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Regulated Variance Ratio Unit Root Tests

Regulated (bounded) integrated time series are of significant practical importance. Although regulated integrated series are characterized by asymptotic distributions which differ substantially from their unregulated counterparts, inferential exercises continue to be performed with complete disregard for this feature of time series data. This article aims to bridge this gap by proposing the variance ratio statistic of Nielsen (2009) in the case of regulated series. The article develops asymptotic distribution for the standard and OLS detrended versions of the statistic. In the unbounded case this statistic offers a means of improving statistical power of the test by choosing the fractional integration parameter d to be as small as possible. What this paper demonstrates is that no such template exists when the series is bounded. Choices of d in the regulated case depends heavily on the length, direction, and nature of the bounding interval. In cases where the bounding interval is sufficiently wide so that the problem may be considered "unbounded", the results in Nielsen (2009) are replicated. In all other cases, the regulated variance ratio statistic suffers from very low power which in most cases of interest decreases to zero as one moves away from the unit root null hypothesis into the stationary alternative hypothesis. Finally, this paper extends the results of Cavaliere and Xu (2011) by introducing what seems to be the first theoretical justification for the asymptotic distribution of regulated integrated time series with a linear trend.