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Modeling US house prices by spatial dynamic structural equation models

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This article proposes a spatial dynamic structural equation model for the analysis of housing prices at the State level in the USA. The study contributes to the existing literature by extending the use of dynamic factor models to the econometric analysis of multivariate lattice data. One of the main advantages of our model formulation is that by modeling the spatial variation via spatially structured factor loadings, we entertain the possibility of identifying similarity "regions" that share common time series components. The factor loadings are modeled as conditionally independent multivariate Gaussian Markov Random Fields while the common components are modeled by latent dynamic factors. The general model is proposed in a state-space formulation where both stationary and nonstationary autoregressive distributed-lag processes for the latent factors are considered. For the latent factors which exhibit a common trend, and hence are cointegrated, an error correction specification of the (vector) autoregressive distributed-lag process is proposed. Full probabilistic inference for the model parameters is facilitated by adapting standard Markov chain Monte Carlo (MCMC) algorithms for dynamic linear models to our model formulation. The fit of the model is discussed for a data set of 48 States for which we model the relationship between housing prices and the macroeconomy, using state level unemployment and per capita personal income.

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