Abstract

This study examines the determinants of Bitcoin's realized volatility by extending the Heterogeneous Autoregressive (HAR) framework to incorporate external shocks from major financial and commodity markets, namely the NASDAQ-100, Brent crude oil, and gold. To capture potential asymmetries in spillover effects, external market returns are decomposed into positive and negative components. In addition, structural changes in volatility dynamics are identified using structural break tests. The empirical results reveal strong volatility persistence at daily and weekly horizons, consistent with the HAR structure. Shocks originating from the NASDAQ and gold markets exert statistically significant effects on Bitcoin's realized volatility, whereas the impact of crude oil prices remains limited. Notably, both negative and positive shocks from gold have a more pronounced influence in the post-2022 period, indicating intensified spillovers and a strengthening linkage between Bitcoin and the gold market.