Some Recent Results on Double AR Models

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This paper investigates the non-stationary double AR(1) model:

$$y_t = \phi y_{t-1} + \eta_t \sqrt{\omega + \alpha y_{t-1}^2},$$

$\omega > 0,\ \alpha > 0$, $\{\eta_t\}$ is i.i.d. N(0,1) and $Eln|\phi + \eta_t\sqrt{\alpha}|$. We show that the maximum likelihood estimator (MLE) of (ϕ, α) is consistent and asymptotically normal. Combined this result with that in Ling (2004) for the stationary case, the asymptotic normality of the MLE of A holds for any A in the real line R, with a root-n rate of convergence. Contrary to the results for the classical AR(1) model (i.e., $\alpha = 0$), our result is surprising and novel.

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