Financial Time Series Analysis Based On A Self-Organizing State Space Model with Simplex Initial Distribution Search: Stochastic Volatility Models with t-distributions *

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Abstract

This paper proposes a method to estimate stochastic volatility models with t-distributions based on a self-organizing state space model with simplex initial distribution search. A self-organizing state space model is proposed by Kitagawa (1998), and simplex initial distribution search is proposed by Yano (2007). This paper explains the Monte Carlo filter (particle filter), which is proposed by Kitagawa (1996) and Gordon et al. (1993), a self-organizing state space model, and a simplex initial distribution search. We will demonstrate the effectiveness of our method by applying it to stochastic volatility models with t-distributions for analyzing the daily return of Yen/Dollar rate.

Key words : nonlinear non-Gaussian state space model, Monte Carlo filter (particle filter), self-organizing state space model, Nelder-Mead method, stochastic volatility model.

*The authors would like to thank Prof. Takashi Tsuchiya, Prof. Naoyuki Yoshino, and Dr. Yoko Shirasu. This paper presents the author's personal views, which are not necessarily the official ones of the Financial Research and Training Center or the Financial Services Agency.

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