

An Analysis of Dynamic Applications of Black-Scholes

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Abstract

For decades people have invested in the stock market in with stocks, options, and bonds. Various groups of people have worked towards modeling the stock market with mathematics. One of the earliest is Black-Scholes. Developed by Fischer Black and Merton Scholes in 1973, it remains one of the most prevalent tools used by European investors today. This project explores the ways in which Black-Scholes can be applied to the more dynamic American option trading market. The major focus of study will be comparing call and put values generated by the Black-Scholes model to historical call and put values.

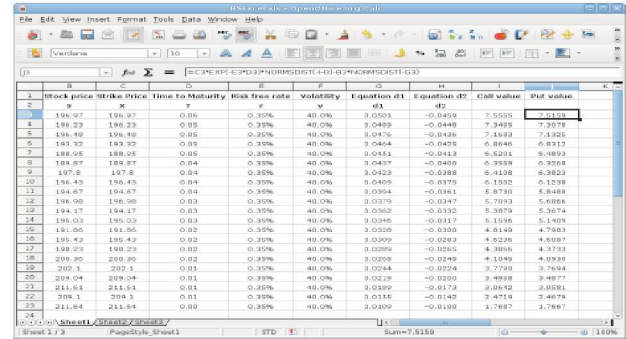


Figure 1: The Black-Scholes Spreadsheet

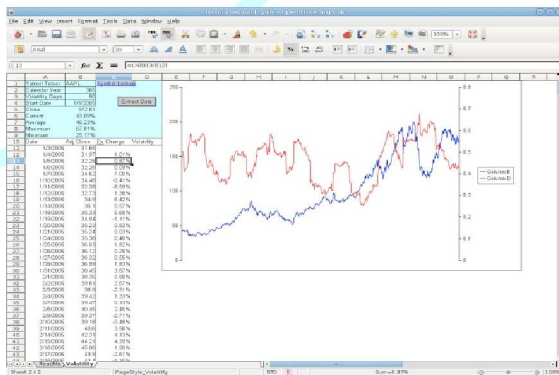


Figure 2: Volatility graphs and calculations

The Black-Scholes involves several main variables: stock price, strike price, volatility, time until maturity, and the risk-free interest rate. Stock price denotes the current market price of the stock, and strike price denotes the price that the option can be exercised at. Time until maturity is the time until the option can be exercised; this value is often measured in years. The risk-free interest rate is the rate of return; in this experiment, the risk-free rate will be equal to the rate of a US Treasury Bond. Finally, volatility is the measure of variation in returns of a stock option. In the American stock exchange, volatility is often expressed in terms of beta.

Modeling

Findings

The results obtained should give insight into future option pricing, as well as underline the main differences in American and European option trading. The results will be presented in both table and graphical format (using spreadsheets and time-series plots). Although this is only one dynamic application of Black-Scholes, it may provide ideas for other investing tools that branch from models of markets of different nationalities.

Screenshots or further discussion of results