

Volatility Smile/Smirk Properties of [GLP & MEMM] Pricing Models

YOSHIO MIYAHARA

*Graduate School of Economics, Nagoya City University, Yamanohata
Mizuhochou Mizuhoku, Nagoya 467-8501, Japan
[y-miya@econ.nagoya-cu.ac.jp]*

NARUHIKO MORIWAKI

*Graduate School of Economics, Nagoya City University, Yamanohata
Mizuhochou Mizuhoku, Nagoya 467-8501, Japan*

It is well-known that the implied volatility has smile or smirk properties in the real markets, and this property is called the volatility smile/smirk (or smile/skew) property. This fact suggests us the necessity of the construction of a new option pricing model other than the Black-Scholes model. Many kinds of models have been proposed and investigated. The [GLP & MEMM] (=Geometric Lévy Process & Minimal Entropy Martingale Measure) pricing model is one of them, and it is known that this model have many good properties as an option pricing model for the incomplete market. (See [1][2] [3]).

In this paper we investigate the volatility smile/smirk properties of the [GLP & MEMM] pricing models by the use of computer simulation method. We first explain the [GLP & MEMM] model briefly and give several examples of it. Next we calculate the implied volatility surface, and we see that the [GLP & MEMM] pricing model possesses this properties in various forms.

The results of this paper show us that the [GLP & MEMM] pricing model is a very strong candidate for the new model which has the volatility smile/smirk property.

1. Fujiwara, T. and Miyahara, Y. (2003), The Minimal Entropy Martingale Measures for Geometric Lévy Processes. *Finance and Stochastics* 7(2003), pp.509-531.
2. Miyahara, Y.(2001), [Geometric Lévy Process & MEMM] Pricing Model and Related Estimation Problems. *Asia-Pacific Financial Markets* 8, No. 1, pp. 45-60.
3. Miyahara, Y.(2004), [GLP & MEMM] Pricing Model and its Calibration. (preprint).