StrategyExplorer

User Guide

Version 1.0

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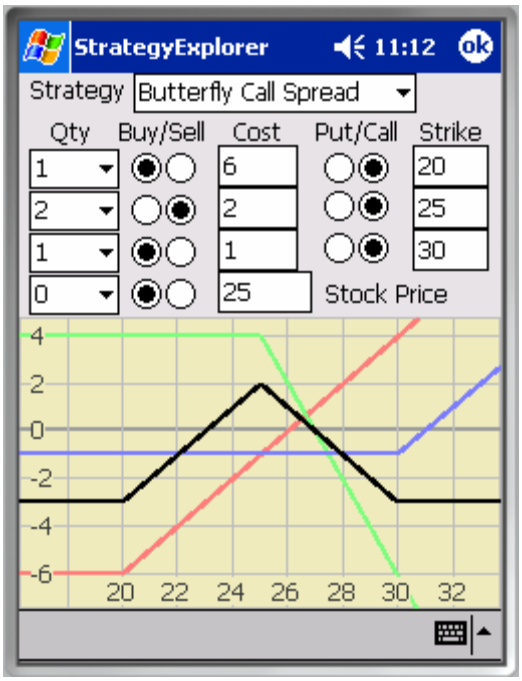
The StrategyExplorer is a graphing tool allowing you to experiment with various hedging strategies optionally including a stock and as many as three options on that stock. It assumes that all options on the stock expire on the same calendar date. It displays an auto-zoomed window on a region of the underlying stock's price with the vertical axis representing gains (losses) imputed by stock prices.



The StrategyExplorer helps you analyze option spreads, enabling you to hedge risk or maximize profit potential. You can think of the StrategyExplorer as a hedge-specific graphing calculator with built-in examples of twenty popular option spreads.

You'll notice that the StrategyExplorer plots payoff polylines for each of the constituent options as well as the aggregate profit (loss) on the spread, but it doesn't bother plotting the Black-Scholes values for the options or the sum of those values. There are two reasons for this. First, it would require capturing the option's times to expiry, for which little room remains on the tiny PocketPC screen. Second, computing enough option values to produce a smooth plot would slow the application down, perhaps unacceptably. Option arbitrage specialists won't be happy about this – they'll have to wait for a future release when beefier PocketPC processors are available.

Strategies Supported

Trivial strategies involving a single option or a single stock are not explicitly discussed below, but are clearly constituent components in the strategies presented. The StrategyExplorer really becomes useful in analyzing the profit profile of a stock and/or a combination of options expiring concurrently on that underlying issue. Each of the positions may be either long or short. Twenty commonly used strategies have built-in examples, so you can start with the example and modify prices to meet your situation. We'll cover the strategies themselves in the order that they appear in the Strategy combo-box. The strategies are not listed alphabetically, they are grouped into those involving only options and those involving both options and stock, with the options only strategies appearing first. The options only strategies further break down into the following subgroups: bullish, bearish, neutral with low volatility, neutral with high volatility. Strategies involving stock break down into the following small subgroups: covered, protective, bracketed, and arbitrage.

Strategy

You don't actually need the Strategy combo-box to run the StrategyExplorer, but you'll probably find it convenient. The Strategy combo-box contains a list of twenty popular option spreads and hedging strategies. If you've never used it before you can use arrow keys or the drop-down box to navigate the list of strategy names. If you know some of the strategy names, you can type a couple of characters and have auto-completion find the strategy name for you.

If you have never used the StrategyExplorer before, the Strategy combo-box selects Synthetic Long Stock (the first strategy in its list of strategies) as the strategy to evaluate, but if you've used the StrategyExplorer before, the Strategy combo-box will display 'Previous Settings' and those settings will drive the plot.

Option Expiration

All of the spreads supported by the StrategyExplorer are classified as vertical spreads. That means that all options are assumed to expire on the same day, at some point in the future, i.e. they haven't expired.

Ratio Spreads

Every strategy supported is inherently a ratio spread. Although the strategies that appear in the Strategy combo-box are usually thought of as having integral values for the stock and option quantities, the StrategyExplorer is not limited to analyzing the accepted discrete definition of a spread.

Non-negative Values

Each of the edit boxes accepts a non-negative value. Negative values will be complemented and echoed back. Short sales are accomplished by selecting a Sell radio button instead of a Buy button.

Quantity Zero

The quantity zero prevents a stock or option from being plotted or contributing to the aggregate payoff.

Graph Colors

The output graph always displays the payoff polyline for the first option in red, the second option in green, the third option in blue, and the stock in purple. It also plots a black polyline over the constituent positions to represent the aggregate payoff.

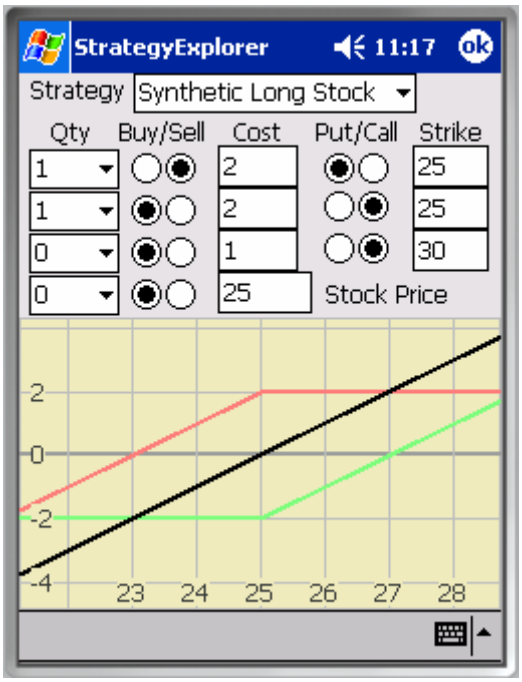
Database Access

The StrategyExplorer does not access the database, so the skeleton options you define and quantities you buy or sell can be completely unrelated to actual options defined or positions you hold. The StrategyExplorer is intended to be an exploratory tool, unconstrained by the realities of the markets or your portfolio.

Restoring the Previous State

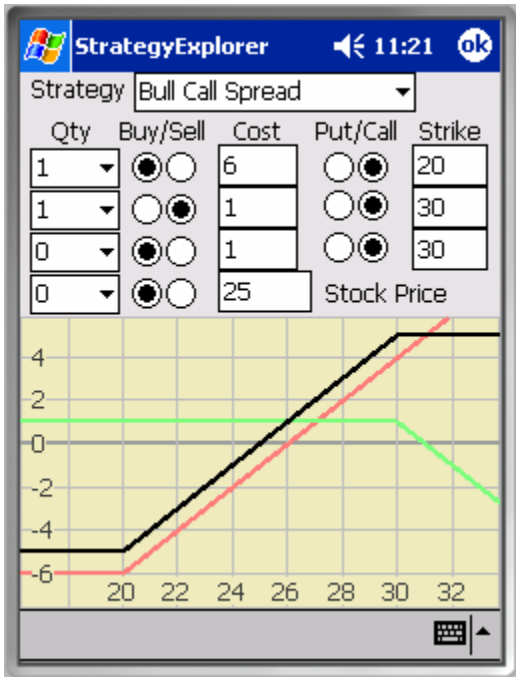
The StrategyExplorer remembers the state of your last analysis, so you can exit out of it at any time to define an option, create a position, etc. and come back to exactly the point you were when you left. The dialog's saved state is only accessed at initialization – once you've made changes to the state of its controls, you can't return to the 'last saved state'.

Option Only Strategies - Bullish



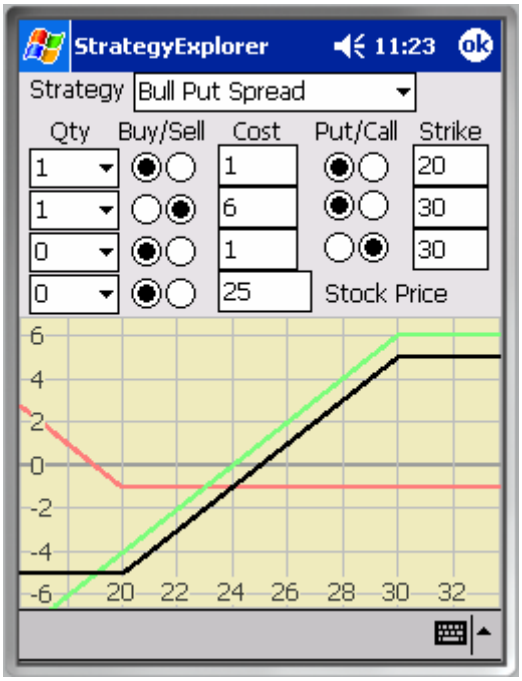
Synthetic Long Stock

A Synthetic Long Stock is a bullish strategy whose profit (loss) behavior is identical to that of a long position in the underlying stock with the advantage of requiring substantially less capital. Ideally, it's constructed from a short at-the-money put (red) and a long at-the-money call (green).



Bull Call Spread

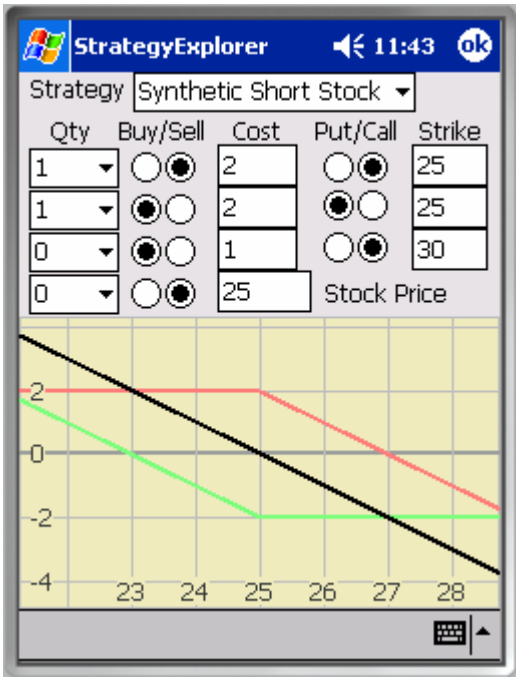
A Bull Call Spread is a bullish strategy constructed from a long in-the-money call (red) and a short out-of-the-money call (green). It achieves exactly the same result as a Bull Put Spread with a profit profile similar to a long position in the underlying, except that both profits and losses are capped.



Bull Put Spread

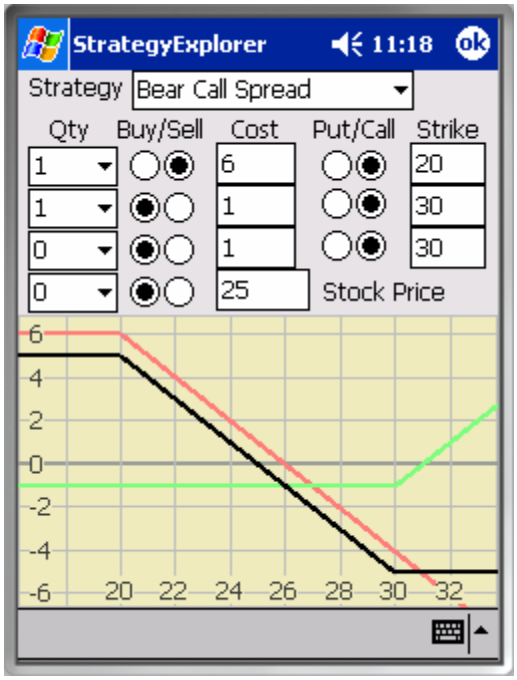
A Bull Put Spread is a bullish strategy constructed from a long out-of-the-money put (red) and a short in-the-money put (green). It achieves exactly the same result as a Bull Call Spread with a profit profile similar to a long position in the underlying, except that both profits and losses are capped.

Option Only Strategies - Bearish



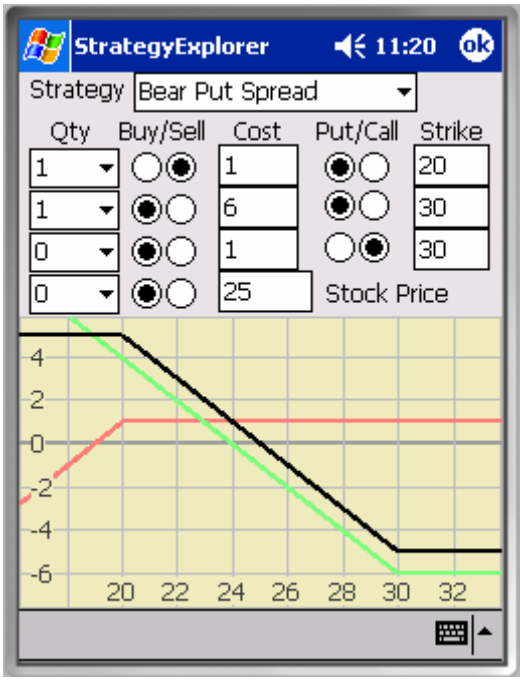
Synthetic Short Stock

A Synthetic Short Stock is a bearish strategy whose profit (loss) behavior is identical to that of a short position in the underlying stock with the advantage of requiring substantially less capital. Ideally, it's constructed from a short at-the-money call (red) and a long at-the-money put (green).



Bear Call Spread

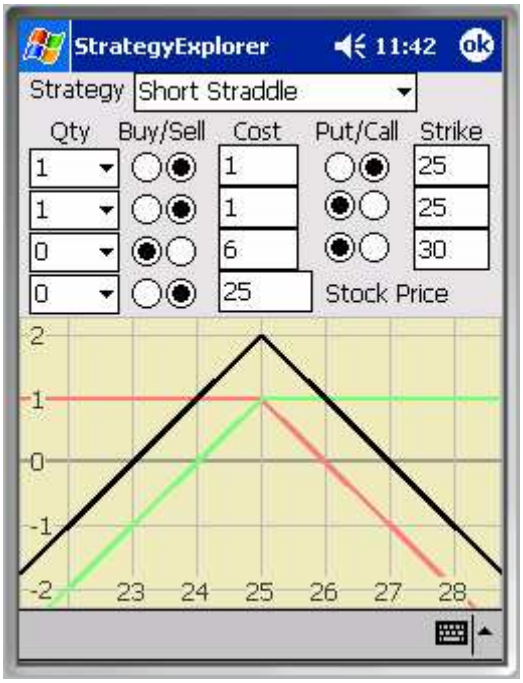
A Bear Call Spread is a bearish strategy constructed from a short in-the-money call (red) and a long out-of-the-money call (green). It achieves exactly the same result as a Bear Put Spread with a profit profile similar to a short position in the underlying, except that both profits and losses are capped.



Bear Put Spread

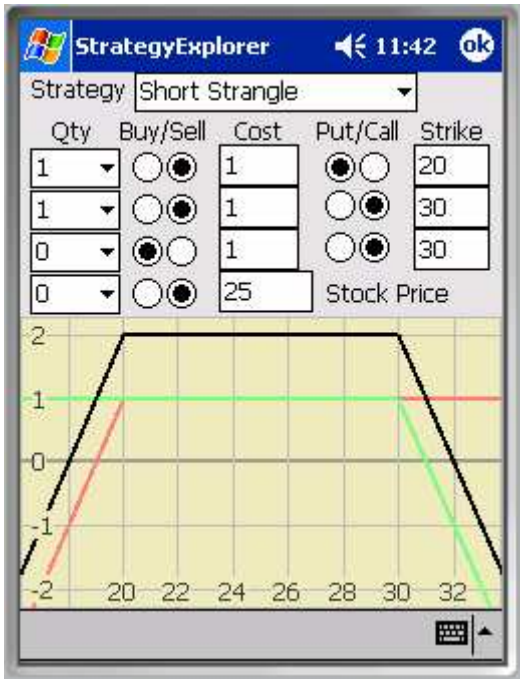
A Bear Put Spread is a bearish strategy constructed from a short out-of-the-money put (red) and a long in-the-money put (green). It achieves exactly the same result as a Bear Call Spread with a profit profile similar to a short position in the underlying, except that both profits and losses are capped.

Option Spreads - Neutral, Low Volatility



Short Straddle

A Short Straddle is a neutral strategy, betting on little or no movement in the underlying stock price. Ideally, it's constructed from a short at-the-money call and a short at-the-money put with the same strike. It has limited profit potential, but can produce unlimited losses, as shown in the example at right.



Strangles

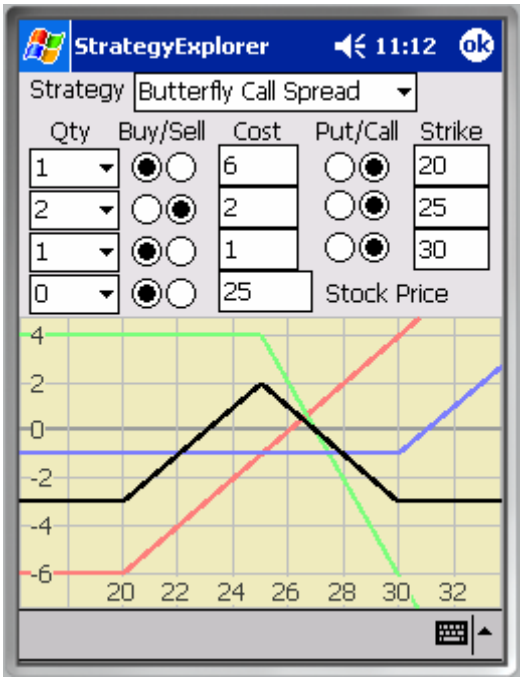
Strangles broaden the low volatility region of straddles by separating the strikes.

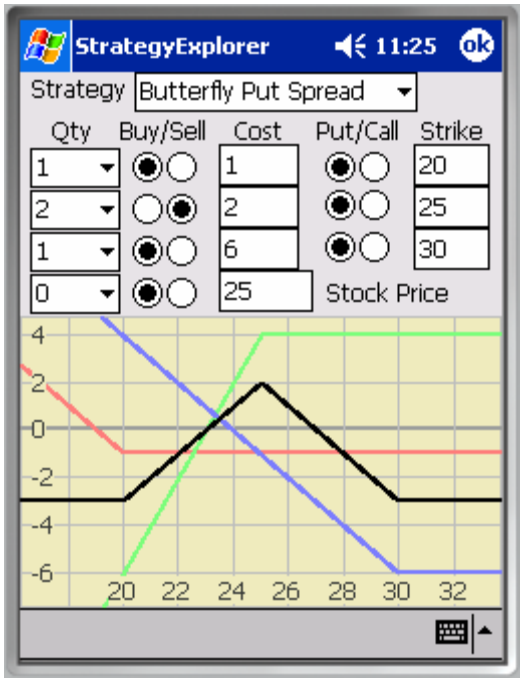
Short Strangle

Short Strangles exhibit limited, fairly likely profits, but potentially unlimited losses as depicted in the example immediately below. Short Strangles exhibit likely finite profits, but potentially unlimited low probability losses.

Butterfly Spreads

A Butterfly Spread is a neutral strategy with an upside like a Short Straddle, but limited losses. It can be constructed from calls or puts, including two short options struck at-the-money and two long options with strikes bracketing the spot price. The profit zone can be extended by selecting bracketing options further from the spot price, at somewhat higher cost.

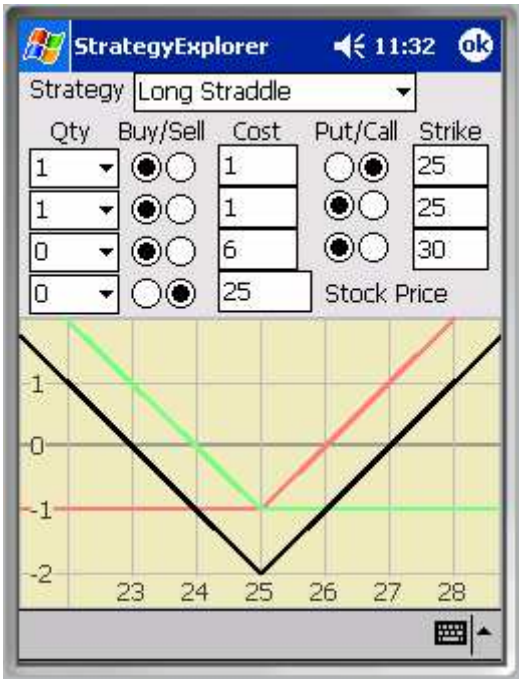




Option Only Strategies - Neutral, High Volatility

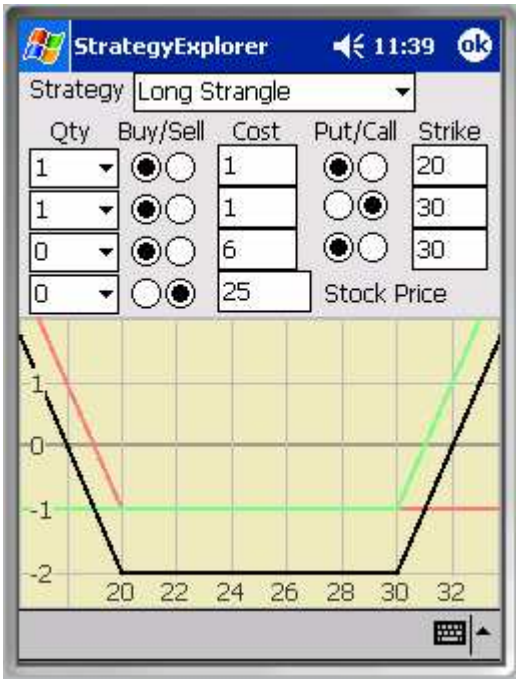
Long Straddle

A Long Straddle is a neutral strategy, betting on a big move in the underlying stock price, so it's a high volatility play. Ideally, it's constructed from a long at-the-money call (red) and a long put with the same strike (green). Peak losses occur at the strike, with gains on both sides of the strike if the underlying moves sufficiently far away from the strike. It exhibits limited likely losses, but potentially unlimited profits.



Strangles

Strangles are similar to Straddles except that the strikes on the options are pulled away from the spot price of the underlying.



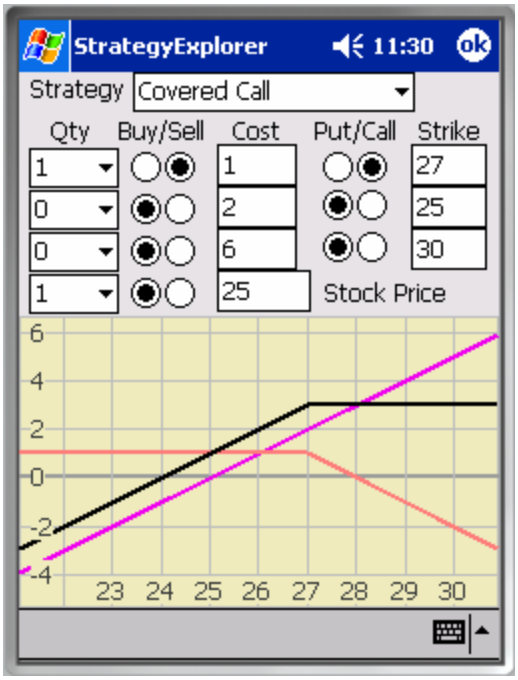
Long Strangle

Both options are struck out-of-the-money, so Long Strangles are generally less expensive strategies to pursue than Long Straddles. Long Strangles exhibit limited, fairly likely losses, but potentially unlimited profit potential, as shown in the example at left.

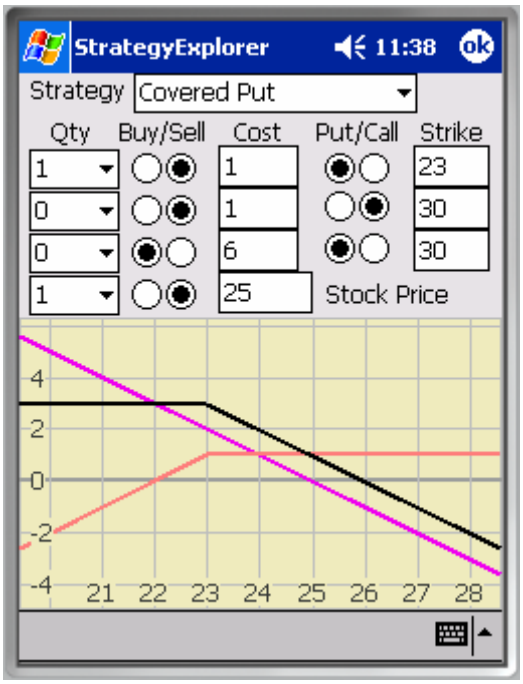
Strategies Involving Stock - Covered

Covered Call

A Covered Call strategy, also known as a Synthetic Short Put, is a strategy wherein the writer (seller) of the call owns the underlying stock on which the option is written. Covered calls are generally written in situations where the writer already owns the underlying and believes that the market has implied too much volatility in the underlying stock.



Since option prices rise with volatility, if the market is implying too much volatility, it's possible to capture the premium represented by the difference in option prices resulting from the difference between the perceived and implied volatilities. Naturally, the seller hopes that time decay will render the short call worthless at expiry, turning the entire premium received into profit. Refer to the example at right.



Covered Put

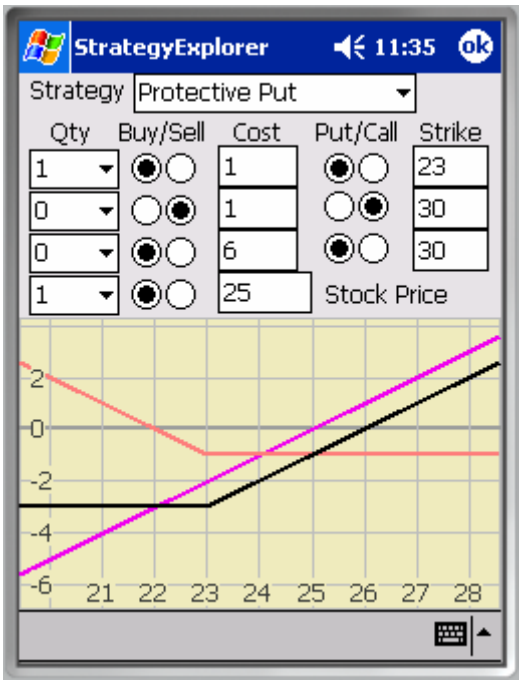
A Covered Put strategy, also known as a Synthetic Short Call, is a strategy involving selling stock and a put against that underlying, though some traders simply sell the put and hold cash to cover the downside. Selling a put by itself is bullish. Coupled with a short stock, the upside here is capped and the downside is potentially unlimited.

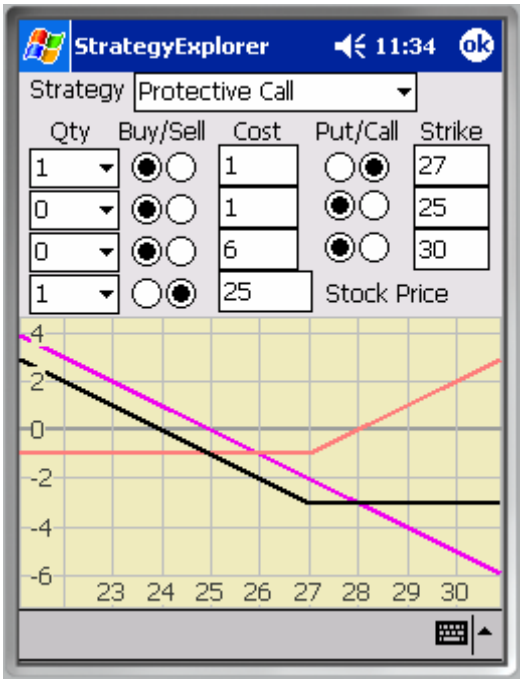
Covered puts can be used to target a buy price on the underlying. The writer would set the option's strike at the target price. The premium received effectively reduces the current stock price. Put writers like to issue options when they believe a rapidly falling (high volatility) stock has bottomed out. Refer to the example at left.

Strategies Involving Stock - Protective

Protective Put

A Protective Put strategy, also known as a Synthetic Long Call, is a bullish strategy constructed from a long stock (purple) and a long put (red). This strategy hedges the downside in the stock position while retaining the upside profit potential.



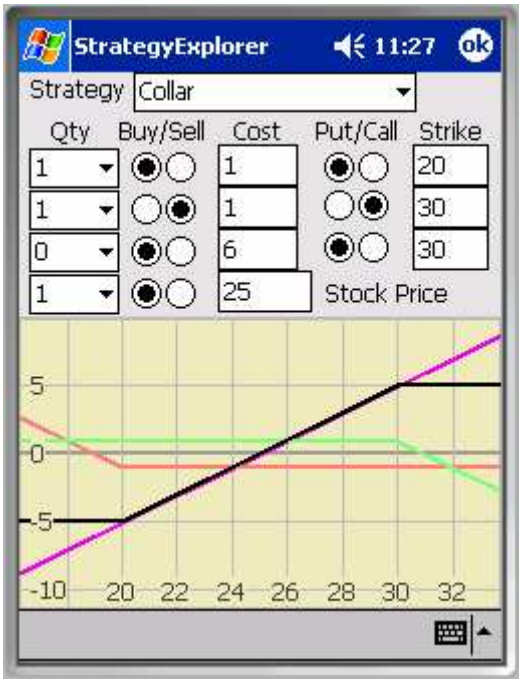


Protective Call

A Protective Call strategy, also known as a Synthetic Long Put, is a bearish strategy constructed from a short stock (purple) and a long call (red). This strategy hedges the upside in the stock position while retaining downside profit potential.

Strategies Involving Stock - Bracketed

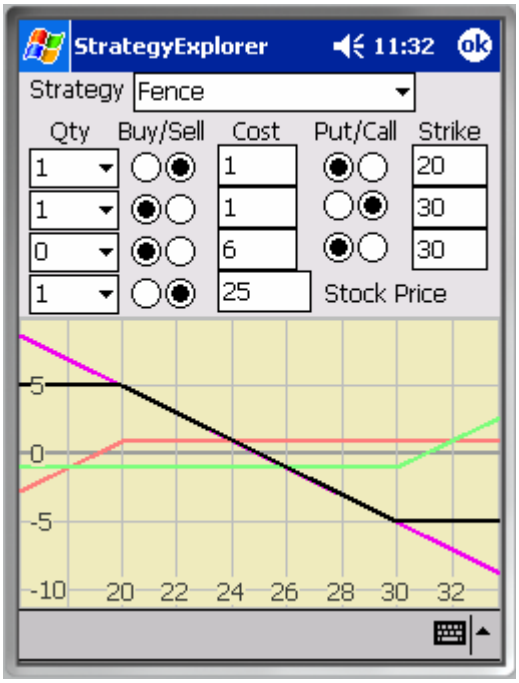
Collar



A Collar has the same profit profile as a Bull Spread, but unlike a Bull Spread (which doesn't include a position in the underlying stock), the Collar is typically used to protect profits in a pre-existing long stock position (purple) by bracketing the long stock position with a long out-of-the-money put (red) and a short out-of-the-money call (green).

It may also be constructed by hedging the downside of a Covered Call with a long out-of-the-money put.

While losses are limited, further profits are similarly capped.



Fence

A Fence is a bearish strategy with the same profit profile as a Bear Spread. Unlike a Bear Spread, which is constructed from two options, the Fence includes a position in the underlying stock. A Fence is typically applied to protect profits already accrued in a short position in the underlying stock. It is constructed from a short stock, a short out-of-the-money put, and a long out-of-the-money call, as shown in the chart at left.

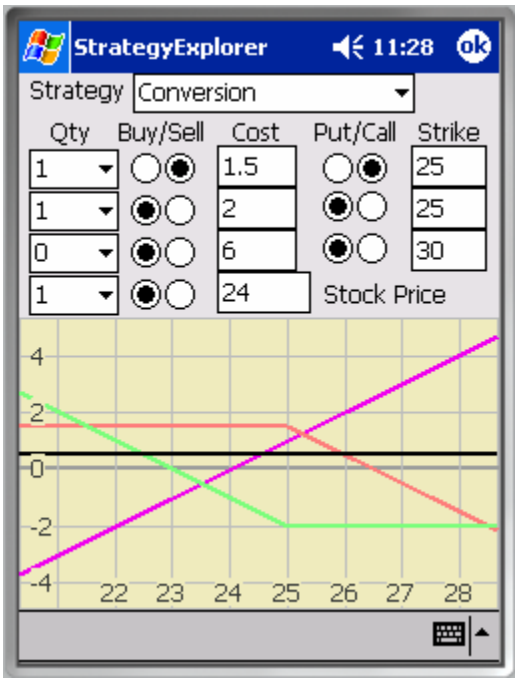
Strategies Involving Stock - Arbitrage

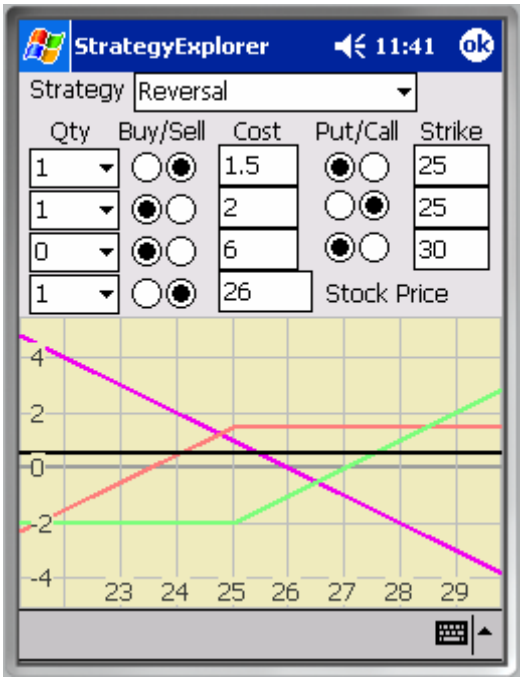
If ***C*** is the call price, ***P*** is the put price, ***S*** is the stock price, and ***K*** is the strike price, and Put-Call Parity is not true, there may be an opportunity for a risk-free profit through arbitrage. Put-Call Parity is often cited as $C - P = S - K$ or sometimes as $C - P = S - Ke^{-r(T-t)}$ where the strike in the simplistic model is replaced by its present value, but a more accurate picture also deducts the present value of dividends through expiry, thus $C - P = S - PV(divs) - Ke^{-r(T-t)}$. Obviously, this model only applies to situations where the put and the call share the same strike and expiration date.

You can use the StrategyExplorer to evaluate potential arbitrage opportunities by setting the price of the underlying stock and two of its options (a put and a call) with the same strike, bearing in mind that StrategyExplorer does not account for the time value of money. To get an accurate portrayal of arbitrage profit potential, you need to discount the stock price by the present value of the strike and the present value of any outstanding ex-dividends. If there's any displacement above or below the horizontal axis, you can capture a risk-free profit on the spread if transaction fees are less than remaining margin.

Conversion

Conversions are used by floor traders to capitalize on discrepancies between the pricing of calls and puts. When calls are overpriced relative to puts (the premium is grossly exaggerated in the example at right), a short term, riskless profit is available using a Conversion. A Conversion is constructed from a Synthetic Short Stock (a short call and a long put at the same strike), exactly offset by a long position in the underlying stock. If the profit line falls below the *X*-axis, you can execute a Reversal instead.





Reversal

Reversals are Reverse Conversions. They are used by floor traders to capitalize on discrepancies between the pricing of calls and puts (the premium is grossly exaggerated in the example at left). When puts are overpriced relative to calls, a short term, riskless profit is available via a reversal. A reversal is constructed from a Synthetic Long Stock (a short put and a long call at the same strike), exactly offset by a short position in the underlying stock. If the profit line falls below the X-axis, you can execute a Conversion instead.

References

Options, Futures, and Other Derivatives, Fifth Edition

John C. Hull. 2002 Prentice Hall

This is an excellent reference on everything from interest rate markets, credit risk, hedging strategies, Black-Scholes theory, the greeks, volatility smiles, etc. Hull continues on into exotic options, interest rate derivatives, swaps, Value-at-Risk, using moving averages to compute volatilities, and more. Very little of Hull's book could be edited out without losing something valuable and Hull's section on spreads is much more useful than Wilmott's.

Paul Wilmott Introduces Quantitative Finance

Paul Wilmott. 2001 John Wiley & Sons, Ltd.

Wilmott has written various books in the computational finance arena, one being a two-volume set (a greatly expanded version of this text), but in this particular text Wilmott and Hull seem to be competing head-on. While Hull and Wilmott each spend a chapter on binomial models, Monte-Carlo methods, value at risk, and credit risk, Wilmott extends that treatment with chapters on portfolio management, RiskMetrics, and CrashMetrics, though these issues are probably beyond the call for the typical NillaHedge user. Wilmott has probably over-diagramed this book. On a content per page basis, I'd pick Hull's book unless I needed the chapters on portfolio theory, RiskMetrics, and CrashMetrics.

