Testing for Structural Breaks in Variance and the Effect of Additive Outliers and Measurement Errors

Abstract

This paper discusses the asymptotic and finite-sample properties of CUSUM-based tests for detecting structural breaks in volatility. Our aim is to analyze formally the effects of stochastic contamination, such as additive outliers or measurement errors. This analysis is particularly relevant for financial data, for which these tests are the most common way to detect variance breaks. In particular, we focus on the tests by Inclán and Tiao (1994) [IT] and Kokoszka and Leipus (1998, 2000) [KL], which have been intensively used in the applied literature. Our results are extensible to related procedures. We show that the asymptotic distribution of the IT test can largely be affected by sample contamination, whereas the distribution of the KL test remains invariant. Furthermore, the break-point estimator of the KL test renders consistent estimates. In spite of the good large-sample properties for this test, we discuss that large additive outliers tend to generate power distortions or wrong break-date estimates in small samples.