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Multiple Local Whittle Estimation in Stationary Systems

Abstract: Two related long memory time series x_t, y_t may have different or identical memory parameters. In the latter case the possibility exists of domination by a single common component, such that an instantaneous linear combination $y_t - \beta x_t$ of the series has long memory. A semiparametric version of the problem presents four unknown parameters of interest: two memory parameters, a phase parameter, and β . We estimate them jointly by optimizing a local Whittle function that entails a single smoothing number, covering also the case where $\beta = 0$ and y_t and z_t have different memory parameters. The proof of consistency is non-standard in that the β estimate converges faster than the others. Joint asymptotic normality is also established, implying correlation between all estimates in general. Comparisons are made with other estimation strategies. Misspecification of the phase, which is usually assumed known in this setting, can slow convergence of estimates of β , and cause inconsistency of memory parameter estimates.