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Parameter change tests for ARMA-GARCH models

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Abstract

This paper considers the problem of testing for parameter change in ARMA-GARCH models. For this, we propose score test and residual-based cumulative sum (CUSUM) test and derive their limiting null distributions. According to our simulation study, the score test performs reasonably in testing for both ARMA and GARCH parameter change, but the residual-based CUSUM test is observed to be unsuitable for detecting changes in parameters belonging to ARMA part. The residual-based CUSUM test, however, outperforms the score test in testing for GARCH parameter change. A real data analysis is provided to illustrate the use of the proposed tests.

Keywords: ARMA-GARCH models; parameter change test; score test; residual-based CUSUM test

1. Introduction

During the past decades, the problem of testing for parameter or structural change has attracted much attention from researchers and practitioners because such changes have been frequently observed in empirical analysis. Since Page (1955) firstly formulated the problem for quality control, several tests and techniques such as likelihood ratio test, CUSUM test, and control chart methods have been developed. For historical background and general review, we refer the reader to Csörgo and Horváth (1997) and Chan and Gupta (2000). See

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