Gleaning Trading Signals from Implied Volatility Surface

vol-Up: the Innovative Quantitative Analysis App Based on Volatility for Successful Investment Decisions

[Presenter: Giuseppe Montesi]
Discovering how to Use vol-Up to Develop Winning Market Strategies Volatility Based

- The empirical relationship between volatility and market price.
- How to extract market expectations from implied volatility data and use it to predict market price.
- Building up and back-testing of trading rules volatility based.
- Performance of volatility based market strategies.
- vol-Up: what it does and how to use it.
- How to make use of vol-Up in your daily job.
Empirical evidence typically shows a **negative correlation between volatility level and market price**: high realized volatility is associated with a bearish market trend and low realized volatility with a bullish market trend.
• Looking at implied volatility we can try to anticipate future market trends.
• In this example we see a negative correlation, i.e.: high implied vol levels tend to be followed by price decrease; and low implied vol by a price increase; revealing that the market expects that the current implied vol level to persist in the near future.
• This kind of vol-market price relationship can be described as a “Follower” market expectation.
In this example we see that high implied vol levels tend to be followed by a price increase; and low implied vol by a price decrease; revealing that market expects a mean reverting process in implied vol, in other words, that after having reached a very high/low level, vol will decrease/increase in the near future.

This kind of vol-market price relationship can be described as a “Contrarian” market expectation.
In this example we see that often, market expectations on an asset can be derived by looking at implied vol of other leading assets, such as VIX.
A Rich Source of Information Inside Implied Volatility Surface

Euro Stoxx 50: Probability Density Function

Euro Stoxx 50: Cumulative Distribution Function

Nikkey 225: Implied Volatility Surface

Nikkey 225: Volatility Skew
• Market implied volatility surface contains information about market perception of the future value of the underlying financial asset in terms of expected value, its variability, its skewness (which tells you how much optimism there is on the market) and kurtosis (how much fear there is on the market; the “fear” is measured in the left tail of the implied probability distribution).

• Empirical evidence strongly suggests that for all financial assets implied volatility data is a highly valuable repository of market expectations about the future dynamic of the market price.

• Extracting such information from implied volatility can be potentially highly rewarding.

• This high potential source of information is the key idea behind vol-Up.
• Extracting valuable information from implied volatility in a useful form for trading is not an easy task.

• The way implied volatility information can be used to predict market price changes from asset to asset, and for some assets it can have unexpected relationships.

• Furthermore, the kind of relationship found may change over time according to changes in the way the market forms its expectations.

**Issues in translating implied volatility analysis into operating market signals:**

• There are many ways to capture and analyze the relationship between volatility and market price, by looking at: implied volatility; implied vs. realized vol spread; skew; etc.

• The relationship between implied volatility and market price can be expressed in terms of “Follower” or “Contrarian” expectations.

• Volatility thresholds that trigger a market signal can assume higher or lower values depending on the specific asset and market momentum.

• Modeling and calculations to reconstruct volatility surface are complex and require a consistent data quality process.
The best way to gather this information and check its potential value is to back-test all possible trading rules based on implied volatility, to look at the results (performance; wrong signals; number of trades; etc.) and then to select the best trading rule.

• Required steps:
  I. Model all potential ways in which the relationship between volatility and market price can be described and translated into potential market signals (i.e. buy or sell).
  II. Back-test all possible combinations of trading rules; vol thresholds; investment style (Follower/Contrarian); vol time window; etc.
  III. Select the best-performing strategy through a rank optimization system.

• All of this requires a considerable effort and know-how

• Luckily for our users, vol-Up does it all in just a few seconds: modelling; data gathering; calculation; optimization; analysis and reporting, quickly and easily translating them into clear and concrete tradable information.
• Strategy based on **Trigger volUp Skew Value**.
• 1 Year tracking record.
• Strategy performance 3 times market underlying performance.
• Highly winning ratio.
• Highly sharpe ratio.
Improving Vol Strategy Performance: Nikkei 225 Long & Short Strategy

Long Only Strategy

Long & Short Strategy
Performance of GBPUSD Spot Exchange Rate: Long Only vs. Short Only vs. Long & Short

Long Only Strategy
Strategy Performance: 11%

Short Only Strategy
Strategy Performance: 7%

Long & Short Strategy
Strategy Performance: 17%
Improving Back-testing Performance with Stop-Loss: TomTom NV Long & Short Strategy

**No Stop-Loss**

- Stop-Loss = -2.0%
Some assets exhibit better performances by building the trading rule using as implied volatility a leading vol index (such as VIX) instead than their own implied vol.

Long & Short Strategy
Strategy Performance +95% vs. Underlying Performance -42%
### VOL-UP STRATEGY

<table>
<thead>
<tr>
<th>Stock Index</th>
<th>Absolute Return</th>
<th>Maximum Drawdown</th>
<th>Volatility</th>
<th>Sharpe Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIKKEI 225 (NKY Index)</td>
<td>344.44%</td>
<td>8.43%</td>
<td>25.17%</td>
<td>13.83</td>
</tr>
<tr>
<td>EURO STOXX 50 Price EUR (SXSE Index)</td>
<td>61.53%</td>
<td>4.91%</td>
<td>14.44%</td>
<td>4.22</td>
</tr>
<tr>
<td>AEX-Index (AEX Index)</td>
<td>62.64%</td>
<td>4.47%</td>
<td>11.99%</td>
<td>5.18</td>
</tr>
<tr>
<td>Deutsche Borse AG German Stock Index DAX (DAX Index)</td>
<td>52.11%</td>
<td>8.93%</td>
<td>12.70%</td>
<td>4.07</td>
</tr>
</tbody>
</table>

### UNDERLYING

<table>
<thead>
<tr>
<th>Stock Index</th>
<th>Absolute Return</th>
<th>Maximum Drawdown</th>
<th>Volatility</th>
<th>Sharpe Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIKKEI 225 (NKY Index)</td>
<td>56.03%</td>
<td>20.36%</td>
<td>27.17%</td>
<td>2.07</td>
</tr>
<tr>
<td>EURO STOXX 50 Price EUR (SXSE Index)</td>
<td>13.36%</td>
<td>11.43%</td>
<td>17.39%</td>
<td>0.76</td>
</tr>
<tr>
<td>AEX-Index (AEX Index)</td>
<td>13.24%</td>
<td>10.71%</td>
<td>13.62%</td>
<td>0.96</td>
</tr>
<tr>
<td>Deutsche Borse AG German Stock Index DAX (DAX Index)</td>
<td>17.22%</td>
<td>9.83%</td>
<td>15.44%</td>
<td>1.10</td>
</tr>
</tbody>
</table>

### SINGLE STOCK

<table>
<thead>
<tr>
<th>Stock Index</th>
<th>Absolute Return</th>
<th>Maximum Drawdown</th>
<th>Volatility</th>
<th>Sharpe Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple Inc. (AAPL US Equity)</td>
<td>53.75%</td>
<td>12.37%</td>
<td>28.27%</td>
<td>1.88</td>
</tr>
<tr>
<td>Ford Motor Co. (F US Equity)</td>
<td>118.12%</td>
<td>7.03%</td>
<td>23.78%</td>
<td>4.94</td>
</tr>
<tr>
<td>TomTom NV (TOM2 NA Equity)</td>
<td>76.39%</td>
<td>14.84%</td>
<td>27.30%</td>
<td>2.76</td>
</tr>
<tr>
<td>The Carlyle Group LP (CG US Equity)</td>
<td>96.56%</td>
<td>8.93%</td>
<td>25.61%</td>
<td>3.77</td>
</tr>
</tbody>
</table>

**Absolute Return:** performance of the vol-Up strategy and of the underlying in the period from September 2012 to September 2013.
### Absolute Return: performance of the vol-Up strategy and of the underlying in the period from September 2012 to September 2013.

#### VOL-UP STRATEGY

<table>
<thead>
<tr>
<th>COMMODITY</th>
<th>Absolute Return</th>
<th>Maximum Drawdown</th>
<th>Volatility</th>
<th>Sharpe Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market Vectors Gold Miners ETF</strong> (GDX US Equity)</td>
<td>70,60%</td>
<td>20,80%</td>
<td>35,32%</td>
<td>1,97</td>
</tr>
<tr>
<td><strong>LME COPPER FUTURE</strong> (Lp1 Comdty)</td>
<td>73,99%</td>
<td>7,05%</td>
<td>17,87%</td>
<td>4,10</td>
</tr>
<tr>
<td><strong>WTI CRUDE FUTURE</strong> (CL1 Comdty)</td>
<td>48,24%</td>
<td>8,45%</td>
<td>16,61%</td>
<td>2,89</td>
</tr>
</tbody>
</table>

#### UNDERLYING

<table>
<thead>
<tr>
<th>COMMODITY</th>
<th>Absolute Return</th>
<th>Maximum Drawdown</th>
<th>Volatility</th>
<th>Sharpe Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Market Vectors Gold Miners ETF</strong> (GDX US Equity)</td>
<td>-53,33%</td>
<td>59,46%</td>
<td>43,76%</td>
<td>-0,23</td>
</tr>
<tr>
<td><strong>LME COPPER FUTURE</strong> (Lp1 Comdty)</td>
<td>-15,11%</td>
<td>20,31%</td>
<td>19,64%</td>
<td>-0,03</td>
</tr>
<tr>
<td><strong>WTI CRUDE FUTURE</strong> (CL1 Comdty)</td>
<td>15,88%</td>
<td>11,50%</td>
<td>21,23%</td>
<td>0,74</td>
</tr>
</tbody>
</table>

#### FOREX

<table>
<thead>
<tr>
<th>CURRENCY</th>
<th>Absolute Return</th>
<th>Maximum Drawdown</th>
<th>Volatility</th>
<th>Sharpe Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AUDUSD Spot Exchange Rate</strong> (AUDUSD Curncy)</td>
<td>16,61%</td>
<td>4,39%</td>
<td>8,25%</td>
<td>1,99</td>
</tr>
<tr>
<td><strong>EURUSD Spot Exchange Rate</strong> (EURUSD Curncy)</td>
<td>16,70%</td>
<td>2,18%</td>
<td>6,10%</td>
<td>2,69</td>
</tr>
<tr>
<td><strong>GBPUSD Spot Exchange Rate</strong> (GBPUSD Curncy)</td>
<td>15,32%</td>
<td>2,51%</td>
<td>6,47%</td>
<td>2,32</td>
</tr>
</tbody>
</table>

#### UNDERLYING

<table>
<thead>
<tr>
<th>CURRENCY</th>
<th>Absolute Return</th>
<th>Maximum Drawdown</th>
<th>Volatility</th>
<th>Sharpe Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AUDUSD Spot Exchange Rate</strong> (AUDUSD Curncy)</td>
<td>-11,09%</td>
<td>16,01%</td>
<td>9,88%</td>
<td>-0,01</td>
</tr>
<tr>
<td><strong>EURUSD Spot Exchange Rate</strong> (EURUSD Curncy)</td>
<td>1,85%</td>
<td>6,30%</td>
<td>7,39%</td>
<td>0,23</td>
</tr>
<tr>
<td><strong>GBPUSD Spot Exchange Rate</strong> (GBPUSD Curncy)</td>
<td>-2,07%</td>
<td>8,67%</td>
<td>7,07%</td>
<td>0,00</td>
</tr>
</tbody>
</table>

#### BOND FUTURE

<table>
<thead>
<tr>
<th>CURRENCY</th>
<th>Absolute Return</th>
<th>Maximum Drawdown</th>
<th>Volatility</th>
<th>Sharpe Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US 10YR NOTE</strong> (TY1 Comdty)</td>
<td>11,03%</td>
<td>2,00%</td>
<td>4,82%</td>
<td>2,26</td>
</tr>
<tr>
<td><strong>LONG GILT FUTURE</strong> (G 1 Comdty)</td>
<td>6,06%</td>
<td>3,77%</td>
<td>5,61%</td>
<td>1,00</td>
</tr>
<tr>
<td><strong>EURO-BUND FUTURE</strong> (RX1 Comdty)</td>
<td>11,47%</td>
<td>4,07%</td>
<td>5,69%</td>
<td>1,99</td>
</tr>
</tbody>
</table>

#### UNDERLYING

<table>
<thead>
<tr>
<th>CURRENCY</th>
<th>Absolute Return</th>
<th>Maximum Drawdown</th>
<th>Volatility</th>
<th>Sharpe Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US 10YR NOTE</strong> (TY1 Comdty)</td>
<td>-6,27%</td>
<td>8,06%</td>
<td>5,22%</td>
<td>0,00</td>
</tr>
<tr>
<td><strong>LONG GILT FUTURE</strong> (G 1 Comdty)</td>
<td>-9,44%</td>
<td>10,89%</td>
<td>6,53%</td>
<td>-0,01</td>
</tr>
<tr>
<td><strong>EURO-BUND FUTURE</strong> (RX1 Comdty)</td>
<td>-1,18%</td>
<td>7,09%</td>
<td>5,93%</td>
<td>0,00</td>
</tr>
</tbody>
</table>
vol-Up is Your Dictionary To Translate Market Expectations Embedded in Volatility Prices Into Operating Trading Rules.


What does it do?
vol-Up builds and back-tests trading strategies, and translates information from the volatility universe into daily trading signals to support you in long/short decisions on a wide range of underlying:

- Equity Indices
- Stocks
- Currencies and ETF
- Commodities
- Government Bonds

How does it do that?
vol-Up analyses implied volatility surfaces (derivatives prices) to timely identify trading signals on the underlying assets. *vol-Up is not a derivatives pricing/trading tool – quite the opposite indeed!*

Main Features
- Automatic optimization system
- SABR, Heston models
- Tailor made market strategies; best fitting to the specific investor’s risk/return profile
- Follower or Contrarian investment style
VOL-UP INCLUDES THREE TAB WINDOWS

Hot Strategies
Offers you a showcase with a selection of some of the best performing trading strategies determined with vol-Up.

Strategy Builder
Allows you to create new trading strategies and back-test them either by a Multi-Strategy optimization process that auto-selects the best trading rule and parameters setting, or by a Single-Strategy management, through which you directly choose the trading rule and set the parameters.

My Strategies
This repository of all your saved strategies allows you to edit their parameters optimization.
This Tab window offers you a showcase with a selection of some of the best performing trading strategies determined with vol-Up. For each Strategy the app indicates:

- The position on the Underlying Asset: Long [or] Short
- The P&L (1 year Absolute Performance) of the strategy vs. the underlying

By clicking on the Back-test button you will be directed to the “Strategy Builder” Tab Window: the corresponding strategy will be loaded and the optimization process will automatically start the back-test.

Clicking on the Get Last Signal you retrieve the strategy’s last available Signal and Strength: <VERY STRONG>, <STRONG>, <MEDIUM>, <WEAK>, or <STAND-BY/EXIT> if the trading rule does not provide any signal.
This Tab Window is the core of the app, allowing you to back-test a strategy and get the daily market signal. The “Strategy Builder” column on the left represents the strategy setting area, where strategy and parameters inputs are entered. The right column allows you to look at the back-testing numerical and graphical outputs.

You can define and set the strategy in the following two ways:

1. Optimizing multi-strategy & parameters.
2. Customizing a single trading strategy.
The chart shows the trade events on the underlying price chart. Each trade for the strategy is marked on the chart with entry (Long with green, Short with red) and exit (with yellow bullet) markers.
**In Sample Back-Test**

Allows you to back-test and optimize a trading rule under the same historical data set. With this option the calibration of the trading rule is optimized over the entire time period considered, on the basis of an ex-post data set. The threshold is fixed over the time period.

**Out of Sample Back-Test**

Allows you to back-test a trading rule determined on the basis of an ex-ante data set (related to a time period prior to the back-testing time). In case of optimization, the trading rule is calibrated on a daily basis and the threshold is not fixed but changes accordingly.
Euro Stoxx 50 Long Only: Back-testing In-Sample vs. Out-Sample

STATISTICS SUMMARY

<table>
<thead>
<tr>
<th>METRICS</th>
<th>STRATEGY</th>
<th>UNDERLYING</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; Final Value</td>
<td>141.20</td>
<td>114.33</td>
</tr>
<tr>
<td>&gt; Minimum Value</td>
<td>98.75</td>
<td>94.84</td>
</tr>
<tr>
<td>&gt; Maximum Value</td>
<td>141.20</td>
<td>114.33</td>
</tr>
<tr>
<td>&gt; Compound Annual Performance</td>
<td>51.70 %</td>
<td>17.81 %</td>
</tr>
<tr>
<td>&gt; Average Annual Performance</td>
<td>61.84 %</td>
<td>25.91 %</td>
</tr>
<tr>
<td>&gt; Maximum Drawdown</td>
<td>6.16 %</td>
<td>11.43 %</td>
</tr>
<tr>
<td>&gt; Volatility</td>
<td>13.59 %</td>
<td>17.49 %</td>
</tr>
<tr>
<td>&gt; Sharpe Ratio</td>
<td>3.80</td>
<td>1.01</td>
</tr>
<tr>
<td>&gt; Sortino Ratio</td>
<td>6.43</td>
<td>1.41</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>METRICS</th>
<th>STRATEGY</th>
<th>UNDERLYING</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; Excess Return (Alpha)</td>
<td>33.99 %</td>
<td>16.64 %</td>
</tr>
<tr>
<td>&gt; Tracking Error</td>
<td>10.66 %</td>
<td>11.79 %</td>
</tr>
<tr>
<td>&gt; Information Ratio</td>
<td>2.40</td>
<td>1.14</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TRADES</th>
<th>STRATEGY</th>
<th>UNDERLYING</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; Trades</td>
<td>47</td>
<td></td>
</tr>
<tr>
<td>&gt; Wins [Winning Ratio]</td>
<td>35 [74.3 %]</td>
<td></td>
</tr>
<tr>
<td>&gt; Losses [Losing Ratio]</td>
<td>12 [25.7 %]</td>
<td></td>
</tr>
<tr>
<td>&gt; Days with Open Position [% Trading Days]</td>
<td>112 [54.4 %]</td>
<td></td>
</tr>
<tr>
<td>Max No. of Consecutive Losing Days</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>No. of Stop-Loss Executions</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

In-Sample

Out-Sample
Based on Implied Volatility

The dissimilarity between implied and realized volatility is quantified as a ratio or a spread. Small (large) values point to an optimistic (pessimistic) market view regarding the underlying asset. A follower trading style would then suggest to go long (short) on the underlying, whereas a contrarian style would suggest to go short (long).

- **Ratio or Spread < Threshold** $\Rightarrow$ Long Follower / Short Contrarian
- **Ratio or Spread > Threshold** $\Rightarrow$ Short Follower / Long Contrarian

**Spread [ImpliedVol-MA(ImpliedVol)]**
This Trading Rule is similar to the Spread (ImpliedVol – RealizedVol) Trading Rule, however while in the latter the “equilibrium level” is Realized Volatility, the former uses the moving average (MA) of the most recent values of market implied volatility. This approach could be more appropriate in market phases where implied volatility levels are very different from realized volatility. The trading rule follows these conditions:

- **ImpliedVol < MA(ImpliedVol) – Spread** $\Rightarrow$ Long Follower / Short Contrarian
- **ImpliedVol > MA(ImpliedVol) + Spread** $\Rightarrow$ Short Follower / Long Contrarian

**Trigger ImpliedVol Value:**
The trading signal is triggered by the Implied Volatility (upward or downward) exceeding a predetermined Threshold fixed by the user, according to the following conditions:

- **ImpliedVol < Threshold** $\Rightarrow$ Long Follower / Short Contrarian
- **ImpliedVol > Threshold** $\Rightarrow$ Short Follower / Long Contrarian

Based on Volatility Smile’s Skew

**Spread[volUp Skew - MA(volUp Skew)]:**
The difference between volatility priced into puts versus calls is a measure of nervousness in the market. Smile’s Skew is the slope of the typical curve shape that volatilities assume when you represent the subset of implied volatilities observed on derivatives with the same time to expiry against the strike price. Typically one finds a negative slope of the smile: this denotes a negative implied correlation between volatility and its underlying. volUp Skew is measured using SABR stochastic volatility model in order to filter market data and obtain a robust measure of skew.

The Market Volatility Smile can be viewed as a synthesis of market expectations: ATM volatility and Volatility Indexes (i.e.: Vix, V2X, VDAX etc.) provide information on market-expected future volatility. We normalize SABR Skew for ATM volatility in order to better detect significant skew variations.

The trading rule follows these conditions:

- **volUp Skew < MA(volUp Skew) – Spread** $\Rightarrow$ Long Follower / Short Contrarian
- **volUp Skew > MA(volUp Skew) + Spread** $\Rightarrow$ Short Follower / Long Contrarian

**Trigger volUp Skew Value:**
A higher Skew value means more market nervousness, that could be translated into trading systems that best fit your trading profile (Follower or Contrarian).

A Follower trading style would suggest to go Long/Short when the volUp Skew is smaller/larger than the Threshold, whereas a Contrarian trading style would suggest the opposite:

- **volUp Skew < Threshold** $\Rightarrow$ Long Follower / Short Contrarian
- **volUp Skew > Threshold** $\Rightarrow$ Short Follower / Long Contrarian
...Based on Probability

**Implied vs. Historical Probability**
Any misalignments between market perceptions and the recent history of the stock is identified by translating input and output signals on the underlying. Assuming a log-normal performance without drift of the underlying, the choice of volatility estimation method solely determines the measure of probability with which to evaluate the performance achievable today by buying the underlying and selling it within a month (if you choose the Expiry month as a reference). What follows will be described as Hist Prob and it will be the measure of probability caused by the following stochastic process:

\[ dS = S(\sigma_{Hist})dW \]

The Trading Rule identifies the day in which the market finds a probability significantly different from the one derived from historical volatility, opening a Long/Short position depending on the profile of trading taken (Follower/Contrarian).

If we indicate as:
- **MktCDF:** Market Risk Neutral Cumulative Probability Function obtained by market Smile with fixed expiry (1,2 or 3 Month)
- **NsCDF:** Cumulative Density Function of a standard Normal Distribution with zero mean and Standard Deviation equal to Realized Volatility for a fixed time window (1 Month, 2 Months, 3 Months)

The follower/contrarian trading styles will follow this scheme:

\[ \text{MktCDF} + (1 \text{ or } 2) \text{StdDev} < \text{NsCDF} + (1 \text{ or } 2) \text{StdDev} \rightarrow \text{Spread} \Rightarrow \text{Long Follower / Short Contrarian} \]

\[ \text{MktCDF} + (1 \text{ or } 2) \text{StdDev} > \text{NsCDF} + (1 \text{ or } 2) \text{StdDev} + \text{Spread} \Rightarrow \text{Long Contrarian / Short Follower} \]

The relationship implies that the probability estimated by the market to have a performance better (worse) than +1 (or +2) standard deviations, that is (1- MktCDF), is larger than the historically based one, that is (1- NsCDF). In this case the Follower style suggests to go Long (Short) on the Underlying, while the Contrarian style suggests to go Short (Long) on the Underlying.
vol-Up helps you to find the best trading rule:
by taking into account your own risk/return profile

vol-Up automatically selects the best strategy:
by back-testing multiple strategies and parameter settings

You can optimize the calibration of your trading strategy according to
your risk-return profile, constraints and targets...

- ...choosing the type of performance measurement: Absolute vs. Relative
- ...setting the criteria that lead the optimization process
- ...selecting the kind of trading rules to consider within the optimization process

**Risk/Return Measures:** Absolute (performance metrics determined in absolute terms) or Relative (performance metrics determined relative to the Underlying Asset; mainly indicated for users interested in alpha risk-return performance).

**Metrics:** You can customize the optimization process by tuning the weights of several performance metrics in order to best fit his/her specific targets and constraints.

**Optimization:** The optimization process is based on all the chosen settings. At the end, the app auto-sets the trading rule and the parameters selected by the process.

**Check Trading Rules:** You can include/exclude specific trading rules from the optimization process.

**Long & Short Trading Rule Optimization Process is Performed in Several Steps...**
The app first optimizes the Long-only strategy; then it optimizes the Short-only strategy; the two strategies are then combined assigning in each day the corresponding position on the underlying (long or short). In case both strategies provide conflicting signals in the same day (i.e. go Long and go Short), the process selects the position with the strongest signal and the corresponding best performance.
This function allows you to check and export the back-testing results in two table formats:

- **Daily Position List**: contains the detailed list of the daily positions. For each trade it shows the Position and the Signal Strength of the Strategy in each day, the Trading Style and Rule, the Threshold associated, the value of the Underlying, and their Daily Yields.

- **Trade Table**: contains details about every trade made over the time period of the back-test: Entry and Exit dates/prices to and from the trade, the Trade Yield, and the Cumulative Strategy Value.
This Tab Window is the repository of all saved strategies. By clicking on the <GO> button the user can reload the parameters of the strategy linked to it. This returns the user back to the “Strategy Builder” Window Tab, where the strategy can be back-tested again in order to obtain the current signal.
• Use vol-Up **daily signals as a trading system** on the specific assets you trade

• Use vol-Up **signals as an additional indicator** to double check your market view with volatility insights

• Take a quick daily look at the Hot Strategies Tab Window to get some smart tips for the day from the volatility world

• Get an **overall view of the expected market trend** by monitoring direction and intensity of market signals on related assets (e.g. World Equity Indexes)

• **Set-up a portfolio strategy based on volatility signals** by: selecting a list of assets for which vol-Up provides strong back-testing performance; taking a position only on those assets for which vol-Up provides the strongest signals (or scaling investments according to the strength of the signal)
Thanks for Your Attention

Discover how our Apps can Help You:

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