BOOTSTRAP FOR RANDOM COEFFICIENT AUTOREGRESSIVE MODELS

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For a bootstrap procedure, we usually need to have i.i.d. random variables that we obtain easily given an estimator for the autoregressive coefficient in the standard autoregressive model. If the coefficient is modeled stochastically, the standard procedure does not work anymore, because one would obtain the convolution of two random variables, namely the innovations and the stochastic coefficient. We present an approach to obtain estimated residuals for both of the variables separately. Together with a least-squares estimator for the fourth moments of both the innovations and the stochastic autoregressive coefficient, these ideas lead to a modification of the standard residual based bootstrap procedure for the mean of the autoregressive coefficient. Its consistency is established.

Further, we introduce a wild bootstrap based on a quasi-maximum likelihood estimator that works under very mild conditions on the process. We establish its consistency for the distribution of the estimator for the coefficient's mean and for the distribution of the estimators for the variances of both the innovations and the coefficient. Finally, the benefit of the bootstrap procedures is illustrated by a simulation study.