

Heston-Type Stochastic Volatility with a Markov Switching Regime*

Robert J. Elliott[†], Katsumasa Nishide[‡] and Carlton-James U. Osakwe[§]

(Very preliminary as of April 9, 2014)

DO NOT CITE OR CIRCULATE!!

Abstract. We construct a Heston-type stochastic volatility model with a Markov switching regime for a stock option price. An analytic solution which contains a matrix ODE is obtained and numerically calculated. Our model is flexible enough to induce a wide variety of volatility surfaces with both flat and steep smiles/smirks for the same parameter values but different regimes.

Keywords: Stochastic volatility, Markov switching.

JEL classification: G12, E32,

*The first author acknowledges the supports of Australian Research Council and the SSHRC. The second author acknowledges the financial support of the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) Grand in Aid for Scientific Research (C) #23530362.

[†]School of Mathematics, University of Adelaide, Center for Applied Financial Studies, University of South Australia, Haskayne School of Business, University of Calgary. E-mail: relliott@ucalgary.ca.

[‡]Department of Economics, Yokohama National University. 79-4 Tokiwadai, Hodogaya-ku, Yokohama 240-8501, Japan. E-mail: knishide@ynu.ac.jp.

[§]Mount Royal University.