Whittle estimation for continuous-time stationary state space models with finite second moments

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Abstract

We consider Whittle estimation for the parameters of a stationary solution of a continuous-time linear state space model sampled at low frequencies. In our context, the driving process is a Lévy process which allows flexible margins of the underlying model. The Lévy process is supposed to have finite second moments. Then, the classes of stationary solutions of linear state space models and of multivariate CARMA processes coincide. We prove that the Whittle estimator, which is based on the periodogram, is strongly consistent and asymptotically normal. A comparison with ARMA models shows that in the continuous-time setting the limit covariance matrix of the estimator has an additional term for non-Gaussian models. Thereby, we investigate the asymptotic normality of the integrated periodogram. Furthermore, for univariate processes we introduce an adjusted version of the Whittle estimator and derive its asymptotic properties. The practical applicability of our estimators is demonstrated through a simulation study.

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