A PORTFOLIO OF OPTION STRATEGIES

Calvin Crosby

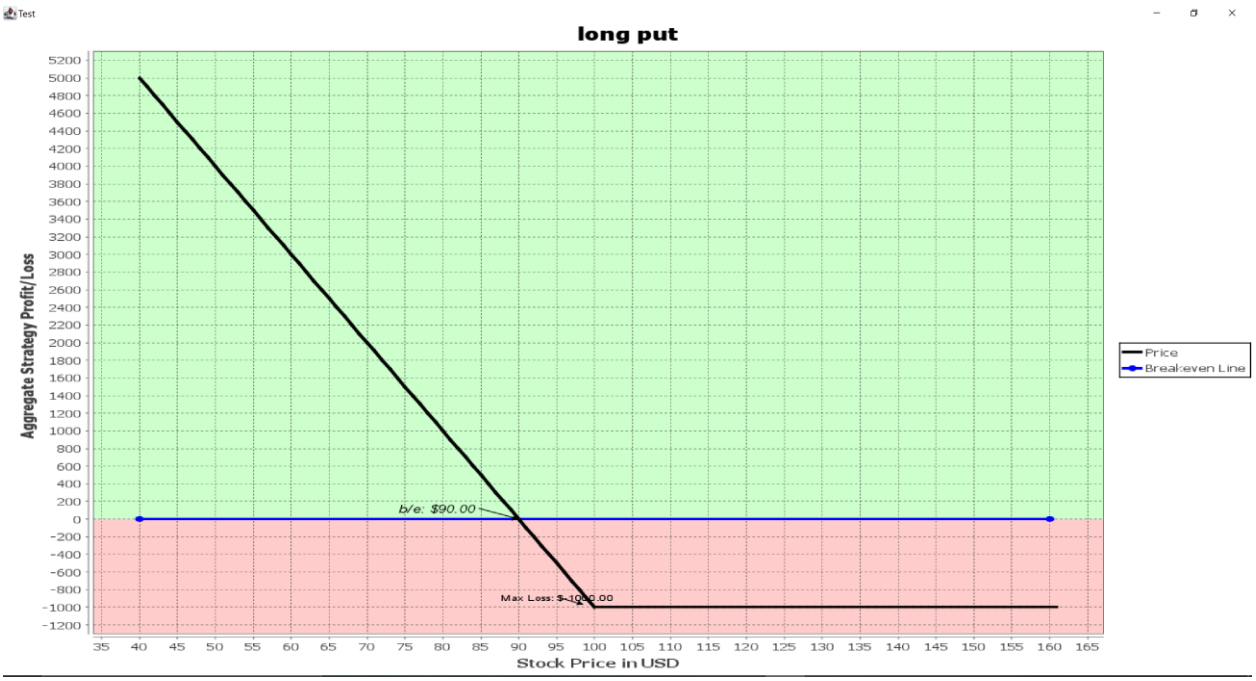
Abstract

Every graph in this document was generated locally with the use of the Option Strategy Visualizer I developed for my final project. A short description accompanies each strategy graph and the components of each graph can be found on the final pages, along with supplementary information.

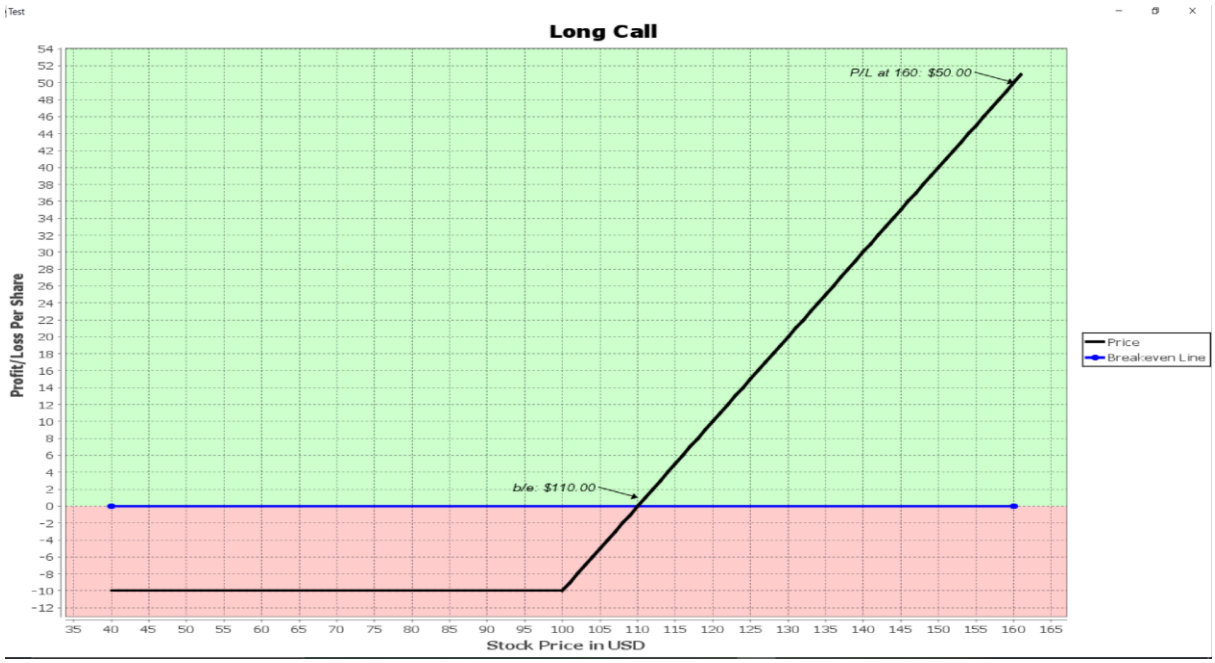
Calvin Crosby
crosbyca@northeastern.edu

Options, or derivatives, are complex financial securities that serve as contracts to buy and sell an underlying asset, like a stock. They come in two types, calls and puts, and can be bought or written (sold) on an open market. There were two major goals I had for this project. The first was to prove that I can connect to a financial data provider reliably, and retrieve real option data requested by a user. I then wanted to allow a user to utilize any of these real options to create a strategy on their own. This strategy, no matter what went into its construction, would then be visualized on a graph. Any number of options or equity stock can be added to a strategy and an accurate graph of its profit/loss will be generated. This is a tool that isn't easily available, and the ones I did find online do not allow as much free reign as I do when it comes to creating a strategy. Most of the online tools I found online demanded you pick a "templated" strategy, like a buy write and stick to that template. My program allows for any combination of up to 150 options. Modeling the aggregate profit/loss of a strategy with up to 150 options required the development of an algorithm that could combine all of their respective profit equations. With higher order functions and linear interpolation, my program allows for the visualization of any option strategy and the identification of its break-even points. Finding breakeven points required me to split apart the "legs" of an option strategy to identify and solve for their location. Option strategies are created in my Driver and visualization is done in the DynamicChartGenerator class. Running these files will generate whatever Strategy is passed into the DynamicChartGenerator instance.

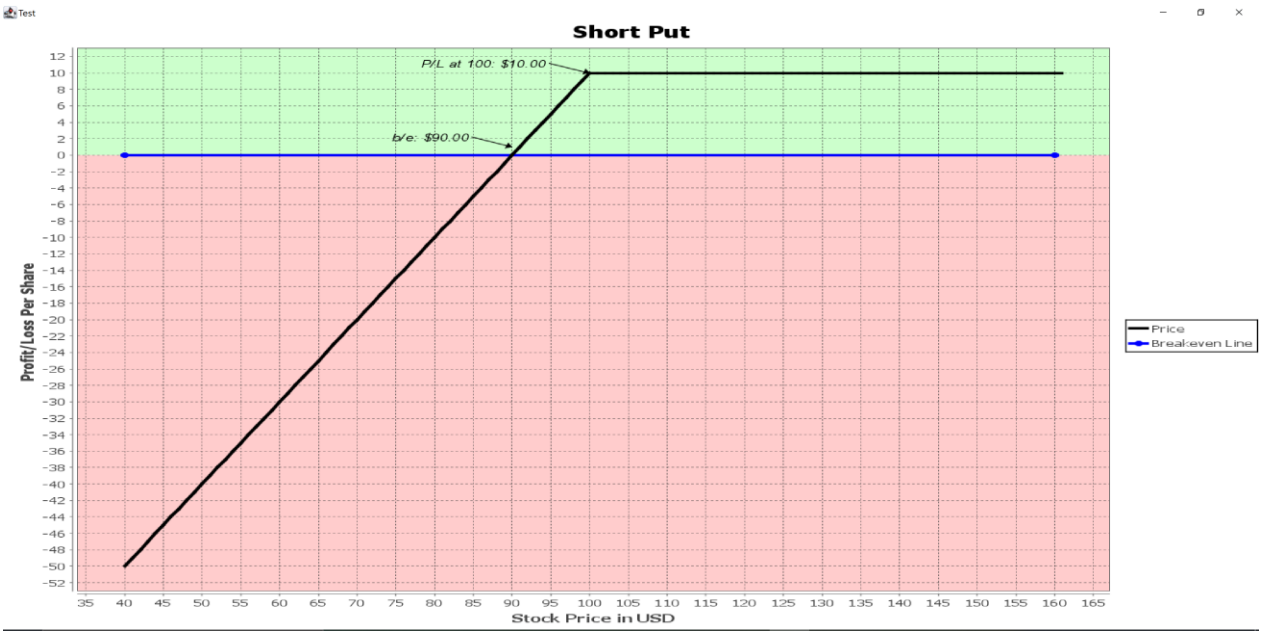
Below are 14 popular option strategies of varying complexity made with my program.



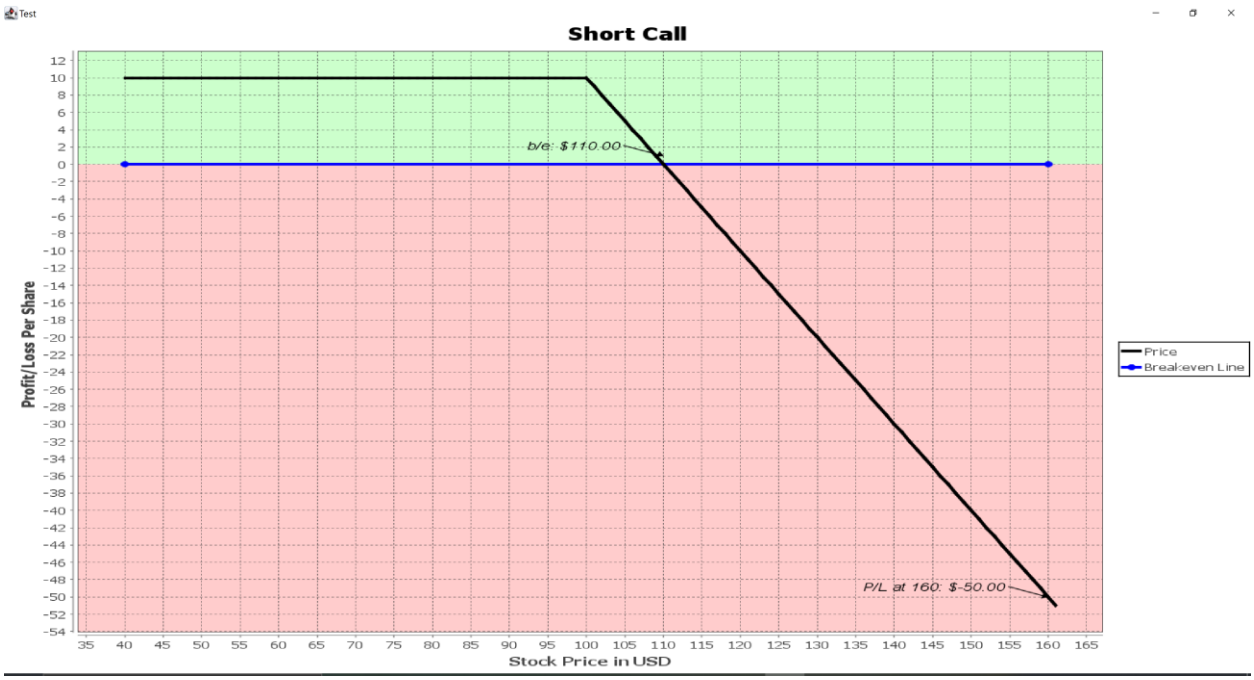
The long put is an options strategy where the trader buys a put expecting the stock to be below the strike price before expiration.



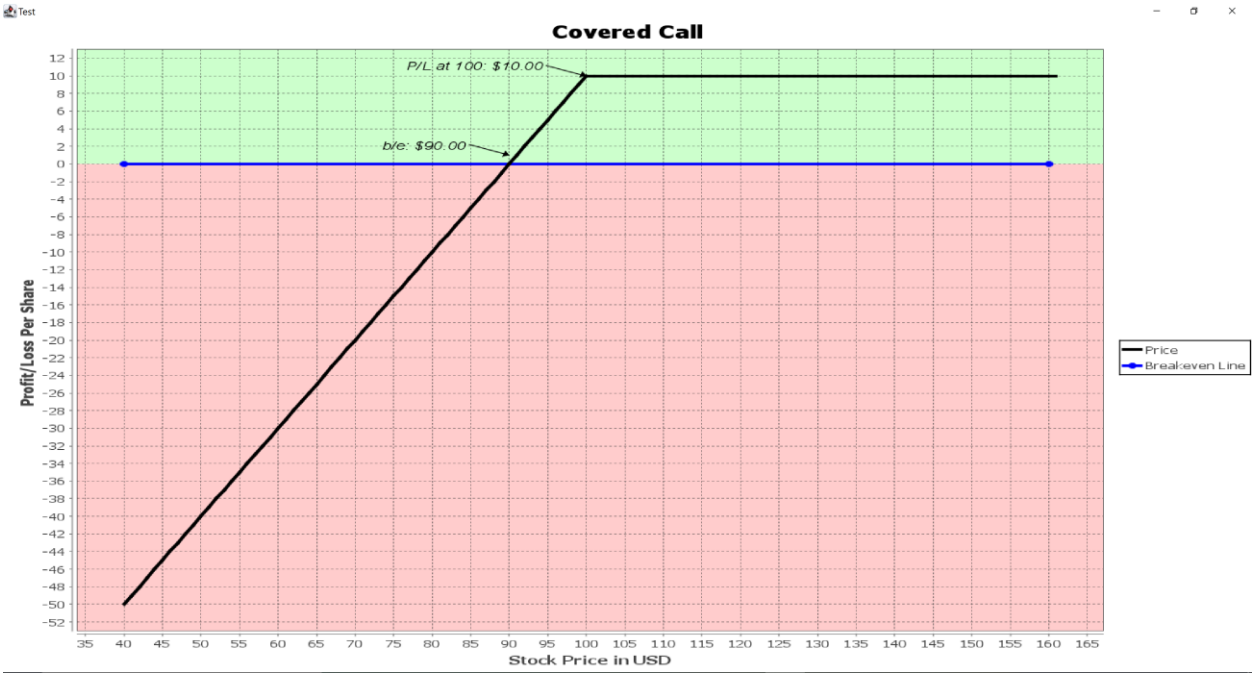
With the long call, the trader buys a call expecting the stock to be above the strike price before expiration.



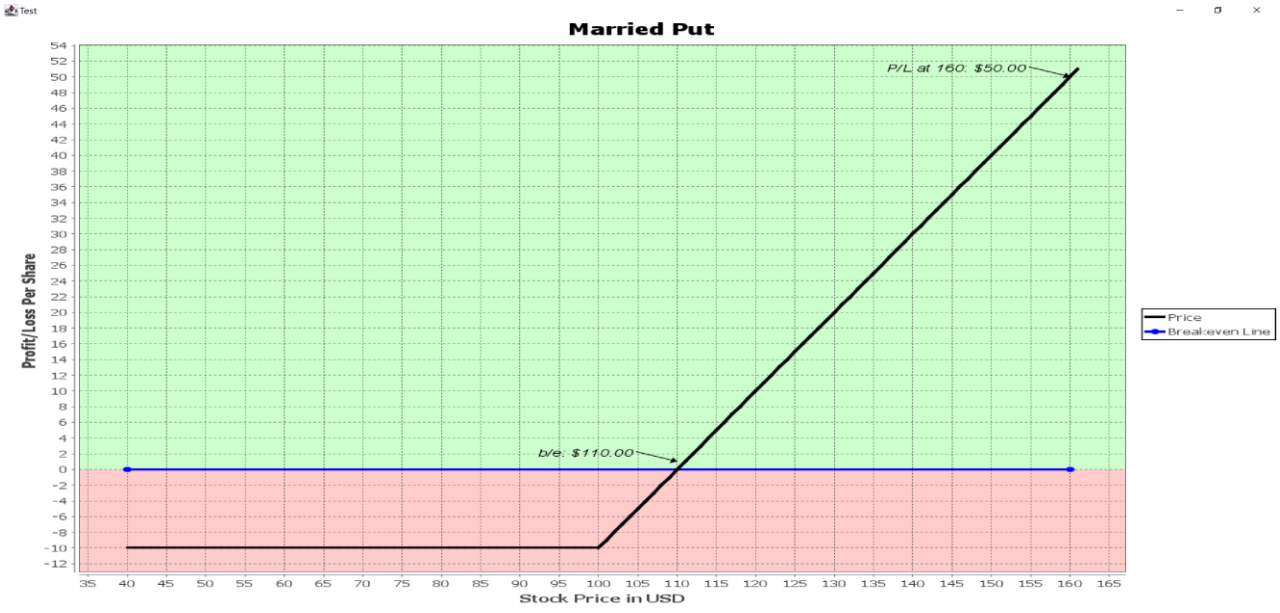
In a short put, the trader sells a put expecting the stock to be higher than the strike price by expiration. This is similar to selling insurance against the stock falling below the strike price.



In a short call, the trader sells a call expecting the stock to be lower than the strike price by expiration.

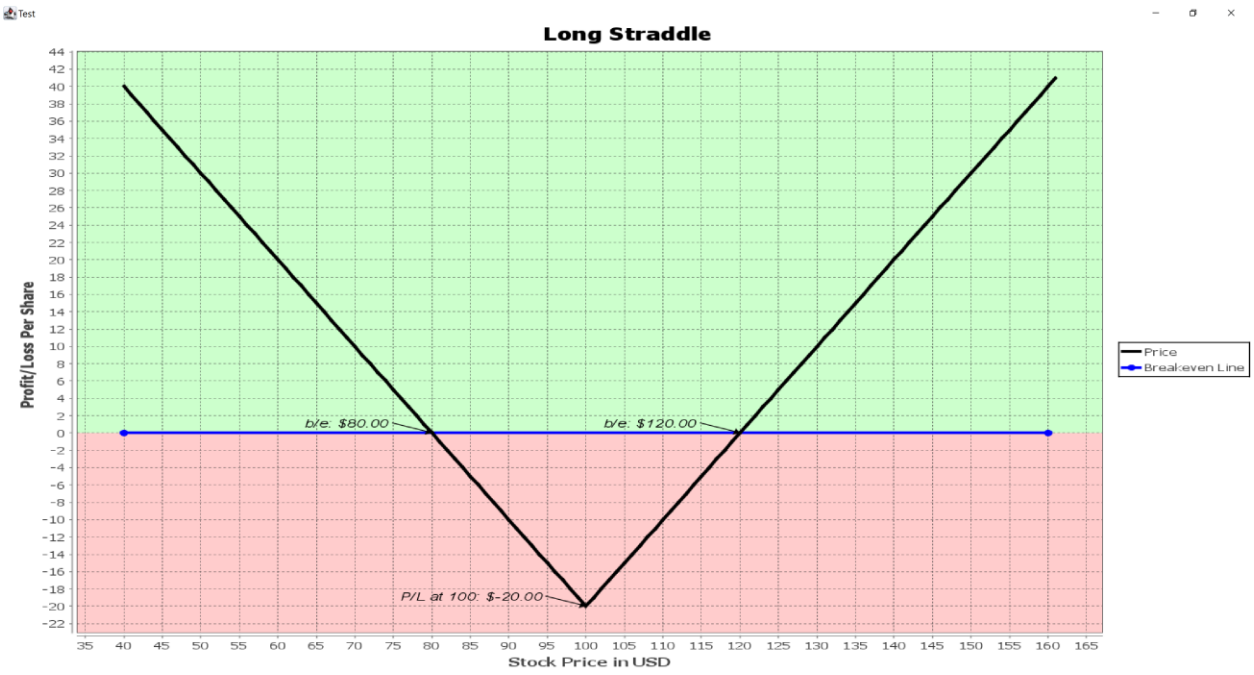


In order to create a covered call, the trader sells call options for each 100 shares of the underlying stock owned. The investor expects the stock to remain relatively flat, allowing the call to expire worthless. This allows the trader to pocket the premium without having to sell the stock at the strike price.

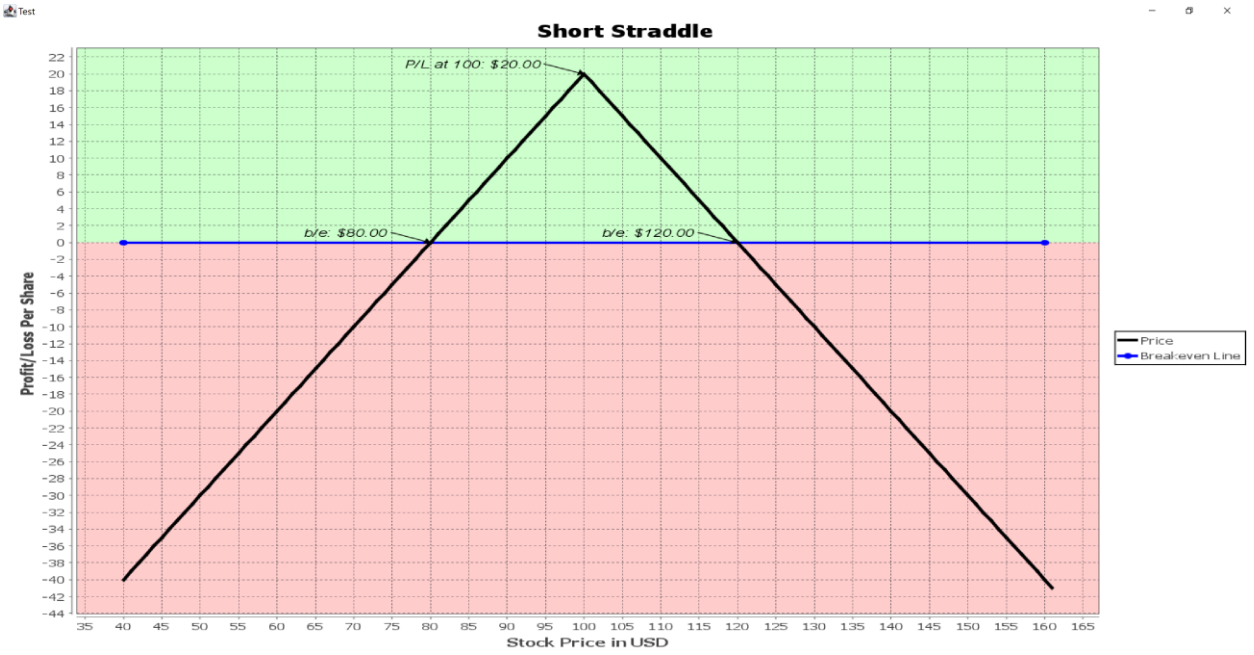


When using a married put, the trader buys put options on a stock for each 100 shares of the underlying stock owned. The investor suspects the stock may fall in the short

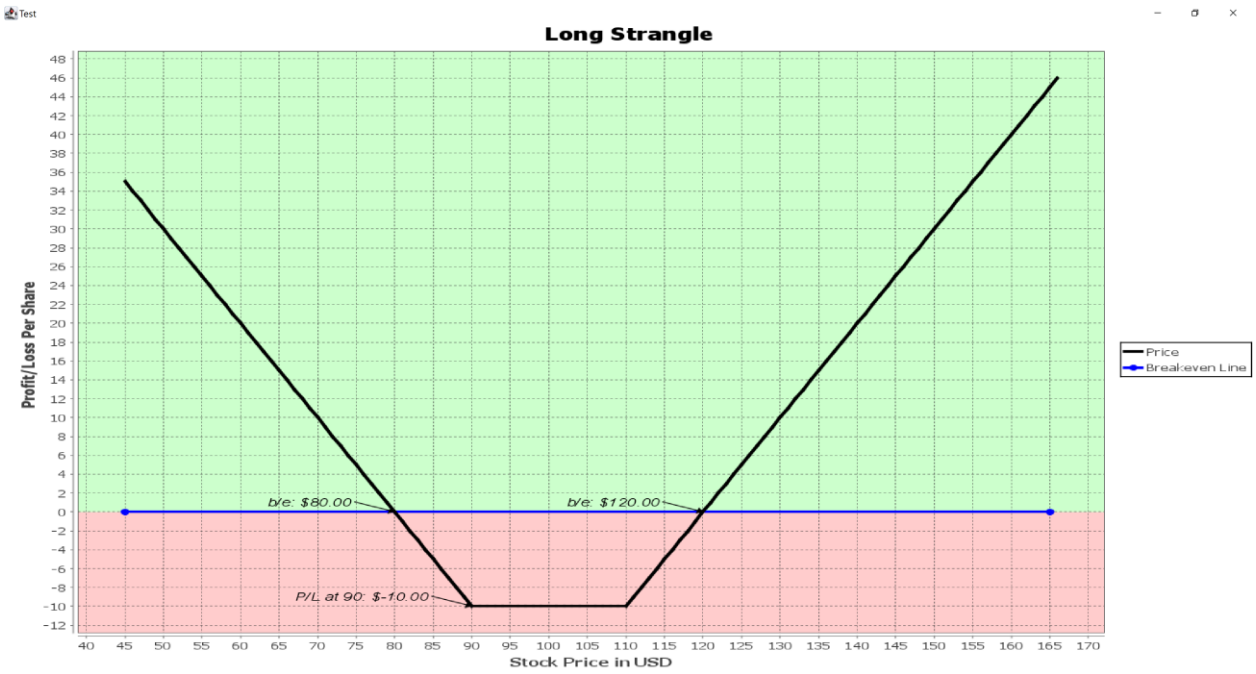
term but wants to continue owning it because it may rise significantly. So the married put protects the investor's downside.



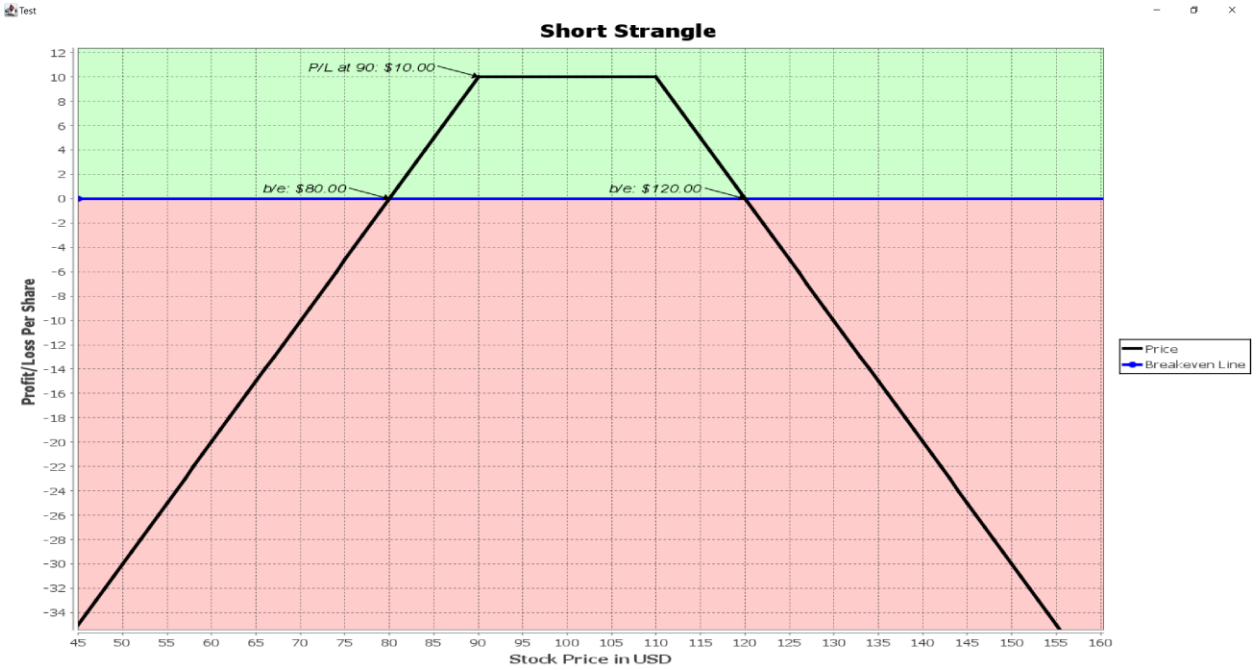
The long straddle is a strategy where the trader buys an at-the-money call and an at-the-money put with the same expiration and the same strike price. The trader suspects the stock may move significantly but is not sure in which direction.



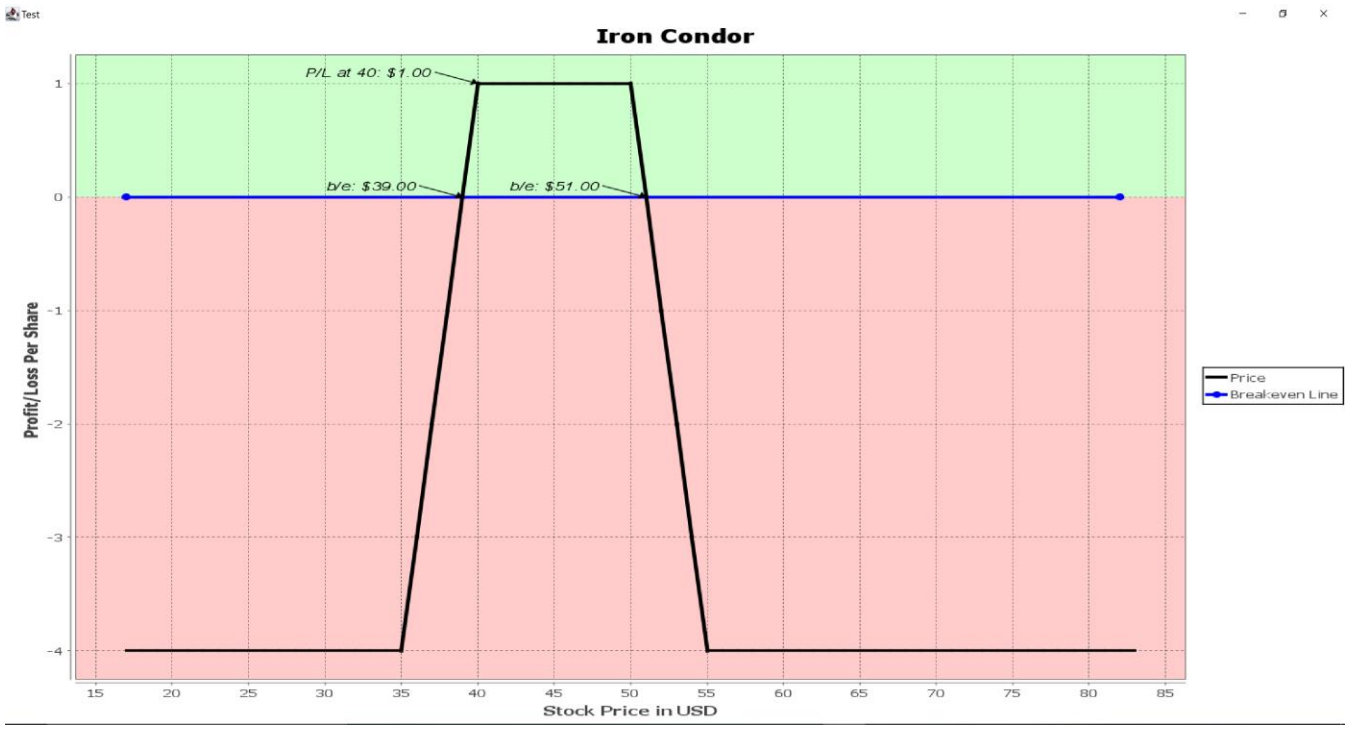
The short straddle is the opposite of a long straddle. A trader sells an at the money call and put, with the expectation that the stock will not move significantly before expiration of the options.



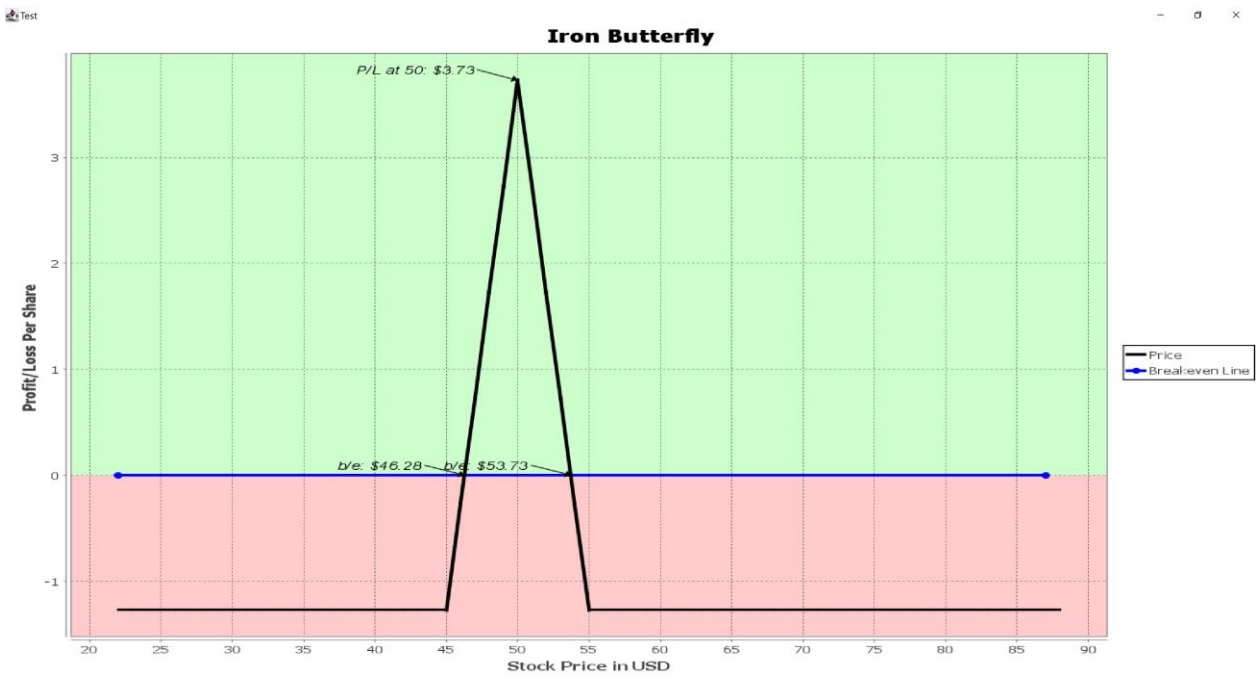
The long strangle is like the long straddle, but it's cheaper to set up because it uses out-of-the-money options instead of at-the-money options. In the long strangle, an investor buys a call and a put option at prices above and below the current stock price, respectively. The trade-off, relative to the straddle, is that the stock must move even more for the strategy to work.



The short strangle is the opposite of a long strangle. An investor sells a call and put option at prices above and below the current stock price. If the stock stays within the spread of the sold strikes, a positive profit will be made.

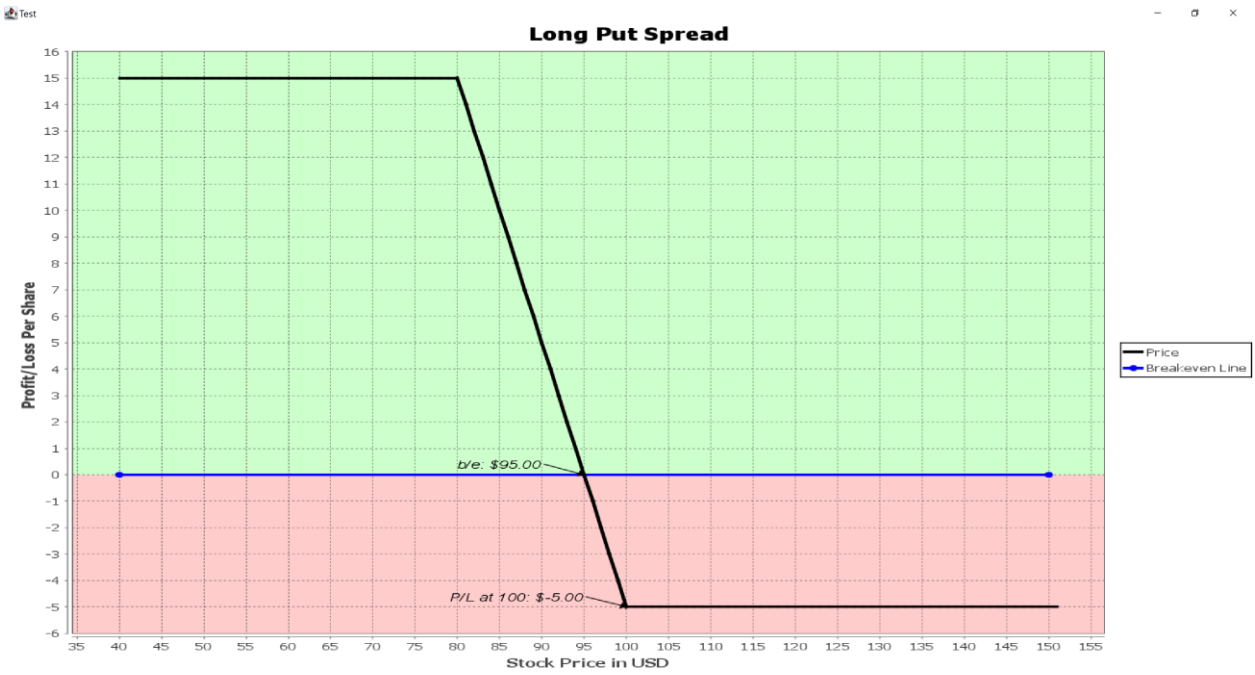


The iron condor is a limited risk, non-directional option trading strategy that is designed to have a large probability of earning a small limited profit when the underlying security is perceived to have low volatility

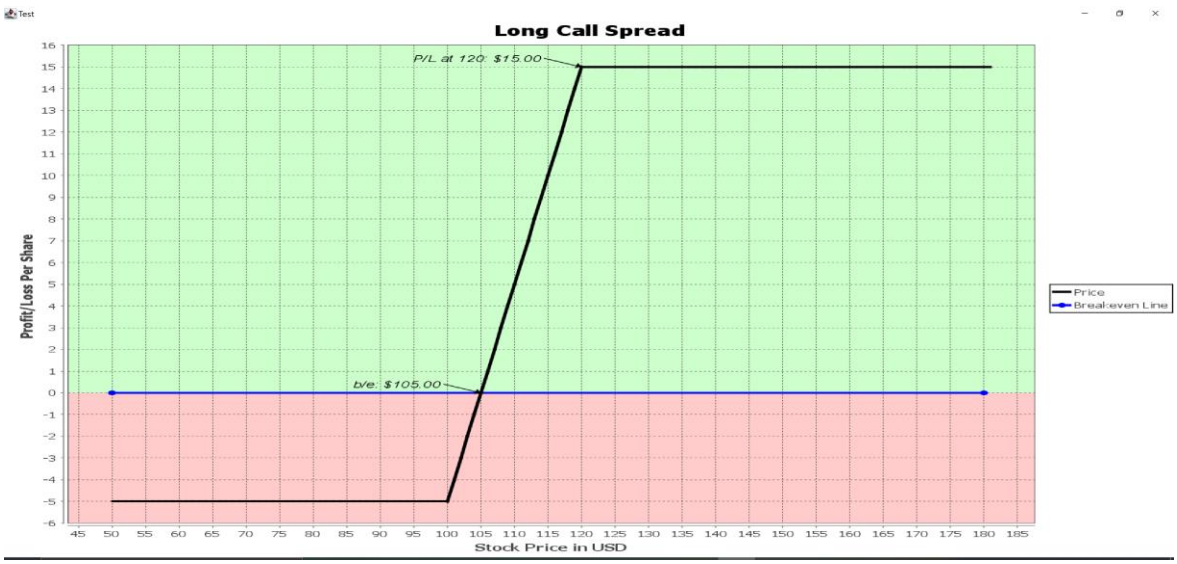


.

The Iron Butterfly Option strategy, also called Ironfly, is a combination of four different kinds of option contracts, which together make one bull Call spread and bear Put spread. Together these spreads make a range to earn some profit with limited loss



A bear spread is a strategy used when one is mildly bearish and wants to maximize profit while minimizing losses. The goal is to net the investor a profit when the price of the underlying security declines. The strategy involves the simultaneous purchase and sale of either puts or calls for the same underlying contract with the same expiration date but at different strike prices.



A bull call spread is an options trading strategy designed to benefit from a stock's limited increase in price. The strategy uses two call options to create a range

consisting of a lower strike price and an upper strike price. The bullish call spread helps to limit losses of owning stock, but it also caps the gains.

Option Strategy Recipes

Useful link for understanding the basics of options: https://www.investopedia.com/options-basics-tutorial-4583012

*ATM = At the money. The strike price will be the same as the current stock price

*OTM = Out of the money. For calls, this means the strike price is above the current stock price. For puts, this means the strike price is below the current stock price.

Long Call:

Buy 1 ATM Call

Long Put:

Buy 1 ATM Put

Short Call:

Sell 1 ATM Call

Short Put:

Sell 1 ATM Put

Covered Call:

Long 100 Shares
Sell 1 Call

Married Put:

Long 100 Shares
Buy 1 ATM Put

Long Straddle:

Buy 1 ATM Call
Buy 1 ATM Put

Short Straddle:

Sell 1 ATM Call
Sell 1 ATM Put

Long Strangle:

Buy 1 OTM Call
Buy 1 OTM Put

Short Strangle:

Sell 1 OTM Call
Sell 1 OTM Put

Iron Condor:

Sell 1 OTM Put
Buy 1 OTM Put (Lower Strike)
Sell 1 OTM Call
Buy 1 OTM Call (Higher Strike)

Iron Butterfly:

Buy 1 ITM Call
Sell 2 ATM Calls
Buy 1 OTM Call

Put Spread:

Buy 1 OTM Call
Sell 1 ITM Call

Call Spread:

Buy 1 ITM Call
Sell 1 OTM Call