

Option pricing using R

John Randal

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Abstract

R has a contributed package `RQuantLib` which provides access to some of the `QuantLib` libraries, and common, practitioner-oriented option pricing tools. These functions are fairly limited in their scope and applicability from a research perspective, in the sense that they are based around the standard Black-Scholes assumptions.

We review extensions to the Black-Scholes pricing equation, in particular the constant elasticity of variance, and the compound option pricing models, focussing on problems relating to computability of their closed form solutions. In each case, R offers probability tables that are otherwise fairly obscure, in particular, the non-central chi-squared distributions, and the multivariate normal distributions available in the package `mvtnorm`.

We present a further extension, the extended compound option pricing model, which also has a closed form solution, and which has applications in stock, stock option, and debt pricing. The model can be implemented in R, however evaluating the pricing formula presents some challenges. These challenges are discussed.