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Abstract

The Intrinsic Entropy as Substitute for the Market Volatility of Underlying Securities †

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Grasping the market volatility of underlying securities, and accurately estimating it in particular, are ones of the salient preoccupations of those involved in the securities industry and derivative instruments pricing.

This paper presents the results of employing the intrinsic entropy model as substitute for the market volatility of underlying securities. Diverging from the widely used volatility models that take into account only elements of the traded prices, namely Open, High, Low, Close prices of a trading day (OHLC), the intrinsic entropy model quantifies in as well the volumes traded during the considered time frame. We adjust the intraday intrinsic entropy model that we introduced earlier for the exchange-traded securities, in order to connect daily OHLC prices with the ratio of the corresponding daily volume to the overall volume traded in the considered period. The intrinsic entropy model conceptualizes this ratio as entropy probability or market credence associated to the corresponding price level.

The intrinsic entropy is computed using historical daily data for traded market indices (S&P 500, Dow 30, NYSE Composite, NASDAQ Composite, Russell 2000, DAX Performance-Index, CAC 40, Hang Seng Index and Nikkei 225). We compare the results produced by the intrinsic entropy model with the volatility obtained for the same data sets using industry widely employed volatility estimators such as Parkinson (HL), Garman-Klass (OHLC), Rogers-Satchell (OHLC), Garman-Klass Yang-Zhang extension (OHLC) and Yang-Zhang (OHLC).

We consequently study the efficiency of the intrinsic entropy and volatility estimates by comparing them with the volatility of the standard close to close estimate. The intrinsic entropy model proves to consistently deliver a minimal estimation error for various time frames we experimented with, along with its peculiar indication regarding the market inclination toward either buying or selling the underlying security.