

A Power One Test for Unit Roots Based on Sample Autocovariances

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Abstract: We propose a new unit-root test for a stationary null hypothesis H_0 against a unit-root alternative H_1 . Our approach is nonparametric as the null hypothesis only assumes that the process concerned is $I(0)$ without specifying any parametric forms. The new test is based on the fact that the sample autocovariance function (ACF) converges to the finite population ACF for an $I(0)$ process while it diverges to infinity with probability approaching one for a process with unit-roots. Therefore the new test rejects the null hypothesis for the large values of the sample ACF. To address the technical challenge ‘how large is large’, we split the sample and establish an appropriate normal approximation for the null-distribution of the test statistic. The substantial discriminative power of the new test statistic is rooted from the fact that it takes finite value under H_0 and diverges to infinity with probability approaching one under H_1 . This allows us to truncate the critical values of the test to make it with the asymptotic power one. It also alleviates the loss of power due to the sample-splitting. The finite sample properties of the test are illustrated by simulation which shows its stable and more powerful performance in comparison with the KPSS test (Kwiatkowski et al., 1992).