



LEVEL 1: DERIVATIVE INVESTMENTS

Reading 45 (1st out of 2): INTRO TO DERIVATIVES

Difficulty:

medium

Benchmark Study Time:

3.75h

2022





THIS E-BOOK:

- ❖ is a selective summary of the corresponding Reading in your CFA® Program Curriculum,
- ❖ provides place for your own notes,
- ❖ helps you structure your study and revision time!

How to use this e-book to maximize your knowledge retention:

1. **Print** the e-book in duplex and bind it to keep all important info for this Reading **in one place**.
2. **Read** this e-book, best twice, to grasp the idea of what this Reading is about.
3. **Study** the Reading from your curriculum. **Here add** your notes, examples, formulas, definitions, etc.
4. **Review** the Reading using this e-book, e.g. write your summary of key concepts or revise the formulas at the end of this e-book (if applicable).
5. **Done?** Go to [your study plan](#) and change the Reading's status to **green** :
(it will make your Chance-to-Pass-Score™ grow ☺).
6. **Come back** to this e-book from time to time to **regularly review for knowledge retention!**

NOTE: While studying or reviewing this Reading, you can use the tables at the end of this e-book and mark your study/review sessions to hold yourself accountable.



WHAT ARE DERIVATIVES?

A derivative is a financial instrument whose value depends on the value of some underlying asset and which derives its performance by **transforming the performance** of the underlying asset.

Exchange-traded vs Over-the-counter derivatives

Depending on the market on which derivatives can be traded, we can distinguish between exchange-traded and over-the-counter (OTC) derivatives:

- ✦ Exchange-traded derivatives are instruments standardized by the stock exchange.
- ✦ Trading in OTC derivatives is not centrally controlled and instruments are not standardized.

Criticism

The main criticism of derivatives is that they:

- ✦ are complex and risky instruments, thus they are sometimes difficult to understand,
- ✦ are used for speculation and gambling,
- ✦ increase systematic risk and are causing the destabilization of prices.

Benefits

Derivatives:

- ✦ provide information about the price of their underlying assets (**price discovery**),
- ✦ are helpful in managing, transferring, and allocating risk,
- ✦ are characterized by operational advantages (lower transaction costs, greater liquidity, a short position is easy to take, lower capital requirements)
- ✦ provides market efficiency promotion.

Types of transactions

Derivatives are used for three types of transactions:

- ✦ hedging,
- ✦ speculation,
- ✦ arbitrage.

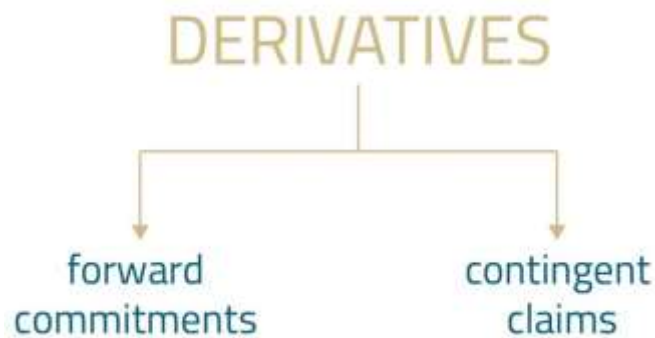




HERE KNOWLEDGE RETENTION HAPPENS | WRITE: notes, examples, formulas, definitions, relations, etc.



FORWARD COMMITMENTS VS CONTINGENT CLAIMS



Forward commitments

A forward commitment is a legally binding agreement between two parties to perform certain actions in the future. The buyer of the contract agrees to purchase and the seller of the contract – to sell an underlying asset at a specific time in the future at a price specified in the contract (**forward price**).

Contingent claims

A contingent claim is a claim that depends on a specific event that occurs in the future.

Because contingent claims are not symmetrical, as one party gets a right and the other gets an obligation, the party enjoying the right has to pay for it. In a nutshell, at the time of entering into a transaction, contingent claims have a certain value, whereas forward commitments have no value, i.e. their value equals zero.

MOST COMMON DERIVATIVES – BASICS

Forward Contract

A forward contract is:

- ▶ an agreement under which one party agrees to buy and the other party agrees to sell certain assets at a specific time in the future at a specified price,
- ▶ a customized contract,
- ▶ an example of a forward commitment.

Futures Contract

A futures contract is:

- ▶ a variation of a forward contract,
- ▶ a standardized contract,
- ▶ an example of a forward commitment.



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Swap

A swap is:

- ▶ an equivalent to a series of off-market forward contracts,
- ▶ an example of a forward commitment.

Option

An option is an example of a contingent claim.



Credit derivatives

Credit derivatives are used to hedge against credit risk.

Examples of credit derivatives:

total return swap, credit spread option, credit-linked note (CLN), credit default swap (CDS)

In the case of a CDS, there are usually 3 parties to be taken into account:

- ▶ borrower,
- ▶ lender (CDS buyer), and
- ▶ CDS seller.

As a rule, the lender lends money to the borrower in exchange for interest and principal payments. If the lender is afraid of the borrower not being able to fulfill the obligation to pay interest and principal, he may buy a credit default swap from the CDS seller (e.g. a bank, an insurance company). So, the CDS is like insurance – in case of the so-called credit event (e.g. bankruptcy of the borrower), the CDS seller will cover the losses of the CDS buyer. Of course, nothing is for free – the CDS buyer is obliged to make regular periodic payments to the CDS seller (cost of insurance).



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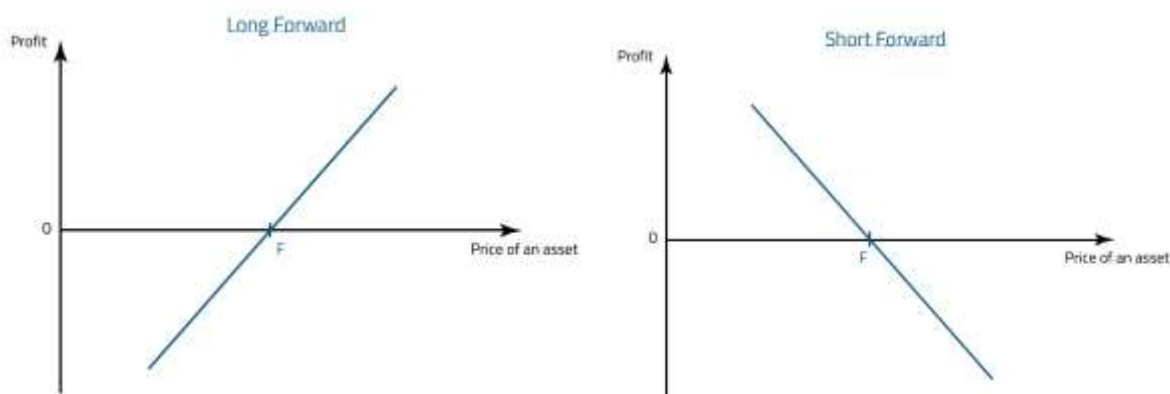
FORWARD CONTRACTS

Long vs short

An investor who buys the contract takes a long position and the seller takes a short position. In the future, the buyer (often called “the long”) will purchase the underlying asset from the seller (also called “the short”).



Forward contracts payoff



Credit risk

In the case of forward contracts:

- ▶ both parties, the long and the short, run the risk of default because it is always possible that the other party will not be able to fulfil his or her obligation,
- ▶ there is generally no margin requirement,
- ▶ the parties do not make any deposits when entering into the contract.



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Settlement

At expiration, the contract can be settled:

- by cash (**non-deliverable forwards [NDFs], cash-settled forwards, contracts for differences**),
- by delivery.

Settlement by Delivery

Settlement by delivery is when assets are delivered on the forward contract expiration date.

Cash Settlement

Cash settlement is when one party pays the difference between the current price of the underlying asset and the price that was agreed upon in the forward contract.

Termination prior to expiration

Investors don't have to wait until the expiration date to terminate the contract. In order to terminate his or her position prior to expiration, the investor has to enter into an opposite transaction:

- if he held a long position, he should take a short position,
- if she held a short position, she should take a long position.

Entering into an opposite transaction with another counterparty increases credit risk. This is because the investor faces the risk of default of both the long party in the first contract and the short party in the opposite transaction.



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FUTURES

Margin transactions

Margin transactions in the securities market

- ▶ A margin transaction in the securities markets is the purchase of securities financed in part by a loan.
- ▶ A margin loan is charged with interest payments.

maintenance margin requirement = the obligation to keep a certain minimal level of the ratio of equity to the value of purchases

Margin transactions in the futures market

A margin is a deposit that serves as a guarantee that a client will perform despite any adverse price movements.

A margin in the futures markets is not a loan and no interest is payable on it.

The amount of the margin is adjusted on a daily basis to reflect gains and losses determined as part of the settlement of futures by a clearinghouse.

Types of margin

Types of margin:

- ▶ the initial margin,
- ▶ the maintenance margin.

Initial margin vs Maintenance margin

The **initial margin** is the amount of money that an investor deposits in an account prior to making a transaction in the futures market.

The **maintenance margin** specifies the amount of money the investor should maintain in his or her account.

$$\text{maintenance margin} < \text{initial margin}$$

margin call = a request to bring the maintenance margin up to the level of the initial margin



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Settlement price

The settlement price for futures transactions is:

- ▶ the average price of trades in a specified time of the day preceding the daily closing of the market,
- ▶ the basis for the daily settlement of investors' accounts.

Futures prices may range between the determined price limits:

limit up = the price reaches the maximum level

limit down = the price reaches the minimum level

locked limit = the situation when a price is stuck at either the lower or the upper limit

Marking-to-market

mark to market = the adjustment of the balance of the investor's account at the end of the day (daily settlement)

As a result of marking-to-market, at the end of each day the balance of the investor's account alters depending on how the settlement price changes.

If the balance goes below the maintenance margin requirement, the investor will have to make a payment to bring it back to the initial margin.

Settlement of futures contracts

Futures can be settled:

- ▶ in cash,
- ▶ by delivery.

Cash settlement is arranged through the marking-to-market process on the last day of the trading of the contract based on the determined settlement price.

Settlement by delivery is not popular for futures.

Offsetting transaction

When executing an offsetting transaction:

- ▶ the investor takes a long position if he went short in the original contract, or
- ▶ he takes a short position if he originally held a long one.



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FUTURES CONTRACTS VS FORWARD CONTRACTS

	Forward contracts	Futures contracts
Similarities	Delivery or cash settlement	
	They have a zero value at the start (unlike options, for which a premium needs to be paid)	
Differences	Traded on an unregulated market	Traded on organized exchanges
	Tailor-made	Standardized
	No clearinghouse supervision results in exposure to the risk of default by the other party	Clearinghouse supervision eliminates the risk of default by the other party
	The date and method of settlement, as well as the size of the contract are agreed on by the parties	The date and method of settlement, as well as the size of the contract are standardized
	Security deposit depends on the parties	Security deposit (termed "margin") is obligatory
	Settled at expiration	Settled on a daily basis

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OPTIONS – INTRODUCTION

Definition

One party to the option contract enjoys a right to buy or sell an underlying asset in the future, whereas the other party is obligated to sell or buy the underlying in the future if the counterparty requests this.

option buyer = option holder = the long

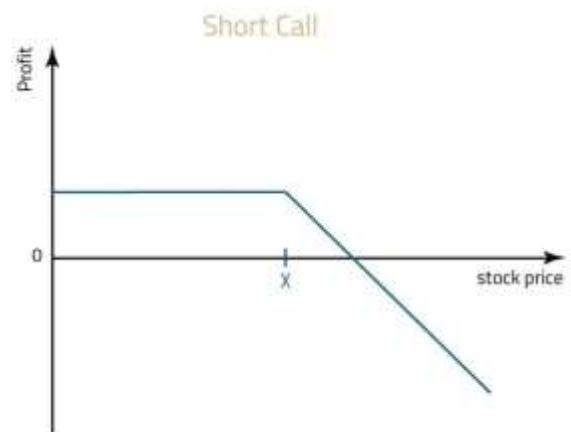
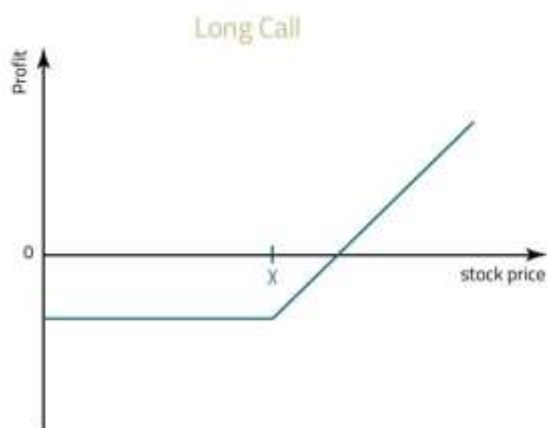
option seller = option writer = the short

1. The option holder enjoys a right that he may or may not exercise.
2. The seller of an option has a commitment to buy or sell the underlying depending on the type of the option.

Call option

A call option on a stock gives the option buyer the right to buy the stock in the future at a specified price (aka. strike price, exercise price, X) from the option seller.

The option seller is obliged to sell the stock on the holder's request.





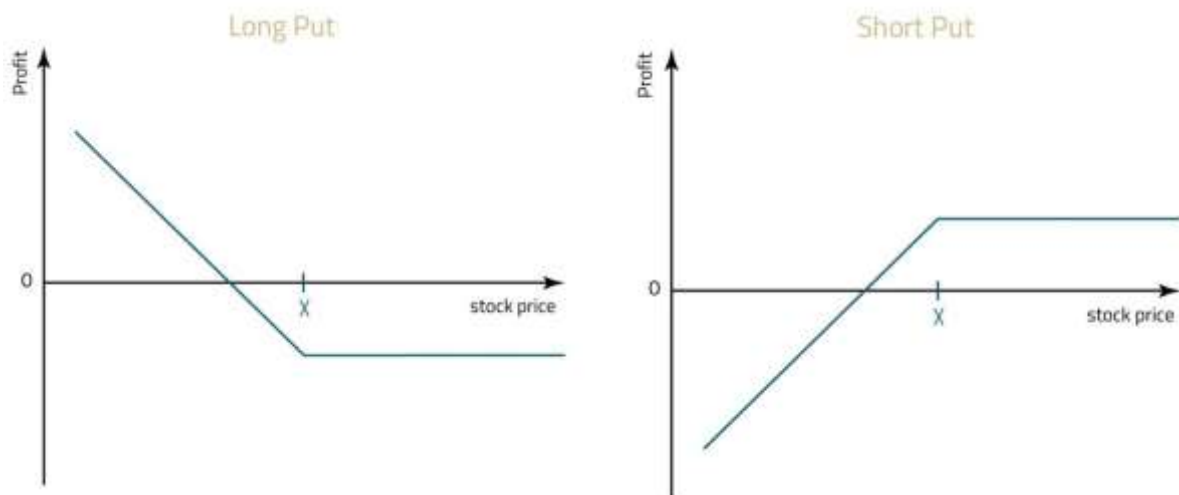
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Put option

A put option on a stock gives its holder the right to sell the stock in the future at a specified price (aka. strike price, exercise price, X) to the seller of the option.

The seller of a put option is obliged to buy the underlying stock on the option holder's request.



Option premium

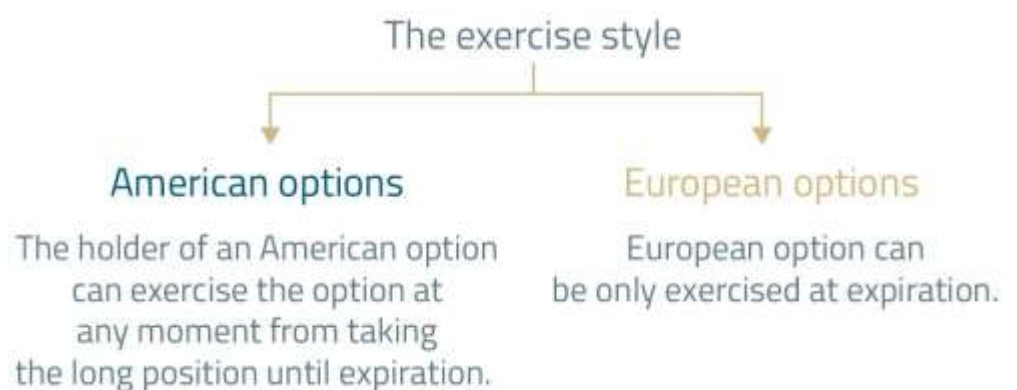
When the parties enter into the option contract, the long pays to the short a certain amount called the option price.

option price = option premium = premium

Options – characteristics

The basic characteristics of an option contract include:

- ▶ the underlying asset,
- ▶ the size of the contract,
- ▶ the expiration date,
- ▶ the type of option,
- ▶ the exercise style.



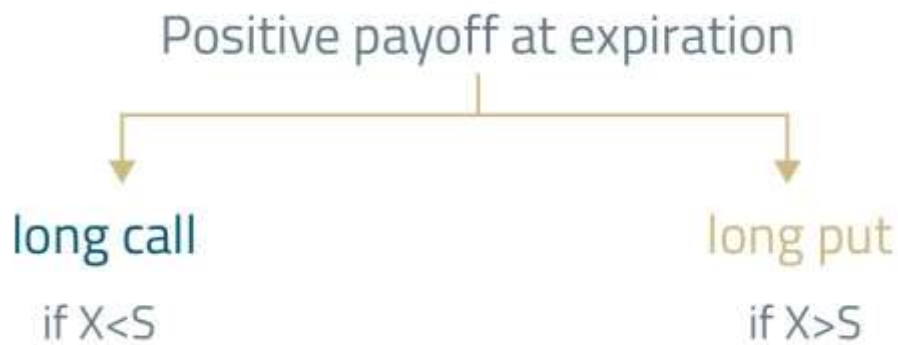


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OPTIONS – PAYOFF, PROFIT, MONEYNES, VALUE

Option – payoff



The payoff is determined based on:

- ▶ the difference between X and S (or S and X),
- ▶ the multiplier (e.g. in the case of index options),
- ▶ the number of contracts,
- ▶ the number of shares covered by one option contract.

$$c_t = \text{MAX}[(S_t - X), 0]$$

$$p_t = \text{MAX}[0, (X - S_t)]$$

Where:

- ▶ c_t – payoff to the holder of a call option,
- ▶ p_t – payoff to the holder of a put option,
- ▶ S_t – stock price at time t,
- ▶ X – option exercise price.

The payoff to the long party, regardless of whether he or she holds a call or a put, is always equal to or greater than zero.



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Options – profit

$$\text{long call profit} = \text{MAX}[(S_t - X), 0] - c_0$$

$$\text{short call profit} = -\text{MAX}[(S_t - X), 0] + c_0$$

$$\text{long put profit} = \text{MAX}[0, (X - S_t)] - p_0$$

$$\text{short put profit} = -\text{MAX}[0, (X - S_t)] + p_0$$

Where:

- ✦ c_0 – call option premium (paid by the long party),
- ✦ p_0 – call option premium (paid by the short party),
- ✦ S_t – stock price at time t ,
- ✦ X – option exercise price.

Moneyness

Based on the moneyness criterion, we distinguish between options that are either profitable or unprofitable to exercise at a given moment.

There are three types of such options:

- ✦ in-the-money options,
- ✦ out-of-the-money options,
- ✦ at-the-money options.

If the exercise of an option produces a positive payoff → in-the-money option

If the exercise of an option produces a negative payoff → out-of-the-money option

If payoff = 0 → at-the-money option

Whether an option is in-the-money, at-the-money or out-of-the-money depends on:

- ✦ the price of the underlying stock, and
- ✦ the strike price of the option.



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$X < S \rightarrow$ a call option is in-the-money

$X > S \rightarrow$ a put option is in-the-money

$X > S \rightarrow$ a call option is out-of-the-money

$X < S \rightarrow$ a put option is out-of-the-money

$X = S \rightarrow$ both a call option and a put option are at-the-money

ARBITRAGE

Definition

Arbitrage is a process through which an investor earns a profit without bearing any risk.

Arbitrage is always possible as long as the prices of the same or equivalent assets on different markets are different.

Arbitrage transactions improve market efficiency.

Law of one price

Law of one price:

- says that assets generating identical future cash flows should be priced at the same level,
- is the basis for arbitrage.

Arbitrage-free pricing

arbitrage-free pricing = the process of valuing derivatives by means of arbitrage

risk-neutral pricing = we can price derivatives assuming that discount rates are equal to the risk-free rate (no matter what the investors' aversion to risk is)



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Summarizing key concepts:

☐ Definition of derivatives

My summary:

☐ Over-the-counter vs Exchange-traded derivatives

My summary:

☐ Criticism vs Benefits

My summary:



☐ Forwards – basic characteristics

My summary:

☐ Futures – basic characteristics

My summary:

☐ Options – basic characteristics

My summary:



☐ Options – profit, payoff

My summary:

☐ Credit derivatives – basic characteristics

My summary:

☐ Arbitrage

My summary:



Reviewing formulas:

$$c_t = \text{MAX}[(S_t - X), 0]$$

$$p_t = \text{MAX}[0, (X - S_t)]$$

Write down the formulas:

$$\text{long call profit} = \text{MAX}[(S_t - X), 0] - c_0$$

$$\text{short call profit} = -\text{MAX}[(S_t - X), 0] + c_0$$

$$\text{long put profit} = \text{MAX}[0, (X - S_t)] - p_0$$

$$\text{short put profit} = -\text{MAX}[0, (X - S_t)] + p_0$$

Write down the formulas:



Keeping myself accountable:

TABLE 1 | STUDY

When you sit down to study, you may want to **try the Pomodoro Technique** to handle your study sessions: study for 25 minutes, then take a 5-minute break. Repeat this 25+5 study-break sequence all throughout your daily study session.



Tick off as you proceed.

POMODORO TIMETABLE: study-break sequences (25' + 5')													
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TABLE 2 | REVIEW

Never ever neglect revision! Though it's not the most popular thing among CFA candidates, regular revision is what makes the difference. If you want to pass your exam, **schedule & do your review sessions**.

REVIEW TIMETABLE: When did I review this Reading?													
date		date		date		date		date		date		date	
date		date		date		date		date		date		date	