

The SIML estimation of realized volatility of the Nikkei-225 Futures and hedging coefficient with micro-market noise

Naoto Kunitomo^{a,*}, Seisho Sato^b

^a Graduate School of Economics, University of Tokyo, Bunkyo-ku, Hongo 7-3-1, Tokyo 113-0033, Japan

^b Institute of Statistical Mathematics, Tachikawa-shi, Midori-cho 10-3, Tokyo 190-8562, Japan

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Abstract

For the estimation problem of the realized volatility and hedging coefficient by using high-frequency data with possibly micro-market noise, we use the Separating Information Maximum Likelihood (SIML) method, which was recently developed by Kunitomo and Sato [11–13]. By analyzing the Nikkei-225 Futures data, we found that the estimates of realized volatility and the hedging coefficients have significant bias by using the traditional historical method which should be corrected. The SIML method can handle the bias problem in the estimation by removing the possible micro-market noise in multivariate high-frequency data. We show that the SIML method has the asymptotic robustness under non-Gaussian cases even when the market noises are autocorrelated and endogenous with the efficient market price or the signal term.

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1. Introduction

The Nikkei-225 Futures at the Osaka Securities Exchange (OSE) are the financial contracts for the Nikkei-225 Spot Index and they have been the most important futures contracts in the Japanese financial markets over the past 20 years. Because of their important role in financial markets, there have been basic questions to be answered on their performance and function as a hedging tool on the Nikkei-225 Spot Index. As the high-frequency data of Nikkei-225 Futures have become available, it may be natural to examine these problems because the majority of the past analyses were based on daily or monthly data. We may think that the finer data we use we have more accurate information on the performance of the futures contracts as some continuous stochastic models suggested by well-known financial theories. However, we shall demonstrate that the estimates obtained by the traditional realized variance, covariance and the hedging ratio are often not reliable and they should be corrected. In this paper we shall use a new estimation method called the Separating Information Maximum Likelihood (SIML) estimation method by incorporating the micro-market noises and show that the estimates obtained give stable and reliable results on these key quantities. For practical purposes our results show that it is important to incorporate the micro-market noise when we estimate the realized volatility and the

* Corresponding author. Tel.: +81 3 5841 5614; fax: +81 3 5841 5521.

E-mail address: kunitomo@e.u-tokyo.ac.jp (N. Kunitomo).