

## **Spatial Models of Land Use Change: The Role of Local Spillovers as Drivers of Open Space Loss (73)**

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It is popularly believed in the U.S. that the single most important driver of land use change in suburban and rural areas is population growth. New residents need housing, schools, shopping, etc. The implication for local governments is that policies that affect population growth will in turn influence the rate of land use change. The objectives of this study are to quantify the drivers of land use change and to determine whether population growth is indeed the most important driver in nonurban areas.

This study area is the mid-Atlantic region in the U.S. This is one of the most densely populated areas of the United States and has been experiencing rapid land use change. The study uses land cover data from the National Land Cover Data Set for the years 1992 and 2001. The specific land use change studied is the conversion of land from less-developed, open space uses (forests, pastures, cropland, wetland) to more developed uses (residential, commercial, industrial, roads).

The unit of observation is the minor civil division (MCD), which is locally defined as a township, borough, or city. A land use change model is estimated that explains differences in the rate of land use change, measured as the percentage loss of open space between the years 1992 and 2001. Drivers considered include initial land use, initial population density, change in population density, and other mitigating factors including proximity to highways, quality of soils, sociodemographic characteristics of the local population, and local topography.

The estimated models show that MCD's that experience higher population growth do indeed experience greater land use change. However, we also find that MCD's with higher initial population density experience greater land use change, even if their population does not grow. We call this effect the "spreading out effect," where an existing population uses more land over time. For many MCD's, the spreading out effect is more important than the impact from population growth.

We extend the simple models by considering three spatial regression models.. The first includes spatially lagged independent variables, to determine whether population and population growth in one MCD impacts land use in neighboring MCD's. The second includes spatial lags in the dependent variable, to determine whether land use change exhibits local contagion, where land use change in one MCD drives land use change in neighboring MCD's. The third includes spatial correlation in the error term, to model spatially correlated omitted variables. Initial estimation results show that spillover effects are important.

This study provides useful information about spillover effects (positive or negative) from neighbouring MCDs. These results help local authorities identify the land use change drivers

over which they have some control. The results also highlight the importance of regional cooperation in land use planning.