

Estimation of the innovation quantile density function of an AR(p) process based on autoregression quantiles

FAOUZI EL BANTLI* and MARC HALLIN**

I.S.R.O., Université Libre de Bruxelles, B-1050 Bruxelles, Belgium. E-mail:

**faouzi.elbantli@fortisbank.com; **mhallin@ulb.ac.be*

In this paper, we propose two types of estimator (one of histogram type, the other a kernel estimate) of the quantile density (or *sparsity*) function $\alpha \mapsto [f(F^{-1}(\alpha))]^{-1}$ associated with the innovation density f of an autoregressive model of order p . Our estimators are based on autoregression quantiles. Contrary to more classical estimators based on estimated residuals, they are autoregression-invariant and scale-equivariant. Their asymptotic behaviour is derived from a uniform Bahadur representation for autoregression quantiles – a result of independent interest. Simulations are carried out to illustrate their performance.

Keywords: autoregression; autoregression quantiles; Bahadur–Kiefer representation; histogram estimator; kernel estimator; quantile density function; sparsity function