

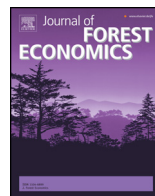


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The impact of agricultural conservation easement on nearby house prices: Incorporating spatial autocorrelation and spatial heterogeneity

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ABSTRACT

The impact of farmland under agricultural conservation easement (ACE) contract on the values of nearby residential properties is investigated using housing sales data in two Pennsylvania counties. ACE-protected farmland had a positive impact on nearby property values in one study county but a negative impact in the other. The paper also looks at the impact of forest land use, and discovers that preserved forest land had a positive impact on the nearby property values in both counties. House prices showed strong spatial correlation in both counties, and a spatial error components (SEC) model fit the data better than the OLS model, a spatial-lag model (SLM), or a spatial autoregressive error model (SEM). Geographically weighted regression (GWR) showed that the impact of ACE-protected farmland on nearby property values varied within one of the two study counties, with positive impacts in some parts of the county and negative impacts in other parts. The impact of forest cover on property values also varied, with positive impacts within both counties. A new hybrid GWR-SEC model is introduced that incorporates both spatial correlation in prices and spatial heterogeneity in the model parameters. Statistical goodness of fit measures showed that the GWR-SEC model fit better than the GWR model or a hybrid GWR-SEM model.

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Introduction

Agricultural and public forest lands are known to play a critical role to play in supplying recreational services, food supply, and regulating services such as climate regulation through carbon sequestration and pollution buffering, to name a few (Millennium Ecosystem Assessment, 2005; Yoo et al., 2014). Between 1982 and 2007, however, 23 million acres of farmland were lost to commercial, industrial or residential development, representing an area the size of Indiana (AFT, 2010). Between 1982 and 1997, approximately 10.3 million acres of private forest land was converted to developed uses (USDA, 2005). As the population growth continues, it is expected that agricultural and forest lands will continue to be converted to developed uses. State and local governments have taken a variety of actions to prevent loss of farmland or forest lands to development including both regulatory approaches (e.g. zoning, transfer of development rights) and acquisition approaches (e.g. purchase of development rights and outright purchase of land) (Storm et al., 2009).

A widely used mechanism is the purchase of development rights through Agricultural (or forest) Conservation Easements (ACE), where an easement is sold by the land owner to a government agency or land trust. The easement allows the owner to continue farming, but prohibits improving or developing the land for any purpose other than agricultural production (forest conservation). Because of its non-regulatory, voluntary nature, ACEs (or forest conservation easement) have been a popular conservation tool for preventing farmland loss. Without knowing the economic values of forest and agricultural lands, however, it is not possible to manage the purchase of development rights efficiently in a market. One of primary goals of this study is, therefore, to consider the implicit prices of forest and agricultural lands.

Several reasons are commonly stated to motivate using public resources to preserve farmland or forest lands in near-urban areas. These include maintaining the viability of family farms, providing fresh food close to urban centers, and discouraging urban sprawl. Another common argument made for protecting farmland and forest lands is that it provides nearby residents with local amenities such as aesthetics, wildlife habitat, recreation, and improved water quality (relative to developed land uses). But living near farms could also be undesirable to nearby residents because of noise and odors created by animal and crop production. Whether, on balance, preserved farmland generates positive or negative local amenity impacts is an empirical question, the answer to which has implications for land use planning policy (Sander and Polasky, 2009).

A common approach to assess the local amenity impacts of different land uses is to measure the capitalized value of those impacts on nearby residential property prices by estimating a hedonic price function. Several studies have shown that houses with more open space nearby tend to sell for higher prices than similar houses with less open space nearby, indicating that open space tends to generate positive local amenity impacts (McConnell and Walls, 2005). However, studies that look specifically at open space that has been protected through ACEs have generated conflicting results. A series of studies conducted in Maryland found that houses located near open space sold for higher prices than similar houses not located near open space, and that preserved open space was associated with a higher price premium than developable open space (Irwin and Bockstael, 2001; Irwin, 2002; Goeghegen, 2002). Another Maryland study (Goeghegen et al., 2003) reported mixed results, where permanent open space had positive significant impacts in two counties with high development pressure, but did not have significant price effects in a third county with lower development pressure. In contrast, Ready and Abdalla (2005), in a study conducted in southeastern Pennsylvania, find that houses located near agricultural land under ACE were worth less than similar houses not located near ACE-protected farmland. They argue that the observed price difference may be due to the fact that eased farms tend to be more intensely managed than farms not under easement and therefore might not be as desirable to live near.

These studies used broadly similar approaches, leading to the conclusion that the impact of ACE-protected farmland on nearby property values differs in different places. The purpose of this study is to directly explore spatial variation in the amenity and disamenity impacts of ACE on nearby property values both between counties and within counties. Within-county heterogeneity is explored by estimating Geographically Weighted Regression (GWR) models that allow the parameters of the hedonic price function to vary spatially within a study region. Several studies have used GWR to explore spatial

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