Effects of Finite-Sample and Realized Kernels on Standardized Returns on the Tokyo Stock Exchange

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Abstract

Statistical properties of asset price returns have been extensively studied and it is well-known that asset return distributions exhibit fat-tailed distributions. A possible explanation for this non-normality of the return distributions is proposed by Clark[1], which often called the Mixture-of-Distributions Hypothesis (MDH). In the MDH the asset price dynamics can be described by the Gaussian process with time-varying volatility. For such price dynamics unconditional return distributions could be different from the Gaussian distribution. Moreover Clark relates the origin of the volatility change with the trading volume which measures the speed of price change. The MDH can be checked by the returns standardized by the volatility which should show the normality. Using the realized volatility the standardized returns have been investigated for both stock and exchange rate returns[2, 3, 4] and it is claimed that the standardized returns show normality, at least approximately. Recently the normality of the standardized returns on the Tokyo Stock Exchange was also investigated separately in the morning session and afternoon session and it is argued that the normality of the standardized returns is recovered[5]. However some kurtosis results are considerably smaller than 3 which is inconsistent with the normal distribution. This smaller kurtosis might be explained by taking into account of the finite-sample effects claimed by Peter & De Vilder[6]. Some empirical studies also document such finite-sample effects[7, 8, 9]. In this study we calculate the standardized returns at various sampling frequencies and investigate the finite-sample effects on the standardized returns of the Tokyo Stock Exchange. Then taking into account of the finite-sample effects we try to extract the kurtosis at the infinite-sample limit by fitting the results to the appropriate fitting formula. Although the variance is not affected by the finite-sample effect the microstructure noise enters in the distortion of the variance. We also fit the variance data at various sampling frequencies to the fitting formula and obtain the variance at the microstructure noise bias free limit. Furthermore we study realized volatility constructed using realized kernels and show that realized kernels themselves distort the variance and kurtosis of standardized returns.

Keywords: Realized volatility; microstructure noise; realized kernel; mixture of distributions hypothesis.

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