Abstract:

In this work, the behavioral dynamics of illiquid stock prices at the Uganda securities exchange (USE) was studied and hedging strategies under illiquid market conditions were formulated. Illiquidity, characterized by wide bid and ask spreads affects price formation by decoupling prices from standard risk and return relationships and increasing sensitivity to market sentiment. Firstly, this study involved modelling prices at USE that remain constant much of the time thus, complicating price forecasting. This challenge was circumvented by using a regime-switching approach through combining the Markov model (MM) with two models; the exponential Ornstein Uhlenbeck model (XOU) and geometric Brownian motion (gBm). The combined models as well as gBm and XOU, calibrated using the Maximum Likelihood Estimator on raw and cleaned data were used to model USE stock prices. The results showed that the combined model; MM-gBm outperformed the other models while modelling USE stock prices, and that illiquidity can significantly suppress measured correlation of the USE stock prices.

Secondly, this study introduces hedging strategies under illiquid market conditions. One of the hedging strategies evaluates the effectiveness of using a more liquid, correlated asset as a hedge in a portfolio of two assets, and the hedging performance was assessed in presence and absence of transaction costs. The decision to hedge using the alternative asset was grounded in the practical constraints created by illiquidity and high transaction costs associated with the right (primary) underlying asset. The considered two-asset portfolio was hedged against only one of the two assets; using varying trading intervals, correlation coefficients and transaction costs. The decisions on when to trade each asset were made basing on a risk metric; risk-adjusted value. The results demonstrate that hedging the alternative asset, with reasonably smaller transaction costs than the primary asset can be better, if the correlation between them is very strong. Another hedging strategy formulated in this study was based on the MM-gBm model, where rebalancing was only conducted on active regimes. The hedging results in both the strategies were compared on a European call and perpetual put options. Results showed that the former strategy entailed a higher risk than the latter strategy.

Thirdly, the efficiency of bilateral cross-hedging between stocks listed on USE and the Nairobi Securities Exchange (NSE), created by replicating options on portfolios consisting of cross-listed stocks was examined. Both markets are relatively illiquid, with several stocks cross-listed in Uganda Shillings (Ug Shs) and Kenya Shillings (KShs), offering hedgers a choice of market for hedging options and managing price risk. A portfolio containing a domestic asset, which is also cross-listed but considered here in its domestic currency with β shares and a cross-listed stock with ω shares was analyzed. The cross-listed stock was modelled first as Ug Shs-denominated asset using the one-dimensional (1-D) Black-Scholes model, and second as a cross-currency asset combining foreign exchange rates and KShs prices using the two-dimensional (2-D) Black-Scholes model. The objective was to hedge the ω shares of the cross-listed stock only and compare hedge performance under transaction costs between the domestic and foreign currency approaches. The results obtained while trading the cross-listed stock demonstrate that when the underlying domestic stock gets too expensive and illiquid, the foreign stock can be traded as an alternative when the transaction costs on the exchange rates are low.