

INFERENCE FOR MA(1) PROCESSES WITH A ROOT ON OR NEAR THE  
UNIT CIRCLE

Richard A. Davis  
Meiching Chen  
William T. M. Dunsmuir

*Abstract:* This paper considers maximum likelihood estimation (MLE) for MA(1) processes when the moving average parameter is on or near the unit circle. The asymptotic theory to be presented allows the use of the generalized likelihood ratio test for testing the null hypothesis of a unit root. The asymptotic distributions of the MLE and the largest local maximizer, the estimator which yields the local maximum closest to the unit circle, are shown to be different. The limit distributions of two estimates provide a very accurate approximation to the finite sample size and power of the tests considered. A comparison is made of the power of four tests of the null hypothesis that the moving average parameter is equal to one versus the alternative that it is less than one. The four tests are based on the MLE, the largest local maximizer, the generalized likelihood ratio test and Tanaka's score type test. The use of the generalized likelihood ratio test is recommended overall since it always dominates the tests based on the MLE and the largest local maximizer and dominates the score type test for close alternatives to the null hypothesis. For alternatives very close to the unit circle the score type test has slightly higher power but this is evident only in the third decimal place.

**2000 AMS Mathematics Subject Classification:** Primary: -; Secondary: -;

**Key words and phrases:** -

THE FULL TEXT IS AVAILABLE [HERE](#)