

Parkinson Volatility Estimator Description

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The Parkinson number, developed by Michael Parkinson in 1980, aims to estimate the volatility of stock prices using the high and low prices over a given period, typically one day. This estimator is particularly useful because it recognizes that the daily range of prices contains information about the volatility that might be lost when only looking at closing prices.

Formula: The Parkinson number is calculated using the following formula: $\sigma_P =$

$$\sqrt{\frac{1}{4 \ln(2)} \cdot \frac{1}{n} \sum_{i=1}^n \left(\ln \left(\frac{H_i}{L_i} \right) \right)^2}$$
 where:

- H_i and L_i are the high and low prices for the i th period, respectively.
- n is the number of total periods (days) observed.
- The factor $\frac{1}{4 \ln(2)}$ is a scaling factor that corrects for the fact that highs and lows are not the true extremes of a log-normal distribution.

Advantages of the Parkinson Number:

1. Utilizes More Data Points: Unlike models that only use closing prices, the Parkinson number leverages the highs and lows, which can provide a more accurate and sensitive measure of volatility, especially on days with significant intraday price movements.
2. Better Reflects Intraday Volatility: It is particularly useful for capturing intraday volatility because it accounts for the full range of price movements within the trading day.
3. Less Sensitive to Microstructure Noise: Highs and lows are less likely to be affected by market microstructure noise compared to prices at fixed times (like the close).