Financial derivates

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Investments

- Investments:
  - Real investments – buildings, land, real estate
  - Financial investments – secutities, indexes, financial derivates
- Stocks: equity securities
  - Preferred stocks receive **fixed** dividends, however you don't have a voting right in company.
  - Common stock the dividend is variable and depends on the profitability of company, typically has voting rights in corporate decision matters.
- Bonds
  - a debt security, in which the authorized issuer owes the holders a debt and is obliged to repay the principal and interest (the coupon) at a later date, termed maturity

Financial derivates

- financial instruments that promise payoffs that are derived from the value of something else, which is called the "underlying."
- The underlying is often:
  - Exchange rate, Interest rate, index, ...
- **derivatives are agreements or contracts between two parties**
- Contract between buyer and seller to buy or sell the underlying for the fixed price on the certain date in the future

Futures versus spot price

Financial market classification **According to market conditions:**

- spot market (immediate transactions)
- futures (transactions on particular dates)
- options (right to buy something in the future under certain conditions)

Spot market means trading on the spot and immediate delivery of securities, commodities or currency. The term spot is also used to describe the current price of a commodity, gold or silver, and also a trade finished immediately. Settlement of spot operations can last several days (depending on an underlying asset).

Financial derivates

- Two counterparties: buyer (long position) and seller (short position)
- Two groups of FD:
  - **Obligations** on both sides
    - Forwards, Futures, Swaps
  - One has the **right**, one obligation
    - Options

Financial derivates

- Main objective

  - Expactation of lower price in the future, speculation aimed to earn profit – TRADING

  - Expectation of higher price in the future, hedge against the risk – HEDGING

  - to use price differences in territorially different markets and the same financial instruments, price differences in futures markets, and prices derived from underlying assets prices in spot markets – ARBITRAGE

Forwards, Futures, Swaps, Options

- 2 sides: Buyer and seller
  - Obligation on both sides

    Forward, futures, swap
  - 1 has right, 1 has obligation

    options
- Trade – (not) standardized:

  OTC (over the counter) – Forward, Option, Swap

  Exchange – Futures, some Options

Financial derivates

Obligatory

Optional

Forwards

Both have obligation to buy or sell

Not standardized

Futures

Both have obligation to buy or sell

Standardized

Swaps

Both have obligation

More forwards/futures at one

Options

1st has right and 2nd has obligation

PUT:righ to sell

CALL:right to buy

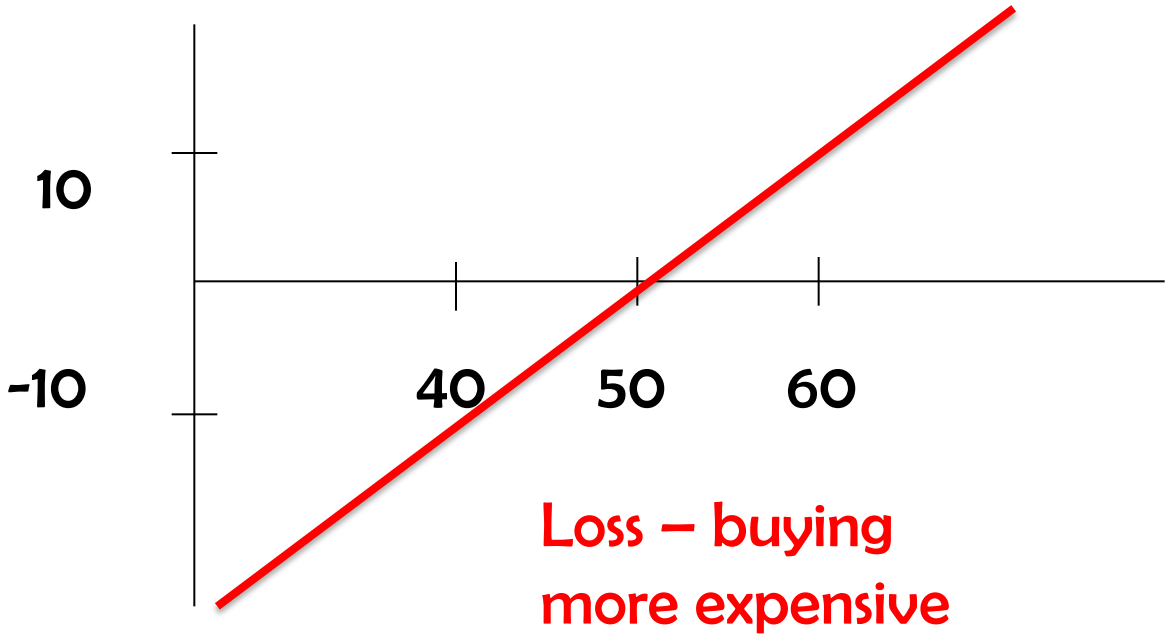
Forward

- Is a contract to deliver at a future date (exercise date or maturity date) at a specified exercise price.

- A forward contract **obligates** one party to **buy** the underlying at a **fixed price** at a certain future date (called the maturity) from a counterparty, who is obligated to **sell** the underlying at that fixed price.

Forward example

- Profit and loss profile – agreed to buy and sell a share for 50EUR
- Profil of buyer (long position)

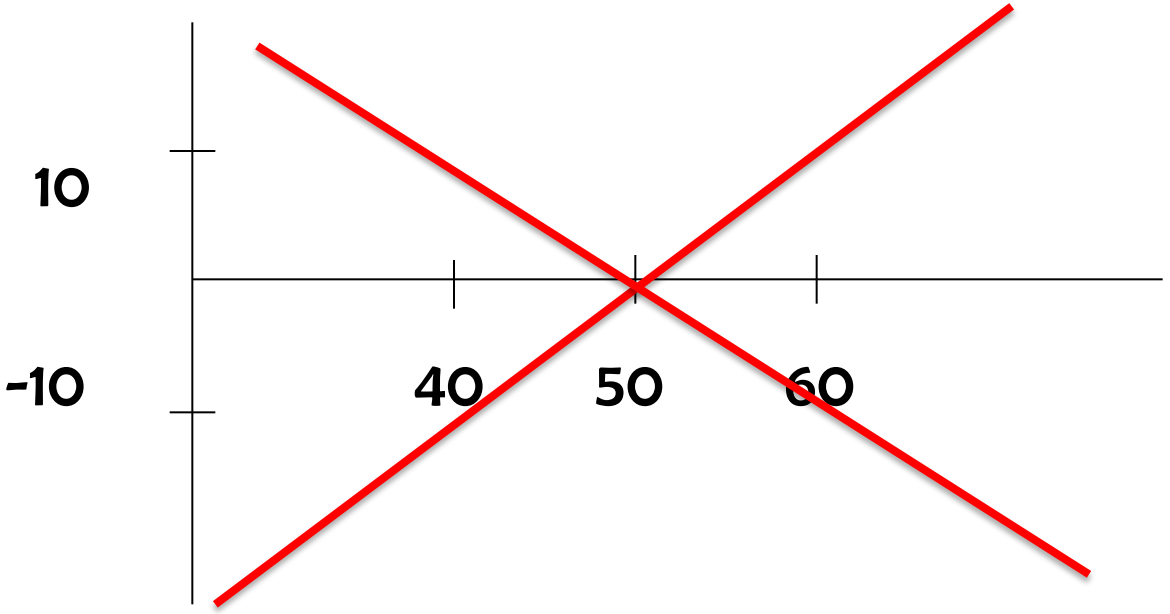


Forward example

- Profit and loss profile – agreed to buy and sell a share for 50EUR
- Profil of seller (short position)

Forward example

- Risk elimination – price is fixed
- Market price can change, but we are not impacted by fluctuations – no profit, no loss, no risk



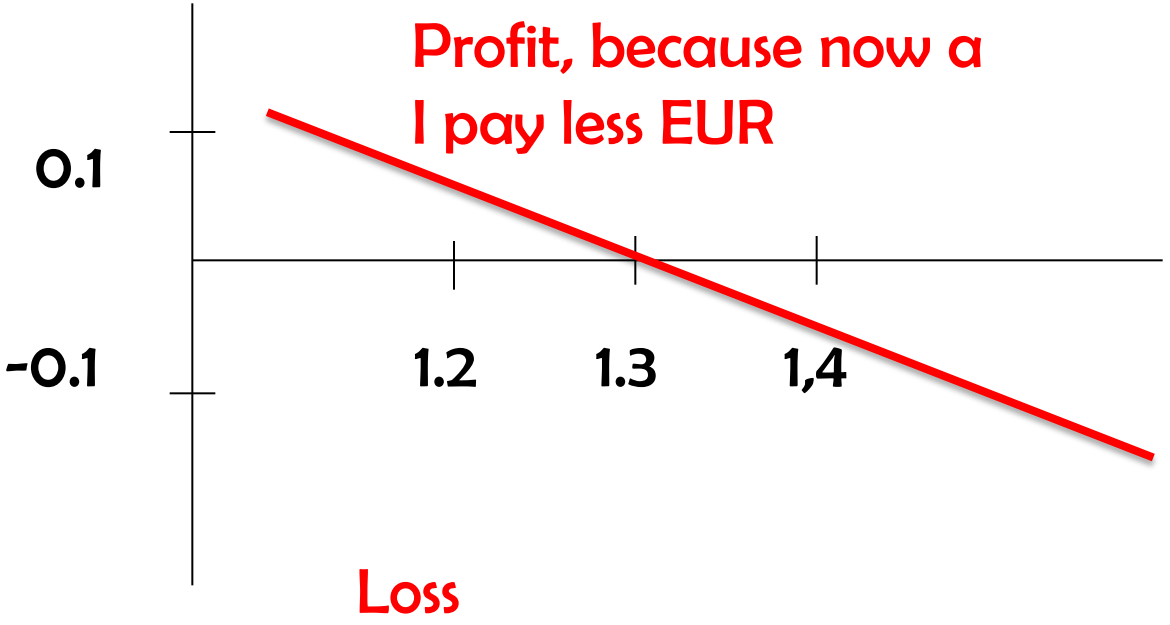
READING

Example with exchange rates

- We make a forward contract with the bank, to exchange 1300 USD for 1.3 USD/EUR.
- Bank is selling us foreign currency USD (seller) and we are buyer.
- **Remember,**
  - the change of exchange rate to 1,4 USD/EUR means depreciation of USD
  - the change of exchange rate to 1,2USD/EUR means apreciation of USD

Exchange rate forward

- Profit and loss profile – 1 300 USD for 1.3 USD/EUR, 3 month later
- **Profil of buyer (long position)** – buying foreign curency

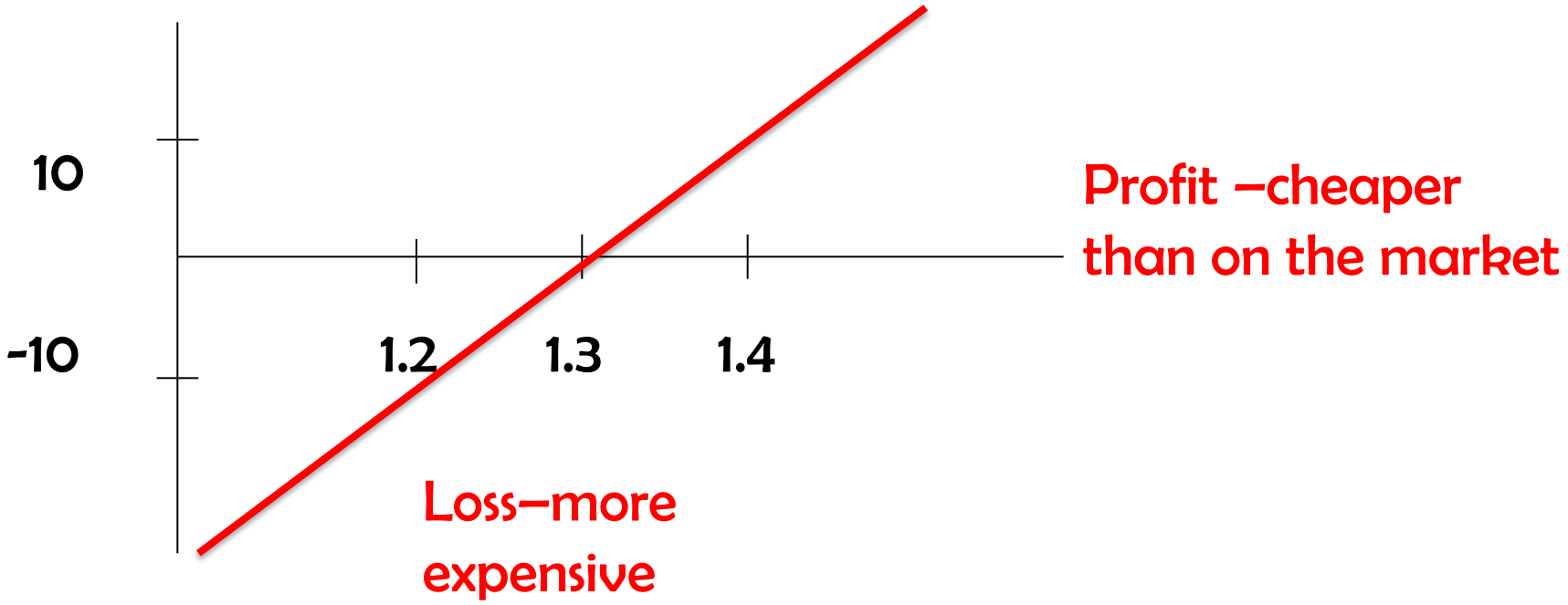


ER forward

- Exchange rate after 3 month
  - The ER remains 1.3USD/EUR, for 1300 USD buyer pays 1000 EUR.
  - The exchange rate changed to 1,4 USD/EUR, on the market we would exchange 1300 USD for 928 EUR.. However we have obligation to exchange for 1.3 (1000 EUR). LOSS
  - The exchange rate changed to 1,2 USD/EUR, on the market we would exchange 1300 USD for 1083 EUR. However we have obligation to exchange for 1.3 (1300 EUR). PROFIT

ER forward

- Profit and loss profile – 1000 EUR for 1.3USD/EUR, 3 month later
- **Profil of seller (short position)** – bank is selling foreign curency



ER forward

- Exchange rate after 3 month
  - The ER remains 1.3USD/EUR, for 1300 USD bank recieves 1000 EUR.
  - The ER changed to 1,4 USD/EUR. If the bank did not make a forward, it would have to sell the buyer 1 300 USD a recieves only 928 EUR. However, there is obligation to exchange for 1.3, for bank it is profit.
  - The ER changed to 1,2USD/EUR. If the bank did not make a forward, it would sell the buyer USD and receives 1083 EUR. However, it is obligated to exchange for 1.3, and receives only 1000 EUR. LOSS

FRA – forward rate agreement

- for agreements dealing with interest rates
- The party paying the fixed rate is usually referred as the borrower, while the party receiving the fixed rate is referred as the lender
- The fixed interest rate is compared to reference rate (EURIBOR, LIBOR...)

FRA

- Sign of contract:

FRA 2 – 6

- The contract will start 2 month later and will take 4 month (6-2)

- The borrowing doesn't have to really happen, only the profit for one of the parties is paid.

Futures

- Same as forward but traded on exchange
- **Standardization**
  - A *future* is a standardized derivative contract between two parties: a buyer and a seller.

Futures

- Being a standardized contract means that the buyer and seller do not contract directly with each other. Instead, they contract with the intermediary known as the **clearinghouse.**
- **The clearinghouse** protects their potential liability by requiring that **margin** be deposited and all positions are marked-to-market on at least a daily basis

Contract obligation: Delivery or Offset

- A holder of a future contract has 2 choices of how to deal with the legal obligations before the last trading day of the delivery month
  1. Delivering or taking delivery
  2. Offset

90% of trages ends with offset

Forward vs. Futures contracts

- Regulation
- Organized market place / OTC
- Default risk
- Standardized trading
- Guaranteed settlement
- Margin and Daily settlement

Swap

- A **swap** is a derivate in which two counterparties exchange cash flows of one party's financial instrument for those of the other party's financial instrument.
- The benefit depends on the type of financial instruments involved.
  - For example, in the case of a swap involving two bonds, the benefits in question can be the periodic interest coupon.
  - Two debts – interest rate.
- The cash flows are calculated over a national principal amount.
- Swaps can be used to
  - hedge certain risks such as interest rate risk,
  - or to speculate on changes in the expected prices.

Swaps

- Big investors
- A swap is a contract to exchange cash flows over a specific period.
- Combination of more derivates at once – Forward portfolio

Swaps

- are contractual agreements to exchange or swap a series of cash flows
- These cash flows are most commonly the interest payments associated with debt service, such as the floating-rate loan of Trident described above
  - If the agreement is for one party to swap its fixed interest rate payments for the floating interest rate payments of another, it is termed an **Interest Rate Swap (IRS)**, or an **Plain Vanilla Interest Rate Swap**
- The swap itself is not a source of capital, but rather an alteration of the types of the cash flows associated with payment

Interest rate swaps

- Interest rate swaps are contractual commitment between a firm and a swap dealer (usually a bank)
  - The existence of swap dealers can provide the liquidity of the swap market because it is difficult to find immediately a counterparty with the different expectation of the change of interest rates but with the same demand of the principal and the timing
  - Swap dealer can earn the bid-ask spread of the swap rates

Example of interest rate swap

- https://www.youtube.com/watch?v=uVq384nqWqg

- Way of reducing costs
- Way how bank can determinate interest for clients

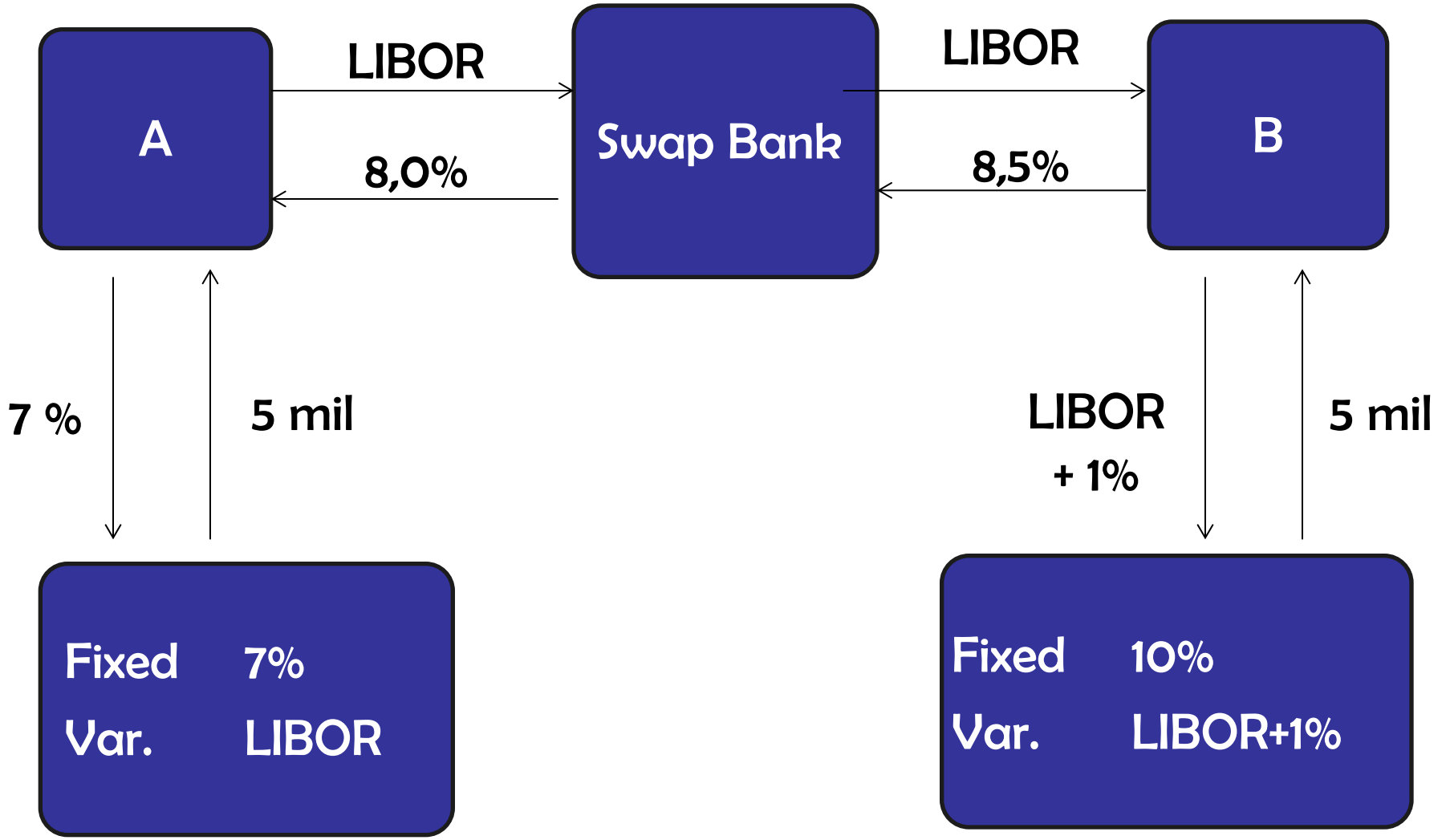
Interest rate swap

- Company A:
  - would like to borrow 5 mil. pounds
  - it is very well known profitable company
  - Wants the variable interest rate
- Company B:
  - would like to borrow 5 mil. pounds
  - it is less well known, small company
  - Wants the fixed interest rate

Offer of the bank

Company A		Company B	
Fixed	7%	Fixed	10%
Variable	LIBOR	Variable	LIBOR + 1%

Offer of the bank



Interest rate swap

- Swap bank:
  - Receives 8,5 % and pays 8%
  - Recives LIBOR and pays LIBOR
  - Profit 0,5%
- Company B
  - receives LIBOR and pays LIBOR +1%
  - Pays 8,5%
  - 8,5% + 1% = 9,5% instead of 10% fixed
  - Saves 0,5 %

Interest rate swap

- Bank A
  - Pays LIBOR as it wanted
  - receives 8% and pays 7% fix
  - As result it saves 1% so pays LIBOR – 1%
- Both can reduce their costs and swap bank is profitable.
- This is the way how clients can pay different rates.

Options

- Options give **one party right** (option) and counterparty **obligation** to buy or sell the underlying at a **fixed price** at a certain future date

- The purchase price of an option – is called the **option premium**

Options

- **Call options** give the holder the right—but not the obligation—to buy something (underlying) at a specific price for a specific time period.
- **Put options** give the holder the right—but not the obligation—to sell something at a specific price for a specific time period.
- The specified price is called the exercise price. When the holder of an option takes advantage of his right, he is said to exercise the option.

Options

Options are classified into:

1. **American** option – an option that may be exercised on any trading day on or before expiration.
2. **European** option – an option that may only be exercise on expiry. These are often described as **vanilla** options.

Two Basic Kinds of Options

- Buyer/long in this case is called **holder** and he byus a **right**
  - Holder buys right to buy – call option
  - Holder buys right to sell – put option

- Holder pays for his right option premium.
- Long position will always be the point of view of buyer who has right and pays for it the option premium

Long call option

- right to buy (call option), obligation to sell
- profile of buyer (long position)

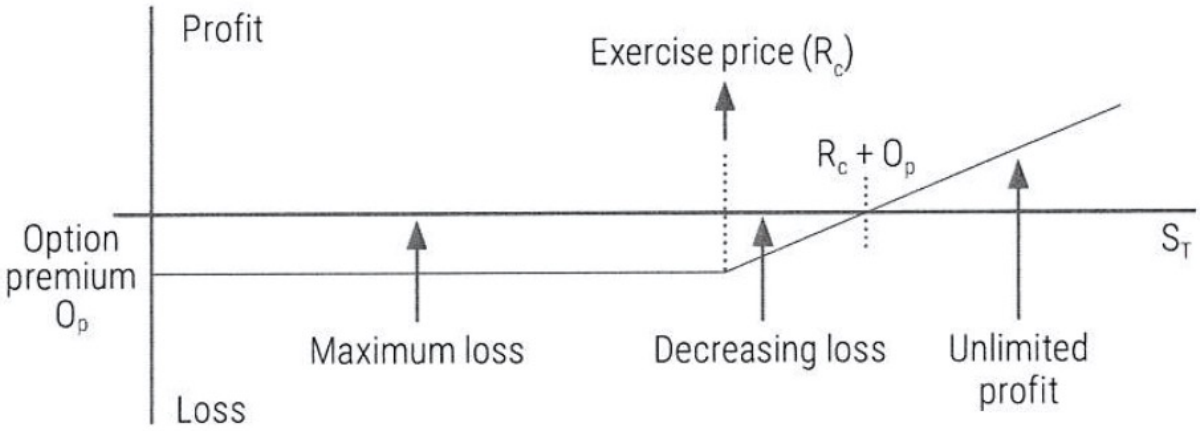


Figure 12.4: Call option – situation of a buyer (long call) (**source:** Vlachynský, K. Markovič, P.: Finančné inžinierstvo. 2001, p. 114)

Profit for buyer can grow any high, however the loss is only till the high of option premium

Short call option

- right to buy (call option), obligation to sell
- Profile of seller(short position)

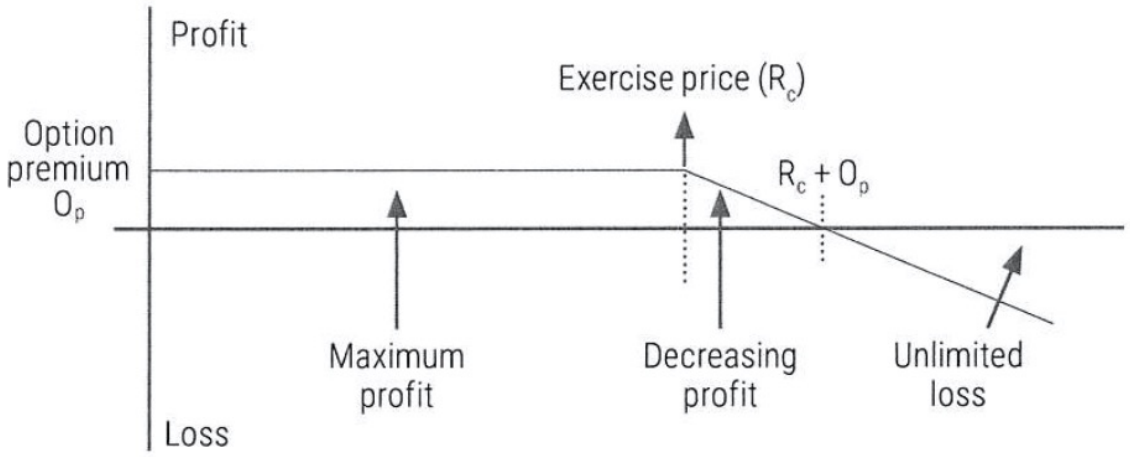


Figure 12.5: Call option – situation of a seller (short call) (**source:** Vlachynský, K. Markovič, P.: Finančné inžinierstvo. 2001, p. 114)

Long put option

Holder has right to sell (put option), writer has obligation to buy

Profile of buyer/holder of option (long position)

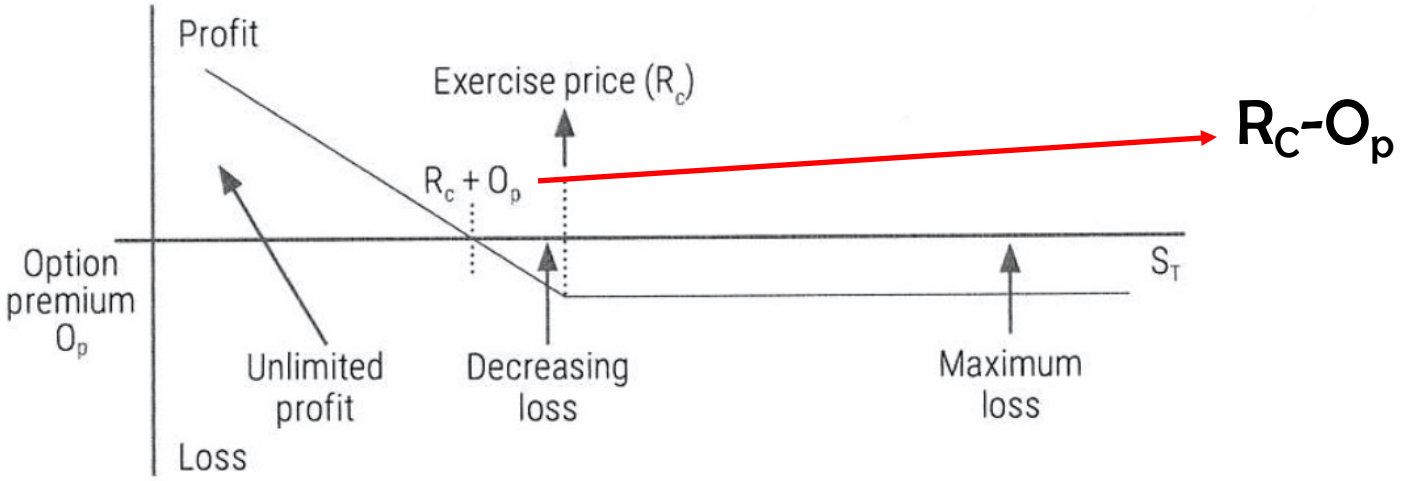


Figure 12.6: Put option – situation of a buyer (long put) (**source:** Vlachynský, K. Markovič, P.: Finančné inžinierstvo. 2001, p. 117)

Profit for seller can grow any high, however the loss is only till the high of option premium

Short put option

- right to sell (put option), obligation to buy
- profile of writer (short position)

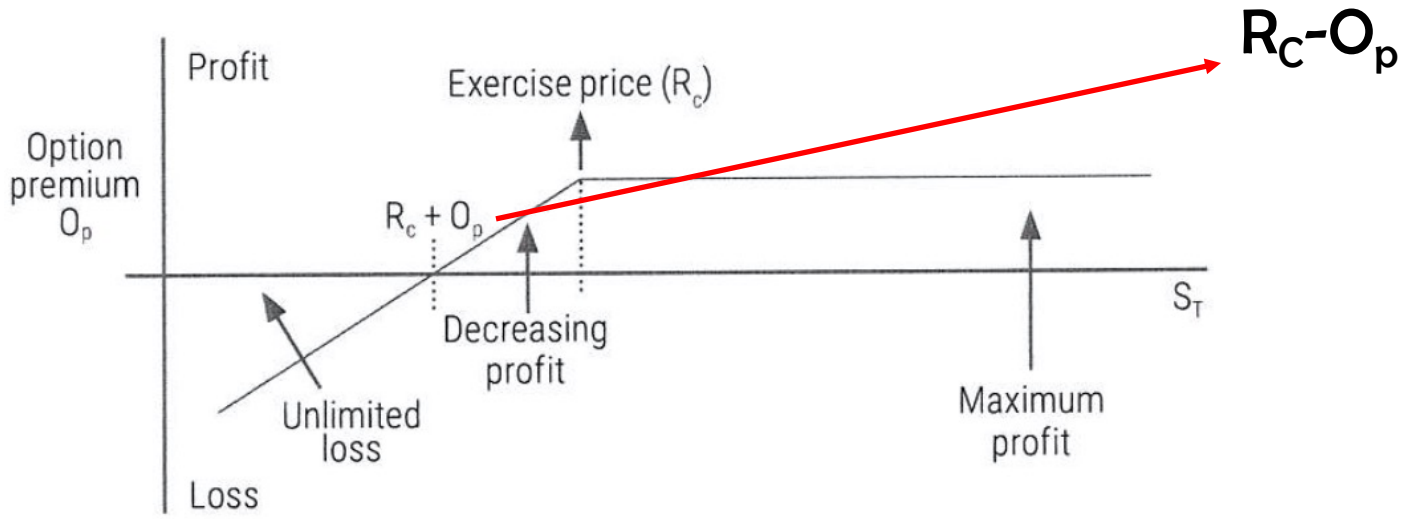


Figure 12.7: Put option – situation of a seller (short put) (**source:** Vlachynský, K. Markovič, P.: Finančné inžinierstvo. 2001, p. 119)

Option strategies

In practice, there exist option strategies combining options, and so-called synthetic positions are created. Some of the simpler option strategies are described as follows:

- **straddle** is a combined stock market strategy of buying and selling the same volumes of put and call options with the same exercise prices and due dates,
- **strangle** is a combination of buying or selling of the same volumes of put and call options for the same security, with the same due date, but with different exercise prices of a call and a put option,
- **strap** is a combination of two call options and one put option (written or bought) with the same due date and either same or different prices,
- **strip** is a combination of one call option and two put options (written or bought) with the same due date and either same or different prices.

Speculation of investors

- 2 types
  - Speculation on the increase of price (á la Hausse)
  - Speculation on the decrease of price (á la Baisse)
- Haussists - BULLS
  - Buys stocks today with the hope, that the price will increase and will sell it later for the higher price, optimistic view
- Baissists – BEARS
  - Sells today because expects the price to go down. He can buy it back later for lower price.

Speculations


CRUSH


WAY
11-21
WALL ST

The bull and bear statues
Frankfurt Stock Exchange, Germany

Value of option

- The value of an option can be estimated using a variety of quantitative techniques based on the concept of risk neutral pricing and using stochastic calculus. The most basic model is the Black–Scholes model.
- In general, standard option valuation models depend on the following factors:
  - The current market price of the underlying security,
  - the cost of holding a position in the underlying security, including interest and dividends,
  - the time to expiration together with any restrictions on when exercise may occur, and
  - an estimate of the future volatility of the underlying security's price over the life of the option.

Thank you for attention!