

## Nonparametric density estimation for linear processes with infinite variance

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**Abstract** We consider nonparametric estimation of marginal density functions of linear processes by using kernel density estimators. We assume that the innovation processes are i.i.d. and have infinite-variance. We present the asymptotic distributions of the kernel density estimators with the order of bandwidths fixed as  $h = cn^{-1/5}$ , where  $n$  is the sample size. The asymptotic distributions depend on both the coefficients of linear processes and the tail behavior of the innovations. In some cases, the kernel estimators have the same asymptotic distributions as for i.i.d. observations. In other cases, the normalized kernel density estimators converge in distribution to stable distributions. A simulation study is also carried out to examine small sample properties.

**Keywords** Linear processes · Kernel density estimator · Domain of attraction · Stable distribution · Noncentral limit theorem · Martingale central limit theorem