

# Volatility Futures & Options

MAR 1, 2016

## Some New Developments In Volatility Calculations

If you're working with daily data (without access to intraday data) and need to calculate volatility, then using close-to-close squared returns is by far not the best way to go. Trades and quants know that it is a very noisy metric, and come up with few work-arounds. In this post I will do a very quick review of some available options, as well as new developments. I am not planning a thorough review or comparison, rather just to offer my personal opinion, based on practical experience of what works better.

Quants tend to like either modelling some long-term average of daily squared returns (which introduced autocorrelation), or using GARCH to filter out smooth volatility process based on the data. GARCH model of daily returns, in my experience, also performed quite poorly, especially in forecasting future volatility.

Traders tend to use ATR - average true range - as a measure of price variability (quick tip: daily volatility  $\approx$  ATR / stock price / 1.6). Another very similar estimate based on squared range, called Parkinson's volatility estimator.

Better volatility estimates have been devised: Garman-Klass and Rogers-Satchell volatility estimators are much better than others mentioned above. Yang-Zhang estimator has theoretically even higher accuracy, but works only for multi-day estimates. Magdon-Ismail and

Atiya published another estimator but (according to their own research) it works only slightly better than R-S and G-K estimators, while being much more complicated from computational point. A quick note about the formulas to the right - similar to Y-Z estimator, G-K and R-S can also be adjusted to include overnight return, see e.g. [this](#).

- Parkinson:
 
$$\sigma_{park} = \sqrt{\frac{1}{N} \sqrt{\frac{1}{4(\ln 2)}} \sum_{i=1}^N (H_i - L_i)^2}$$
- Garman-Klass:
 
$$\sigma_{GK} = \sqrt{\frac{1}{N} \sqrt{\frac{1}{2}} \sum_{i=1}^N (H_i - L_i)^2 - (2 \ln(2) - 1)(C_i - O_i)^2}$$
- Rogers-Satchell (Drift Free Estimator):
 
$$\sigma_{RS} = \sqrt{\frac{1}{N} \sqrt{\frac{1}{2}} \sum_{i=1}^N [(H_i - C_i)(H_i - O_i) + (L_i - C_i)(L_i - O_i)]}$$
- Yang-Zhang (Includes Overnight):
 
$$\sigma_{YZ} = \sqrt{\sigma_{close-to-open}^2 + k\sigma_{open-to-close}^2 + (1-k)\sigma_{RS}^2}$$

$$k = \frac{0.34}{1.34 + \frac{N+1}{N-1}}$$

Recently there were three interesting developments in estimators based on OHLC data.

Last year Bruno Dupire introduced what he called a [Move-based estimator](#), a volatility estimate that reflect the cost of option hedging. I have to honestly admit, that after reviewing the presentation several times I still don't understand how the estimator is derived. If you can explain it to me, please email or comment below.

Jerzy Pawlowski created a skew-like and moment like estimators based on OHLC data, [here](#) slides 6 and 7, with R code available [here](#).

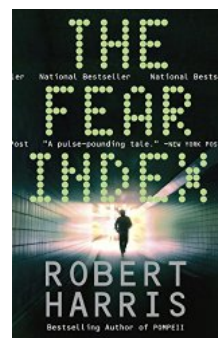
Finally, not quite recent (2008) but also important is this [correlation formula](#) from Rogers and Zhou.

Posted by [onlyvix.blogspot.com](http://onlyvix.blogspot.com) at 3/01/2016

 Recommend this on Google

**No comments:**

**Post a Comment**



SEARCH THIS BLOG

ABOUT ~

The information in this website does not constitute investment advice or an offer to invest or to provide management services. Email your questions to [onlyvix@gmail.com](mailto:onlyvix@gmail.com)

PAGES

[Home](#)  
[Volatility Publications](#)  
[Volatility Bookshelf](#)  
[Volatility Indexes](#)  
[Volatility ETFs & ETNs](#)  
[Expiration Calendar 2015](#)  
[Forecasts Tracker](#)  
[Privacy Policy](#)

TOP VOLATILITY RESOURCES

[VIX Central](#)  
[Quantocracy](#)  
[MarketSci](#)  
[VIX and more](#)  
[Six Figure Investing](#)  
[Trading The Odds](#)  
[The Intelligent Investor Blog](#)  
[QuSMA](#)  
[Sitmo](#)  
[Quantum Blog](#)

POPULAR POSTS

[Simple Trick to Convert Volatility](#)  
[CBOE to List SPX Wednesday-Expiring Weeklys Options](#)  
[Old VIX vs New VIX - Simple Explanation](#)  
[Triple Expiration](#)  
[How To Manipulate VIX Settlement Price](#)  
[Intuitive Understanding Of VIX Formula](#)  
[Some Vol Funds News](#)  
[VIX, VIX Futures, and VIX ETNs - Interview with John Hwang](#)  
[Manager Spotlight: John Dolan, independent market maker in CME Case-Shiller Index futures and options](#)

Enter your comment...

Comment as: Unknown (Goc ▾) Sign out

Publish Preview  Notify me

[Home](#)

[Older Post](#)



Subscribe to: [Post Comments \(Atom\)](#)

[MOVE Index and VIX Index](#)

*OTHER VOLATILITY BLOGS I READ*

- [Adaptive Trader](#)
- [Cassandra Does Tokyo](#)
- [Climateer Investing](#)
- [Dekalog Blog](#)
- [Don't Fear the Bear](#)
- [Gödel's Market](#)
- [LPPL Market Watch](#)
- [Macroption](#)
- [Market Q View](#)
- [Options For Rookies](#)
- [The Options .Net](#)
- [Trader Edge](#)
- [Trader's Club](#)
- [Trading Markets](#)
- [Trading Volatility](#)
- [VIX For The People](#)
- [VIX and less](#)
- [Value Bin](#)
- [Volatility Fighter](#)
- [Vovam \(in Russian\)](#)
- [Из мира опционов](#)
- [ОПЦИОНЫ И ИНВЕСТИЦИИ](#)

*SUBSCRIBE TO*

-  [Posts](#) ▾
-  [Comments](#) ▾

*FOLLOW BY EMAIL*

Submit