



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

SEMINAR ON STATISTICS

Sample Splitting and Assessing Goodness-of-fit of Time Series

By

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Abstract

A fundamental and often final step in time series modeling is to assess the quality of fit of a proposed model to the data. Since the underlying distribution of the innovations that generate a model is often not prescribed, goodness-of-fit tests typically take the form of testing the fitted residuals for serial independence. However, these fitted residuals are inherently dependent since they are based on the same parameter estimates and thus standard tests of serial independence, such as those based on the autocorrelation function (ACF) or distance correlation function (ADCF) of the fitted residuals need to be adjusted. The sample splitting procedure in Pfister et al. (2018) is one such fix for the case of models for independent data, but fails to work in the dependent setting. In this paper sample splitting is leveraged in the time series setting to perform tests of serial dependence of fitted residuals using the ACF and ADCF. Here the first f_n of the data points are used to estimate the parameters of the model and then using these parameter estimates, the last l_n of the data points are used to compute the estimated residuals. Tests for serial independence are then based on these l_n residuals. As long as the overlap between the f_n and l_n data splits is asymptotically $1/2$, the ACF and ADCF tests of serial independence tests often have the same limit distributions as though the underlying residuals are indeed iid. In particular if the first half of the data is used to estimate the parameters and the estimated residuals are computed for the entire data set based on these parameter estimates, then the ACF and ADCF can have the same limit distributions as though the residuals were iid. This procedure ameliorates the need for adjustment in the construction of confidence bounds for both the ACF and ADCF in goodness-of-fit testing. (This is joint work with Leon Fernandes.)

Biography

Professor Richard A. Davis is Howard Levene Professor of Statistics at Columbia University. He is a former president of the Institute of Mathematical Statistics. He is a fellow of the Institute of Mathematical Statistics and the American Statistical Association, and is an elected member of the International Statistical Institute. He is co-author (with Peter Brockwell) of the bestselling books, "Time Series: Theory and Methods", "Introduction to Time Series and Forecasting", and the time series analysis computer software package, "ITSM2000". In 1998, he won (with collaborator W.T.M Dunsmuir) the Koopmans Prize for Econometric Theory.

Date : 25 April 2024 (Thursday)

Time : 3:00pm-4:00pm

Venue : Room 4504 (Lifts 25/26)

All are Welcome!