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Modified Local Whittle Estimator for Long Memory Processes in the Presence of Low Frequency (and Other) Contaminations*

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Abstract

We propose a modified local-Whittle estimator of the memory parameter of a long memory time series process which has good properties under an almost complete collection of contamination processes that have been discussed in the literature, mostly separately. These contaminations include processes whose spectral density functions dominate at low frequencies such as random level shifts, deterministic level shifts and deterministic trends. We show that our modified estimator has the usual asymptotic distribution applicable for the standard local Whittle estimator in the absence of such contaminations. We also show how the estimator can be modified to further account for additive noise and that our modification for low frequency contamination reduces the bias due to short-memory dynamics. Through extensive simulations, we show that the proposed estimator provides substantial efficiency gains compared to existing semi-parametric estimators in the presence of contaminations, with little loss of efficiency when these are absent.

JEL Classification Numbers: C22, C13, C14.

Keywords: long memory process, random level shifts, short memory dynamics, additive noise, local-Whittle estimators.

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