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A comparative study of growth management effectiveness and urban sprawl in two thoroughbred landscapes in the U.S.

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ABSTRACT

This study compares sprawl development over a 40-year period in Fayette County (Lexington) Kentucky and Marion County (Ocala) Florida, which are centers of the thoroughbred horse industry in the U.S.A. Both sites rely heavily on the local economic benefits of the thoroughbred industry, and have adopted growth management programs to steer development away from soils well-suited to the equine operations, which are highly sensitive to non-farming land uses. The research operationalizes sprawl through population density, housing unit density, roadway length density, and housing unit density measured against roadway density. Although both sites' new construction seems to have avoided prime areas well suited for thoroughbred farming operations, the analysis shows that Lexington has been able to maintain more compact housing development, and new roadways tend to fill with higher density housing. This may be a result of the locally-based growth management program, or a series of other factors, including political economy.

1. Introduction

Between 1982 and 2007, sprawl was responsible for the loss of almost 4.5 million hectares of United States farmland, an overall loss of about 15 percent of the total land area dedicated to cropland in this country (USDA, 2007). Many state and local governments have used Growth Management (GM) programs to prevent and deter sprawl, with mixed results (Yin & Sun, 2007). The drivers and impacts of sprawl on prime agricultural land (and the effectiveness of efforts to control it) vary greatly according to environmental settings, economic drivers, political factors, urban morphology, and history of urban and economic development, among other factors. This study is focused on two case studies of agricultural landscapes associated with the thoroughbred horse industry surrounding the urban areas of Lexington, Kentucky and Ocala, Florida. These equine landscapes are unique among agricultural landscapes in terms of the monetary per-unit value of their product, and the economic and political power wielded by the owners as compared to typical farmers. The two locations differ, however, in their environmental context, urban and political histories, political culture, and other factors. A traditional controlled statistical design, where all factors except one (e.g. the different growth management strategies of the Kentucky and Florida sites) would allow isolating the effects of that single factor. That approach is not feasible in this case, due to the wildly varying urban/agricultural settings even within the United States. However, there are advantages to the reverse approach (only one major factor in common), as it allows a comparative study to tease out the complex interacting effects of other factors in explaining differences between the sites. In this study, the focus is the effectiveness of GM schemes in a vulnerable, high-value type of agricultural landscape.

This study evaluates the effectiveness of two different urban growth management systems from 1970 to 2010 in highly specialized agricultural landscapes – thoroughbred race horse centers. The study sites of Lexington (Fayette County), Kentucky and Ocala (Marion County), Florida are among a handful of centers of thoroughbred racehorse breeding and training in the United States. In fact, these two locations together contain 55.6% of all thoroughbred mares bred and 21% of all thoroughbred stallion studs in the United States (The Jockey Club, 2015). Both places have experienced conflict between residential land uses and thoroughbred equine operations, and both sites have GM programs in place. It may be possible to derive meaningful generalizations about growth management, land use change, and establishment of sprawl through comparisons of similar agricultural landscapes like these two thoroughbred horse centers, which operate under two different GM programs. The results are potentially relevant

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for agricultural land protection on urban fringes in general, and particularly with respect to other high-value crops such as wine vineyards, specialized horticulture, and legalized marijuana.

Motivation for this research includes public outcry to protect thoroughbred farm rural landscapes from expansive residential development in Ocala and Lexington. In a comprehensive nationwide study titled "Wide Open Spaces" published in *USA Today* (El Nasser and Overberg, 2001), Ocala, Florida was found to be the most sprawled community among the 271 metropolitan areas surveyed. Lexington, Kentucky, was 54 rankings higher on the list, indicating less sprawled development than Ocala, although still labeled as sprawled. Conversion of farms to sprawl development in the Lexington area has received attention from an organization with a global focus. In 2006, Lexington's Bluegrass Cultural Landscape was placed on the World Monument Fund's "Watch List" of 100 Endangered Sites (which also includes antiquities like Pompeii, the Great Wall of China, and the Taj Mahal) to generate interest, action and preservation of dwindling farmland being lost to urban-style development (Slayman, 2007).

Both Lexington and Ocala have GM planning programs in place to address emerging issues over land use in the context of thoroughbred farms. As the American thoroughbred industry suffers declining attendance and interest in pari-mutuel track racing, both localities seek to protect local farms because of their significant employment counts and overall economic contributions.

And coincidentally, thoroughbred farms are seemingly an ideal land use to test effectiveness of GM programs, or conversely, encroachment of sprawl. McManus and colleagues (McManus, 2008; McManus, Albrecht, & Graham, 2011, 2012) describe how thoroughbred operations are unique landscapes requiring special land use consideration. As thoroughbred horses are valued at several hundred thousand (and sometimes several million) dollars apiece, they are investments, not livestock. Often co-owned by a syndicate of investors, farm managers cannot risk horses being spooked, fed, or potentially injured by curious neighbors or neighbors' dogs; those horses are multi-million dollar investments entrusted to be cared for by the farm. And this is compounded as there are often dozens of thoroughbreds housed at each farm. Owners and managers of thoroughbred farms prefer to be surrounded by other horse/livestock farms (or similar low-intensity farming uses) to ensure safe keeping of horses. If there are incompatible land uses adjoining them, these equine operations often relocate, or owners will move their horses (particularly the more valuable ones). The very existence of thoroughbred operations depends on maintaining a landscape free of urban/suburban encroachment on farms. This creates ideal geographic and economic conditions to study the effectiveness of two types of growth management programs in combatting sprawl.

There has been little urban planning research conducted on the impacts of sprawl on specific types of agriculture, and horse farms as a specific land use (Elgåker, 2012a, b). This study documents how thoroughbred operations intersect with adjacent land uses to assess long term GM planning strategies to protect the vitality of these equine operations from encroachment and sprawl, especially as farming operations in general, and thoroughbred operations specifically, struggle economically (Economic Impact of the Horse Industry, 2010).

2. Background—agriculture, sprawl, and growth management

Agricultural land is lost to sprawl because of economics – that is, the least expensive land for development is raw, unimproved property including farmland. The theoretical underpinnings of agricultural location economics as related to land costs were first described by von Thünen. That is, Thünen bid rent theory suggests that higher yielding "crops" tend to locate closer to urban settings to reduce overall transportation costs. Urban-type land uses tend to yield higher bid rents as the value of a unit of farmland is considerably lower than the value of the same unit of urban land uses. And hence, farmland is converted to urban uses as demand for urban land increases. Where not contiguous to an existing urban area, this land use conversion often results in sprawl. Increasingly, urban or suburban vs. agricultural land use conflicts are seen as having implications for food security and agricultural sustainability as well as land use planning and policy and loss of historical, cultural, and scenic values (e.g., Francis, et al., 2012; La Rosa & Martinico, 2013; Mok et al. 2014; Vaz, De Noronha, & Nijkamp, 2014). Recent trends in conversion of farms to non-agricultural land use in North America are reviewed by Francis et al. (2012).

Transferable or tradeable development rights, or purchase of development rights for agricultural land have been used as a tool fairly recently to limit urban encroachment in both the U.S. and Australia (Daniels, 1998; Harman & Choy, 2011), and such a program exists in Lexington. In their study in southeast Queensland, Australia, Harman and Choy (2011) identified a number of barriers that need to be overcome before tradable development rights become a viable option for land use planning. U.S. programs have generally been more successful (Harman, Pruetz, & Houston, 2015).

Bengston, Fletcher, and Nelson (2004) conducted a nationwide analysis of farmland protection policy instruments at all levels of government. They showed that growth management and farmland preservation policies are mutually reinforcing and complementary because managing urban growth and open space represent the same development outcome. Farmland preservation is most effective in locales with a combined methodological approach toward land conservation, including incentives, regulation and public acquisition, as well as significant growth management techniques. They also found that multiple policy instruments that are vertically and horizontally coordinated are required, yet very few U.S. communities have these kinds of programs in place. The research argued that unless a federal land use policy is forthcoming, managing development against farmland and open space loss will continue to be fragmented, politically challenging and expensive (Bengston et al., 2004).

Statewide GM programs have been adopted in 13 states, and nearly 100 local governments have instituted urban containment strategies (Bengston et al., 2004; Fulton, Pendall, Nguyen, & Harrison, 2001; Nelson & Dawkins, 2004), although there was no statistically significant difference between states that have GM programs and those without GM in reducing sprawl (Anthony, 2004; Nelson, 1999). GM programs have been shown to induce sprawl-type development (Pendall, 1999), or foster more compact urban form (Weitz & Moore, 1998). Hepinstall-Cymerman, Coe, and Hutyra (2013) found that a state growth management program in Washington was not effective in the Puget Sound area.

3. Methods

The general approach here recognizes the idiosyncratic political, economic, social, and environmental contexts for urban and agricultural land use that exist in any area. Thus, as noted by Salvati (2013), it is necessary to take each area on its own terms to account for the "extremely variegated" socioeconomic and territorial contexts. Tavares, Montiero, Vargas, Pato, and Serra (2014) also note the varied trajectories of urban and peri-urban land use change, and adopt a case-study approach.

3.1. Measuring sprawl

This research seeks to understand the spatial and temporal patterns of land use change at each place from 1970 to 2010, including