

Testing for Smooth Structural Changes in GARCH Models

Bin Chen

Department of Economics

University of Rochester

and

Yongmiao Hong

Department of Economics and Statistical Science

Cornell University,

Wang Yanan Institute for Studies in Economics

Xiamen University

Abstract

Modelling and detecting structural changes in GARCH processes have attracted a great amount of attention in econometrics over the past few years. We generalize Dahlhaus and Rao (2006)'s time varying ARCH processes to time varying GARCH processes and show the consistency of the weighted quasi maximum likelihood estimator. A class of generalized likelihood ratio tests are proposed to check smooth structural changes as well as abrupt structural breaks with known or unknown change points in GARCH models. The idea is to compare the log likelihood of the unrestricted nonparametric time-varying GARCH model and the restricted constant parameter GARCH model, which can be viewed as a generalization of likelihood ratio tests from the parametric framework to the nonparametric framework. The tests have a convenient asymptotic $N(0,1)$ distribution and do not require any prior information about the alternatives. A simulation study highlights the merits of the proposed tests.

JEL Classifications: C1, C4, E0.

Key words: GARCH, Kernel, Model stability, Parameter constancy, QMLE, Smooth structural change