

Weichi Wu
University College London

Abstract

Structural Change Detection for M-estimation Regression Under Time Series Non-stationarity

We consider the structural change testing for a wide class of M-estimation regressions with non-stationary regressors and errors. New uniform Bahadur representations are established with nearly optimal approximation rates. A CUSUM-type test statistics based on the gradient vectors are considered. Two of the most frequently used change point testing procedures, pivotalization and independent wild bootstrap, are shown to be inconsistent for non-stationary time series M-estimation regression. In this paper, a simple bootstrap method is proposed and is proved to be consistent in the context of M-estimation regression for structural change detection under both abrupt and smooth non-stationarity and temporal dependence. Our bootstrap procedure is shown to have certain asymptotically optimal properties in terms of accuracy and power. Our methodology is applied to the Hong Kong circulatory and respiratory data, and asymmetry of structural changes in different quantiles and conditional mean are found.