

# Chapter 8

## Comparison of European Option Pricing Models at Multiple Periods

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### ABSTRACT

*The point of this chapter is to think about the correlation of two well-known European option pricing models – Black Scholes Model and Binomial Option Pricing Model. The above two models not statistically significant at one period. In this examination, it is shown how the above two European models are statistically significant when the time period increases. The independent paired t-test is utilized with the end goal to demonstrate that they are statistically significant to vary from one another at higher time period and the Anderson Darling test being used for the normality test. The Minitab and Excel programming has been utilized for graphical representation and the hypothesis testing.*

### INTRODUCTION

The derivatives are the agreement between the two gatherings in which one gathering consents to purchase and another gathering consents to offer the basic resource at a characterized cost at a future date. The fundamental derivatives are forward, future, swap and options. They are exchanged on both Over-the-Counter (OTC) and exchange market. In this investigation, just European options are utilized. European options will lapse just on the development date. The Black Scholes Model (BSM) and Binomial option pricing model (BOPM) are the celebrated option pricing models. Through the budgetary world, the two

DOI: 10.4018/978-1-7998-3053-5.ch008

option evaluating models are utilizing with the end goal to gauge the estimation of the options (call and put). “An option is an agreement/contact that gives the proprietor the rights, yet not the commitment to purchase (if there should arise an occurrence of call option) or sell (in the event of a put option) at some characterized cost called strike cost at some future date” (Hull 2003). The holder of a call option trusts that the price of an underlying asset value will increment in future date and in the event of the put option, the holder trusts that the estimation of underlying asset price value will fall in future. With the end goal to claim the rights, the holder/purchaser of an option needs to pay some add up to the writer/seller, that instalment is known as premium.

Options are utilized with the end goal to decrease the future hazard (misfortune) i.e. s hedging or to maximise the profit of an investment. The price of the option relies upon the movement of the price of an underlying stock. Therefore a financial specialist will settle on a option relies upon whether the cost of a underlying asset will climb or down. On the off chance that the underlying asset climbs, at that point the speculator will pick the call option and if the value moves down, at that point he will pick put option. The financial specialists will practice the option if there is a positive result. The result is an arrival at some future date. Fisher and Myron in 1973 separated a hypothetical option value valuation and analysis it with scientifically. That demonstrates the actual price/value varies from the calculated option pricing model. Panduranga (2013a, 2013b) tried whether Black Scholes choice evaluating model is significant to Indian derivatives market. It was distinguished that the actual cost of an option is statistically significant with the calculated price of an option using Black Scholes model. Feng and Kwan (2012) researched that the BOPM which in the end meets to understood BSM as the quantity of Binomial period increment. In the year 2018, Dar and Anuradha distinguished that there is no huge contrast between the BOPM and BSM at one period by utilizing the two measurable techniques – t-test and Tukey strategy.

Initially, we use networks to assess the estimations of the options (call/put) toward the  $t=0$  that gives an incentive to each call and put options at different strike costs at an expiry/develop date subject to the non-benefit paying shares and without premium.

At last, the outcomes we understood that BSM is fundamentally unique in relation to BOPM at the number of time periods increment with the assistance of statistical paired t-test. Minitab and Excel have been utilized as a vital apparatus to compute all the vital outcomes.

Most speculators and dealers new to options markets want to purchase calls and puts as a result of their restricted hazard and boundless benefit potential. Purchasing puts or calls is commonly a path for financial specialists and dealers to hypothesize with just a small amount of their capital. Yet, these straight option purchasers miss a considerable lot of the best highlights of stock and product options, for example, the chance to turn time-esteem rot (the decrease in estimation of an alternatives contract as it arrives at its termination date) into potential benefits. This chapter focused on the option values and its two famous methods for calculating the option values. The traders should know about the methods so that they can easily estimate the premium when people buy options. In this way, this chapter comes under the data science and analytics.

## **LITERATURE REVIEW**

Boyle (1988) has presented five-jump cross section structure for evaluating with two state factors under the suspicion of the bivariate lognormal dispersion of these state factors. Boyle, Evnine and Gibbs (1989) presented a methodology for esteeming multivariate unexpected cases including a few hidden resources

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