How to Distinguish Abrupt Structural Breaks from Smooth Structural Changes?

Yuying Sun[1, 2], Yongmiao Hong[3]* and Shouyang Wang[1;2]

1 *Academy of Mathematics and Systems Science, Chinese Academy of Sciences*
2 *Center for Forecasting Science, Chinese Academy of Sciences*
3 *Department of Economics and Department of Statistical Sciences, Cornell University*

ABSTRACT

Structural changes often occur in economics and finance due to changes in preferences, technologies, institutional reforms, policies, crises and other factors. It is important to distinguish whether a structural change is abrupt or evolutionary, because the implications on econometric modelling and inferences will be different. In this paper, we propose a nonparametric consistent test for the null hypothesis of smooth structural changes against the alternative hypothesis of at least an abrupt structural break. The basic idea is to check whether smoothed nonparametric estimators for the left and right limits of time-varying parameters in a linear regression model converge to the same limit at every time point in the sample period. We avoid making any restrictive assumption on a parametric functional form for time-varying parameters, and allow to use data-driven time-varying bandwidths in nonparametric estimation. We derive the asymptotic nonstandard null distribution of a test based on the maximal difference between the left and right limit estimators and establish the consistency of the test under the alternative. A Hansen's-type (1996) resampling method is used to compute the p-value of the test statistic. Our simulation study highlights the merits of the proposed test. In an empirical application, we find strong evidence in favor of existence of abrupt structural breaks for most predictive regressions of equity returns, and the dates of these structural breaks are closely related to important historical macroeconomic events and policy changes

KEY WORDS: Abrupt structural break; Boundary problem; Local linear smoothing; Model instability; Predictive regression models; Smooth structural change