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Options strategies

- We will now introduce options as a derivative that can be used to hedge risks for investors.
- We will also see how options can be used as part of investment strategies rather than only as a hedging tool.
- Finally we will relate the values of the two main types of options, call and put options.

# Options in financial markets

- ▶ Options gives the purchaser the right to choose an action, but he is not obligated to conduct the action
- ▶ For options in financial markets this action is the purchase or sale of financial assets
- ▶ The seller of the option (writer) is required to accept the action of the purchaser and sell or buy the financial assets
- ▶ Futures and swaps put obligations on both parties, options impose obligations only on the seller

- We will introduce the general idea of options first.
  - ▶
    - Options, in general, give the buyer the right to do something,
    - but he does not have to take this action.
  - ▶ In the context of financial markets, options give the buyer the right to purchase or sell an asset.
    - ▶
      - The seller of the option, also called the writer of the option has to accept the decision of the buyer.
      - If demanded he has to buy the asset from or sell the asset to the buyer if the demands it. Furthermore, the seller cannot force the buyer into any actions.
    - ▶
      - Options are in contrast to futures and swaps where the obligation was on both parties to complete a transaction.
      - With options the obligation is only on the seller and the buyer makes the decision.
- Thus options are an asymmetric contract, where the buyer has all the rights, but the seller the obligation.

# The importance of options

- ▶ Options are a central element in finance, but they are not only found in financial markets
- ▶ Option theory can be applied to decide the optimal timing of investments: invest now or wait?
- ▶ Option theory can be used to determine the value of shares with limited liability and the value of corporate bonds
- ▶ Option theory can be used to determine default rates of companies from observing their stock prices


- Options can be found in many areas in finance and it is therefore essential to understand the basic ideas behind them and their valuation.
- ▶
  - Options are very versatile in assessing actions by individuals, in finance as investment strategies,
  - but they can also be found in many areas outside the direct trading environment in which they were developed and first analysed.
- ▶
  - We can use option theory to make investment decisions, in particular the timing of making investments.
  - Often companies can delay an investment to a later point in time or make the investment now, giving it an option to invest now or wait. This can be analysed using option theory and what is known as real options.
- ▶
  - We can also use option theory to take into account the limited liability of companies to determine the value of shares of a company
  - as well as the value of corporate bonds, which might default.
- ▶ We can also use the results of option theory to assess the default rates of companies that are listed on the stock exchange.
- All these aspects are not covered here, but show the versatility of option theory and its importance beyond the realms of financial markets.

# Hedging strategies with options

- ▶ A limitation when hedging using of futures or swaps is that losses and profits are eliminated
- ▶ In many cases investors are concerned about eliminating losses, but want to retain any potential profits
- ▶ We will see that options are able to achieve exactly this result

- We will first look at applying options to hedge the risk of investments.
- ▶ When using forwards, futures, or swaps to hedge any risks in financial markets, they do not only eliminate possible losses, but also any possible gains from the underlying asset moving in their favor.
- ▶ Eliminating possible gains is not what investors usually seek as they are mainly concerned about eliminating or limiting any losses they have.
- ▶ With options we can achieve a situation in which losses are eliminated but profits are maintained.
- We will now explore how such hedging strategies with options will achieve this aim.





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Hedging with options

→ Before looking at such hedging strategies using options, we will first need to gain a better understanding of options.

## Reducing losses and retaining profits

- ▶ A call (put) option gives the purchaser the right to buy (sell) an asset at a set price in the future
- ▶ Options allow investors to hedge their assets such that they have losses limited and profits retained
- ? Why would not every investor hedge with options if losses can be eliminated but profits are maintained?
- ! Investors have to pay a premium when purchasing an option, imposing some losses if the option is exercised and reducing profits otherwise; these costs make options not always attractive

# Reducing losses and retaining profits


- We have seen that with options, investors can reduce or eliminate any losses, but still participate in gains.
  - ▶ We have seen the profits that options generate at their maturity for investors and how they differ for put and call options.
  - ▶ Using these payoffs at maturity, we have then shown how put and call options can be used to hedge the exposure to the underlying asset.
  - ▶ [?] Using options can eliminate losses but retains profits, so would it not be rational for all investors to use options to hedge their risks?
  - ▶ [!] This hedge is not available for free; investors need to pay an option premium and this will reduce their profits. Bearing these costs is not always attractive to investors.
- Options provide a way to eliminate losses while maintaining profits, but this is achieved at the cost of paying an option premium.

## Using options to create payoff profiles

- ▶ Options allow investors to hedge their positions, but options are available even if the underlying asset is not held
- ▶ Investors can purchase different options on the same underlying asset and create bespoke payoff profiles
- ▶ This is attractive to investors who have specific information about the underlying asset
- ▶ It can also be used to create payoff profiles that suit their needs in terms of risk exposures when considering their entire portfolio of assets

# Using options to create payoff profiles

- Options cannot only be used to hedge risks. They are also used by investors as part of their investment strategies.
  - ▶
    - As shown above, with options investors can hedge risks,
    - but investors can use options also if the underlying asset is not held and thus options are not only used for hedging.
  - ▶
    - Investors can combine different options, on the same underlying asset.
    - Depending on how they are combined, they will provide investors with profits in specific scenarios only, which the investor might want to exploit.
  - ▶ Making gains from specific scenarios might be attractive to investors if they hold information that causes them to believe that this scenario is likely to occur, but they want to ensure that if they are wrong, they do not face too large losses.
  - ▶ Looking more widely at the portfolio of an investor, it can also serve the wider risk management purposes of an investor, for example ensuring that sufficient funds are available to make any necessary payments.
- We will explore some of the more basic trading strategies that can be achieved using combinations of options.



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Investment strategies with options

→ We will combine two different options to obtain some simple trading strategies.



# Options meeting the needs of investors

- ▶ Options are flexible in creating payoff profiles that benefit investors who assess the value of assets differently or have opinions about future volatility of assets
- ▶ Using exotic options, nearly every possible payoff profile can be created
- ? If options are so flexible, why are not more private investors using them?
- ! Options are difficult to understand and choosing the correct combination can be difficult; in addition, combinations of exotic options can have unexpected properties in extreme market scenarios

- We have seen how using put and call options with identical or different strike prices, we can create a number of trading strategies that cannot be achieved using the underlying asset alone.
  - ▶
    - If investors have different opinions about the future development of asset prices, there will be opportunities to create payoff profile that fit the assessment of an investors, while another investor creates a different trading strategy using different options.
    - These opinions might not only be about the future value of assets, but also the volatility of the asset.
  - ▶ Using other option types, called exotic options, nearly every possible payoff profile can be created to suit the demands of investors.
  - ▶ Options are not very popular with private investors, most of the use is limited to professional investors, why might this be the case?
  - ▶ Using options require a good understanding of these instruments and combining them in the right way, choosing the right strike prices and the right types, but also realising that possible large losses from writing (selling) options might be compensated for equivalent large gains in another option. Using exotic options makes this task even more difficult as some options might have unexpected properties in some market conditions.
- Options allow investors to generate investment profiles that suit their needs, but these are often difficult to understand and assess.

# Relating put and call options

- ▶ Options can be combined to create a variety of payoff profiles, including those that resemble other options
- ▶ The main building blocks of options are put options and call options
- ▶ We will look into the relationship between these two option types

- We finally are seeking to relate the value of call and put options. We achieve establishing this relationship by building portfolios of assets and options and compare their values at maturity of the options.
  - ▶
    - We will use combinations of the underlying asset, a risk-free asset and options to create a specific payoff profile.
    - We can use such portfolios to create the payoff profile of other options.
  - ▶ We focus here on the main building blocks of put and call options, the standard options, neglecting exotic options.
  - ▶ It is the relationship between these two basic options that we will explore, assuming they have the same strike price.
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→ We will obtain a relationship between put and call values, which is known as the Put-Call parity.

## Focussing on call options only

- ▶ The value of put and call options have a close relationship as expressed by the Put-Call parity
- ▶ Given this relationship, it is common to focus on call options only and then obtain the value of a put option from the put-call parity
- ▶ The Put-call parity is only applicable for standard European options, although similar relationships have been obtained for many other option forms

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- ▶ We have found that there is a clear relationship between the value of put and call option.
  - ▶ If we know the value of a call option, we can easily obtain the value of a put option and vice versa. For this reason it is common to focus only on obtaining the value of a call option and then derive the value of a put option using the Put-Call parity.
  - ▶
    - The Put-Call parity as derived here is only valid for standard (Vanilla) European option, it is not a general relationship for all options.
    - However, for many exotic options similar relationship can be derived.
- We have established that the relationship between the value of put and call options allows us to focus the valuation of options on call options only.



# Summary

- ▶ Options give purchasers the right to buy or sell asset at given prices in the future
- ▶ Options can be used to hedge positions such that losses are limited and profits retained
- ▶ Options can also be used as building blocs to create bespoke payoff profiles and thereby bespoke risk profiles for investors

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- ▶ We have seen that options gives purchasers the to buy or seel the underlying asset at a given price in the future, but in contrast to forwards, futures, and swaps, there is no obligation to do so.
  - ▶ Options can be used to hedge positions without foregoing potential profits.
    - We can also combine different options to create bespoke pay-off profiles that suit the needs of investors,
    - which indirectly also creates risk profiles (possible losses) that investors would like to obtain.
- We have seen that options are versatile tools to hedge, but also helpful to develop investment strategies.



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