An Empirical investigation of the Black and Scholes Model in Pricing of Index Nifty 50 Call Options

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Abstract
The Black-Scholes option pricing formula is widely used by investors, traders, all leading stock exchanges and by other participants for pricing options contracts written on the identified underlying assets. This research paper empirically investigates the pricing accuracy of the Black-Scholes model (B&S model) for pricing the Index Nifty 50 call options traded on NSE. The pricing accuracy of 2,829 Call option contracts written on the underlying equity Index Nifty 50 call options are calculated under this model. To gauge pricing errors of this model, the Market closing prices of Index Nifty 50 option and corresponding calculated call option prices under the Black-Scholes model are compared by using the paired t-test, mean error and absolute percentage mean error. Thiel’s U statistic has been also used to measure the forecast accuracy of the B&S model. It has been observed that the Black and Scholes model is relatively suitable in pricing of the Index Nifty 50 call options.

I. Introduction
BASED ON THE European-style of options, the Black-Scholes (B&S) options pricing model is considered as the most acceptable theories in the areas of financial engineering. F. Black and M. Scholes had published paper titled “The pricing of option and corporate Liabilities” in the Journal of Political Economy in 1973. The financial derivatives tools are particularly designed for minimizing the impact of associated risks. Hence, the Black-Scholes formula is used for options contracts pricing and developing hedging strategies to minimize the impact of risks written on European-style options.

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The produced ME by 0.90 indicates that B&S model under prices index call options. However, these pricing errors are very marginal and comparatively no high (Jordon and Seal, 1986; Blomeyer and Boyd, 1988; Lauterbach and Schultz, 2012). The value of Thiel’s U statistic is 0.053, closer to one, indicates a good forecasting accuracy.

V. Conclusion

The Black and Scholes model produced pricing has been empirically tested in pricing of Index Nifty 50 call options traded on NSE. The Black-Scholes model is relatively suitable in pricing of the Index Nifty 50 call options. This is in line with the findings of McKenzie, Gerace and Subedar (2007) that the model is relatively suitable in pricing of the call options. But this is also inconsistent with the findings of Gencay and Salih (2003) that the model exhibits pricing error for index call options.

Black and Scholes model is used for the calculation of premium of the European-style of options. An attempt has been made under this research paper by the researchers to investigate the produced pricing accuracy of the Black and Scholes model for the underlying assets Index Nifty 50. The theoretical prices have been calculated under this model. The calculated prices have been compared with the market closing prices to gauge the pricing accuracy of the Black and Scholes model. The pricing accuracy produced under the Black and Scholes model has been evaluated by using the paired t-test, Mean Error, Mean Absolute Percentage Error and Thiel’s U statistic. It has been found that the Black and Scholes model is relatively suitable in pricing of the Index Nifty 50 call options.

References


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