World Academy of Science, Engineering and Technology
International Journal of Economics and Management Engineering
Vol:9, No:03, 2015

Kou Jump Diffusion Model: An Application to the SP 500; Nasdaq 100 and Russell 2000 Index Options

Authors : Wajih Abbassi, Zouhaier Ben Khelifa

Abstract : The present research points towards the empirical validation of three options valuation models, the ad-hoc Black-Scholes model as proposed by Berkowitz (2001), the constant elasticity of variance model of Cox and Ross (1976) and the Kou jump-diffusion model (2002). Our empirical analysis has been conducted on a sample of 26,974 options written on three indexes, the S&P 500, Nasdaq 100 and the Russell 2000 that were negotiated during the year 2007 just before the sub-prime crisis. We start by presenting the theoretical foundations of the models of interest. Then we use the technique of trust-region-reflective algorithm to estimate the structural parameters of these models from cross-section of option prices. The empirical analysis shows the superiority of the Kou jump-diffusion model. This superiority arises from the ability of this model to portray the behavior of market participants and to be closest to the true distribution that characterizes the evolution of these indices. Indeed the double-exponential distribution covers three interesting properties that are: the leptokurtic feature, the memory less property and the psychological aspect of market participants. Numerous empirical studies have shown that markets tend to have both overreaction and under reaction over good and bad news respectively. Despite of these advantages there are not many empirical studies based on this model partly because probability distribution and option valuation formula are rather complicated. This paper is the first to have used the technique of nonlinear curve-fitting through the trust-region-reflective algorithm and cross-section options to estimate the structural parameters of the Kou jump-diffusion model.

Keywords : jump-diffusion process, Kou model, Leptokurtic feature, trust-region-reflective algorithm, US index options
Conference Title : ICBFE 2015 : International Conference on Business, Finance and Economics
Conference Location : Miami, United States
Conference Dates : March 09-10, 2015