

RISK MANAGEMENT APPLICATIONS OF OPTION STRATEGIES

In Reading 70 we concentrated on option payoffs, but in this reading we shall focus on *profits and losses* from option positions. Recall that the profit on an option position is simply the payoff from the option adjusted for the premium paid to acquire it (cost of the option).

LOS 72a: Determine the value at expiration, profit, maximum profit, maximum loss, breakeven underlying price at expiration, and general shape of the graph of the strategies of buying and selling calls and puts, and indicate the market outlook of investors using these strategies. Vol 6, pg 159-168

A call option holder benefits when the price of the underlying asset rises above the exercise price. Let's work with a call option on a share of TKS and illustrate the payoff and profit diagrams for a call option holder. Suppose that the exercise price of the option is \$100, the option is purchased for \$5, and at expiration, TKS stock trades at \$115.

The call option is in-the-money as soon as TKS stock rises above \$100. At this stage, however, even though the option holder will receive a positive payoff, she would be making a loss on her option position. She breaks even on her investment at a price of \$105 (payoff of \$5 minus premium of \$5 = Zero profit).

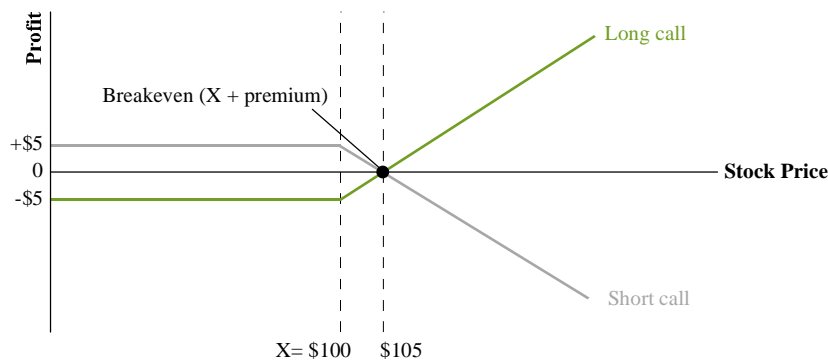
Call Holder's Perspective

- If the option expires out-of-the-money, the maximum loss to the call option holder equals the premium paid for the option (\$5).
- Breakeven on the option position occurs when the market price equals the strike price plus option premium ($\$100 + \$5 = \$105$).
- The call option holder's profits are unlimited. As the stock price rises, her profits continue to increase.
- The call option holder will exercise the option if there is a positive payoff i.e., when the stock price exceeds exercise price. ($S_T > X$)

Call Writer's Perspective

- When the option expires out-of-the money (when the stock price is less than the exercise price) it is not exercised by the holder so the writer makes a maximum profit equal to the option premium (\$5).
- The writer's breakeven occurs at the same point as the holder's breakeven. At a price of \$105, the writer has a negative payoff on the option of \$5, which offsets the premium collected upon writing the option.
- The call option writer's losses are unlimited. As stock price rises, the writer continues to suffer increasingly negative payoffs on the option position.

At a TKS stock price of \$115, the call option holder's payoff equals \$15, while the option writer's payoff is negative (-\$15). The call holder's profit is \$10, while the option writer's loss equals \$10. The sum of the buyer's and writer's profits always equals zero. Options are a zero-sum game.

Figure 1: Profit/Loss Diagram For A Call Option

Now let's work with a put option on TKS stock. We will once again assume that the strike price of the option is \$100, and that the option premium is \$5. However, now we shall assume that TKS stock price at option expiration equals \$80.

The put option is in-the-money once TKS stock price falls below \$100. At this stage however, even though a put option holder would receive a positive payoff on the put, she would still make a loss on her investment. She would break even on the option position at a TKS stock price of \$95 (payoff of \$5 from the put minus premium of \$5 = Zero profit).

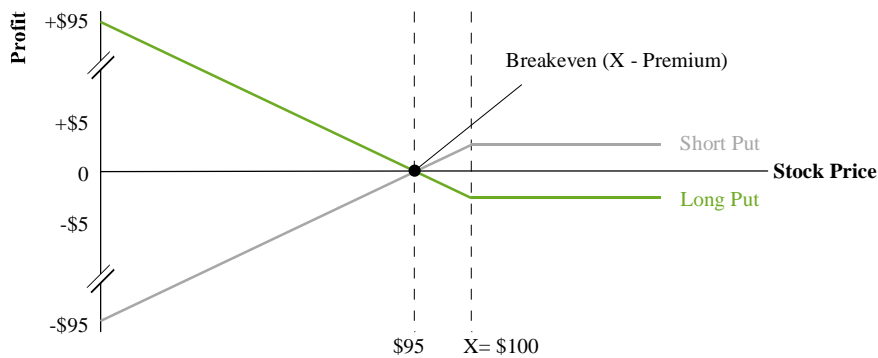
Put Holder's Perspective

- If the put expires out-of-the-money, the maximum loss to the option holder equals the premium paid for the option (\$5).
- Breakeven on the option position occurs when the stock price equals the strike price minus option premium ($\$100 - \$5 = \$95$).
- The put option holder's profits are maximized when the stock price falls to zero. With a stock price of zero her payoff equals \$100 (the exercise price) and her profits equal \$95.
- The put option holder will exercise the option when there is a positive payoff i.e., when the stock price is below exercise price at expiration. ($S_T < X$)

Put Writer's Perspective

- When the put option expires out-of-the-money (when stock price exceeds the exercise price), it is not exercised by the holder so the writer makes a maximum profit equal to the option premium (\$5).
- The writer's breakeven occurs at the same price as the holder's breakeven. At a price of \$95, the writer has a negative payoff on the option of \$5 which offsets the premium collected upon writing the option.
- The maximum loss to the put option writer occurs when the stock price falls to zero. At this point, the writer has a negative payoff equal to \$100 (the exercise price) and a loss of \$95.

At a TKS stock price of \$80, the put option holder's payoff equals \$20, while the option writer's payoff is (-\$20). The put holder's profit equals \$15, while the option writer's loss equals \$15. Once again, we see that options are a zero-sum game.

Figure 2: Profit/Loss Diagram For A Put Option

- Call option holders and put option writers benefit when underlying asset prices *increase*. Call option buyers believe that the underlying asset is undervalued.
- Put option holders and call option writers benefit when underlying asset prices *decrease*. Put option buyers believe that the underlying asset is overvalued.

LOS 72b: Determine the value at expiration, profit, maximum profit, maximum loss, breakeven underlying price at expiration, and general shape of the graph of a covered call strategy and a protective put strategy, and explain the risk management application of each strategy. Vol 6, pg 168-175

A covered call strategy for a stock involves owning the stock and writing a call option (usually out-of-the money) on the stock. A covered call is written when an investor believes that the stock price will not increase in the near future. Therefore, she expects the written call not to be exercised, and hopes to supplement her return by collecting option premium while maintaining her holding of the stock. In case she is wrong and the stock price exceeds the exercise price at option expiration, the option will be exercised and the stock will be called away. This strategy has an element of risk in it i.e., the investor essentially trades away the stock's upside potential in return for the call premium.

Let's suppose that we write a call on a stock that we already own. We earn \$8 from writing a call on the stock that currently trades at \$100. The exercise price of the call is \$110.

- If the stock price at option expiration is below \$110, the option will not be exercised. We would continue to hold the stock and would have earned extra revenue equal to the premium (\$8).
- We breakeven at a stock price of \$92. At a price of \$92, the loss in the value of our stock holding ($\$100 - \$92 = \$8$) equals the amount we earned from writing the option.
- Between stock prices of \$100 and \$110, we benefit from stock price appreciation, and the option is not exercised. Our total gain (including option premium) varies between \$8 and \$18.
- The maximum gain on the covered call position occurs when the option expires at-the-money, where we gain \$10 in stock appreciation and \$8 in premium.
- The maximum loss occurs when the stock price falls to zero. Our loss of \$100 (in stock value depreciation) would only be offset to the extent of \$8 from the option premium and leave us with a total loss of \$92.

Investors will only pursue the covered call strategy when they believe that the chances of the stock price rising above the exercise price of the written calls, till option expiration, are slim. They trade away the upside in the stock for the receipt of call premium. Figure 3 illustrates the payoff diagrams on the individual components of the covered call strategy and Figure 4 illustrates the payoffs on the strategy overall.

Figure 3: Covered Call Components

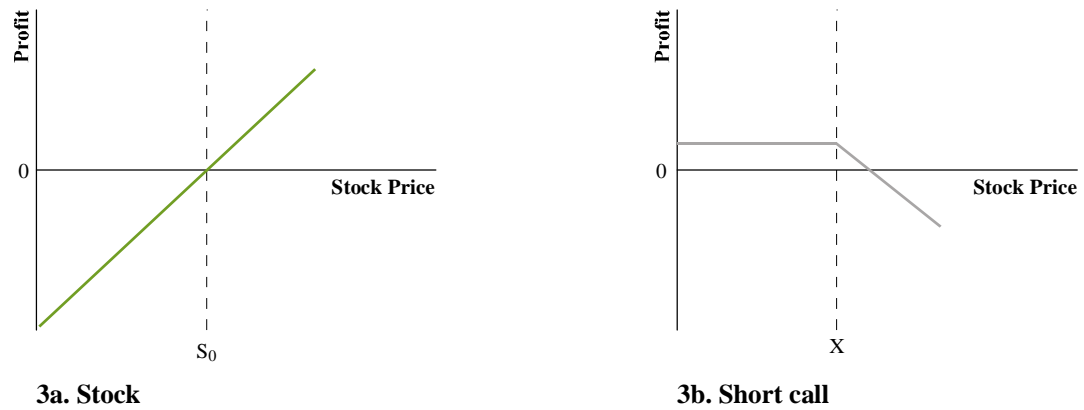
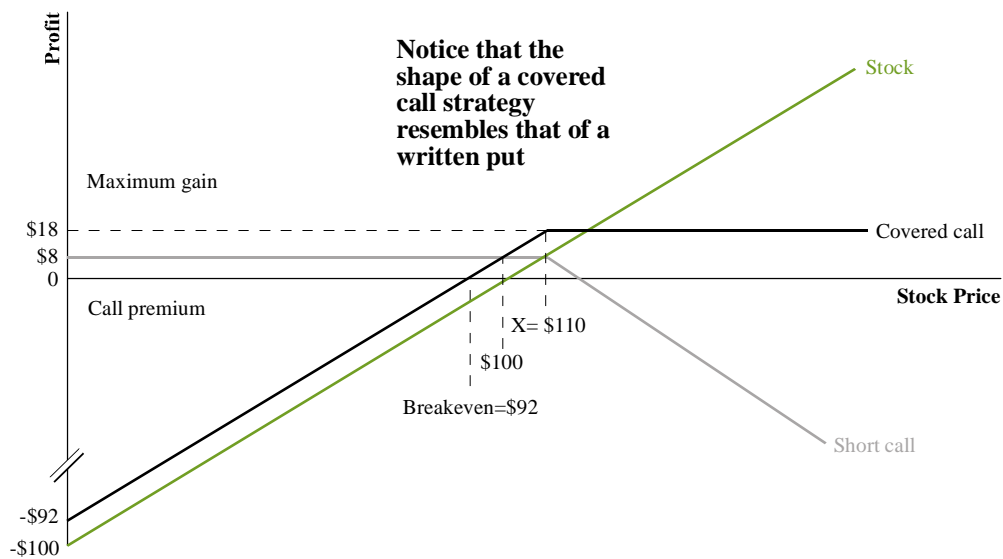


Figure 4: Covered Call Payoff



Protective Put Strategy

A protective put is a hedging strategy that protects a portfolio from falling in value below a particular level. A protective put is constructed by owning a stock and purchasing a put option on the stock. Let's suppose that we own a stock that is worth $\$50$ currently and we want to protect ourselves against a decline in value below $\$50$. At the same time, we want to participate in any upside in the stock. We can accomplish this by purchasing a put option on the stock with a strike price of $\$50$. Assume that this option is available for $\$2$.

- If the stock price exceeds the exercise price at option expiration, the put expires worthless, and we suffer a maximum loss equal to the put premium paid (\$2).
- If the stock price falls below \$50, we exercise the put option. The reduction in the value of our stock holding is offset by positive payoff from the put option.
- Between prices of \$50 and \$52, the loss on the protective put position varies between \$0 and \$2.
- Profits are made when the stock price exceeds \$52.
- Breakeven occurs at a stock price of \$52 (original stock price plus put premium).

Figure 5 illustrates the payoff diagrams for the individual components of a protective put strategy and Figure 6 illustrates the payoff on the protective put overall.

Figure 5: Protective Put Components

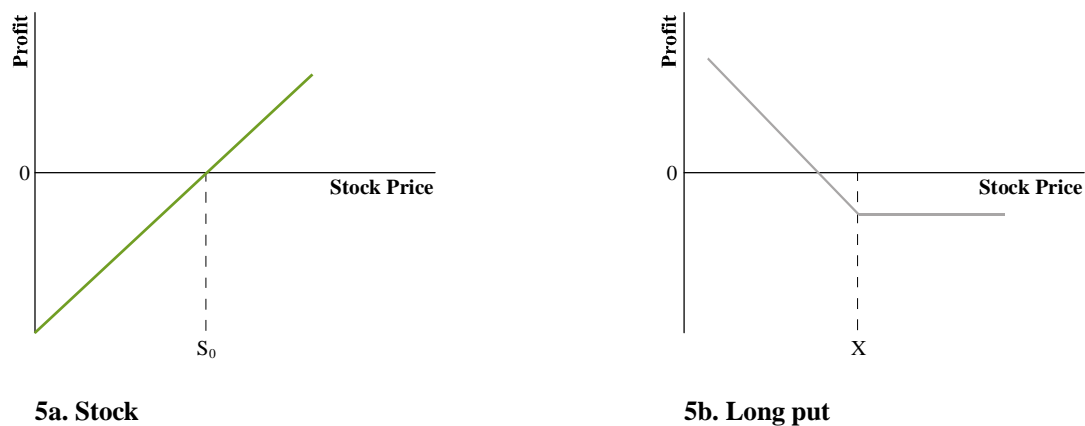


Figure 6: Protective Put

