Distinguishing Between Random Walks and Changes in the Mean

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Abstract:

We discuss test procedures that detect structural breaks in underlying data sequences. In particular, we wish to discriminate between different reasons for the breaks, such as (1) shifting means, (2) random walk behavior, and (3) switches from stationarity to difference stationarity. Almost all procedures presently available in the literature are simultaneously sensitive to all three types of alternatives.

The test statistics under consideration here are based on functionals of the partial sums of observations. These CUSUM-type statistics have limit distributions if the mean remains constant and the errors satisfy the central limit theorem, but tend to infinity in the case any of the alternatives (1), (2) or (3) holds. On removing the effect of the shifting mean, however, divergence of the test statistics will only occur under the random walk behavior, which in turn enables statisticians not only to detect structural breaks but also to specify their causes.