PUBLIC ABSTRACT

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This study consists on two different but related parts.
In the first part, we consider a multivariate regression model with time varying volatilities in the error term. The time varying volatility for each component of the error is of unknown nature, may be deterministic or stochastic. The model is over-parameterized while exhaustive comparison of all possible restrictions is infeasible. We propose Bayesian stochastic search as a feasible variable selection technique for the regression and volatility equations. We develop Markov Chain Monte Carlo (MCMC) algorithms that generate a posteriori restrictions on the elements of both the regression coefficients and the covariance matrix of the error term. Efficient parametrization of the time varying covariance matrices is studied using different modified Cholesky decompositions, which are then compared by estimation of the Bayes Factor for the resulting models. We compare two competing algorithms for the simulation of the latent stochastic volatilities, the Gilks-Wild algorithm for log-concave densities and particle filters. We propose a hierarchal approach for selection of the volatility equation's variance components: this approach allows choosing between the most appropriate models for the volatilities with a completely data driven procedure and can have broad application in the financial econometric field.
In the second part, we extend the results of the first in order to apply the stochastic search algorithm to dynamic model settings. We compare the results obtained with our method with those obtained the actual available techniques. We develop a MCMC algorithm that performs a stochastic model selection for the coefficients and the covariance matrix of the latent process of a dynamic model, thus making the choice of the best model only based on probabilistic considerations.