Abstract:

Econometric time series analysis is vital in business and finance with applications in the prediction of stock volatility, bond yields, foreign currency exchange rates, and so on. From both the economic and statistical viewpoints, it is important to tell whether a particular series or its differenced one is stationary or not for dynamic modeling. While many previous tests of second order stationarity have been developed for linear or Gaussian time series, time series are often nonlinear and non-Gaussian in many econometrics applications. In this presentation, we consider a bootstrap assisted test to check the second order stationarity of nonlinear time series. The test is based on a Walsh transformation in a framework of nonlinear time series. The asymptotic normality of the Walsh ordinates and their asymptotic covariance matrix under the null hypothesis are derived. The new form of the asymptotic covariance matrix is adaptive to nonlinearity, which is then consistently estimated by a bootstrap procedure. In the framework of locally stationary processes, it is shown that the local power of the proposed test tends to one under local alternatives at a certain rate as the length of time series goes to infinity. A simulation study is conducted to examine the finite sample performance of the test with comparisons to some existing competing methods, indicating that the proposed approach works well for nonlinear time series. The proposed test is applied to an analysis of a financial data set.