ANALYSIS OF FACTORS AFFECTING RURAL REAL ESTATE VALUES IN EASTERN OKLAHOMA

by

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ABSTRACT

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The objective of the study reported was to examine factors that cause variations in rural real estate values in an eastern Oklahoma study area. Econometric models were developed to explain values of study area rural real estate in general and agricultural and non-agricultural real estate in particular.

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The rural real estate market in Oklahoma and the United States has generally been characterized by increasing prices in the 1970's. During the 1973 to 1979 period farm real estate values in the United States increased by 56.0 percent [4]. In Oklahoma over the same period, farm real estate values increased by 50.5 percent [4].

Such increases in rural real estate values have generated interest in identifying the factors that affect real estate prices. According to theory, the value of real estate is determined by the returns that can be generated from the most profitable enterprise that a particular tract of real estate is capable of supporting. Previous studies have established a direct relationship between farm income and rural real estate prices [2,3]. The increases in rural real estate values appear to be greater than can be justified by farm income. The non-agricultural demand for rural real estate has increased rapidly in certain areas. Special pressures on rural real estate are often extremely high.

The objective of the study reported herein [1] was to examine the factors that cause variations in rural real estate values in an area of Oklahoma experiencing substantial non-agricultural as well as agricultural real estate use pressures. The study area included Adair, Cherokee and Muskogee counties in Eastern Oklahoma.

General Methodology and Data

The general method of analysis utilized to explain study area rural real estate values was multiple linear regression. The following three basic

models were used to explain the variation in study area rural real estate values:

1. Model of values of all rural real estate
2. Model of values of rural agricultural real estate
3. Model of values of rural non-agricultural real estate

Variables included in these models and the availability of data on each variable are discussed below.

Data utilized in this study consist of information describing study area real estate transactions for the years 1976, 1977 and 1978. Value per acre is the dependant variable in this study. The value per acre variable measures the values of rural real estate that changed ownership in the study area during the time period of the study. Value per acre for study area transactions was obtained from information on warranty deeds in county clerks' offices and was deflated by the CPI.

A date of sale variable was specified by month and year for each transaction. This information was also obtained from warranty deeds in county clerks' offices. Special factors particularly related to the fact that real estate is an absolutely limited resource should cause real estate prices to increase at a rate greater than the general economy inflation rate. Therefore, date of sale was expected to be positively related to value per acre of real estate.

The size of the tract of real estate considered in this analysis was specified in acres as an independent variable. The amount of credit that is required for the purchase of larger tracts of real estate is difficult for most people to finance. Due to this fact, value per acre for the large tracts of real estate should be lower than value per acre for smaller tracts of real estate. The expected relationship between the size of the tract and the value per acre of real estate was negative.

A rural water district variable that signified that a tract of real estate was located inside a rural water district was included in the analysis and was determined by data available from the Oklahoma Conservation Commission. When non-agricultural tracts of real estate were located inside a rural water district the potential for being served by the water line was expected to increase the value per acre of the tract of real estate. Therefore, the location of a tract of real estate inside a rural water district was expected to have a positive influence on the value per acre for real estate.

Data on a soil slope variable was obtained from the Oklahoma Foundation for Research and Development Utilization, Inc. The slope was measured as a percent and grouped into three categories. These categories are as follows:

1. zero to three percent,
2. three to eight percent and
3. greater than eight percent

The usefulness of agricultural real estate is decreased with a steeper slope. So real estate value was expected to decrease as slope increased.

A value of improvements variable was specified to measure the value of the improvements that were present on tracts of real estate sold in the study area. The relationship between the value of improvements per acre and the value of real estate was expected to be positive. The value of improvements on a tract of real estate was expected to be included in the value of the sale of the property.

Land use information from the Oklahoma Foundation for Research and Development Utilization, Inc. was used to specify an improved agricultural real estate variable. Land use classifications reported are forest land, range land, pasture land and crop land. For this study, forest and range land were grouped together. If a tract of real estate was classified as forest or range land, then the value

of the improved agricultural real estate variable was zero. Pasture and crop land were also grouped together. If a tract of real estate was pasture or crop land the value of the improved agricultural real estate variable was one. The relationship between improved agricultural real estate and the value per acre of real estate was expected to be positive.

A non-agricultural real estate variable was determined by data in county assessors' offices. The pressure placed on rural real estate for non-agricultural uses in the study area is great. This should push the value of real estate that is used for non-agricultural uses above the value for agricultural real estate. Therefore, positive relationships were expected between the non-agricultural real estate use variable and the value per acre for rural real estate.

A distance to the nearest county seat variable was specified in highway miles from the individual parcels of real estate considered. The greater the distance that must be traveled from a tract of real estate to reach the major market in the area the greater the operating expense required for the operation of the real estate. This translates into a lower value per acre for the real estate. Therefore a negative relationship was expected between the distance to the nearest county seat and the value per acre for rural real estate.

Results

The estimation procedure selected to analyze the data collected was the Statistical Analysis System (SAS). SAS is a computer routine developed by Barr and Goodnight that is extremely flexible in data organization and manipulation. SAS also lends itself particularly well to multiple regression analysis. The general forms of the models specified earlier in this chapter were applied to the data and evaluated on the basis of certain criteria.

Models of Value of All Rural Real Estate

A general model of value of all rural real estate was estimated for the study area. The specific form for the model is as follows:

$$VPA = a + b_1DOS + b_2SIZ + b_3SRS + b_4RWD + b_5SSL + b_6IPA + b_7NAG + b_8DNC + b_9SRD$$

Where:

VPA = Value per acre

DOS = Date of sale

SIZ = Size of tract

SRS = Square root of size of tract

RWD = Rural water district

SSL = Soil slope

IPA = Value of improvements per acre

NAG = Non-agricultural real estate

DNC = Distance to the nearest county seat

SRD = Square root of the distance to the nearest county seat.

The results of model estimation are shown below[1]:

$$VPA = \underset{(.2405)}{1068.3254} + \underset{(.0012)}{44.9273DOS} + \underset{(.1367)}{8.6603SIZ} \underset{(.1359)}{-175.6568SRS} + \underset{(.0126)}{755.0358RWD}$$

$$+ \underset{(.3279)}{50.877555L} + \underset{(.0001)}{0.4920IPA} + \underset{(.0001)}{4413.2468NAG} + \underset{(.7028)}{33.2077DNC}$$

$$- \underset{(.3170)}{511.4417SRD}$$

$R^2 = .4440$; PR > F = .0001

Date of sale had a significant impact on the value per acre for all rural real estate in the study area. Based on the value of the coefficient for the date of sale it can be said that the value of real estate in the study area, adjusted for normal inflation, increased by an estimated $44.93 per acre per month due to the impact of time related factors such as increasing demand for

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[1]Numbers appearing in parenthesis represent the observed significance levels of the variables as determined by the "Student-t" values.

rural real estate for recreational and investment purposes.

To examine the impact of the size variable on each of these models both the size in acres and the square root of the size must be considered together. Considering these variables together, size of tract was inversely related to general real estate value per acre. However, neither variable was significant at the 0.10 level.

The dummy variable stating that a tract of real estate is in the boundaries of a rural water district was significant. Based on this analysis, the value per acre for rural study area real estate in general increased by an estimated $775.04 if the tract was located inside a rural water district.

As was expected, the value of improvements per acre is an important variable in this model. This variable had a significant coefficient of 0.4920. From this it can be said that, in general for rural study area real estate, for every dollar of improvements per acre, the value of the real estate per acre increased by $0.4920.

A major factor in the value per acre of all rural study area real estate taken together was the dummy variable stating whether or not the property was used for non-agricultural purposes. The impact of this factor was expected to be positive. This was determined to be significantly true. The coefficient was $4,413.25 per acre.

Neither distance to the nearest county seat nor square root of distance to nearest county seat were found to be significantly related to general rural real estate values in the study area.

Models of Values of Agricultural Real Estate

A model of value of study area agricultural real estate was estimated as follows:

$$VPA = a + b_1DOS + b_2SIZ + b_3SRS + b_4IPA + b_5SSL + b_6IAG + b_7DNC + b_8SRD$$

Where:

VPA = Value per Acre

DOS = Size of Tract

SRS = Square Root of Size of Tract

IPA = Value of Improvements per Acre

SSL = Soil Slope

IAG = Improved Agricultural Land

DNC = Distance to the Nearest County Seat

SRD = Square Root of Distance to the Nearest County Seat

For purposes of this model, agricultural real estate was defined as that real estate so designated by county assessors. The results of model estimation are shown below[2]:

$$VPA = \underset{(.0001)}{4108.8731} + \underset{(.0001)}{30.3679DOS} + \underset{(.0092)}{7.0616SIZ} - \underset{(.0003)}{210.8707SRS} + \underset{(.0001)}{0.2660IPA}$$

$$+ \underset{(.2202)}{35.7517SSL} + \underset{(.5444)}{104.1883IAG} + \underset{(.0001)}{202.5409DNC} - \underset{(.0001)}{1665.303SRD}$$

$R^2 = .4408$; PR > F = .0001

Date of sale had a significant impact on the value of assessor defined agricultural real estate in the study area. Study area agricultural real estate values adjusted for normal inflation, increased by an estimated $40.37 per acre per month over the time period of the study due to time related factors.

Both size of tract and the square root of size of tract assessor defined agricultural real estate in acres had significant influence on value. Taken together these variables had a negative influence on values.

The value of improvements per acre was a very significant variable in the model of value per acre for assessor defined agricultural real estate. For every dollar of study area improvements per acre, the value per acre for agricultural

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[2]Numbers appearing in parenthesis represent the observed significance levels of the variables as determined by the "Student-t" values.

real estate increased by an estimated $0.2660. This relationship also was identified in the individual county models.

The improved agricultural real estate variable did not have a significant impact on the value per acre of assessor defined agricultural land in the study area.

Distance and square root of distance to the nearest county seat both had significant impacts on value of assessor defined agricultural real estate. The coefficients of these variables, taken together, indicate an inverse relationship between distance to nearest county seat and agricultural real estate value.

Models of Values of Non-Agricultural Real Estate

A model of values of non-agricultural real estate, based on assessor designations, was estimated for the study area. The specific form for the model is as follows:

$$VPA = a + b_1DOS + b_2SIZ + b_3SRS + b_4RWD + b_5IPA + b_6DNC + b_7SRD$$

Where:

VPA = Value per Acre

DOS = Date of Sale

SIZ = Size of Tract

SRS = Square Root of Size of Tract

IPA = Value of Improvements per Acre

DNC = Distance to the Nearest County Seat

SRD = Square Root of Distance to the Nearest County Seat

Results of model estimation are shown below[3]:

$$VPA = \underset{(.1144)}{5503.2678} + \underset{(.2246)}{63.1136DOS} + \underset{(.0101)}{511.5229SIZ} - \underset{(.0012)}{5129.8731SRS} + \underset{(.0176)}{2738.2269RWD}$$

$$+ \underset{(.0001)}{0.8119IPA} - \underset{(.2760)}{477.0166DNC} + \underset{(.2958)}{2334.8096SRD}$$

$R^2 = .4642$; PR > F = .0001

[3]Numbers appearing in parenthesis represent the observed significance levels of the variables as determined by the "Student-t" values.

Date of sale did not have significant impact on the value of assessor defined non-agricultural real estate in the study area.

Both size of tract and square root of size of tract of assessor defined non-agricultural real estate had significant influences on value. These two variables taken together were inversely related to value.

The dummy variable signifying that a tract of real estate is located inside a rural water district had a significant impact on assessor defined non-agricultural real estate. If an assessor defined non-agricultural tract of real estate in the study area was located inside a rural water district, the value per acre increased by an estimated $2,738.23 per acre.

The value of improvements per acre was a very significant variable in explaining the value per acre for assessor defined non-agricultural real estate in the study area. For every dollar of improvements per acre the value of assessor defined non-agricultural real estate increased by an estimated $0.8119 per acre.

The distance to the nearest county seat in miles did not significantly affect the value per acre of assessor defined non-agricultural real estate in the study area.

Conclusions

Several factors were found to be particularly important in explaining rural real estate values in the study area. These are date of sale, size of tract and value of improvements per acre. Distance to nearest county seat was found to be important in explaining values of agricultural real estate.

The inflation rate in the local real estate market being higher than the inflation rate for the general economy was the important factor measured by the date of sale variable. This phenomenon may be a result of buyers expectations of continuing inflation and their view of real estate as a store of real value.

The greater capital outlays required for the purchase of large tracts of agricultural real estate reduce the number of potential buyers, making size of tract an important variable in determining rural real estate values. Most small tracts of non-agricultural real estate have a higher than average value per acre. The capital required for larger tracts limits the number of potential buyers when large tracts of non-agricultural real estate are placed on the market.

The value of improvements per acre is an important variable in explaining the values of all rural real estate, agricultural real estate and non-agricultural real estate. However, the coefficients for this variable were consistently less than one. There are two plausible explanations for less than unitary coefficients. The first is that the sellers of rural real estate didn't know the real market value of the improvements and sold for less than full value. The second is that the county assessors' estimates of value of improvements may be biased by replacement costs which are greater than market values.

The total relationship between the distance to the nearest county seat and value of rural real estate was significant only in the model of values of agricultural land. This relationship was negative as expected. As the distance from the primary market increased the estimated value of agricultural real estate decreased at a decreasing rate. This phenomenon is consistent with cost theory, assuming that real costs of farming increase as operations are located farther from input and output markets.

Limitations and Future Research Needs

Primary limitations of this study were related to the specification and availability of the data, particularly the lack of consistent reliable data to differentiate agricultural and non-agricultural land uses. A more exact method of separating agricultural and non-agricultural real estate would benefit the analysis of rural real estate values.

Another limitation of the study was the inaccuracy inherent in the method of determining the value of improvements per acre on rural real estate. A study of rural real estate values using a more accurate method of determining the value of improvements per acre would be useful.

An additional weakness in the study relates to the necessity of using tax stamps from warranty deeds to determine the sale prices of real estate. A more accurate method of determining real estate values would have strengthened the analysis herein.

References

[1] Burton, William E. "Analysis of Factors Affecting Rural Real Estate Values in Eastern Oklahoma." Unpublished Thesis, Department of Agricultural Economics, Oklahoma State University, Stillwater, 1981.

[2] Pasour, E.C., Jr. "Real Property Taxes and Farm Real Estate Values: Incidence and Implications." American Journal of Agricultural Economics. 55: 549-556.1973.

[3] Tweeten, Luther G. and James E. Martin. "A Methodology for Predicting U.S. Farm Real Estate Price Variation." Journal of Farm Economics, 48: 378-393. 1966.

[4] U.S. Department of Agriculture. Farm Real Estate Market Developments CD-84, pp 33, Washington, D.C., August, 1979.