

NONLINEAR LONG MEMORY TIME SERIES MODELS

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Abstract

ABSTRACT HERE - Data sets exhibiting slowly-decaying correlations occur in a wide variety of different subject areas, for example, financial returns, internet traffic and certain hydrological time series. A standard approach to analysis of such data specifies that the observed time series is a realization of a fractionally-differenced linear process. This specification has several advantages; for example, the resulting stochastic model may be formulated as a special case of the standard ARIMA models. In addition, the maximum likelihood estimates of the unknown parameters of the model are known to be asymptotically Normal and Fisher efficient. A principal disadvantage, however, is that the model so specified is linear and it excludes certain types of boundary behavior which may arise when the memory parameter either vanishes or equals the upper limit of the acceptable region. In the former case, for example, the model implies that the resulting time series has short memory. This however need not be so and it is possible to construct examples which show that, in this situation, the time series may still exhibit long memory, but that specified by a slowly-varying spectral density function at the origin. In the latter case, by contrast, the model specifies that the resulting time series is non-stationary and again this need not be so and it is possible to construct counterexamples which demonstrate that a stationary time series with this type of boundary behaviour may be found. A further difficulty is that a 'physical' explanation for why the long-memory arises is not given and the model in this sense lacks a motivation. A class of non-linear long memory time series models which overcome the difficulties described above with the standard linear models has recently been introduced in the Dynamical Systems Theory. The talk will describe some new results obtained by the author in collaboration with D. Natsios on studying several different statistical properties of this new class of long memory models.