33</b> | Pricing and Valuation of Forward Commitments<br>by Adam Schwartz, PhD, CFA                                  |
| <b>Reading 34</b> | Valuation of Contingent Claims<br>by Robert E. Brooks, PhD, CFA, and David Maurice Gentle,<br>MEc, BSc, CFA |

### LEARNING OUTCOMES

#### READING 33. PRICING AND VALUATION OF FORWARD COMMITMENTS

The candidate should be able to:

- a** describe the carry arbitrage model without underlying cashflows and with underlying cashflows;
- b** describe how equity forwards and futures are priced, and calculate and interpret their no-arbitrage value;
- c** describe how interest rate forwards and futures are priced, and calculate and interpret their no-arbitrage value;

- d** describe how fixed-income forwards and futures are priced, and calculate and interpret their no-arbitrage value;
- e** describe how interest rate swaps are priced, and calculate and interpret their no-arbitrage value;
- f** describe how currency swaps are priced, and calculate and interpret their no-arbitrage value;
- g** describe how equity swaps are priced, and calculate and interpret their no-arbitrage value.

## READING 34. VALUATION OF CONTINGENT CLAIMS

The candidate should be able to:

- a** describe and interpret the binomial option valuation model and its component terms;
- b** calculate the no-arbitrage values of European and American options using a two-period binomial model;
- c** identify an arbitrage opportunity involving options and describe the related arbitrage;
- d** calculate and interpret the value of an interest rate option using a two-period binomial model;
- e** describe how the value of a European option can be analyzed as the present value of the option's expected payoff at expiration;
- f** identify assumptions of the Black–Scholes–Merton option valuation model;
- g** interpret the components of the Black–Scholes–Merton model as applied to call options in terms of a leveraged position in the underlying;
- h** describe how the Black–Scholes–Merton model is used to value European options on equities and currencies;
- i** describe how the Black model is used to value European options on futures;
- j** describe how the Black model is used to value European interest rate options and European swaptions;
- k** interpret each of the option Greeks;
- l** describe how a delta hedge is executed;
- m** describe the role of gamma risk in options trading;
- n** define implied volatility and explain how it is used in options trading.