

Historical Open-High-Low-Close Volatility: Garman and Klass (Yang Zhang)

<http://www.happywednesday.org/portal/content/historical-open-high-low-close-volatility-garman-and-klass-yang>

{Yang and Zhang derived an extension to the Garman Glass historical volatility estimator that allows for opening jumps. It assumes Brownian motion with zero drift. This is currently the preferred version of open-high-low-close volatility estimator for zero drift and has an efficiency of 8 times the classic close-to-close estimator. Note that when the drift is nonzero, but instead relative large to the volatility, this estimator will tend to overestimate the volatility.

$$\{\sigma = \sqrt{\frac{Z}{n} \sum \left[\left(\ln \frac{O_i}{C_{i-1}} \right)^2 + \frac{1}{2} \left(\ln \frac{H_i}{L_i} \right)^2 - (2 \ln 2 - 1) \left(\ln \frac{C_i}{O_i} \right)^2 \right]}$$

{where

{ σ = Volatility

Z = Number of closing prices in a year

n = Number of historical prices used for the volatility estimate

O_i = The opening price

H_i = The high

L_i = The low

C_i = The close

{<http://www.sitmo.com/eq/409>