Semiparametric Leverage in a Stochastic Volatility Model

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Abstract. This paper extends the stochastic volatility with leverage model, where returns are correlated with volatility, by flexibly modeling the bivariate distribution of the return and volatility innovations non-parametrically. The novelty of the paper is in modeling the unknown distribution with an infinite ordered mixture of bivariate normals with mean zero, but whose mixture probabilities and covariance matrices are unknown and modeled with the Dirichlet Process prior. A Bayesian Markov chain Monte Carlo sampler is designed to fully characterize the parametric and distributional uncertainty. Marginal likelihoods from a variety of stochastic volatility models are compared. We find strong empirical evidence in favor of the semiparametric leverage version of the stochastic volatility model.

*The views expressed here are ours and not necessarily those of the Federal Reserve Bank of Atlanta or the Federal Reserve System.