Options Strategies
Theory & Application

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Option Strategies Overview

Options strategies are applicable to various asset classes and for OTC as well as traded Options. The main motives to use options are:

1. **Take a directional** view of the market
   - Reduce exposure to risk (partial or full),
   - Increase exposure to risk.
2. **Enhance your income** by writing your income and collecting the premium for instance.
3. **Take of view on the volatility** of the underlying.
4. **Arbitrage** i.e take advantage on mispriced of options or between the option and the underlying.
Focus for today

There are 3 main style of Options strategies:

- Strategies involving one stock and one Option
- Spreads strategies
- Combinations

We will follow this structure for the seminar
I. Strategies involving one stock and one Option

There are various type of strategies that can be undertaken, for instance covered calls.
Covered Call

A covered call

The long position will cover the investor against a sharp rise in the stock price.

A covered call is composed of:

- 1 long position in the stock
- 1 short position in a call
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Pay off for a covered call

Equivalent to writing a put

Long Stock

Min (S_{T} - K ,0)

Short Call

-Max (S_{T} - K ,0) or Min (K -S_{T},0 )

π

Stock price

YieldCurve.com
II. Spreads

Spreads are strategies involving taking two or more options of the same types

i.e. at least 2 calls or 2 puts to build up your strategy.

The most popular strategies are

- Bull spread
- Bear spread
- Butterfly
- Calendar
Call Bull spread

**Vertical spreads** are used in a moderately **bullish market** to lower your premium and maximise your upside potential, which would be equal to the difference between the two strikes as long as the underlying is superior to the higher strike.

Maximum loss would be the debit when your underlying is lower the lower strike. This **strategy is composed of**:

- Buy 1 call Option with a strike \( K_1 \)
- Sell 1 call Option with strike \( K_2 \) where \( K_2 > K_1 \)
Pay off for a Call Bull Spread

Payoff:
- Short Call: \( \pi = \max(S_T - K, 0) \)
- Long Call: \( \pi = \min(K - S_T, 0) \)

Graph:
- Stock price on the x-axis
- \( \pi \) on the y-axis
- Two lines representing the payoff for short and long call options
- Points \( k_1 \) and \( k_2 \) on the graph
### Explanation of Pay off

<table>
<thead>
<tr>
<th>Price</th>
<th>PO from Long call</th>
<th>PO from Short Call</th>
<th>Total Pay off</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_T &gt; k_2$</td>
<td>$S_T - k_1$</td>
<td>$K_2 - S_T$</td>
<td>$K_2 - K_1$</td>
</tr>
<tr>
<td>$K_1 &lt; S_T &lt; k_2$</td>
<td>$S_T - k_1$</td>
<td>0</td>
<td>$S_T - k_1$</td>
</tr>
<tr>
<td>$S_T &lt; k_1$</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Call Bull spread on Bloomberg

| Underlying | Vodafone underlying at 95.75 |
| Options | Long VOD LN 12 C80  
  Short VOD LN 12 C110 |
| Premium | (20.25 –3) * 1000 = 17250 |
| Max Profit | Limited between a underlying of 80 and 110 |
| Max Loss | The premium so 17250 |
Bear Spread

By contrast a Bull spread is where the investor is hoping that the stock price will go up, in a bear spread the investor is hoping that the stock price will go done.

A Bear Spread is composed of 2 options on we buy and one we sold where the one we buy as a strike superior to the one we sell so we have an initial cash flow.
Pay off for a Bear call spread
Pay off for a Bear Call spread

<table>
<thead>
<tr>
<th>Price</th>
<th>PO from Long call</th>
<th>PO from Short Call</th>
<th>Total Pay off</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_t &gt; k_2$</td>
<td>$S_t - k_2$</td>
<td>$K_1 - S_t$</td>
<td>$K_1 - K_2$</td>
</tr>
<tr>
<td>$K_1 &lt; S_t &lt; k_2$</td>
<td>0</td>
<td>$K_1 - S_t$</td>
<td>$-(S_t - k_1)$</td>
</tr>
<tr>
<td>$S_t &lt; k_1$</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Call Bear spread using Bloomberg
Butterfly Spread

A butterfly spread involves taking 3 different strikes prices.

If you buy a call at $K_1$ which is low compared to $K_3$. Then you sell 2 calls at in between the 2 previous strikes, $K_2$.

This strategy would lead to a profit if your underlying stay close to the medium strike, $K_2$ and then to a small loss if it moves in any of the two over directions.
Graphical Pay off for Butterfly

\[ \Pi \]

2 Short Calls

- \( \text{Max} (S_T - K, 0) \) or \( \text{Min} (K - S_T, 0) \)
## Pay off Butterfly

<table>
<thead>
<tr>
<th>Price</th>
<th>PO from Long call 1</th>
<th>PO from Short Call 2</th>
<th>PO from Short Call 2 Pay off</th>
<th>Total Pay off</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_t &lt; k_1$</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>$k_1 &lt; S_t &lt; k_2$</td>
<td>$S_T - k_1$</td>
<td>0</td>
<td>0</td>
<td>$S_T - k_1$</td>
</tr>
<tr>
<td>$k_2 &lt; S_t &lt; k_3$</td>
<td>$S_T - k_1$</td>
<td>0</td>
<td>-2 ($S_T - k_2$)</td>
<td>$K_3 - S_T$</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Where $k_2 = 0.5 (k_1 + K_3)$</td>
</tr>
<tr>
<td>$S_t &gt; k_3$</td>
<td>$S_T - k_1$</td>
<td>$S_T - k_3$</td>
<td>-2 ($S_T - k_2$)</td>
<td>0</td>
</tr>
</tbody>
</table>
Graphical Pay off for Butterfly using Bloomberg

![Graphical Pay off for Butterfly using Bloomberg](image-url)
III. Combinations

This type of option strategy involves taking a position in both call and put side of the market at the same time.

The most commonly traded are Straddles and strangles which are strategies where investors are betting on volatility of the underlying to recover their premium.
Straddle

Popular type of strategy it involves buying a call and a put with the same strike and expiry date.

At expiry, If the stock stays close to the strike price the pay off would be a loss. Meanwhile if there is a large move of the stock price positive or negative a profit would be made.

This type of strategy tends to work if large volatility moves are expected on the stock price.
Straddle Pay off

\[ \Pi = \max(S_T - K, 0) \]

\[ \max(K - S_T, 0) \]

Long Call

Max \( S_T - K, 0 \)

Long Put

Max(\( K - S_T \), 0)
# Pay of Straddle

<table>
<thead>
<tr>
<th>Price</th>
<th>PO from Long Call</th>
<th>PO from Long Put</th>
<th>Total Pay off</th>
</tr>
</thead>
<tbody>
<tr>
<td>( S_T &lt; k )</td>
<td>0</td>
<td>( K - S_T )</td>
<td>( K - S_T )</td>
</tr>
<tr>
<td>( S_T &gt; k_2 )</td>
<td>( S_T - k )</td>
<td>0</td>
<td>( S_T - k )</td>
</tr>
</tbody>
</table>
Straddle using Bloomberg
Strangle

A strangle is composed of a call and a put position with the same expiry but on different strikes.

Usually Call strike $K_2 > K_1$

Put strike $K_2 > K_1$
Strangle Pay off

\[ \Pi \]

- Long Call: \( \text{Max}(S_T - K, 0) \)
- Long Put: \( \text{Max}(K - S_T, 0) \)
- Long Stock
- \( S_T \)
- Min \( (S_T - K, 0) \)
- Stock price
- \( K_1 \)
- \( K_2 \)
## Pay off representation

<table>
<thead>
<tr>
<th>Price</th>
<th>PO from Long call</th>
<th>PO from Short Call</th>
<th>Total Pay off</th>
</tr>
</thead>
<tbody>
<tr>
<td>$S_1 &lt; k_1$</td>
<td>0</td>
<td>$K_1 - S_T$</td>
<td>$K_1 - S_T$</td>
</tr>
<tr>
<td>$K_1 &lt; S_1 &lt; k_2$</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>$S_1 &gt; k_2$</td>
<td>$S_T - k_2$</td>
<td>0</td>
<td>$S_T - k_2$</td>
</tr>
</tbody>
</table>
Graphical representation in Bloomberg

<table>
<thead>
<tr>
<th>Option Portfolio Scenario Analysis</th>
<th>Page 1/2</th>
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</thead>
<tbody>
<tr>
<td><strong>Summary</strong></td>
<td></td>
</tr>
<tr>
<td>X-axis:</td>
<td></td>
</tr>
<tr>
<td>Curr. Underlying:</td>
<td>92.5</td>
</tr>
<tr>
<td>Evaluation Dates:</td>
<td></td>
</tr>
<tr>
<td>1-Underlying Price:</td>
<td>60.000 to 110.000</td>
</tr>
<tr>
<td>2-Volatility Change:</td>
<td>-5.0% to +5.0%</td>
</tr>
<tr>
<td>10/13/02</td>
<td></td>
</tr>
<tr>
<td>10/23/02</td>
<td></td>
</tr>
<tr>
<td>12/18/02</td>
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