Measuring stationarity in long-memory processes

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Abstract

In this paper we consider the problem of measuring stationarity in locally stationary long-memory processes. We introduce an $L_2$-distance between the spectral density of the locally stationary process and its best approximation under the assumption of stationarity. The distance is estimated by a numerical approximation of the integrated spectral periodogram and asymptotic normality of the resulting estimate is established. The results can be used to construct a simple test for the hypothesis of stationarity in locally stationary long-range dependent processes. We also propose a bootstrap procedure to improve the approximation of the nominal level and prove its consistency. Throughout the paper, we will work with Riemann sums of a squared periodogram instead of integrals (as it is usually done in the literature) and as a by-product of independent interest it is demonstrated that the two approaches behave differently in the limit.

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