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The Land Market As a Link Between the Rural and Urban Sectors of the Economy

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The Land Market as a Link Between the Rural and Urban Sectors of the Economy

Studies of the agricultural land market have in general focused attention on determinants of land value that are endogenous to agriculture. Only a few isolated efforts have attempted to examine the nonfarm determinants of farm land values, or to integrate the agricultural land market with the nonfarm sector of the economy.[1/] Nonfarm influences have been assumed to have their impact on the agricultural land market either through the demand for farm products or through the mortgage rate of interest.

This paper discusses in part the results[2/] of a cross-sectional study of agricultural land values. The total model on which it is based includes both farm and nonfarm considerations, although space limitations prevent a complete discussion of the model here. In this analysis we will concentrate on nonfarm influences on the agricultural land market. The total statistical model will be presented, however, as a means of evaluating the results.

A Conceptual Model and Statistical Results

Hypotheses with respect to the determinants of cross-sectional variations in land values may be drawn from three bodies of economic thought. (1) Location theory has historically been assumed to play a major role in explaining

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1/ For a recent attempt in this direction, see Ruttan, V. W., "The Impact of Local Population Pressure on Farm Real Estate Values in California," Land Economics, Vol. 37, 1961, pp. 125-131. Scofield and Sargent have also stressed the importance of nonfarm influences in the market for agricultural land. See Scofield, W. H., "Prevailing Land Market Forces," Journal of Farm Economics, Vol. 39, No. 5, Dec. 1957, p. 1500, and Sargent, F. O., "Land Market and Price Analysis in an Agro-Industrial Economy," The Appraisal Journal, Oct. 1959, pp. 359-363.

2/ For further discussion see Scharlach, W. C., "A Cross-Sectional Analysis of Indiana Land Values, 1959," unpublished M. S. thesis, Purdue University, 1961.

variations in land values at a point of time.[3] (2) Economic development theory, in combination with location theory, has been used by Schultz[4] and others to explain geographical variations in labor returns. This body of thought also has implications for the pattern of land values, both from a locational standpoint and in terms of nonfarm demands for land. (3) And finally, the theory of the firm provides insights into the determinants of the demand for land as a factor of production.

A statistical model[5] based on these considerations is presented in Table 1. Land quality has historically played a major role in cross-sectional models of the land market. Fertilizer application, expenditure on other inputs, the farm wage rate and farm size evolve out of the theory of the firm as determinants of land values. They represent shifters of the demand for land and are important to the extent that land values are endogenously determined within the firm. The distance from Chicago reflects both transportation costs, and the influence of a major metropolitan area as a focal point for industrial-urban development. Property taxes and population density both reflect nonfarm impacts on land values.

The model was fitted using county averages for Indiana as observations.[6] The R^2 was .89, indicating a good fit to the data, and all coefficients except for fertilizer application and average size of farm were significantly

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3/ Dunn, Edgar S., Jr., 1954. The Location of Agricultural Production, pp. 6-24, Gainesville, University of Florida Press.

4/ Schultz, Theodore W., 1951, "A Framework for Land Economics - The Long View," Journal of Farm Economics, Vol. 33, pp. 204-215.

5/ Several experiments were made with the model to find appropriate measures of land quality, fertilizer and taxes. The model represents what we feel to be the most adequate model of those tested.

6/ Data were taken from the 1959 Census of Agriculture.

Table 1. Variable Identification and Least Squares Estimate of Cross-Sectional Model of Land Market.

Regression equation:

$$Y = 452.60 + \underset{(.214)}{.649}\ X_1 + \underset{(.701)}{1.987}\ X_2 - \underset{(.063)}{.307}\ X_3 - \underset{(1.327)}{5.610}\ X_4 - \underset{(1.269)}{2.567}\ X_5 + \underset{(6.140)}{62.579}\ X_6 + \underset{(.046)}{.058}\ X_7 + \underset{(.150)}{.171}\ X_8$$

Variable Identification:

Y = Value of land and buildings per acre ($0.10)[a]

X_1 = Population density (persons per square mile)

X_2 = Specified farm expenditures per acre ($0.01)

X_3 = Distance from Chicago (.43 mile)

X_4 = Farm wage rate - USDA ($0.001)

X_5 = Property tax rate per acre (based on tax collections) ($0.10)

X_6 = Weighted index of land capability (Index figure to two decimal places)

X_7 = Fertilizer application per acre (0.02 lb.)

X_8 = Average size of farm in acres (0.1 acre)

[a] Units of measurement in parentheses

different from zero at the 5 per cent level or better. Both of these have coefficients larger than their standard errors so they were retained in the model.

The remainder of the paper will concentrate on the links between agricultural land values and the nonfarm sector of the economy, and the implications they have for agriculture in a dynamic economy.

Population Density

The statistical results indicate a significant positive relationship between population density and land values. The impact of population on land values has at least two dimensions. The postwar period has been one characterized by a population explosion. Based on a constant land area for the nation as a whole, this increase in population can make the spatial aspects of land for all purposes an increasingly scarce resource, although technology in its various forms constantly acts to alleviate this pressure. The role of technology in reducing the area needed for growing the food and fiber needs of the country is especially obvious.

But even assuming constant population for the nation as a whole, population will exert an impact through its continuous redistribution over the space available. Economic development and change in its various dimensions leads to contraction in some areas and expansion in other areas. The impact of this is channeled into the factor markets, and results in capital gains and losses to existing land holders. This is especially relevant from an agricultural standpoint as the movement from farming to nonfarm occupations continues at its present rapid rate. The result is a tendency to depopulate certain rural areas. The effect of this population movement is transmitted

indirectly to those remaining behind through changes in taxes and directly through local declines in the demand for land services.

The redistribution of population has been a two-directional process in recent years. The migration from agricultural and rural areas to the urban centers has been proceeding at the same time that a sizeable suburbanization process has been taking place. Clearly this has a differential impact on agricultural land values.

As the agricultural labor force declines in relatively isolated areas, the demand for service and supporting industries also declines. This leads to an eventual decline in the total population base, independent of or in addition to what is happening to the farm population. This is typified by the decline and even abandonment of many rural communities. Associated with this will be a decline in the local nonfarm demand for land.

On the other hand, agricultural land located near the larger urban areas and subject to the increasing urban sprawl will be subject to pressures in the opposite direction. The increasing nonfarm demand for land in these areas will result in a bidding up of land values.

Property Taxes

Such governmental services as police and fire protection, education, and courts are provided in part by local government units. The revenue to provide these services in turn comes in large measure from local property taxes. The rather rapid expansion in recent years on the part of local governmental units has led to increasing levels of property taxes. The results of this study indicate that these property taxes do have an impact on local land values. The statistical results indicate that, ceteris paribus, an increase in tax collections leads to a decrease in land values.

Urbanization or economic development therefore exerts a two-pronged effect on land values. Increasing concentrations of people lead to increases in land values, ceteris paribus. But the concentrations of people increase the need for government services. This increases the property tax burden and, by itself, acts to lower land values.

The net effect of a population change on land values was examined by determining the relationship between population density and tax collections. Population density was treated as a determinant of tax collections, and the relationship between the two was examined by ordinary regression analysis. This was done by linearly regressing property taxes on population density. The equation obtained was $Y = -33.892 + 1.664X$. The coefficient for population density was highly significant, with a correlation coefficient of .99 and a standard error of 34.87.

The relationship between population and tax collections was examined at the mean values of the function. The results indicate that 10 per cent changes in population density lead to 11.9 per cent changes in property taxes per acre. Inserting these changes into the original equation at the means for the independent variables provides an estimate of the net effect of increases in population density. This net effect of the 10 per cent increase in population density and the attendant 11.9 per cent increase in tax collections is a 1.2 per cent increase in the value of land. In toto, then, changes in population density lead to corresponding changes in land values.

Distance From a Primary City

The statistical results of this study provide limited support for the hypothesis that distance from a metropolitan area is an important determinant of cross-sectional variations in land values. The results suggest that it is

meaningful to consider Chicago as a focal point for the economic development of the midwest, of which Indiana is a part.[7] As the center of a hierarchy of smaller secondary cities, Chicago dominates the local factor and product markets, and gives rise to a pattern of land values that declines as the distance from Chicago increases. An analysis of the residuals from the equation suggests that Indianapolis, as the largest of the secondary cities in the area, may be interpreted as a secondary focal point of development, and as such, generates its own pattern of land values.

The Price of Labor

Local industrialization exerts its impact on local agriculture in part through the labor market. The actual or imputed cost of the human agent in agriculture is raised toward the prevailing level of nonfarm wages, in turn forcing those who remain in agriculture to reorganize their farms to raise labor productivity enough to cover the higher labor cost.

This reorganization takes the form in part[8] of changing the proportions in which resources are combined. More land is used relative to labor, and this is accomplished through farm enlargement. This kind of factor substitution leads to lower marginal physical productivity for the land resource, ceteris paribus, and in turn lower land values.

This hypothesis is tested in this study by introducing agricultural wage rates into the equation. The consistent significant results obtained for the coefficient of this variable and its expected sign provide support for the hypothesis. Higher wage rates for labor lead to more extensive forms

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7/ This point is more carefully defended in a forthcoming research bulletin.

8/ The reorganizations can also be accomplished by farm operators becoming part-time farmers without any increase in the amount of farm land and also by the addition of capital inputs, especially in the form of livestock.

of farm organization, ceteris paribus, and in turn to lower per acre land values through the declining marginal physical productivity of land as less labor is used with it.

Economic growth, as conventionally defined, leads to increasingly higher wage rates in agriculture.[9/] This study suggests that an increasing price for labor, as an exogenous change imposed on the agricultural industry, can and does lead to a substitution of land for labor in agriculture.

Stated somewhat differently, rising wages in agriculture lead to a more labor-extensive form of agricultural organization. Other things being equal, this change will lead to lower value productivities for the land resource, and in general suggest a declining price for land. In practice, however, other economic forces may offset this by an increased demand for land from nonfarm sources and the incentive to use increasing quantities of non-land capital resources with the labor.[10/]

Conclusions

The statistical results presented indicate that nonfarm influences are channeled into the agricultural land market through at least four variables: population density, transportation costs, property taxes, and agricultural wages or the labor market. Changes in these economic forces generated in the nonfarm sector of the economy impose changes on agriculture, and these changes are reflected in part in the agricultural land market.

9/ See Schuh, G. E., "Some Dynamics of the Agricultural Labor Market," paper presented before Econometric Society, August 1961.

10/ The rising price of labor also leads to the substitution of other capital goods for labor. Taken by itself, this can lead to increased value productivities for land, and offset in part or totally the substitution effect of land for labor. A final answer on this depends on the relative elasticities of substitution and the opportunity costs of the respective inputs.