Pioneer Journal of Theoretical and Applied Statistics
Volume 18, Issues 1-2, Pages 15-29 (July & October 2019)
ISSN: 2230-9837

THE DYNAMICS OF OPTION PRICING MODELS TO ZIMBABWEAN LISTED FIRMS ON JSE AND NASDAQ MARKETS

Ndava Constantine Mupondo and Tichaona Kutchwa

Received June 6, 2016

Abstract

In this study, we have looked at the Heston and Nandi [S. L. Heston and S. Nandi, A closed-form GARCH option valuation model, Review of Financial Studies 31(3) (2000), 585-625] Garch (1.1) and the Black and Scholes [F. Black and M. Scholes, The pricing of options and corporate liabilities, Journal of Political Economy 81(3) (1973), 637-654] model in their ability to price stock options fairly and accurately. Effectiveness of the model in pricing stock options is judged by how close the model is to the real option price. Debate has been that since, the Black and Scholes assumes constant volatility on stock returns then its predictive power with regards to option pricing is weak. This distributional assumption problem of the Black-Scholes model means that it generally underestimates stock option values because the likelihood of having an extreme price movement is greater than the model expects. The Heston and Nandi model has an advantage that it treats volatility as a stochastic quantity measure and have its volatility filtered from the Garch (1.1) historical underlying price hence its ability to perform better. It further has its calibration of parameters estimated in Visual Basics.net and C++ using the Nelder-Mead algorithm. However to distribute fairness between the models in comparison a deterministic volatility model, the ad hoc Black-Scholes model of Dumas et al is added and together with the original Black-Scholes are allowed to use volatility implied from reported market option prices to price options. Empirical analysis show that the original Black-Scholes and the ad hoc Black-Scholes tend to price options better than the Heston and Nandi model when both models use volatility implied from the market. This could have been a result that option prices which have their volatility implied from the market are forward looking. And this becomes a disadvantage to the Heston and Nandi model since it uses historical data to filter volatility and volatility is a driving process for the estimation of Garch (1.1) parameters. These parameters together with volatility serve as a function to pricing of options.

Keywords and phrases: Garch, option pricing, algorithm, strike price, volatility.