

Conditions for convergence of random coefficient AR(1) processes in higher dimensions

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Abstract: We consider a d -dimensional random coefficient AR(1) process, defined by

$$X_0 = Z_0; \quad X_t = M_t X_{t-1} + Z_t \quad \forall t = 1, 2, \dots,$$

where the random $d \times d$ matrices $\{M_t; t = 1, 2, \dots\}$ and the d -dimensional random variables $\{Z_t; t = 1, 2, \dots\}$ are i.i.d. In the case $d = 1$, Goldie and Maller (2000) gave several equivalent sufficient conditions for the convergence in distribution of X_t as $t \rightarrow \infty$, and proved that (under a nondegeneracy condition) the conditions are also necessary. We here extend most of the results of Goldie and Maller to the case $d > 1$, under the additional assumption that

$$\left\| \prod_{t=1}^n M_t \right\| \xrightarrow{a.s.} 0 \quad \text{as } n \rightarrow \infty.$$

References

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