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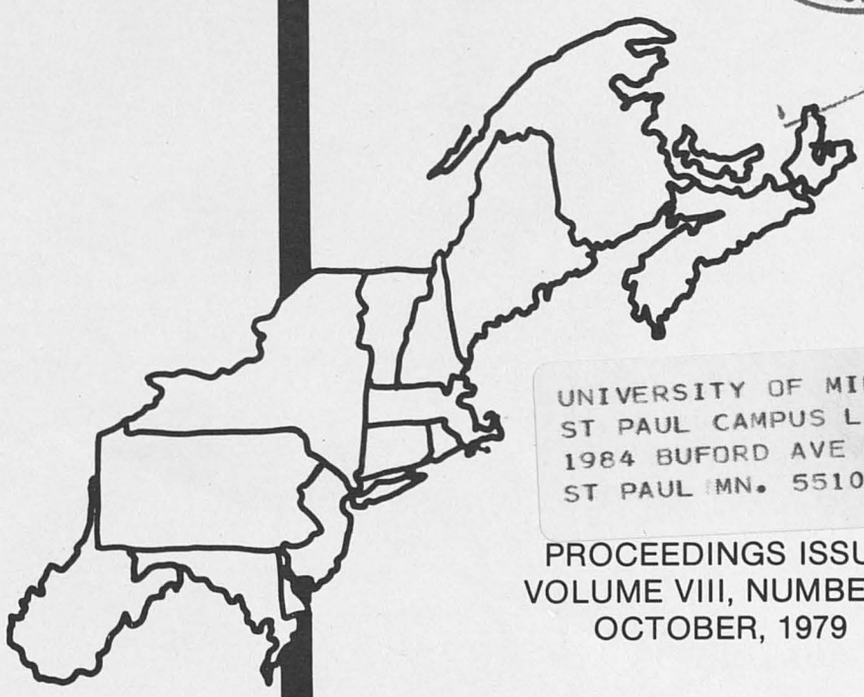

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FACTORS AFFECTING LAND PRICES IN A RURAL NEW JERSEY COUNTY

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Much attention has been given in recent years to the conversion of substantial amounts of rural land to urban uses. A variety of policies designed to encourage the retention of rural open space have been either proposed or implemented by many state and local governments. Because the decision to convert land to urban uses is generally a private decision in response to market forces, an understanding of these market forces should facilitate better policy development and implementation. This paper reports on a research project designed to explore the forces affecting rural land prices in areas where the rural land market is significantly influenced by the demand for land for urban or suburban uses. Publicly available data on transfers of rural land were analyzed, using a multiple regression model, to both identify and quantify the importance of factors affecting rural land prices.

The Study Area

Hunterdon County, New Jersey, was selected as the general study area. Despite the fact that its county seat, Flemington, is located only 50 miles from both New York City and Philadelphia, Hunterdon County retains many rural characteristics. According to the U.S. census of 1970, Hunterdon ranked second to last among all New Jersey counties in population density, with 165 people per square mile. Eighty-four percent of the 1970 population was classified by the Census Bureau as rural. In 1978, approximately 58 percent of the total land area of the county qualified for agricultural use-value assessment (New Jersey Division of Taxation). But there is also clear evidence of urban influence in Hunterdon County. Data from the U.S. Census Bureau show that the county experienced an average annual rate of

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population growth of 2.6 percent between 1960 and 1970. Recent population estimates indicate that the rate of growth between 1970 and 1976 was about 2.2 percent per year, which is considerably higher than the corresponding estimate of 0.6 percent for the entire state of New Jersey (U.S. Bureau of the Census, 1979).

To keep the study within manageable limits, only 4 of the 26 municipalities composing Hunterdon County were studied. These municipalities composing Hunterdon County were studied. These municipalities were purposively selected to reflect the variability that exists within the rural portions of Hunterdon County with respect to urban influence. As can be seen from Table 1, Readington Township shows considerably more evidence (in both population density and activity in the market for new house construction) of urban influence than the other three municipalities. West Amwell, although experiencing about the same percentage rate of population growth as Readington, had the lowest rates of activity in the new housing market. Franklin and Delaware Townships fall between these two extremes.

Procedures

Records of all transfers of land in New Jersey are kept by the New Jersey Division of Taxation in Trenton. These records include the location of the parcel, by lot and block number; the land-use category into which the land is classified for tax purposes (vacant, agricultural, residential, or commercial/industrial), the acreage of the transfer; the tax assessment of the land; the tax assessment of any structures; the date of the transfer; and the price of the transfer. For purposes of this study, transfers were deemed to involve rural land if the land was in either the "vacant" or "agricultural" land-use tax categories, and if the parcel was 5 acres or more in size.

Records for all such transfers occurring in the four municipalities between January 1, 1974 and December 31, 1976 were examined. Because in the analysis of the data it is assumed that the recorded price represents the total consideration for the transfer, transfers which are likely to involve other types of consideration (such as "love and affection," changes in renumeration in a closely-held corporation, etc.) must be excluded. Transfers which were obviously not bona fide "arm's length" transfers, along with those that involved no market transactions (such as transfers for the purpose of correcting defects in title) were therefore eliminated from further consideration, leaving a total of 100 transfers of agricultural land and 42 of nonagricultural rural land.

For each of these transfers, detailed data were collected from public records (deeds, mortgates, tax records, zoning maps, and highway maps). In this process, an additional 37 cases were eliminated because of evidence that they were not "arm's length" transfers.[1] Another 23 were dropped because of problems encountered in collecting the data.[2] The analysis was thus based on a total of 82 transfers, of which 48 involved only land (either agricultural or vacant) and 34 involved both agricultural land and buildings.

A multiple regression model was developed to explain raw land prices. In an effort to remove the distortions caused by the presence of buildings,

Table 1

Characteristics of the Municipalities Studied,
Hunterdon County, New Jersey

Characteristic	Readington	Delaware	Franklin	West Amwell
(1) Percentage of total area in agriculture	56.8	69.5	70.5	60.9
(2) Population, 1970 (number of people)	7,688	3,249	2,154	2,142
(3) Population density, 1970 (people per square mile)	161	88	92	97
(4) Average annual population growth rate, 1960-1970 (percent)	2.3	2.7	1.9	2.4
(5) Average annual population growth rate, 1970-1976 (percent)	1.2	1.3	2.2	1.3
(6) Average annual number of residential building permits issued:				
1970-1977				
Number of housing units	110.3	22.4	14.8	9.8
Number of housing units per 1,000 acres of total land in municipality	3.61	0.95	0.99	0.70
1975-1977				
Number of housing units	176.3	26.3	14.3	4.0
Number of housing units per 1,000 acres of total land in municipality	5.76	1.11	0.96	0.29

Sources: (1) New Jersey Division of Taxation

(2), (3), (4) U.S. Bureau of the Census, 1970

(5) U.S. Bureau of the Census, 1979

(6) New Jersey Department of Labor and Industry

the dependent variable was specified as the total purchase price of the parcel (in thousands of dollars) minus the assessed value of the buildings (in thousands of dollars), divided by the total number of acres of the parcel.[3] Independent variables were constructed to represent (1) the agricultural productivity of the land; (2) the characteristics of the buyers and sellers (as determined from public records); (3) thedevelopment potential of the parcel; and (4) the geographical location (municipality) of the parcel. In addition, a time trend variable and a dummy variable reflecting the presence or absence of buildings on the parcel were included.

As a proxy for the agricultural productivity of the land, the percentage of the total parcel that was cropland was used as an independent variable. For nonagricultural parcels, this variable took on a value of zero. Thecharacteristics of buyers and sellers were represented by three dummy variables. One variable indicated whether the seller was an ividvidual or a corporation; another indicate whether the buyer was an individual or a corporation; and a third indicated whether or not the purchaser resided within Hunterdon County. Seven variables representing the development potential of the parcel were included in the model: The amount of road frontage per acre of land transferred; the distance from the parcel to a population center; the distance to a major road; the distance to the nearest commercial parcel; the distance to the nearest residential parcel; the size of the parcel[4], and a dummy variable, which took on a value of "1" if the tax records indicated that the parcel had been converted to urban use in the two- to three- year period between the date of the transfer and the time of the collection of the data for this study. In all cases encountered, the conversion represented by this dummy variable was to single-family residential use. For the parcel size variable, previous work suggests the posibility of a nonlinear relationship to price (Bellows and Colacicco); therefore, this variable was tested in both a linear and a nonlinear form. The nonlinear form (specified as the reciprocal of the acreage of the parcel) gave a better fit, and only results using the nonlinear form are presented here.

We had originally planned to include a variable to reflect the zoning of the parcel as another indicator of its development potential; however, there was so little variation in the values of this variable that it was not included in the model. No variables reflecting the availability of public sewer and water lines were included, due to the absence of these facilities in the study area.

The geographic location of the parcel was indicated by the use of three zero-one dummy variables, reflecting the four municipalities included in the study. These variables were included to account for the possibility that factors unique to a given municipality (such as quality of the schools or of other municipal services; attitude of local government toward development; etc.) could affect the general level of rural land prices in the municipality.

The time trend variable was based on the number of months elapsed between the beginning of the study period (January 1974) and the date of the transfer. It was included to account for any general increase in land values during the 36-month period over which the transfers occurred.

Finally, the dummy variable reflecting the presence or absence of buildings was included because market values tend to be greater than assessed values, so that the subtraction of the assessed value of the buildings from the purchase price is likely to only partially remove the distorting effect of buildings on the estimated raw land prices. This

Table 2

Regression Coefficients for Equations Estimated to Explain Raw Land Prices in Four Townships, Hunterdon County, New Jersey, 1974-1976[a]

Independent Variable	Equation 1[b]	Equation 2[c]	Equation 3[d]
Change to Urban Use (dummy)	0.872**	-0.293	-0.034
	(.325)	(1.65)	(0.536)
Time Trend (month)	0.022	0.023	0.023
	(0.014)	(0.042)	(0.019)
Parcel Size (1/acreage)	11.3**	22.7**	19.6**
	(2.2)	(9.9)	(3.4)
Readington Township (dummy)	0.641**	1.81*	1.41**
	(0.299)	(1.03)	(0.42)
Franklin Township (dummy)	1.75**	-0.182	0.925**
	(0.34)	(1.23)	(0.492)
Corporation Purchaser (dummy)	-	0.076	0.274
		(1.33)	(0.498)
Distance to Commercial Parcel	-	0.012	.009*
		(0.006)	(.006)
Presence of Buildings (dummy)	-	-	1.04**
			(0.40)
Constant	.630	-.336	-.716
R^2	0.64	0.51	0.45
Adjusted R^2	0.60	0.36	0.38
Degrees of Freedom	42	23	69

* Significant at the .05 level.

** Significant at the .01 level.

a The standard error of each regression coefficient is given in parentheses.

b Based on transfers with no buildings. Dependent variable is price per acre (in thousands of dollars).

c Based on transfers in which buildings were included. Dependent variable is purchase price per acre minus assessed value of buildings per acre (in thousands of dollars).

d Based on all transfers. Dependent variable is purchase price per acre minus assessed value of buildings per acre (in thousands of dollars).

variable took on a value of "1" for all transactions that included buildings.

Results

Because of the difficulty of satisfactorily removing the effects of buildings on land prices, the model was first applied only to the data for the parcels that did not involve buildings. All the variables discussed above, with the exception of the dummy variable reflecting the presence of absence of buildings, were included. Insignificant variables were then dropped, one by one.[5] The variables remaining in the final equation (Equation (1) in Table 2) were: the dummy variable reflecting the change to urban use; the time trend; the reciprocal of parcel size; and the dummy variables for Readington and Franklin Townships. All variables in this equation, which had an R^2 of 0.64, were significant at the 1 percent level except the time trend variable, which was significant only at the 10 percent level.

Of the 48 transfers analyzed in Equation (1), 14 involved parcels that were developed for residential use subsequent to the transfer. The regression coefficient on the dummy variable representing these parcels indicates that, ceteris paribus, these parcels sold for a price that averages $872 per acre higher than the price of other parcels. This suggests that individuals acquiring land in order to convert it to residential use within a short period of time pay a higher price than other buyers.

Although significant only at the 10 percent level, the estimated coefficient for the time trend variable suggests that land prices rose about $22 per acre per month, or $264 per acre per year during the three-year period studied. With an average price per acre of about $3,300, this suggests that land prices may have risen roughly 8 percent per year.

The positive coefficient on the parcel size variable (reciprocal of acreage) indicates that, ceteris paribus, larger parcels sell at lower prices per acre. This is consistent with the findings of other studies (Bellows and Colacicco; Colyer). The magnitude of the coefficient is such that as parcel size doubles from 5 acres (the minimum parcel size included in the study) to 10 acres, the price per acre decreases by $1,130. A second doubling of parcel size to 20 acres would imply a further price reduction of $565 per acre. Increase in parcel size beyond 40 acres appears to have a relatively small effect on price.

Other things equal, rural land in Franklin Township commanded a premium of $1,750 per acre as compared with land in Delaware and West Amwell. Land in Readington commanded a premium of $641 per acre. The premium for land in Readington could be due either to unmeasured factors related to the greater degree of urban influence in that township, or to other locational factors not measured in this study. The reasons for the large premium for land in Franklin Township are not clear, although one could hypothesize that the apparent rapid rate of population growth since 1970 (Table 1) has been an important factor.

Equation (2) of Table 2 was estimated from data on transfers with buildings. This equation includes all the independent variables used in Equation (1), plus the dummy variable indicating whether the buyer was an individual or a corporation, and the variable indicating the distance to

the nearest commercial parcel. The first of these two additional variables was included in the analysis because it appeared that most of the transfers with corporate purchasers involved parcels with buildings. The second was included because it was hypothesized that location near a commercial parcel might be more likely to increase the value of parcels with buildings than parcels with no buildings. The resulting equation has an R^2 of 0.51, but with only two variables showing significant coefficients. Of these, the dummy variable for Readington Township is significant at the 5 percent level, and the coefficient is positive, as it was in Equation (1). The only other significant variable is the reciprocal of parcel size, for which the coefficient is double that of Equation (1). This suggests that some of the effect of the buildings on the price of land has not been removed by subtracting their assessed value from the total amount paid, and is being reflected in the coefficient of the parcel size variable.

Equation (3) was estimated using the data from all transfers -- both those with buildings and those without. It includes the same variables that were in Equation (2), with the addition of the dummy variable to indicate the presence of buildings. The resulting equation has an R^2 of 0.45, with parcel size, dummy variables for Readington and Franklin Townships, and the dummy variable for buildings significant at the 1 percent level. Distance to a commercial parcel was significant at the 5 percent level. The dummy variable representing the development of the parcel subsequent to its transfer, which had been significant in Equation (1) was not significant.

The coefficient for the dummy variable for the presence of buildings indicates that, even after adjusting for the assessed value of buildings, parcels with buildings commanded, ceteris paribus, a price averaging $1,040 per acre higher than parcels without buildings. Furthermore, the coefficient for the parcel size variable remains much higher than in Equation (1), suggesting that some of the effect of the value of buildings on price paid is still reflected in this variable.

The results of Equations (2) and (3) indicate that our efforts to incorporate transfers involving both land and buildings into the analysis of raw land prices were not very successful. It is possible that the price of land with buildings is affected by different variables than affect the price of raw land alone. Furthermore, the assessed value of the buildings may be a poor proxy for their market value. The motives of the purchaser may be more important in the price determination process for transfers with buildings. It is possible, for example, that in some cases buildings may have a strong positive value on price, while in other cases, similar buildings may have little or even negative (if they must be torn down) value to the purchaser.

Summary and Conclusions

All transfers of parcels of rural land of 5 acres or more that were deemed to be bona fide arm's length transfers that occurred in four townships in Hunterdon County, New Jersey, between January 1, 1974 and December 31, 1976 were identified. Data on these transfers, and on the parcels involved, were obtained from tax records, deeds, township maps, and mortgages. A multiple regression model was developed to analyze the variation in rural land prices.

The most significant factors affecting land values were those representing either the development potential of the parcel or its geographic location. In the first category, the dummy variable reflecting the conversion of the parcel to urban use subsequent to the transfer showed a significant positive relationship to price, while the parcel size variable indicated a significant negative relationship between price and parcel size. The nonlinear form of the parcel size variable (the reciprocal of the acreage) gave a better fit than the linear form. In terms of geographic location, two dummy variables representing Readington and Franklin Townships had significant positive coefficients.

In spite of the fact that the study area was chosen for its rural and agricultural characteristics, the results failed to indicate any evidence that the productivity of the land affected its price. In part this may reflect the fact that the percentage of a parcel which is in cropland may be a poor proxy for the agricultural productivity of the parcel. But the results are consistent with the view that within an urban state such as New Jersey, the value of rural land, which may be suitable for agricultural or other nonurban uses, is strongly influenced by factors relating to urban demand.

A methodological finding of the study is that the analysis of rural land prices may be confounded by the inclusion of transfers that include buildings. No satisfactory method to remove the effect of the buildings on the price of land was found.

FOOTNOTES

[1]Some of these transfers were probably not legitimate market transfers, but rather involved changes in title with no change in the effective control of the land. Others were legitimate market transfers, but for which the total consideration involved aspects other than the purchase price. While it would be desireable to include these transactions in the analysis (using the full consideration as the transfer price), it is not feasible to obtain accurate information on the full consideration. The exclusion of these transfers may bias the results of the analysis, but the nature and direction of that bias are unknown.

[2]Most of these were cases in which only a portion of the tax parcel transferred (split-off transfers), but for which it was not possible to ascertain from the public records either the acreage that transferred or else whether any buildings transferred. In many of the latter cases it appeared likely that buildings were included; however, the uncertainty regarding this basic fact of the transfer, coupled with the potentially large error on the calculated price per acre of raw land which could result from an incorrect assumption about the buildings, led to the decision to exclude these transfers. This may also create some bias in the results, but again of unknown nature and direction.

[3]Because of the potential importance of favorable financial terms on the purchase price, an alternative specification of the dependent variable was developed, in which the price per acre was adjusted downward to account for any favorable financial terms given by the seller. Replacing the unadjusted price per acre variable with this adjusted price per acre variable did not improve the R^2 of the estimated equations; therefore, the unadjusted price per acre was used in the analysis.

[4]Parcel size is deemed to represent the development potential of the parcel because, with very few large, tract-type housing developments occurring in the study area, small parcels would likely be more attractive to a buyer interested in residential development.

[5]This process appeared reasonable, given the relatively low correlation coefficients among the independent variables. As each variable was dropped, the results were scrutinized to attempt to detect multicollinearity problems. Some multicollinearity may exist between parcel size and the variables representing corporate purchaser, percent cropland, distance to population center, and distance to commercial parcel. For a fuller discussion, see Northcraft.

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