

# Straddle screening tool

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## Research Question

What is the highest reachable consistency in screening stocks that will exhibit abnormal price volatility at a foreseeable market or stock event (dividends announcement...)?

Candidate stocks should have their at-the-money options tree premiums exhibiting high correlation (positive for calls and/or negative for puts) with their underlying stocks' prices.

## Data sources

- S&P 100 list of symbols - Wikipedia
- S&P 100 Stock historical (12 years) – API from Quantmod; QuantTools
- S&P 100 stock historical events – API from Quantmod
- Option Tree historical data (call on select stocks in sprint 2) – Quantmod; QuantTools
- Greeks historical data (call on select stocks in sprint 2) – API from fOptions

## Methodology

- Consolidate & clean all stock data sets
- Isolate incidents where the stock increased at a significant rate – these are straddle opportunities during the last 10 years (where stock price had a TBD% increase with similar increase in option prices)
- Divide these incidents data into test & training sets
- Using training data sets:
  - Clustering for optimal straddle opportunities using multi variables (strike price in the option tree, Greeks, market depths, beta, volatility)
- Using testing data set: Backtest the top 10 selection combinations

## Literature Review

- [Hedging volatility risk](#)
  - [M Brenner](#), EY Ou, [JE Zhang](#) - Journal of Banking & Finance, 2006 - Elsevier

- Volatility risk plays an important role in the management of portfolios of derivative assets as well as portfolios of basic assets. This risk is currently managed by volatility “swaps” or futures. However, this risk could be managed more efficiently using options on volatility that were proposed in the past but were never introduced mainly due to the lack of a cost efficient tradable underlying asset.
- The objective of this paper is to introduce a new volatility instrument, an option on a straddle, which can be used to hedge volatility risk. The design and valuation of such an instrument are the basic ingredients of a successful financial product. In order to value these options, we combine the approaches of compound options and stochastic volatility. Our numerical results show that the straddle option is a powerful instrument to hedge volatility risk. An additional benefit of such an innovation is that it will provide a direct estimate of the market price for volatility risk.
- [Empirical properties of straddle returns](#)
  - F Goltz, WN Lai - The Journal of Derivatives, 2009 - jod.ijournals.com
  - An at-the-money (ATM) straddle, ie, going long an ATM call and an ATM put with the same maturity, is generally thought of as a volatility trade. It is essentially delta-neutral, but a large price move in either direction or an increase in implied volatility will produce a profit. A delta-neutral straddle position also has zero beta, so under the CAPM it should earn the riskless rate. Research has shown, however, that straddles with stock index options tend to lose money, which may be attributed to a volatility risk premium: it is the cost of hedging against a rise in volatility. If buying straddles produces losses, writing straddles should yield excess profits. An important aspect of the trade is that the delta (and beta) of the position change when the underlying index moves away from its initial level, and rebalancing is necessary if one wishes to maintain neutrality.
  - In this article, Goltz and Lai examine the performance of buying and holding one-month straddles on the DAX index, with and without rebalancing, and find negative returns on average. If investors are entering the trade as a volatility hedge, one might expect the return to vary with other measures on volatility risk and potential hedging demand. They find that a widening credit spread on corporate bonds relative to government bonds, greater stock market turnover, and higher actual volatility all are related to straddle returns. But in considering what position an investor with constant relative risk aversion would take in straddles as part of an optimal portfolio including the underlying stock index and the riskless asset, they show that for risk aversion over a broad range, the optimal position would be to short straddles. That is, the “risk premium” in the market is too big to be consistent with utility maximization by investors with a reasonable level of risk aversion. The effect is most important for daily rebalancing, but that requires bearing heavy transaction costs, to the point that

the potential improvement in utility would be largely wiped out in trying to capture it in the market.