ANALYTIC SOLUTION OF A NONLINEAR BLACK-SCHOLES EQUATION VIA LONG AND SHORT GAMMA POSITIONS

Esekon J. E.,

Kirinyaga University, KENYA

Correspondence: *jesekon@kyu.ac.ke*

Abstract

This study presents a nonlinear Black-Scholes equation whose nonlinearity is due to feedback effects. The market involved is illiquid as a result of transaction costs. An analytic solution to the equation via long and short gamma positions is currently unknown. After transforming the equation into a parabolic nonlinear porous medium-type equation, find that the assumption of a traveling wave profile to the later equation reduces it to Ordinary Differential Equations (ODEs). This together with the use of long and short gamma positions facilitate a twice continuously differentiable solution. Both positive and negative gamma exposure can lead to an out-of-the-money option.

Keywords: *Nonlinear Black-Scholes Equation, Illiquid Markets, Transaction Cost, Gamma Position, Analytic Solution*

KyU is ISO 9001:2015