

## “Hedging With a Stock Option”

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**Abstract:** *The aim of this paper is to provide a discussion of the use of stock options in risk management and how they can be used for hedging purposes. This aim is achieved by reviewing the literature and analysing practical hedging examples in the context of an investment company. The results of the discussion show that stock options can be employed by companies as a protection against the downside risk when volatility in the market is high. They can also be used during the periods of low volatility to achieve a specific expected payoff within a band of stock prices. The case study reviewed the strategies that involved naked put and calls as well as more complex hedging procedures, namely the butterfly strategy and the bear spread strategy. By purchasing a put option or selling a call option, the company anticipates a decrease in stock prices as in this case there would be a positive payoff. However, when higher prices are anticipated, the company is interested in purchasing a call option or selling a put option. The butterfly strategy allows the firm to cut potential losses and profits to a specific range whereas the bear spread protects against an increase in volatility. The latter strategy implies entering positions in options with different strike prices.*

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### I. Introduction:

The aim of this study is to assess the use of stock options contracts in risk management. Stock options are derivative instruments that provide a right to the holder to purchase the stock of the company, which is used as the underlying asset (Kolb and Overdahl, 2010). Moreover, if the company is involved in stock trading and purchases of shares of other companies, stock options can be used as hedging instruments to protect against the downside risk (Lien and Tse, 2001). While stock options give the right to buy or sell stocks at a particular price, there is no obligation to do this. The company may choose not to exercise the option, and this flexibility is one of the advantages of this type of derivative instruments compared to alternatives such as futures and forward contracts (Mitra, 2013). Companies that are involved in purchases of stocks are faced with the market risk. For this reason, it is important to investigate how the stock options contracts are used to mitigate and manage such risks. The next section of the paper provides a brief literature review on the use of options and the case study that follows provides a discussion of the practical hedge strategies employed by investment companies.

### II. Literature Review:

Companies can use options for hedging purposes and this is one part of risk management (Norden, 2001). Options are generally divided into call options and put options. When used for hedging purposes, call options provide the right to purchase a particular amount of stocks or enter a long position. The price and a period of time of such purchase are predetermined (Tompkins, 2002). However, depending on whether a European or American option is used, there is more or less flexibility in regards to the exercise date. For instance, the company is allowed to exercise a European option exactly on the date of maturity (Sasidharan, 2009). In contrast to this, if an American option is used, the company has the right to exercise it earlier before the date of maturity (Norden, 2001).

An option holder does not have an obligation to buy the security and this is the major difference of options from futures and forward contracts. Still, an option holder pays the option premium and therefore needs to evaluate whether the benefits of an option hedge are worth this premium (Madura, 2011). The premium is paid regardless whether the option is exercised or not.

Put options provide the buyers of the option with the right to sell a particular amount of securities at a predetermined price and within a predetermined period (Wang et al., 2014). Similarly to the call option the put option contract is the right but not the obligation for the holder of the option. Normally the buyer of the call option expects an increase of the price of the underlying security in future. In this case if the exercise price of an option is lower than the market price, the option is considered in-the-money and the option holder has an opportunity to buy the security at the price that is below market price (Smith, 2008). On the other hand, the holder of the put option expects a decrease of the security price in future. Thus he seeks an opportunity to sell the security at a price that is higher than market price (Roberts, 2006). However, if the current strike price of the option is lower than the market price, the put option is considered out-of-the-money (Allen, 2012).

One of the disadvantages of options hedging is the fact that the cost of hedging is not known at the time of purchase of the options. It becomes known only when the payables are due (Lai and Lim, 2009). Therefore option holders need to assess what would be the cost of hedging under different circumstances. The cost of

hedging consists of the security price and the premium that is paid for the option (Madura, 2011). The disadvantages of options hedging include the facts that premium payment is required for holding the options. The premium normally includes two components. The first one is the intrinsic value which represents the amount by which the exercise price exceeds the current price in the market. The second one is the time value. It represents the amount that is required by the option seller to compensate for the risk that he bears in the course of the life of the contract (Dritsakis and Grose, 2003). Besides only a fixed quantity of securities is available. Nevertheless the major advantage of options hedging is the right to cancel the commitment. This provided greater flexibility to the option holder (Anderson et al., 2012).

Even though the most common types of stock options employed in hedging are American and European options, there is a wide range of alternatives. These include barrier options, Asian options, binary options and other types of exotic options (Zakamouline, 2006).

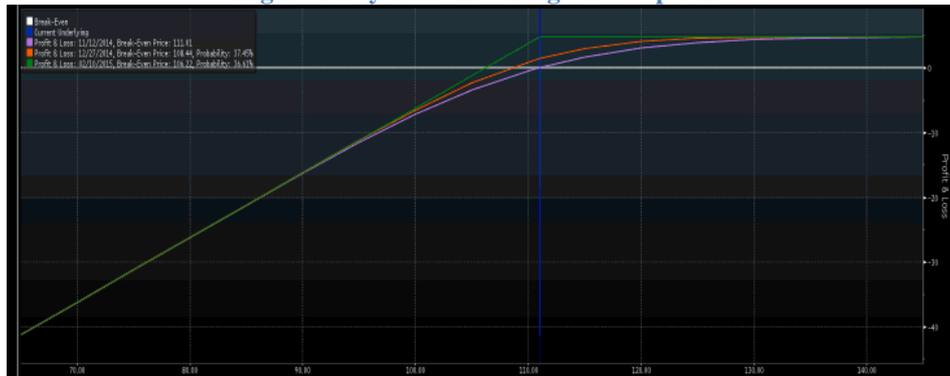
### III. Case Study:

An investment company can use stock options to minimise the market risk and the risk associated with volatility of individual assets in which the company invests. This can be done using traditional stock options such as American or European or exotic options that include barrier, Asian and binary options. Barrier options have a certain benchmark for the price of the underlying asset. If this benchmark is crossed, the option has to be exercised or nullified. In Asian options, the payoff depends on the average price of specific underlying assets rather than the current price. At the same time, binary options provide a payoff that does not depend on the price of the underlying stock but only on whether the strike price exceeded the price of the underlying asset. The payoff is fixed regardless of the difference. The European and American options provide payoffs that are dependent on the difference between the strike price and the price of the underlying stock (Wu et al., 2014). These options provide variety of opportunities for hedging and the most common hedging strategies are analysed in the next section.

In a stock option contract used by an investment company to hedge its position, the most important conditions are the strike price, maturity date and type of option (call or put). These conditions are expressed in the options contracts. Given these three elements, the investment company can use several hedging strategies with stock options.

The investment company does not use stock options only for hedging purposes. In fact, the most basic strategies such as naked call and naked put are good for speculative purposes. For conducting these strategies, the investment company does not have to invest in the underlying asset. They would simply sell a put option to investors. The payoff of this strategy is represented in the following figure that uses Apple as an example.

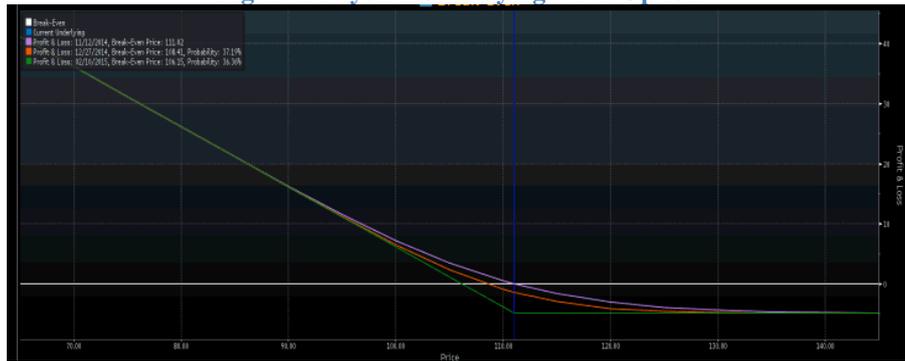
Figure 1 Payoff from Selling a Put Options



Source: Bloomberg (2014)

If the stock price does not go down, the investment company would generate a profit equal to the premium paid by the investor. In case of the current put option (purple curve) which is at the money, a further increase in share price would lead to a positive cash inflow for the company in the form of the premium. If the stock price falls down below the horizontal break-even point, the company will incur a loss as it would have to buy the underlying stock from the investor for a higher price than currently available in the market. (Song et al., 2014). If a put option is purchased by the investment company, the payoff from this strategy will be different as shown in the following figure.

Figure 2 Payoff from Buying a Put Option

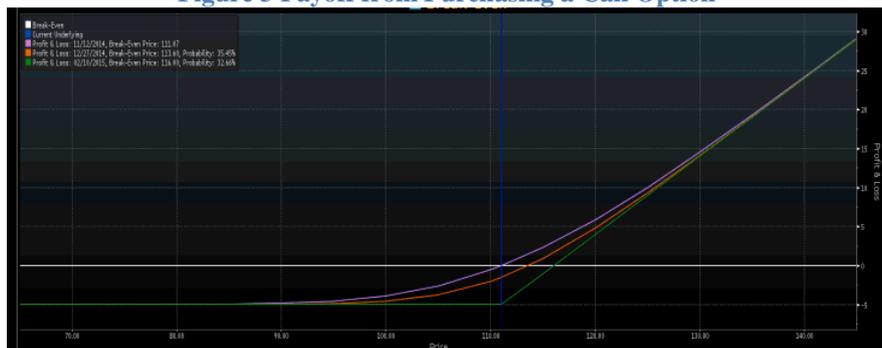


Source: Bloomberg (2014)

If the price of the underlying stock increases, the long position in the put option will result in a loss for the company equal to the size of the premium paid for the put as the option would not be exercised. However, a decrease in the share price would increase the payoff from the hedging strategy that involves purchasing a put option. The company would be able to purchase the underlying stock in the market for a low price and exercise the option that allows it to sell this stock for a higher price. The difference would represent the payoff, and the latter increases along with the further decline in the share price.

The next figure illustrates the company’s position if it purchased a call option instead of a put option.

Figure 3 Payoff from Purchasing a Call Option

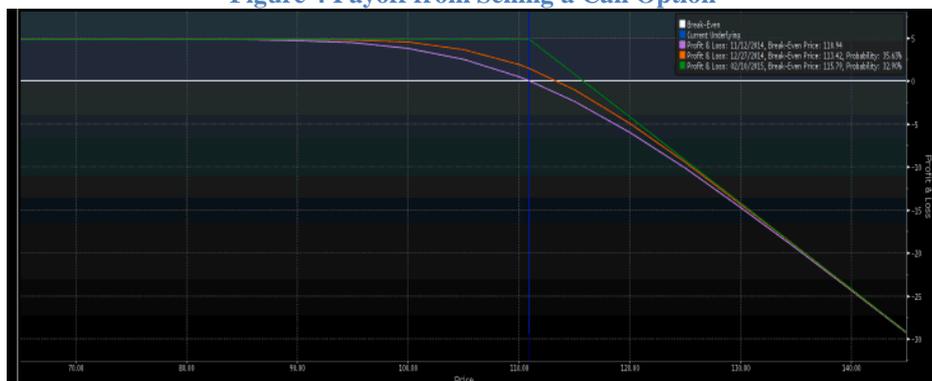


Source: Bloomberg (2014)

By holding a call option, the company can exercise it if the strike price goes higher than the market price of the underlying stock. In this case, the payoff will be increasing as the company pays less than the market price for the same stock. It can then sell the stock at a higher price in the market. In case of the downfall of the stock price, the risk of purchasing a call option would be limited to the premium paid for the derivative instrument.

The company can also sell a call option to trade on the downfall in prices. The payoff in this case would be as follows:

Figure 4 Payoff from Selling a Call Option

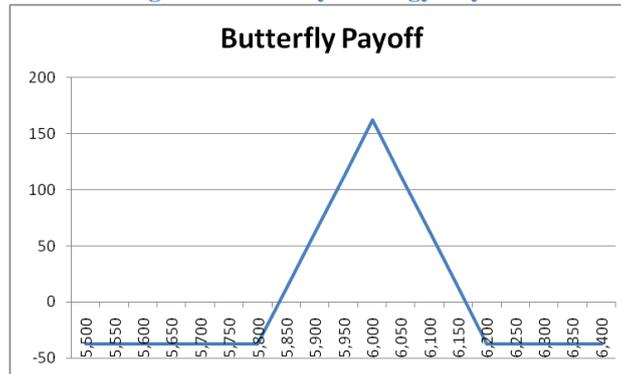


Source: Bloomberg (2014)

When the stock price goes up, the counterparty will exercise the call option and the investment company that sold the option would have to sell the underlying stock to the investor for a lower price than currently in the market. Hence, a loss would be incurred and the loss is theoretically unlimited as the share price can skyrocket. Yet, if the stock price goes down, the company that sold the option would be enjoying a profit equal to the premium on the stock option.

One of the common hedging techniques employed by the investment firm is the Butterfly strategy. It implies shorting two call options with the same strike price and entering long positions in two call options with the strike prices a certain point below and above the strike price in the shorted call option. By doing this, the firm captures the price band where expected profit will be generated (Smith, 2008). In this case, the payoff will be as follows:

Figure 5 Butterfly Strategy Payoff



This payoff assumes that the shorted call options have a strike price \$6,000 and the long positions are entered in the call options with the strike price \$150 below and above \$6,000. This strategy works well for the periods of low volatility in the financial markets. However, if uncertainty and volatility are high in the market, the investment firm would choose another stock option hedge strategy such as the Bear Spread (An and Suo, 2009). The company decides the minimum acceptable price level of the underlying stocks that it can tolerate and enters a short position in a call option with the strike price equal to this target. Simultaneously with this action, a long position is entered in a call option with a higher strike price. As a result, the following payoff is generated by the investment firm that protects it from increased volatility and the downside risk as a result:

Figure 6 Bear Spread Payoff



When the company already owns stocks of a particular company but wants to achieve greater security and hedge the position, it either buys a put option that will allow for selling the stock if prices go down or shorting a call option on the same stock that it owns. The latter strategy is known as the Covered Call (Cohen, 2005). Yet, the investment firm tends to utilise this strategy when there is scepticism about future increases in particular stock prices and a high probability of the downside movement. Instead of selling securities now and losing potential profits, the company chooses to implement these hedging strategies.

The latter example of the hedging strategy can be classified as spread hedging because it is set based on the level of underlying prices and stock prices of different options (Fonseca and Rustem, 2012). However, another popular technique for hedging is the of calendar spread hedges. Instead of considering different strike prices, this strategy implies investing in one type of stock options with a specific maturity and selling at the same time the same stock option with a different maturity. The main idea is to make decisions on the basis of

the maturity dates. For example, the investment company expects that in the long run a certain stock would increase in value. Therefore, it can profit not only from purchasing the stocks but also from selling put options. If these options are not exercised as the price goes up, the company is left with the income determined by the premium on the options. However, another put option is purchased to hedge against a downside possibility. This purchased put option would have a longer term to maturity and it would not be exercised if the investment company manages to earn on premiums from the sales of short-term put options in the calendar spread (Smith, 2008).

The discussed payoffs provided in this case study are rather general and mostly theoretical. In practice, the payoffs could be lower because the use of options for hedging is associated with additional costs. These costs include taxes, brokers' commission fees and margin costs. The latter occur when the potential losses from the use of stock options exceed a particular benchmark set as a percentage of the account. In this case, even if the investment company is unwilling to forfeit stock options, the broker has the right to close the transaction to avoid further losses that it cannot tolerate (Mitra, 2013). Therefore, while stock options can be used as hedges against the market risk, they can also work as a leverage that increases risk because the potential losses are greater than what would have been incurred by trading the underlying stocks only.

#### **IV. Conclusion:**

In conclusion this study investigated the use of stock options contracts in practical cases by investment companies that specialise in trading of the stocks of other companies. The options can be of many types among which there are American options, European options, Asian options and barrier options. They are different in terms of when the investor can exercise the options and what the payoff will be.

This research investigated theoretical aspects of stock options such as the types of options and how they work for investors and traders. The second part of the paper analysed a case study of an investment company that was involved in stock trading and used stock options mostly for hedging purposes. Even though examples were provided that stock options strategies such as naked put or naked call could be used for speculative purposes, the majority of strategies reviewed were used for hedging.

By entering a long position in a put option or shorting a call option, the company anticipates a decrease in stock prices. In this case, there would be a positive payoff. However, when higher prices are expected, the company buys a call option or shorts a put option.

It has been found that different hedging strategies serve different purposes in managing risk. Some strategies such as the butterfly strategy are good for the times when the volatility in the market is low. The butterfly strategy implies shorting two call options with the same strike price and entering long positions in two call options with the strike prices a certain point below and above the strike price in the shorted call option. However, when volatility rises due to financial crises, alternative hedge strategies such as the bear spread are used by the company to protect its earnings against the market risk. According to this strategy, the company decides on the minimum acceptable price level of the underlying stocks that it can accept and enters a short position in a call option with the strike price equal to this target. The case study also showed that besides the hedging with price spreads, the investment company utilises calendar spreads that use the terms to maturity to adjust the hedging position.

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