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Nonparametric Estimation of Realized Volatility and Daily Jump using Periodicity Filters in Foreign Exchange Rates

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Abstract

This paper analyzes the realized volatility and jumps of Korean won–US dollar exchange rate returns using five-minute returns from June 1, 2010, to April 30, 2021. This paper adopts the standard normal jump statistics which use both tripower quarticity and quadpower quarticity. To determine whether a significant jump occurs and to obtain more robust jump statistics, this paper also uses Realized Outlying Weighted variation instead of bipower variation and Realized Outlying Weighted Quarticity with several periodicity filters, such as median absolute deviation, Shortest Half estimator, and weighted standard deviation. The standard normal jump statistics using either tripower quarticity or quadpower quarticity show that Korean won/US dollar exchange rate returns show considerably high jump probabilities from 2010 to 2021. When we consider the periodicity filters of volatility such as Shortest Half estimator and weighted standard deviation probabilities with outlying daily jump statistics, the five-minute returns of Korean won–US dollar exchange rate had much lower jumps probabilities. Therefore, if the periodicity filters of volatility are not considered, the standard jump probabilities may be overestimated.

Keywords: Exchange Rate, Power Volatility, Jump Statistic, Periodicity Filter, Outlyingness ,

JEL Classification: F3, F4