

Geometric Asian option pricing in the Black Scholes model

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Abstract

The vast majority of the market consists of different types of derivatives. Our focus will be on contingent claims (derivatives with future payoff depending on an uncertain event) and options within that. We will work in the Black-Scholes model which consists of a risk free and a risky asset. Furthermore we will assume the following properties: no bid-ask spread, liquidity, divisibility, no transaction fees.

Options are contracts which conveys its owner, the holder, the right, but not the obligation, to buy (call) or sell (put) an underlying asset or instrument at a specified price on a specified date. These contracts can be categorized in various ways depending on the properties of the claim.

We will concentrate on geometric Asian options which means that the underlying asset is the geometric average of the risky asset within a given time interval. Pricing these options properly means, that we would like to find the fair value of these contracts without giving the opportunity of arbitrage (profit larger than the return of the investment in the risk free asset) profit to the other market participants. To do this we have to be acquainted with the topic's financial terminology, models, mathematical definitions/theorems (mainly probability and measure theory) and their connections.

Using these tools we will be able to state a powerful theorem about contingent claim pricing in the model. At the end of the thesis, besides mentioning other type of options, we will calculate the exact form of the price of such contracts and state another theorem between the connection of the value of call and put options as well.