Public Abstract

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Title:ESTIMATION OF SPATIAL AUTOREGRESSIVE MODELS WITH DYADIC OBSERVATIONS AND LIMITED DEPENDENT VARIABLES

Spatial correlation, like temporal correlation, often leads to inconsistent estimates if not properly handled. This dissertation addresses spatial correlation in flow data that are recorded as binary or censored values. Flow data involve both an origin and a destination by nature, so they feature spatial dependence in a complicated manner. Similar to the spatial Origin-Destination (OD) modeling suggested by LeSage and Pace (2008), this dissertation devises three spatial lag terms to capture spatial dependence, and incorporate them into regression models with binary and censored dependent variables.

In the first essay, a spatial OD probit model is proposed to tackle with spatial dependence embedded in binary flow data. By incorporating the spatial lags into the latent regression model and utilizing Bayesian data augmentation approach, this dissertation develops an estimation strategy that avoids the inconsistency problem associated with MLE. When applied to cross-sectional data on militarized dispute initiations among European countries, the proposed model shows evidence that spatial correlation exists between conflict initiations and is more complex than often thought.

In the second essay, this dissertation designs a spatial OD threshold Tobit to model flow data that are censored. International trade data are often left-censored at zero when trade activities are lacking between a pair of countries, and they are likely to exhibit spatial correlation. The proposed model addresses the zero problem that challenges the log-linear formulation of the gravity model as well as the multiple sources of spatial correlation in trade data. Using data on export flows among European countries in 1990, the model indicates the presence of all three types of spatial dependence. Further, the effect of conventional trade variables changes noticeably, calling into question the assumption of spatial independence when modeling trade flows.