

An Empirical Model of Daily Highs and Lows

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Summary

While price data on open, high, low, and close are available, studies on stock returns and volatility usually employed only close-to-close return data. Do the data on closings contain more information about price dynamics than the other three variables? Seemingly, the answer is not a definite yes. The high and the low, for instance, correspond to the prices at which the excess demand is changing its direction — the information that is not reflected by data on closing prices.

The current exercise offers an exploratory analysis of the empirical properties of highs and lows. There are several reasons for analyzing the high and the low. The motivation of the empirical model of highs and lows used in the current study is quite intuitive. For equity markets in developed countries such as the US, stock prices exhibit stochastic trends and are typically characterized by I(1) processes. Daily highs and lows, however, do not appear to drift apart from each other too far over time. Thus, highs and lows may follow a cointegration relationship.

To explore the idea, we consider three main US stock indexes: the Dow Jones Industrial index, the NASDAQ index, and the S&P 500 index. Our empirical results show that daily highs and daily lows of three main US stock price indexes are cointegrated. Data on openings, closings, and trading volume are found to offer incremental explanatory power for variations in highs and lows. With all these variables, the augmented VECM models explain 40% to 50% of variations in daily highs and lows. It is also shown that the responses of daily highs and daily lows to the shocks depend on whether data on openings, closings, and trading volume are included in the analysis.