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**"Determining the number of regimes in Markov-switching VAR and VMA models"**

Abstract:

We give stable finite order VARMA( $p^*$  ;  $q^*$  ) representations for M-state Markov switching second-order stationary time series whose autocovariances satisfy a certain matrix relation. The upper bounds for  $p^*$  and  $q^*$  are elementary functions of the dimension  $K$  of the process, the number  $M$  of regimes, the autoregressive and moving average orders of the initial model. If there is no cancellation, the bounds become equalities, and this solves the identification problem. Our class of time series include every M-state Markov switching multivariate moving average models and autoregressive models in which the regime variable is uncorrelated with the observable. Our results include, as particular cases, those obtained by Krolzig (1997), and improve the bounds given by Zhang and Stine (2001) and Francq and Zakoian (2001) for our classes of dynamic models. Data simulations and an application on foreign exchange rates complete the paper.