Volmex Realized Volatility Indices

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This paper introduces the Volmex Realized Volatility Indices, and specifies in detail how to calculate these indices.

1 Introduction

Volatility, the degree of variation in asset prices over time, is a central concern for all market participants, from institutional investors to individual traders. Whether deciding to enter or exit a position, understanding the potential for price fluctuations is essential for informed decision-making. In financial markets, this variability is typically measured by the standard deviation of asset returns, which, when annualized, becomes the commonly referenced metric of volatility.

This paper introduces the methodology behind the Volmex Realized Volatility (VRV) Indices, which are designed to serve as robust and consistent indicators of historical volatility for crypto assets. These indices aim to provide a transparent and standardized benchmark for measuring realized volatility in digital asset markets.

2 Volmex Realized Volatility Index

2.1 Purpose and Use

The Volmex Realized Volatility Index measures the historical, or realized, volatility of a crypto asset using daily (non-overlapping) returns. By focusing on actual past movements, it offers a backward-looking but highly interpretable signal of how turbulent recent price action has been. This makes the VRV indices a valuable tool for traders, asset managers, and risk professionals looking to assess recent market dynamics or calibrate risk models.

2.2 Realized Volatility

The core of the VRV methodology is the use of logarithmic returns, which are preferred over arithmetic returns in financial modeling due to their statistical properties—particularly their ability to normalize skewed distributions.
The log return $r_{S,t}$ of a crypto asset with price level S_t at time t is defined as:

$$r_{S,t} = \ln S_t - \ln S_{t-\Delta t} \tag{1}$$

where Δt is the 1-day which is the time difference between two observations.

Given a series of n daily log returns, the realized variance RVar_t at time t is calculated as the sum of squared returns over a rolling window of n days:

$$\mathrm{RVar}_t = \sum_{i=0}^{n-1} \times r_{S,t-i}^2 \tag{2}$$

To convert this variance into an annualized volatility percentage, we apply the square root and multiply by an annualization factor:

$$\mathrm{VRV}_t = 100 \times \sqrt{A \times \mathrm{RVar}_t} \tag{3}$$

where

- VRV_t is the realized volatility at time t,
- $A = 365/n$ is the annualization multiplier assuming 365 calendar days per year,
- and the result is expressed in percentage terms.

2.3 Naming Convention

Each VRV index is identified by a naming convention that encapsulates both the asset and the historical window used in the calculation.

The format is as follows: `xVRVyD` where

- `x` denotes the asset,
- `VRV` stands for "Volmex Realized Volatility",
- and `yD` indicates the number of days in the historical return window.

For example, `BVRV30D` refers to the 30-day realized volatility of Bitcoin, and `DOGEVRV7D` represents the 7-day realized volatility of Dogecoin.

Major tokens like BTC, ETH, SOL, and XRP are abbreviated to their first letter, while other assets retain their full ticker symbols for clarity.

3 Conclusion

The Volmex Realized Volatility Indices provide a simple yet effective methodology to quantify historical volatility in crypto markets. By leveraging non-overlapping daily log returns and standardizing across various assets and timeframes, the VRV framework ensures a consistent and transparent view of market behavior.

These indices can be used not only to understand past market turbulence but also to inform strategies in trading, hedging, and portfolio construction. As the crypto ecosystem continues to evolve, the VRV indices serve as a foundational building block for analytics, derivatives, and risk management in crypto markets.