

Statistical analysis of the non constant covariance structure of time series

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Abstract:The problem of testing instantaneous causality between Vector Autoregressive (VAR) variables with time-varying unconditional covariance is investigated. It is underlined that the standard test does not control the type I errors, while the tests with White (1980) and Heteroscedastic Autocorrelation Consistent (HAC) corrections can suffer from a severe loss of power when the covariance is not constant. Consequently a modified test based on a bootstrap procedure is proposed. The relevance of the modified test is illustrated through a simulation study. The tests considered in this paper are also compared by investigating the instantaneous causality relations between US macroeconomic variables

In this paper a methodology for investigating long run linear relationships between the non constant variance structures of time series variables is developed. The asymptotic behavior of a cumulative sum (CUSUM) test statistic for detecting departures from a linear relationship in variance is established. Noting that the processes under study have unknown time-varying variances structures our tools are based on a wild bootstrap technique. The theoretical outputs are illustrated by means of Monte Carlo experiments.

The existence of linear relations between the non constant variances of the consumer price indexes for energy and transportation in the U.S. is established.