On the conditional homoscedasticity test in time series: asymptotic power properties

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In this paper we propose several tests for examining hypotheses about conditional variance functions in time series with martingale innovations. The proposed tests are asymptotically distribution-free under the null hypothesis. As an application, we are interesting to test the volatility function $\sigma^2(X_t)$ appearing in a non-linear autoregressive model with errors $\epsilon_t = \sigma(X_t)e_t$, where $e_t = \rho_0 e_{t-1} + u_t$. This model provides linkage between risk and expected return of financial assets. Moreover, it can be used for testing the martingale difference sequence hypothesis, which is typically uncritically adapted in financial time series models. The limiting distribution of these tests under a local of sequence of alternatives is obtained and the asymptotic local power is derived.
Keywords: Conditional variance; LAN; local alternatives; martingale difference.