Granger causality and regime inference in Bayesian Markov-switching VARs

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Recent economic developments have shown the importance of spillover and contagion effects in financial markets as well as in macroeconomic reality. Such effects should potentially be modeled and analyzed taking into account such properties of time series as changes of parameter values over time and heteroskedasticity. We derive restrictions for Granger noncausality within the framework of Markov-switching Vector Autoregressive Models. Moreover, considering the specific construction of these models, we propose the inference on the hidden Markov process that determines the changes of the parameter values over time. It answers the question, whether one variable is useful for the one-period-ahead forecast of the regime of the other variable. This analysis is closely linked to Granger causality. Due to the complicated structure and the nonlinearity of the resulting restrictions, classical tests have limited use. We, therefore, choose a Bayesian approach to evaluate the hypotheses of noncausality. The inference consists of a novel Block Metropolis-Hastings sampling algorithm for estimation of the restricted models, and of standard methods of computing the Posterior Odds Ratio. As an empirical illustration we analyse the system of the US money and income variables. We found that while the the past information about the money aggregate M1 is dispensable for the forecasting of the conditional mean of income, it crucial for predicting the next period's state of the economy.