

# Analysis on Hedging and Risk Management of Options and Futures

Siyuan Yang

School of Foreign Languages, Tianjin University, Tianjin, China

ysy69572383@tju.edu.cn

**Abstract.** Options play an irreplaceable role in today's financial markets. This article begins with an introduction to the meaning and rules of use of options, where a party who owns an option has the right, but not the obligation, to buy or try to sell an asset at a particular price on or before a specific date. As the price of the underlying changes, the option price changes along with it, providing an opportunity to hedge risk and speculate. In the face of different market conditions, this article proposes different options strategies that enable investors to choose the right combination of options to mitigate risk and get more returns under different circumstances. Maximize gains or minimize losses by taking advantage of the different properties of call and put options and the effects of the combination. Finally, this article draws conclusions on the characteristics of futures in risk management and the implications for investors or companies.

**Keywords:** Option, options strategy, hedge risk, risk management.

## 1. Introduction

### 1.1. The Basic Concept of Options

The option is a type of financial derivative that grants the purchaser the option to purchase or sell an underlying asset at a predetermined future date, without being obligated to do. The underlying assets of an option can be stocks, stock indexes, foreign exchange, commodities, bonds, etc. The buyer of an option trade usually pays a fee (called an option premium) for the right to buy or sell the underlying asset [1].

Options can be used for risk management and speculation [2]. For investors, options offer a way to protect a portfolio in times of high market volatility, while also allowing them to take advantage of their leverage to speculate. For enterprises, option can be used to manage exchange rate risk, commodity price risk and so on.

### 1.2. The Principle of Using Options

The principle of an option can be summed up simply as giving the buyer the right, but not the obligation, to buy or sell the underlying asset at a specified time in the future.

Options trading generally involves the following elements:

**Underlying assets:** The underlying assets of an option can be stocks, stock indexes, foreign exchange, commodities, bonds, etc.

**Option type:** There are two types of options: call options and put options. A call option allows the buyer to purchase the underlying asset at a specific price at a future date, while a put option allows the buyer to sell the underlying asset at a specific price at a future date, while a put option allows the buyer to sell the underlying asset at a specific price at a specific time in the future.

**Exercise price:** The exercise price of an option is the price at which the buyer buys or sells the underlying asset at a specified time in the future.

**Expiration Time:** The expiration time of an option is the deadline for the buyer to exercise the option within a specified time in the future.

**Option premium:** The buyer of an option transaction pays a fee called an option premium.

The value of an option depends on the change in the price of the underlying asset, as well as factors such as when the option expires and the exercise price. If the price of the underlying asset exceeds

the exercise price before the option expires, then the buyer can choose to exercise the option and thus make a profit. If the price of the underlying asset is below the strike price, the buyer can choose not to exercise the option, thereby losing up to the option premium [3]. The value of an option is also affected by factors such as volatility, interest rates, dividends, etc.

### 1.3. Research and Objectives

This paper provides different approaches to option combinations for different situations that investors may encounter in the market, using the nature of long and short options and the effects produced by the combinations to inform investors. The profit and loss ranges and turning points are shown using charts and graphs to give investors with different risk preferences the appropriate options.

Options have great significance for investors and businesses today, playing an important role in risk management, leveraging, and promoting liquidity, and being able to use option combinations wisely has a critical impact on the smooth operation of a business.

## 2. Different options strategies

### 2.1. Bull Spread

Bull Spread is an option strategy that is typically used in bullish markets. Consider using Bull Spread when there is an optimistic thread about the rising price of a stock or other asset.

The core idea of Bull Spread is to purchase one call option (i.e., call option) while selling another call option at a higher strike price. In this way, it will make sense to increase the profit potential while limiting the risk.

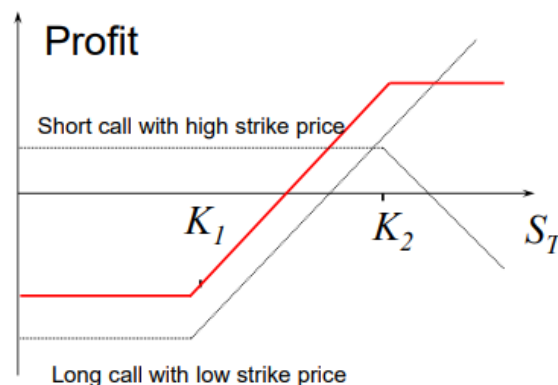


Figure 1. Bull Spread Using Calls

In Bull Spread using calls (see Fig. 1), by buying the long call and selling the short call, the investor can limit their potential losses while still benefiting from the stock's price increase.

A bull spread has a limited maximum profit, which is determined by subtracting the cost of the options from the difference between the strike prices of the two options. However, the maximum loss is also limited and is equal to the cost of the options.

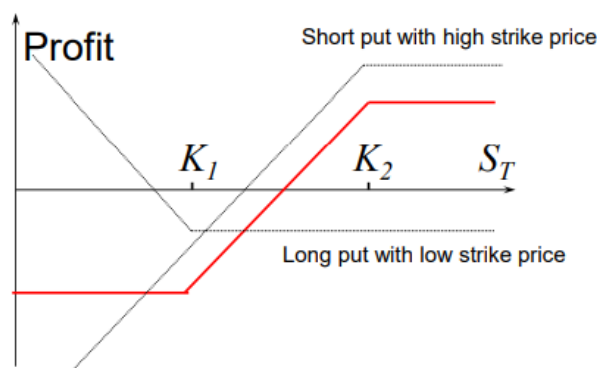


Figure 2. Bull Spread Using Puts

In Bull Spread using puts (see Fig. 2), the difference between the premium received from selling the higher strike put and the premium paid for the lower strike put is the maximum potential profit. The net credit received sets a cap on the maximum potential loss, which is equal to the difference between the strike prices.

For example, suppose the person purchases a stock option contract that allows him to buy 1,000 shares of XYZ Company stock at a specific price within the next three months. The exercise price of the contract is \$50 per share, while the current market price is \$40 per share. If the market does enter a bull market and the price of the stock in this company rises to \$60 per share within the next three months, then the purchaser has the option to execute the contract, buy the shares at \$50 per share, and sell them immediately for a \$10 per share profit.

If the market fails to enter a bull market, or if the stock price does not rise above the exercise price, then the purchaser may choose not to exercise the option contract, thereby losing only the cost of purchasing the option. Thus, the option contract allows the purchaser to make a potential profit in the event of a bullish market and lose only the option fee in the event of a bearish market.

The advantage of the strategy is that you can greatly reduce the cost of buying call options by selling them. At the same time, your risk is limited because the call options you sell will provide protection by limiting the maximum amount you can lose. Bull Spread is therefore a suitable strategy for gaining and controlling risk in a call market [4].

## 2.2. Bear Spread

Bear spread refers to the spread between going short and going long in a bear market in the stock market. In a bear market, the overall market performance is weak and stock prices generally fall, so investors often choose to go short in order to take profits. Going long, on the other hand, is more difficult because the overall market trend is not favorable for stock prices to rise. As a result, the spread between shorting and going long widens [5].

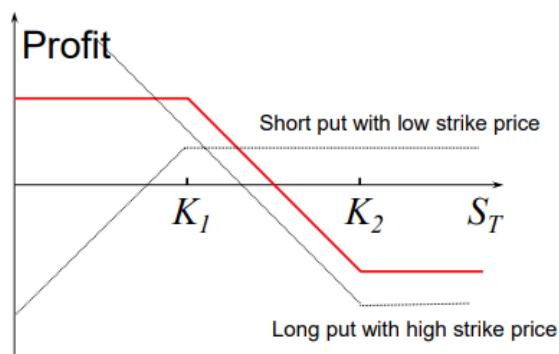


Figure 3. Bear Spread Using Puts

The goal of a bear put spread is to profit from a decrease in the price of the underlying asset, while limiting the potential losses. The highest possible profit is the gap between the put options' strike prices, reduced by the overall cost of the approach.

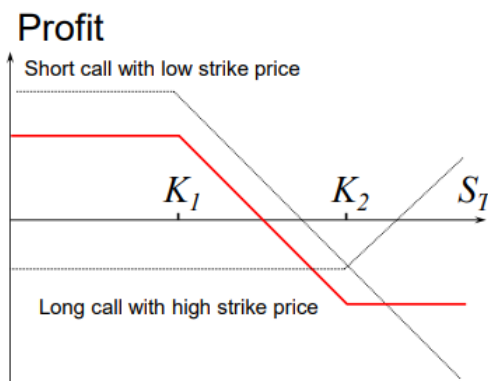


Figure 4. Bear Spread Using Calls

A bear call option is a right that grants the purchaser the right to purchase a specific stock at a fixed price at a future time, which is usually higher than the current market price. If the stock price falls, the purchaser can choose not to exercise this right and instead purchase the stock at a lower price in the market. But if the price of the stock rises, the purchaser can still buy the stock at the fixed price and thus make a profit. Bear call options can be used to hedge the risk of investors who hold stocks, or they can be used to gamble on the market. However, options trading involves a high level of risk and investors should trade with full knowledge and understanding of the risks involved (see Fig. 3 and Fig. 4).

Bear market spreads provide investors with investment opportunities. Since bear market spreads can lead to relatively high prices for certain stocks and relatively low prices for others, investors can get better returns by selecting those stocks that are undervalued. But it also brings risk. When markets fall, the prices of all stocks fall, and the share prices of companies with relatively poor fundamentals and valuations may fall even more. Therefore, choosing undervalued stocks may entail higher risk.

### 2.3. Box Spread

A box spread is an investment strategy in which an investor simultaneously purchases the same number of two options, one to buy and one to sell, but the two options have different strike prices. This strategy is typically used to take advantage of market volatility and thus make a profit.

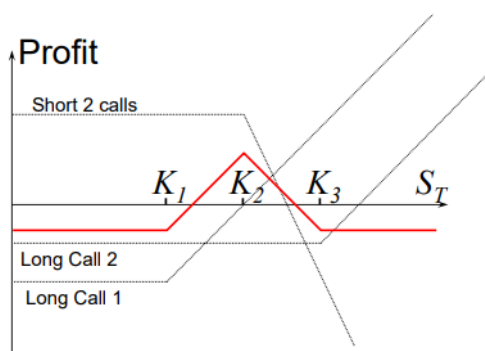
Specifically, a box spread typically consists of four options, two of which are calls and two of which are puts. One of the call options and one of the put options has the same strike price, while the other call option and the put option also have the same strike price, but they are priced lower than the first two options. Therefore, the maximum profit an investor can make is the spread between the two option prices [6].

A box spread is often considered a lower risk strategy because it provides a degree of protection. For example, if market prices fall, investors can hedge their losses by exercising a put option. However, there are still risks associated with this strategy, so investors should carefully consider market volatility and risk tolerance to determine if a box spread strategy is appropriate.

### 2.4. Butterfly Spread

Butterfly Spread is an options trading strategy that is typically used to speculate or hedge against the risk of option price fluctuations.

Butterfly spreads refer to a trading strategy that involves buying or selling two options (either calls or puts) at the same time, with different strike prices, and the simultaneous purchase or sells a call or put option at a specific strike price in between the two options [7].



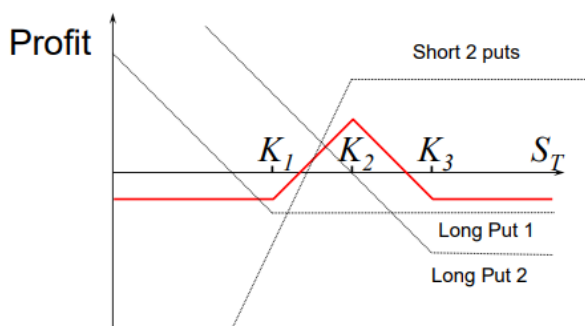
**Figure 5.** Butterfly Spread Using Calls

A Butterfly Call Option (see Fig. 5) is an options trading strategy that involves the purchase of two dummy calls and the sale of one real call option. This strategy is typically used to take profits when the market is expected to have low price volatility, as the option price is usually more reasonable in this case.

The yield curve of a butterfly call option resembles the shape of a butterfly. The butterfly call option yields the highest return when the price of the underlying asset is close to the strike price of

the real call option. If the value of the underlying asset exceeds the strike price of the dummy call option, then the butterfly call option's return will begin to decrease.

The butterfly call option is a very common option trading strategy used to capture gains when the market expects low price volatility. However, because this strategy involves the trading of multiple option contracts, it is usually more costly than a single option contract [8].



**Figure 6.** Butterfly Spread Using Puts

A butterfly put option consists of three put options that each have a certain strike price and the prices are arranged in a certain ratio.

In a butterfly put option, the option holder simultaneously buys A put option that has the same expiry date, and a fixed strike price, sells two puts that has the same expiration date and a strike price lower than the strike price of that put option, and purchases an additional put option that has the same expiry date, and a lower strike price. The combination of these options can form a value range in which the option holder will gain when the price of the underlying asset falls within this value range.

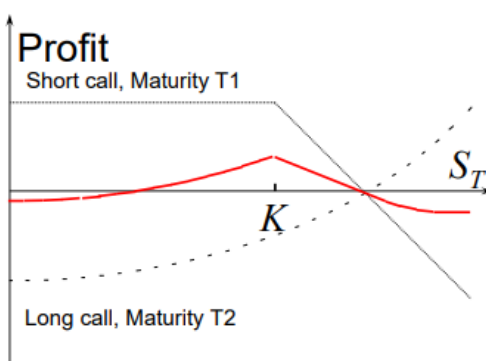
A butterfly put option (see Fig. 6) is typically used in options trading as a market neutral strategy, where the price of the underlying asset is expected to fall within a specific value range at the expiration date, resulting in a gain. It provides a degree of hedging against put option price fluctuations and market volatility risk.

Butterfly option strategies can be used in a variety of market conditions, but are best suited when market volatility is low. When market volatility is high, butterfly option strategies may suffer losses. Therefore, investors should carefully consider market conditions and risk factors when using a butterfly option strategy and decide whether to use such a strategy based on their investment objectives and risk tolerance [9].

## 2.5. Calendar Spread

Calendar spread refers to the spread between futures contracts of the same species on the same exchange with varying expiry dates. It is also known as a time spread.

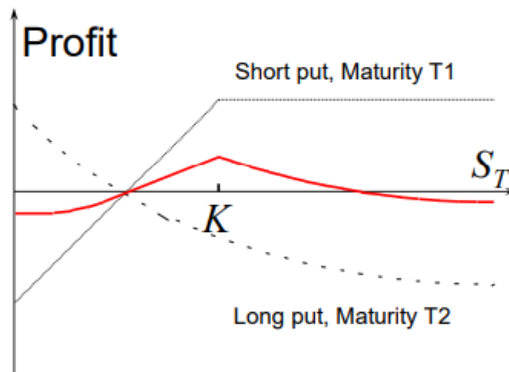
Calendar spreads are often used in arbitrage strategies in futures trading. In this strategy, an investor simultaneously buys one contract, then sells another contract with a later expiration date, thereby taking advantage of the spread between the two contracts to earn a profit (see Fig. 7 and Fig. 8).



**Figure 7.** Calendar Spread Using Calls

By utilizing a call calendar spread, one can generate profits by taking advantage of the discrepancy in time decay rates between two call options. The longer-term call option will have a higher premium because it has more time until expiration, while the shorter-term call option will have a lower premium because it has less time until expiration. By selling the shorter-term call option and buying the longer-term call option, the trader can capture the difference in premium between the two options.

The strategy is most profitable when the underlying asset remains relatively stable in price, and the shorter-term call option expires worthless, while the longer-term call option retains its value due to the remaining time until expiration.



**Figure 8.** Calendar Spread Using Puts

The goal of this strategy is to profit from the time decay of the short-term option while limiting the downside risk with the long-term option.

The investor expects the price of the underlying asset to remain relatively stable or slightly increase over the short term, allowing the short-term option to expire worthless, while the long-term option will still have some time value remaining.

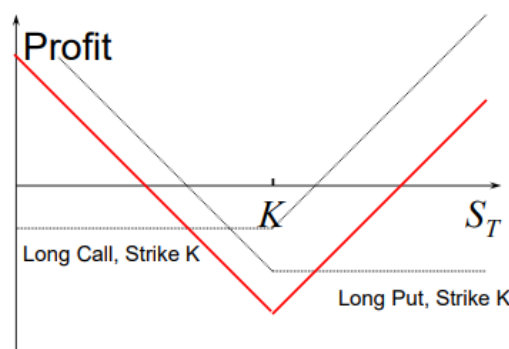
If the price of the underlying asset declines, the long-term put option will increase in value, providing a hedge against potential losses from the short-term put option.

One potential risk with this strategy is if the price of the underlying asset drops sharply before the short-term option expires, causing the value of the long-term put option to increase but not enough to offset the losses from the short-term option.

The advantage of this strategy is that it reduces the impact of market volatility on the investor. Since investors perform both buying and selling operations, this strategy allows for some protection against price fluctuations, thus reducing investment risk [10]. In addition, it is also a low-risk trading strategy since calendar spreads are usually small.

### 2.6. A Straddle Combination

When an investor is uncertain about the direction of price movement for an underlying asset but expects significant movement, they may employ a straddle combination strategy, which involves purchasing both a call option and a put option with the same expiration date and strike price (see Fig. 9).



**Figure 9.** A Straddle Combination

By purchasing both a call and a put option, the investor can profit from a significant price movement in either direction. In the event of an increase in the price of the underlying asset, the investor has the option to exercise the call option, which allows them to purchase the asset at the lower strike price and sell it at the higher market price. Conversely, if the price of the underlying asset decreases, the investor can exercise the put option, which enables them to sell the asset at the higher strike price and repurchase it at the lower market price.

However, it's important to note that a straddle combination can be an expensive strategy, as the investor is buying two options instead of one. Additionally, the investor needs to be aware of the break-even points for the strategy, which will depend on the premium paid for the options and the strike price chosen.

### 3. Conclusion

#### 3.1. Features of Options in Risk Management

(1) Leverage effect: The nature of an option is a leveraged instrument that allows investors to control a larger asset size by paying a smaller margin; therefore, the leverage effect of an option is greater and investors can control a larger risk with a smaller cost.

(2) Flexibility: An option contract is a very flexible financial instrument that can be used for risk management purposes by selecting different contract types, delivery dates and exercise prices, etc., depending on the investor's different needs and risk preferences.

(3) Limited risk: Compared to other financial derivatives such as futures, the risk of options is limited because the loss of options can only reach the size of the option fee at most.

(4) Market liquidity: The options market is relatively active, and traders can buy and sell operations at any time, so it is easy to make position adjustments and manage risk in the options market.

(5) Hedging Function: Options can be used to hedge risk in a portfolio, especially for positions in underlying assets such as stocks, where risk can be reduced by buying or selling the corresponding option contracts.

#### 3.2. The Significance of Options for Investors or Companies

(1) Risk management: options are an effective risk management tool. By purchasing options you can lock in the value of assets such as stocks, commodities, and exchange rates to protect your investment in times of market volatility, thereby reducing investment risk.

(2) Speculation and Arbitrage: Options can be used for speculation and arbitrage, buying or selling options to earn spreads or gain speculative gains by means of market forecasting and technical analysis.

(3) Tax incentives: Some countries offer tax incentives in options trading, allowing companies and investors to reduce their tax liability when trading options.

(4) Asset Allocation: Options can be used as an asset allocation tool to provide investors with diversified investment options and help them build a more balanced portfolio.

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