CFA LEVEL I STUDY SHEET · TOPIC 8

Derivatives

Chartered Financial Analyst (CFA®) Program Level I exam

6-9% of the exam · 10 learning modules · 2027 curriculum

This topic covers mortgage-backed securities and prepayment risk, then derivatives: what forwards, futures, swaps and options are, why they are used, how no-arbitrage pricing sets forward prices, how forwards, futures and swaps are valued, what drives option values, and put-call parity. Level I questions test definitions and short calculations: payoffs and profits, forward prices and values, one-period binomial values and parity.

You should be able to: You should be able to explain prepayment risk, compare derivative types, price and value forwards, compute option payoffs, a one-period binomial value and parity prices.

Every learning module: the key point and the trap

DER.1 What derivatives are and where they trade

A derivative is a contract whose value comes from an underlying: an asset, a rate, an index or a credit event.

Trap: Exchange-traded means standardized and cleared, not customized.

DER.2 Forwards, futures, swaps and options compared

Forward commitments (forwards, futures, swaps) oblige both parties to perform; contingent claims (options) give the buyer a right, not an obligation.

Trap: Payoff and profit differ by the premium; questions ask for one and offer the other.

DER.3 Why issuers and investors use derivatives

Benefits: transferring and pricing risk, price discovery, lower transaction costs, high liquidity and the ability to take positions with little capital.

Trap: Questions confuse the swap leg that converts fixed-rate debt to floating (receive fixed) with its opposite.

DER.4 No-arbitrage pricing and the carry of an asset

Arbitrage is a riskless profit from mispriced assets; no-arbitrage pricing assumes it disappears.

Trap: The forward price is not a forecast of the future spot price; it follows from carry and the risk-free rate.

DER.5 Forward contract pricing and value

At initiation the forward price is set so the contract's value is zero: F0 = S0 x (1 + r)^T for an underlying with no carry.

Trap: The forward price is fixed for the contract's life; the forward value changes daily.

DER.6 Futures versus forwards

Futures are standardized forwards traded on exchanges, marked to market daily through a clearing house.

Trap: Variation margin brings the account back to initial margin, not to maintenance margin.

DER.7 Swaps as bundles of forwards

A swap is an exchange of a series of cash flows: in a plain vanilla interest rate swap, fixed payments for floating payments on a notional.

Trap: The swap's price (its fixed rate) is set at initiation; its value starts at zero and then moves.

DER.8 What drives an option's value

Exercise value is what exercise would pay now: max(0, S - X) for a call, max(0, X - S) for a put; option value = exercise value + time value.

Trap: The risk-neutral probability is not the real probability of an up move; using real-world odds gives a wrong value.

DER.9 Put-call parity and its forward form

Put-call parity for European options: c0 + X/(1 + r)^T = p0 + S0 (fiduciary call equals protective put).

Trap: The exercise price enters parity at its present value, not its face amount.

DER.10 One-step binomial option pricing

In one period the underlying moves from S to S x u (up) or S x d (down); the option's payoff is known in each state.

Trap: The risk-neutral probability is a pricing device, not investors' forecast of an up move.

Key terms

Contraction risk: The risk that prepayments speed up when rates fall, shortening a mortgage security's life.

Extension risk: The risk that prepayments slow when rates rise, lengthening a mortgage security's life.

Forward commitment: A contract obliging both parties to transact: forwards, futures and swaps.

Contingent claim: A contract giving its buyer a right without an obligation, such as an option.

Cost of carry: The net cost of holding the underlying: financing and storage less income and convenience.

Forward price: The fixed price agreed today for a trade at expiry, set so the contract starts at zero value.

Variation margin: Funds needed to restore a futures account to its initial margin.

Swap rate: The fixed rate that gives an interest rate swap zero value at initiation.

Time value: The part of an option's price above its exercise value.

Risk-neutral probability: The probability that makes the underlying earn the risk-free rate in a binomial model.

Put-call parity: The no-arbitrage link between European call, put, underlying and risk-free bond prices.

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