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A multivariate hidden Markov model in the analysis of financial stability

We develop multivariate hidden Markov model (HMM) filters in recursive forms. These filters then provide optimal estimates for the state of the Markov chain as well as estimates of other related and auxiliary processes. The motivation behind our modelling is to capture regimes of financial stability through the filtering of relevant indices. In particular, these indices contain information regarding the systemic stress levels in the financial and business cycles. Through the recursive filters, parameters are updated instantaneously when new index information is available. Actual data is considered in our model validation. An early-warning signal system is also developed to produce alerts on the potential occurrence of some financial-crisis events.