Volatility in Global Bitcoin Market: A Comparison of GARCH and HAR Approaches

D.M. Mudalige

University of Moratuwa, Sri Lanka

darshanadm@uom.lk

Abstract

It was found that more than 500 million individuals owned the Bitcoin cryptocurrency by the end of 2022, and the usage is growing. Investors and other key stakeholders need now to correctly predict the volatility of the bitcoin market in order to manage risk effectively. The methods that are best suited for predicting Bitcoin volatility are examined in this study. The analysis used two HAR models and several GARCH models with multiple error distributions. Performance for both in-sample fit and out-of-sample predictions of these models was evaluated. According to the results, the top-performing models in the GARCH model category are EGARCH, MSGARCH, and HARCH. Surprisingly, HAR models outperformed GARCH models in terms of performance and forecasting. The fact that HAR models are estimated from realized variance is the primary cause of this improved fit. While the HAR model performs well across all time horizons, the performance gap is most pronounced for short-term forecasting timeframes. With regard to the selection of the loss function, this result is robust. When an exact forecast of Bitcoin market volatility is needed, high-frequency data-based HAR models are advised. However, the EGARCH model is a suitable substitute if a model is estimated from daily data. This study offers insightful information to investors in the Bitcoin market and lawmakers.

Keywords: *bitcoin, cryptocurrency, GARCH models, HAR model,*