Urban Influence on Farmland Values and Costs of Production: The Corn Belt, the South, and the Plains States: A Farm-Level Analysis (38)

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The expansion of low-density nonfarm development into traditionally rural and urban-influenced areas is affecting more and more U.S. farmland (Nehring, Barnard, Banker, and Breneman, 2006). The direct effect of such development, the conversion of rural lands to housing and other nonfarm uses is well documented (Cho, Wu, and Boggess, 2003). However, this direct conversion may be overshadowed by the secondary effects of "urban influence" on the active farmland that remains interspersed among nonfarm development. Recent studies suggest that such interspersion raises the cost of producing agricultural commodities (Gardner, 1994). Nehring et al. have estimated that urban influence raises total variable costs per acre for traditional farms in the Corn Belt by more than 8%, and is consistent with a 67% higher price of land per acre. Policies such as government payments, farmland preservation, and environmental impacts that affect land use cannot be properly evaluated without including the urbanization component.

Objective
This study uses stochastic production frontier (SPF) procedures to estimate the impact of urban influence on the cost of production for traditional corn/soybeans farms in the Corn Belt, for cash grain farms in the Plains States, and for cattle farms in the South. We hypothesize that urban influence decreases the technical efficiency of these farms. Although these regions are not entirely subject to urban influence, some parts of these areas are. Despite regional variations in urban influence, these regions have soil types, climate, and crop patterns/rotations that are relatively homogeneous, helping us to isolate the effects of urbanization.

Procedure
Given the inherent stochastic nature of agricultural production, we employ the stochastic frontier production function approach developed by Aigner, Lovell, and Schmidt (1977) and by Meeusen and van den Broeck (1977) to assess technical efficiency in traditional agriculture. Technical efficiency measures the ability of the firm to assess the technical efficiency in traditional agriculture. Because of its flexible properties we use a translog production function to assess the impacts or urban influence following Battese and Coelli (1995).

Data.
The SPF approach uses U.S. farm-level data from the 1998–2005 ARMS Phase III surveys (USDA/ERS). We will also use data from the USDA's June Agricultural Survey(JES). While containing less economic data than ARMS, the JES involves more farmland data observations (about 125,000). The ARMS is a large probability-weighted, stratified sample of about 10,000 U.S. farms each year. Farm output and input variables used in this estimation are contained in a pooled dataset (repeated cross-section). Our construction of a variable to represent the land input is particularly unique. We account for capitalization of spatial differences in land quality and urban influence in land values.

To properly account the effect of differences in land characteristics on land prices, we construct a quality-adjusted land input using hedonic regression techniques following Ball et al. (1997) and Ball, Butault, and Nehring (2000, 2001). To compute quality-adjusted land prices by farm, we relate observations by Agricultural Statistics Districts (ASDs) to their physical characteristics using hedonic techniques. Such an approach presumes that land price differences across space (or time) are due mainly to quality differences that can be measured in terms of common attributes. Hence, using a semilog model, the price of land is regressed on ASD dummies, level of urban influence, 10 climatic characteristics, 9 physical characteristics, and the percentage of cropland irrigation.

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