

The threshold autoregressive (TAR) model and the smooth threshold autoregressive (STAR) model have been among the most popular parametric nonlinear time series models for the past three decades or so. However, as yet there is no formal statistical test in the literature for one against the other. The two models are fundamentally different in their autoregressive functions, the TAR model being generally discontinuous while the STAR model being smooth (except in the limit of infinitely fast switching for some cases). Following the approach initiated by Cox (1961, 1962), we treat the test problem as one of separate families of hypotheses, thus filling a serious gap in the literature. The test statistic under a STAR model is shown to follow asymptotically a chi-squared distribution, and the one under a TAR model expressed as a functional of a chi-squared process. We present numerical results with both simulated and real data to assess the performance of our procedure.