

Profitable Strategies

Most investors have a mix of winners and losers in their portfolio. Hopefully that portfolio is dominated by stocks that enjoyed a growth spurt, but now seem to be locked into a trading range. Or less fortunately, the portfolio is populated by issues that suffered from negative news and are taking longer than hoped to recover. The ever present decision is whether to continue holding or to simply realize the gain or loss. Investors that buy stocks are bulls betting on appreciation, whether they're bottom fishers, value investors, or sophisticated analysts. We've all heard about contrarian investors - those that bet on out of favor sectors or issues, but much more rarely meet bears that back up their skepticism by betting on their market sense and actually selling an issue short. Being a committed bear is somewhat more difficult because a bull with a languishing issue in his portfolio is under no outside pressure to sell (except perhaps from their account churning broker or an exasperated tax collector), while a bear who sold shares he didn't own which subsequently appreciated would soon get a call to provide them at the current market price or make good on his margin calls.

Almost everyone has heard of the options market even if they haven't actively participated. For bulls, options offer the possibility of betting on appreciation without the cost of trading the underlying equities. Similarly, bears can trade depreciation on the underlying issues. Of course, margin calls will be just as swift. A third less publicized possibility exists.

Collecting Premiums

One alternative strategy is to step back from the emotional demands of the bulls' commitment to optimism for growth or the bears' commitment to skepticism and decline, by playing the role of insurance agent. The strategy is to make money by selling premiums on insurance policies. The best of all possible worlds is that the policy never gets cashed in, but the worst possible outcome is that the policy is cashed in at a value previously calculated to cost you nothing.

Perhaps the easiest way to collect such premiums is to sell options on stocks. If you're a bearish 'insurance agent,' you might sell calls to hapless bulls. Bullish option buyers are betting that the underlying stock will appreciate, hoping that calls purchased earlier will reach profitable territory (in the money) before expiration. It's fairly common for sellers of calls to own shares in the underlying stock. In the event that the underlying stock appreciates (profit going to the buyer of the call), the option seller simply turns over the appropriate number of shares rather than buying them on the stock market.

Intrinsic Value

Options have an intrinsic value defined by the difference between the underlying stock's current market price and the option's strike price. For call options, intrinsic value is zero wherever the strike price exceeds the underlying stock's market price, and positive everywhere else. For put options, intrinsic value is zero wherever the stock price exceeds the strike, and positive elsewhere. In both cases, intrinsic value does not account for the time value of money or the contribution to option value derived from the underlying stock's volatility. Time and volatility contributions to value are extrinsic, or outside the scope of the option contract.

Bearish option buyers are usually betting that the underlying stock will depreciate, hoping that put options purchased earlier will at some point be in the money, facilitating profit taking. Analogous to the sale of calls being evidence of a bearish outlook on the seller's part, someone selling puts would be bullish on the underlying. Obviously, premiums are collected in both cases, with the worst outcome being the provision (or purchase) of shares at market value and the best possible outcome being the collection of a premium on an option that was never exercised. Yet those are just two possibilities involving a single vanilla option. The really mind bending possibilities are the short sale of puts and calls, where bearish and bullish are each their respective double negatives. The short sale of a call is evidence of a seller with a bullish outlook. Conversely, the short sale of a put is evidence of a seller with a bearish outlook on the underlying.

Spread Basics

Once you allow for the possibility of both long and short sales of puts and calls, another world of possibilities opens up. Consider two options used in combination. Given that each can be either a put or a call and each can be either bought or sold, long or short, the classes of possibilities are: two long puts, two short puts, two long calls, two short calls, a long and a short call, a long and a short put, a long call and a short put, and a long put and a short call. But that only scratches the surface of the possibilities because each of those options could be struck in the money, at the money, or out of the money. At the money representing the present value of the underlying stock, in the money occurring when the option is in its profitable range, and out of the money being anywhere that the option could expire valueless. So the possibilities are numerous, but not all of the aforementioned possibilities are really useful. As an investment strategy, two long calls struck in the money, would be redundant - particularly when each is struck at the same price. Similarly for two long calls struck out of the money, not to mention two short calls in the money, two short calls struck out of the money, etc. Strategies involving a long and a short option of the same type (both calls or both puts) struck at the same value, are pointless because profits in one are offset by losses in the other *and* you'd have to pay a commission on each. So the really interesting possibilities are the heterogeneous strategies - those involving a put and a call, two puts struck at different values, or two calls struck at different values.

Some of the resulting strategies are: [short straddle](#),¹ [long straddle](#),² [short strangle](#),³ [long strangle](#),⁴ [bull call spread](#),⁵ [bull put spread](#),⁶ [bear call spread](#),⁷ [bear put spread](#),⁸ [synthetic long stock](#),⁹ and [synthetic short stock](#).¹⁰ Each of the foregoing is classified as a vertical spread, with the profitable range and potential downside discussed on the referenced pages. All options in [StrategyExplorer](#)¹¹ are assumed to expire on the same date, so spread value is based only on the options' intrinsic value. Any spread that doesn't qualify as vertical is considered to be a calendar spread. Obviously, once the identical expiration date restriction is removed, the number of possible behaviors becomes much larger. Vertical spreads offer the convenience of behaving consistently throughout the lifetime of the options, but calendar spreads exhibit one behavior while all options are active and additional behaviors after each option expires. Wise investors will be aware of what the profit profile looks like on both sides of the each option's expiration date. [NillaHedge](#)'s¹² [HedgeExplorer](#)¹³ allows you to modify the 'today' date so you can see what the profit profile looks like on alternative dates of interest.

Until now, we've been using quantity one of each of the options in the spread, but we might consider using quantity two of say, the second option in the spread. Whenever those quantities are unequal, the spread is classified as a ratio spread. Ratio spreads composed of two options don't exhibit particularly unique behaviors, but ratio spreads consisting of three option issues are useful, the most popular being the butterfly spread. Butterflies can be composed of all calls or all puts, resulting in the [butterfly call spread](#)¹⁴ and [butterfly put spread](#)¹⁵ respectively. Note that the net effect, absent dividends on the underlying stock, is identical - profit taking in a relatively small trading range, with capped losses outside that region. To see the effect of dividends on a butterfly spread, you must use a tool that accounts for the present value of dividends as well as the time value of money, [HedgeExplorer](#) being one such tool.

¹ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Short_Straddle.htm

² http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Long_Straddle.htm

³ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Short_Strangle.htm

⁴ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Long_Strangle.htm

⁵ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Bull_Call_Spread.htm

⁶ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Bull_Put_Spread.htm

⁷ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Bear_Call_Spread.htm

⁸ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Bear_Put_Spread.htm

⁹ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Synthetic_Long_Stock.htm

¹⁰ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Synthetic_Short_Stock.htm

¹¹ <http://pnmx.com/StrategyExplorer.php>

¹² <http://pnmx.com/NillaHedge.php>

¹³ http://pnmx.com/Documentation/NillaHedge/NillaHedge_HedgeExplorer.pdf

¹⁴ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Butterfly_Call_Spread.htm

¹⁵ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Butterfly_Put_Spread.htm

Beyond Intinsic Option Value

After stock price and dividends, there are three contributors to option value – the time value of money (which we've alluded to), the volatility of the underlying stock, and the risk free rate of interest. Time is interesting beyond the time value of money because options expire at some point, after which they are valueless, but also because dividends accrue to the stockholder of record on the ex-dividend date, so the holder of a call will experience a small but precipitous decline in option value immediately after the ex-dividend date. The holder of a put will conversely see option value increase sharply by a small amount after an ex-dividend date. Note that you must have defined dividends and their ex-dividend dates in NillaHedge's [Stock Definition Dialog](#)¹⁶ in order to see these changes in the [TimeDecayExplorer](#).¹⁷

The risk free rate of interest drives the time value of money and discounts the present value of the strike price. The higher the risk free rates, the higher option values will be. Similarly, underlying stocks with high volatility have higher value options than those drawn on low volatility stocks. Analytical models of option value, like Black-Scholes consider stock price, volatility, and dividends, and some form of interest rate. Typically the risk free rate is considered to be the rate of interest you can get on a risk free investment without any requirement for committing the funds for a period of time. There may be different opinions about what investments are truly risk free, but the general consensus is that the U.S. Treasury Bonds are the benchmark. Unfortunately, the shortest term bond available has a three month term, so doesn't satisfy the criteria that the funds be uncommitted. The next best thing is to extrapolate the T-Bill yield curve back to the rate you'd get if there were such a thing as a zero term T-Bill. The [YieldCurveFitter](#)¹⁸ does exactly that for options valuation. It computes a zero term rate, called the spot rate, from the U.S. T-Bill rates. Each time it updates the spot rate on the screen, it also registers that value, so NillaHedge can use it as the risk free rate.

Sidebar on Fixed Income Investing

Fixed income investors have other uses for YieldCurveFitter, primarily assessing premiums over the Treasury bill yield curve. Note that there are no U.S. Treasury bills at 1, 7, 15, 20, or 25 year terms, yet there are mortgage backed securities at some of those terms. An investor considering an instrument with a seven year term paying 7% generally wants to know what premium they're getting for the risk they're taking over simply buying the equivalent term U.S. T-Bill. YieldCurveFitter provides fitted yields at those commonly used intermediate maturities. Finally, there is no requirement that YieldCurveFitter base its calculations on U.S. T-Bill rates. Any set of yields with terms among those offered can be inputs and YieldCurveFitter will compute the rest. However, it is not a general purpose curve fitter, it uses multi-basis function nonlinear optimization which produces very stable results for historical U.S. T-Bill yield curves, but the algorithm's stability is uncharacterized for general purpose curve fitting.

There are two principal risks in bond investing. The risk to principal, where the issuer defaults on repayment, and interest rate risk. Bond ratings and issuer reputation help bond investors assess repayment risk. Changes in market yields are anybody's guess, but once a benchmark has been established, such as a half percent change in yield, its effect on bond value is analytical. Bonds lose value as market yields rise, but some issues are more sensitive than others. The [BondManager](#)'s¹⁹ [RateSensitivityExplorer](#)²⁰ provides a convenient mechanism for comparing bond issues in terms of their sensitivity to changes in market yields. Additionally, the [BondAnalyzer](#)²¹ provides numerical insight into bond rate sensitivity. Modified duration is a first order effect. Convexity is a second order effect. Given these, the BondAnalyzer can impute bond value at any specified deviation from current market yields.

¹⁶ http://pnmx.com/Documentation/NillaHedge/NillaHedge_StockDefinition.htm

¹⁷ http://pnmx.com/Documentation/NillaHedge/NillaHedge_TimeDecayExplorer.pdf

¹⁸ <http://pnmx.com/YieldCurveFitter.php>

¹⁹ <http://pnmx.com/BondManager.php>

²⁰ http://pnmx.com/Documentation/BondManager/BondManager_RateSensitivityExplorer.htm

²¹ http://pnmx.com/Documentation/BondManager/BondManager_BondAnalyzer.pdf

Let's return to option valuation. If you accept that the instantaneous risk free rate is well represented by a spot rate extrapolated from U.S. T-Bill rates, you may have observed that the underlying stock's volatility is the only parameter of option valuation that isn't readily discernable in the market. Despite that inconvenience, volatility is crucial to accurately assessing option values. There are many possible spins on volatility, in particular there are forward looking volatility estimates as well as historical views. Yet, even within the undeniably quantitative realm of historical perspective, there are different ways of weighting near and longer term stock prices.

Volatility

One source of historical volatilities is [Robert's Historical Stock Volatilities](#).²² If you visit that page and provide a stock symbol, you'll see a variety of percentage values representing the stock's [volatility](#)²³ during the period. NillaHedge expects a fractional (not percent scaled) value, so if you choose to use Robert's values, be sure to scale the values down by a factor of 100. You can also get *historical* volatilities for most traded stocks from the [CBOE](#).²⁴ [IVolatility](#)²⁵ is a paid subscription supplier of implied volatilities for stocks. None of the aforementioned sources for stock volatilities mention the period over which the volatilities are calculated, nor how they were calculated (e.g. whether straight line or an exponentially weighted moving average). The market prices of options drawn on the same underlying stock imply the underlying stock's *forward* looking volatility, where historical prices are irrelevant. Perhaps the best accepted weighting scheme is the exponentially weighted moving average. [RiskMetrics](#)

$$\sigma = \sqrt{(1-\lambda) \sum_{t=1}^T \lambda^{t-1} (r_t - \bar{r})^2}$$

²⁶ recommends using: to compute exponentially weighted historical measure of volatility using market prices from the most recent 80 trading days, and a decay factor of $\lambda = 0.94$. There is some discussion that the EWMA model is insufficiently responsive to market prices, but the next best alternative is a two factor GARCH model that is a probably more complex than the average investor can justify pursuing. A summary comparison of various approaches to historical volatility is available at [theFinancials](#).²⁷ It includes Black-Scholes' standard deviation, Exponentially Weighted Moving Average (EWMA), and Generalized AutoRegressive Conditional Heteroskedasticity (GARCH). In a [March 2001 study](#),²⁸ authors Pafka and Kondor found that the RiskMetrics methodology performed satisfactorily, despite known shortcomings. If you're concerned about the edge professional traders will have by using GARCH over EWMA, you may find comfort in the fact that a very large contingent of banks assess the Value-at-Risk of their portfolios using RiskMetrics' EWMA volatilities.

All of this attention to volatility is not without purpose. You may find it useful to experiment with different volatilities in the [OptionAnalyzer](#).²⁹ Note the implied volatilities of near-term options struck near the money (the current price of the underlying stock). Now, for the same underlying stock, note the implied volatility as you select options with expiration dates further into the future and/or struck further from the money. Normally, near term options near the money exhibit the lowest implied volatilities. As you go further out in time and further from the money, you generally see an increase in implied volatilities. This effect is called the volatility smile and it is evidence that options theory does not fully account for market behavior. If you spend any time in the [VolatilityValueExplorer](#),³⁰ you'll quickly find that volatility has a profound (quadratic) effect on option value, so you don't want to get it wrong. In a perfect world, you'd avoid options with implied volatilities that protrude above the volatility surface, but this is particularly difficult to determine since the volatility surface is nonlinear in both price and time. You cannot just look

²² <http://www.intrepid.com/robertl/stock-vols1/stock-vols.cgi>

²³ <http://en.wikipedia.org/wiki/Volatility>

²⁴ <http://www.cboe.com/data/HistoricalVolatility.aspx>

²⁵ <http://www.ivolatility.com/>

²⁶ http://pascal.iseg.utl.pt/~aafonso/eif/rm/TD4ePt_2.pdf

²⁷ <http://www.thefinancials.com/FAQs1b.html>

²⁸ http://arxiv.org/PS_cache/cond-mat/pdf/0103/0103107v1.pdf

²⁹ http://pnmx.com/Documentation/NillaHedge/NillaHedge_OptionAnalyzer.pdf

³⁰ http://pnmx.com/Documentation/NillaHedge/NillaHedge_VolatilityValueExplorer.pdf

for a higher implied volatility because it might be justified by increased moneyness or time. Options with flatter VolatilityValue curves are the easiest to price correctly since small deviations in volatility produce small mis-pricing errors. The more radically quadratic the curve, the more sensitive the option is to the underlying stock's volatility and the easier it will be to get the volatility wrong and thereby mis-price the option.

Rate Sensitivity

Another consideration in option valuation is rate sensitivity. Like bonds, option values are sensitive to changes in market yields, specifically to the risk free rate. Put options, like bonds, gain value in response to falling market yields, but calls gain value when yields rise. NillaHedge's [RateSensitivityExplorer](#)³¹ allows you to compare the rate sensitivity of options across the same range of changes in market yields. Option rate sensitivity can be used to hedge an existing portfolio against expected changes in market yields.

More on Spreads

Having covered the basics of bond and option sensitivity, we can combine options to speculate on market direction, trading ranges, and volatility. We briefly mentioned a few option spreads previously. The [documentation index](#)³² for StrategyExplorer organizes spreads and hedging strategies into groups according to the investor's market view. [Synthetic long stock](#)³³ is a bullish strategy that behaves exactly like holding the underlying stock (until the options expire). [Bull call](#)³⁴ and [bull put](#)³⁵ spreads behave identically. Both are bullish strategies behaving like long positions in the underlying stock, but with caps on both gains and losses. Conversely, [synthetic short stock](#)³⁶ emulates a short position in the underlying, until the options expire. [Bear call spread](#)³⁷ and [bear put spread](#)³⁸ each accomplish the same objective, emulating a short position in the underlying, but capping both gains and losses. Investors convinced that a particular stock will remain in a trading range will generally pursue one of the neutral, low volatility strategies. [Short straddles](#)³⁹ cover the nearest values of the trading range, but allow for unlimited gains and losses. Butterfly spreads cap both gains and losses and can be constructed from [puts](#)⁴⁰ or [calls](#)⁴¹ to accomplish this objective. [Short strangles](#)⁴² broaden the trading range of short straddles by pushing some space between the strikes of the options in the spread. Like short straddles, fairly likely profits are capped and less likely losses are unlimited. Investors betting on big moves away from the current stock price, but not sure which way it will go will choose either a long straddle or a long strangle. [Long straddles](#)⁴³ allow for limited likely losses in a trading range, and less likely but unlimited profits outside the range. [Long strangles](#)⁴⁴ push space between the strikes of the options in a long straddle, thus expanding the range of likely losses, the benefit being that both options are further out of the money, thereby cost less.

Hedging

If you already have a position in a stock and want to hedge your bets during a period of uncertainty, you might consider one of the following strategies. The [covered call](#)⁴⁵ (a.k.a. synthetic short put) is strategy that relies on selling to a bull. You'd think that would make it a bearish strategy, but the profits, though

³¹ http://pnmx.com/Documentation/NillaHedge/NillaHedge_RateSensitivityExplorer.htm

³² <http://pnmx.com/Documentation.php>

³³ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Synthetic_Long_Stock.htm

³⁴ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Bull_Call_Spread.htm

³⁵ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Bull_Put_Spread.htm

³⁶ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Synthetic_Short_Stock.htm

³⁷ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Bear_Call_Spread.htm

³⁸ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Bear_Put_Spread.htm

³⁹ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Short_Straddle.htm

⁴⁰ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Butterfly_Put_Spread.htm

⁴¹ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Butterfly_Call_Spread.htm

⁴² http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Short_Strangle.htm

⁴³ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Long_Straddle.htm

⁴⁴ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Long_Strangle.htm

⁴⁵ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Covered_Call.htm

capped, are on the upside, with the potential for unlimited losses. So, why go there? Generally, it's a strategy pursued by the owner of stock, selling calls to collect premiums in the hope that the options will expire unexercised. A [covered put](#)⁴⁶ (a.k.a. synthetic short call) analogously relies on selling to a bear, and similarly hopes to collect a premium on an unexercised put covering a short position in the underlying stock. Protective strategies reverse the sense of the covered strategies. A [protective put](#)⁴⁷ (a.k.a. synthetic long call) is bullish, with an unlimited upside and capped losses. It protects a long position in the underlying by buying a put to cap downside losses. A [protective call](#)⁴⁸ (a.k.a. synthetic long put) is bearish, with a long call protecting a short position in the underlying against up market moves. If you already own the underlying stock, a [collar](#)⁴⁹ behaves exactly like a bull spread. Similarly, if you already have a short position in the underlying, a [fence](#)⁵⁰ behaves exactly like a bear spread. The hands down favorites of floor traders are arbitrage strategies. [Conversions](#)⁵¹ and [reversals](#)⁵² capitalize on value skew between the stock and options markets, generating 'riskless' profits at all prices of the underlying. The real risk is that each requires you to sell something to the market. Conversions require that you sell a call while buying a put and the underlying stock, while reversals require that you sell a put and short the underlying stock while buying a call. Markets naturally move to eliminate price skew, so these opportunities are generally short lived and most safely executed as programmed trades. The position cannot improve or degrade over time (until the options expire), so if you're not careful, you will be paying commissions to buy into a position that can't move and has no profit potential (or at worst, locks in a loss) while the options are active, after which it reverts to a long or short position in the underlying.

Other Interesting Stuff

This is mildly off topic, but I feel compelled to compliment the developers of [NYSE MarkeTrac](#).⁵³ Although the depth of data presented there won't give pause to [Google Finance](#),⁵⁴ [Yahoo! Finance](#),⁵⁵ [MSN MoneyCentral](#),⁵⁶ and similar sites, the MarkeTrac interface raises the bar on the presentation of market data. The Activity Map isn't something that other sites would have the data to offer, so don't expect it to appear anywhere else, but one really interesting aspect is the interactive linkage between the 3D Chart, the Activity Map, and the spreadsheet view. MarkeTrac developers have every reason to be proud - it's world class work.

⁴⁶ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Covered_Put.htm

⁴⁷ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Protective_Put.htm

⁴⁸ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Protective_Call.htm

⁴⁹ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Collar.htm

⁵⁰ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Fence.htm

⁵¹ http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Conversion.htm

⁵² http://pnmx.com/Documentation/StrategyExplorer/StrategyExplorer_Reversal.htm

⁵³ <http://marketrac.nyse.com/>

⁵⁴ <http://finance.google.com/>

⁵⁵ <http://finance.yahoo.com/>

⁵⁶ <http://moneycentral.msn.com/>