Local inference for long memory

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Room BENVENUTI

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Testing for persistence in time series has traditionally focused on the presence of stochastic trends in the form of unit roots at zero frequency. However, the concept of persistence is much broader, including the possibility of fractional roots of any order and at any frequency. Wald and Lagrange Multiplier-type tests are proposed here as means of testing for the existence of long memory of any degree at any set of frequencies. The tests are applicable to both stationary and non-stationary as well as to invertible and non-invertible series exhibiting any type of standard, cyclical or seasonal persistence. No estimation of parameters (in the LM test) or specification of short memory behaviour are required, as the tests are based on a local spectral specification around the frequencies of interest. Standard inference can be implemented thanks to the chi-squared asymptotic distribution under the null hypothesis. The testing strategy is shown to be consistent against constant departures from the null hypothesis and the asymptotic distribution of the test statistics under local alternatives is also shown. Finally, the robustness of the tests to the presence of deterministic terms is discussed.

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