

# Option Box Spreads for Investors

## Introduction

The box spread is an options strategy that can facilitate the lending (box buyer) or borrowing (box seller) of money in a manner which serves as an alternative to a traditional loan through a bank. Due to its structure, the box spread provides fixed returns with defined risks and is often used as a method to efficiently manage capital.

### Box Spread Buyer

The buyer of a box spread is essentially loaning money to the seller of the spread. At expiration, the value of the box will be the difference between the strike prices. Consequently, the buyer can calculate their anticipated rate of return as the difference between the purchase price and the known full value of the box at expiration.

### Box Spread Seller

Conversely, the box seller can use the same approach to calculate the rate at which they are borrowing. As the box spread is market-neutral with a known payout at expiration, it does not benefit or suffer from directional moves in the underlying.

Considering the time value of money, longer dated boxes will trade at lower prices (i.e. greater discount to full value) based on prevailing interest rates. Transaction costs also have to be factored into the overall profitability of the strategy as it consists of four different legs.

Generally, box spreads are implemented using European-style options ensuring the defined outcome feature of the spread cannot be disrupted by early exercise or assignment which would greatly alter the risk profile of the strategy.

### Additional characteristics of the box spread include:

- Market driven rate of return comparable to treasury bill rates.
- Buyer (lender) and seller (borrower) are protected from counterparty credit risk due to the transaction being guaranteed by The Options Clearing Corporation (OCC) – the largest equity derivatives clearing organization in the world.
- The ability to liquidate the spread through closing transactions on an options exchange.

## Risks and Benefits of the Box Spread

The risks and benefits of a box spread primarily relate to interest rates, execution costs, and inflation. The buyer of a box spread enters into a position that pays a fixed amount at expiration in exchange for an upfront cost. Prior to expiration, the value of the box spread fluctuates with changes in interest rates—rising rates reduces the present value of the future payoff, and vice versa. If interest rates rise after initiation, the market value of the box may decline, and closing the position early could result in a realized loss. However, if held to expiration, the buyer still receives the known and pre-calculated payout. The main risk is opportunity cost: if prevailing interest rates increase, the funds committed to the trade could have earned more elsewhere. Additionally, inflation can erode the real purchasing power of the fixed payout over time, reducing its value in today's dollars.

The seller (short side) of the box spread takes on the opposite exposure. They collect an upfront premium and are obligated to pay the fixed amount at expiration. If interest rates fall, the value of the box increases, and closing the position early could result in a realized loss. Lower interest rates also imply a higher opportunity cost for the seller, as they received less value for the funds committed. Higher inflation, however, works in favor of the seller: if inflation rises, the real (inflation-adjusted) value of the fixed payout decreases, meaning the seller repays in “cheaper” dollars. Thus, inflation benefits the short box spread position by reducing the real cost of repayment.

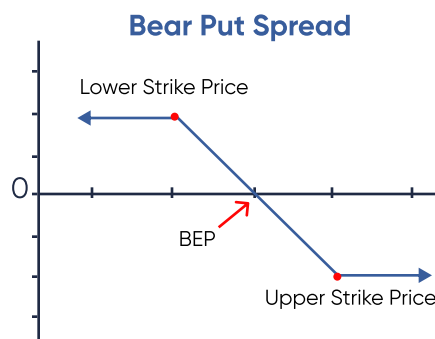
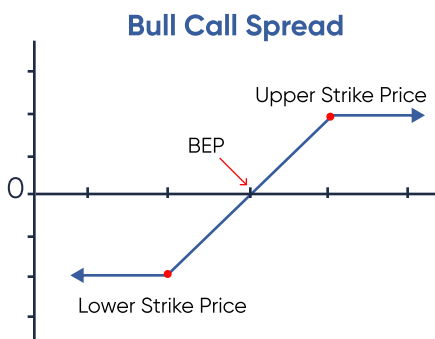
## Construction of a Box Spread

A box spread is a complex, four-sided options strategy that can be viewed as a synthetic long stock position (long call, short put) paired with a synthetic short stock position (long put, short call) at a different strike price with all four legs having the same expiration date.

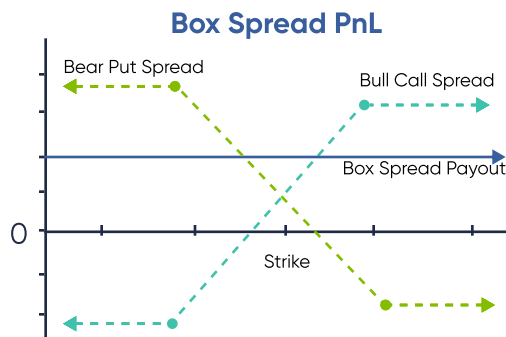
From the buyer's perspective, the box spread would consist of a bull call spread and a bear put spread. The bull call spread involves buying a call option at one strike and selling another call at a higher strike. The bear put spread consists of purchasing a put option with the same strike as the short call and selling a put option with the same strike as the long call with all four legs having the same expiration date. Keep in mind, the buyer of a box spread is essentially loaning money to the seller for a fixed return on their investment.

The basic structure involves two strike prices with the following components:

- Buy a call at the lower strike price
- Sell a call at the higher strike price
- Buy a put at the higher strike price
- Sell a put at the lower strike price



At expiration, the payout of the box spread is calculated as a combination of the four options positions with the result being fixed across all possible outcomes for the underlying as shown below:



The goal of the strategy is to achieve a known rate of return which is calculated as the difference between the strike prices (the box) less the net debit paid while taking into consideration the time to expiration.

### Box Spread (Buying) Example

In this example we will be using cash-settled, European-style index options on the hypothetical underlying "OICX". The exercise style ensures that the defined outcome of the trade, which is an essential characteristic of the strategy, remains intact and is not disturbed by early exercise or assignment. The net payoff at expiration will be the difference between strikes less the debit paid for the position. We will also assume the box spread is done 1x meaning the value will be \$100,000 (1 box spread x 100 multiplier x 1,000 difference in strike).

Index: OICX  
Current Index Value: 6,050

Expiration: 1 year  
Multiplier: 100

#### The Position

##### Synthetic Long

Buy one 5,000 strike call at \$1,297  
Sell one 5,000 strike put at \$92  
Debit = \$120,500  
(1,297 - 92 = 1,205 x 100 multiplier)

##### Synthetic Short

Sell one 6,000 strike call at \$512  
Buy one 6,000 strike put at \$267  
Credit = \$24,500  
(512 - 267 = 245 x 100 multiplier)

Net Position Debit: \$96,000 (\$1,205 - \$245 = 960 x 100 multiplier)

### Calculating the rate of return

The formula for calculating the rate of return is:

$$\frac{\text{Difference between strikes} - \text{Net debit paid}}{\text{Net debit paid} \times \text{time period}} \times 100 = \frac{1,000 - 960}{960 - 365 / 365} \times 100 = 4.16\%$$

This means the buyer of the box spread is essentially loaning money to the seller at an effective interest rate of 4.16%. The strategy will then close at expiration when the buyer is paid the full value of the spread.

This calculation is valid because, at expiration, each box spread will have the same value regardless of the value of the underlying (assuming European-style options are used)

OICX at Expiration	Long 5,000 Call	Short 5,000 Put	Long 6,000 Put	Short 6,000 Call	Box Value
<b>4,000</b>	0	(\$1,000)	\$2,000	0	\$1,000
<b>4,500</b>	0	(\$500)	\$1,500	0	\$1,000
<b>5,000</b>	0	0	\$1,000	0	\$1,000
<b>5,500</b>	\$500	0	\$500	0	\$1,000
<b>6,000</b>	\$1,000	0	0	0	\$1,000
<b>6,500</b>	\$1,500	0	0	(\$500)	\$1,000

At expiration, if OICX settles at 5,000:

- Both options at the 5,000 strike expire exactly at-the-money and without value
- The 6,000 strike call expires out-of-the money and without value
- The 6,000 strike put expires in-the-money with \$1,000 of intrinsic value
- The box owner can exercise the 6,000 put and capture \$1,000 of intrinsic value

At expiration, if OICX settles at 5,500:

- The 5,000 strike call expires in-the-money with \$500 of intrinsic value
- The 5,000 strike put expires out-of-the-money and without value
- The 6,000 strike call expires out-of-the-money and without value
- The 6,000 strike put expires in-the-money with \$500 of intrinsic value
- The box owner can exercise both in-the-money options and capture \$1,000 of intrinsic value

At expiration, if OICX settles at 6,000:

- The 5,000 strike call expires in-the-money with \$1,000 of intrinsic value
- The 5,000 strike put expires out-of-the-money and without value
- Both options at the 6,000 strike expire exactly at-the-money and without value
- The box owner can exercise the 5,000 call and capture \$1,000 of intrinsic value

At expiration, across all possible values for the index, the value of the box remains \$1,000.

## Conclusion

This paper is a summary of the option box spread which offers market participants an alternative method for borrowing or lending money. The benefits include the ability to achieve competitive interest rates while knowing the contracts are cleared, settled, and guaranteed by The Options Clearing Corporation (OCC), thus eliminating counterparty risk. Transaction costs and commissions must be factored into the overall profitability of the strategy.

Box spreads are best suited for institutional traders or experienced individuals who can better price the strategy and manage the position accordingly. Traders must weigh the benefits and costs before deciding to implement this strategy in their portfolios.

## About OCC

The Options Clearing Corporation (OCC) is the world's largest equity derivatives clearing organization. Founded in 1973, OCC is dedicated to promoting stability and market integrity by delivering clearing and settlement services for options, futures and securities lending transactions. As a Systemically Important Financial Market Utility (SIFMU), OCC operates under the jurisdiction of the U.S. Securities and Exchange Commission (SEC), the U.S. Commodity Futures Trading Commission (CFTC), and the Board of Governors of the Federal Reserve System.

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In order to simplify the computations used in the examples in this paper, commissions, fees, margin interest and taxes have not been included. These costs will impact the outcome of any stock and options transactions and must be considered prior to entering into any transactions. Investors should consult their tax advisor about any potential tax consequences.

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