Title:

Bootstrapping Unit Root Models

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Abstract:

This paper develops a bootstrap theory for unit root models. The models considered in the paper include quasi- and near-, as well as exact-, integrated processes. The quasi- and near-integrated processes are stationary, but have roots approaching to unity as the sample size increases. For the former the largest roots converge to unity at the rate of 1/n or faster, while for the latter the rate is slower than 1/n. The near-integrated processes yield normal asymptotics, quite distinctively with the exact- and quasi-integrated processes whose asymptotics are nonnormal and involve functionals of Brownian motions and Ornstein-Uhlenbeck processes respectively. It is shown in the paper that the bootstrap provides asymptotic refinements for all these broadly defined unit root models. For the exact- and quasi-integrated processes, however, we need to impose the appropriate restrictions on the roots of the models used to generate the bootstrap samples. This is essential to achieve the bootstrap asymptotic refinements. Without such restrictions on the roots, the bootstrap only provides consistency for the exact- and quasi-unit root models. In sharp contrast, it is not required to impose any restriction on the roots to bootstrap near-integrated processes. The unrestricted bootstrap generally yields asymptotic refinements for the asymptotically pivotal statistics defined from near-integrated processes.