

Land Use and Evaluation of Selling Price in Lincoln, Logan, and Payne Counties

By Maddie Morris
Oklahoma State University

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Introduction

Land values and population have been increasing for several years. The market area for Oklahoma has a good demand for livestock grazing, hay crops, small grain crops, passive recreation, and rural home sites. There appears to be an adequate amount of available properties to the open market, along with adequate market information to obtain value. Experienced real estate appraisers have a good understanding of market forces and value elements that influence selling prices of real property in their field of professional practice. However, there is the danger that after years of appraising, complacency sets in and reveals itself with the tendency to replicate trends and adjustments without in-depth analysis. Hence, the professional practitioner may find it necessary to periodically step outside the box of everyday routine and objectively analyze data sets to independently confirm value trends and the significance of value determinants. They may start to notice the trend but gathering data to know exactly by how much each specific attribute is adding to the price may be helpful. Market value is changing over time and it is an appraiser's job to estimate the market value on the tracts they are appraising. Over the past few years, research has been conducted and shown that recreational land is becoming more popular. With population continuing to rise in rural areas. They are also seeing a rise in the desire to be in the great outdoors. Nationally, recreational land is up seven percent, with land values highest for plots near metropolitan areas (ASFMRA). The old saying, "A bad day hunting is better than a good day at work" has likely been murmured by more than one hunter pursuing game in deer woods that are a little too dense with tree cover. Replacing that bad day of hunting with more that are good can be as simple as improving a forest through some strategic tree

removal. Cost-share programs are often available and there is no better time than now to take action. (Johnson) “Farmland is increasingly being converted to recreational use in some areas of the country. Last year's Iowa State Land Valuation conference estimated that out of \$14 billion spent on U.S. farmland in 2003, \$2.5 billion was spent on non-farming recreational use (Kansas Land Values Book 2019).”

There has been research in other states about the recreational land uses increasing land prices. This paper focuses specifically on three counties in Oklahoma (Payne, Logan, and Lincoln) analyzing the price effect of cultivation, pasture, and woodlands. This analysis includes sales from 2016 to 2019.

Hypothesis

The market dynamics can fluctuate over time. This paper analyzes how national trends on the primary land use effects market price in Payne, Logan and Lincoln Counties.

The hypothesis is that the sale price of a tract increases as a function of land use and size of tract. We are validating the assumption that woodland acres used for recreation increase the selling price significantly, hence the average price per acre for these counties.

Methodology

The data collected in this analysis were from Oklahoma AgCredit Appraisal Team. Oklahoma AgCredit serves 60 counties in Oklahoma. The appraisal team consist of 8 people who have gone through American Society of Farm Managers and Rural Appraisers (ASFMRA) to become a certified general appraiser. They collect sales frequently for the 60 counties they provide services to. The counties that have been selected are due to the familiarity and curiosity of what the market is specifically doing in these areas. The data set contains unimproved sales

from Payne, Logan, and Lincoln counties, between the years 2016-2019; excluding the following outliers that have been taken out in order to get an accurate analysis: tracts with improvements, tracts less than 20 acres, primarily wetland sales, mineral rights, and unusually high land sales. The sales selected range from 40 to 1,600 acres in size. The data includes price, price per acre, total acres, county, date it were sold, and the primary land use that was separated into cultivation, pasture, and woodlands. The appraisal team at Oklahoma AgCredit verify that the highest and best use for tracts that are primarily woodlands are considered recreational.

The regression model developed uses the price per acre as the y, dependent, variable to look at the relationship of price per acre for cultivation and pasture tracts to mainly woodland tracts. This can lead to a better indication to evaluate if woodlands/recreational land use is selling for more price per acre. It has been assessed by iterations of a multiple regression using the strongest predictors. The best model was based on 277 sales from the three counties selected. The other variables include cultivation and pasture acres, pasture acres squared, months away from our basis month which is March 2020, and two dummy variables that include Payne and Logan counties.

In this analysis, elements identified in the sale verification process were analyzed for significance, that is the β_i coefficients.

Formula for Regression:

$$\begin{aligned} & \textit{Price Per Acre} (\$) \\ & = \beta_0 + \beta_1 \textit{Cultivation} + \beta_2 \textit{Pasture} + \beta_3 \textit{Pasture squared} \\ & + \beta_4 \textit{Month} + \beta_5 \textit{Payne} + \beta_6 \textit{Logan} \end{aligned}$$

Definitions of Variables:

Cultivation= Number of cultivated acres in the observation. It is considered to be in Good quality upland or bottomland cultivation. This category would consist of Class I - V soils with adequate drainage. Terrain is typically level to gentle sloping with minimal terraces. FSA designated NHE and HEL.

Pasture= Number of pasture acres in the observation. It is considered to be an Average quality improved pasture or good native pasture. This category would consist typically of Class III - Class VI soils. Terrain is typically gentle to moderate sloping. Condition of pasture is considered average management practices.

Woodlands= Number of woodland acres in the observation. It is considered to be Timber areas that include non-harvestable trees and have poor agricultural capabilities. Typically used for passive recreation. The timber can range from hardwood (blackjacks, elms, willows) to cedar trees.

Pasture squared= Number of observation of pasture acres squared. This is to determine the effects on the size of the tract and price per acre. It is predicted that as track size increases, the price per acre will decrease.

Month= Number of months from our basis month and year, March 2020.

Payne= Sales in Payne county.

Logan= Sales in Logan county.

Several tables have been developed to help simplify and understand the data. The data are summarized into various tables to understand more of what the market is doing within Payne, Logan, and Lincoln counties between the years of 2016-19.

Table 1 summarizes the number of sales between 2016 and 2019 by primary land use. Sales with multiple land uses are counted in each type of use. For example, a sale with 20 acres of cropland and 20 acres of pasture would be included in the count for cropland and the count for pasture

Table 1: Count of Sales by Year and Land Use

Year of Sale	Land Descriptions		
	Cultivation	Pasture	Woodlands
2016	3	57	16
2017	5	49	24
2018	1	31	16
2019	5	58	13
Grand Total	14	195	69

Table 2 outlines the average, minimum, and maximum of the variables included in the analysis.

Table 2: Sale Statistics by Land Use

	Average	Minimum	Maximum
Sales Price	\$283,554.43	\$40,000.00	\$3,476,200.00
Price/Acre	\$2,877.57	\$1,101.85	\$8,125.00
Months	27.33	3	50.00
Cultivation (acres)	61.77	11.12	130.00
Pasture (acres)	78.18	2	1,318.68
Woodlands (acres)	37.33	2	264.00

Table 3 Shows the amount of variation within the data by counties and size of tract. There was less variation within the data in Lincoln County and more variation in Logan and Payne counties.

Table 3: Standard Deviation of Price Per Acre by Size and County

Number of Acres	Lincoln	Logan	Payne	Grand Total
above 160	483.61	1341.94	747.13	920.20
between 80 and 160	506.24	1438.90	603.81	963.56
between 40 and 80	460.88	1119.55	1326.45	1172.00
under 40	401.67	1473.33	1553.84	1477.16
Grand Total	493.79	1350.99	1388.82	1154.54

Table 4 summarizes average price per acre of sales by counties (Lincoln, Logan, Payne) and total number of acres. Using the averages of all number of acres, Payne County sales seem to bring a higher price per acre. For all three counties the smaller acre tracts are selling for more than the larger tracts.

Table 4: Average Sale Price Per Acre by Size and County

Number of Acres	Lincoln	Logan	Payne	Grand Total
above 160	\$2,213.19	\$2,636.65	\$2,464.97	\$2,426.32
between 80 and 160	\$2,210.84	\$3,099.79	\$2,475.59	\$2,514.71
between 40 and 80	\$2,175.10	\$3,338.65	\$3,364.87	\$2,897.23
under 40	\$2,622.84	\$3,786.73	\$4,892.09	\$3,540.90
Grand Total	\$2,263.89	\$3,073.79	\$3,220.82	\$2,752.90

Results

In statistical modeling, regression analysis is a set of statistical processes for estimating the relationships between a dependent variable and one or more independent variables. A linear regression provides a powerful device to help identify which variables have impact on the topic of interest. In our results we have found that all the coefficients are statistically significant with a t-statistic above the absolute value of 2. The t-test is greater than two being an absolute value then it is considered statistically significant, meaning it has a direct effect on our y (price per acre). The negative coefficients for cultivation and pasture, one would expect that the price per acre has a negative effect relative to woodland acres. The positive coefficient on the square of pasture simply says that the amount of decline for pasture slows as acreage gets larger.

Woodland acres are expected to have a positive effect on price per acre. In addition, pasture acres when combined with woodland acres are expected to have a negative. Furthermore, cultivation has a larger negative effect on price per acre when combined with woodlands.

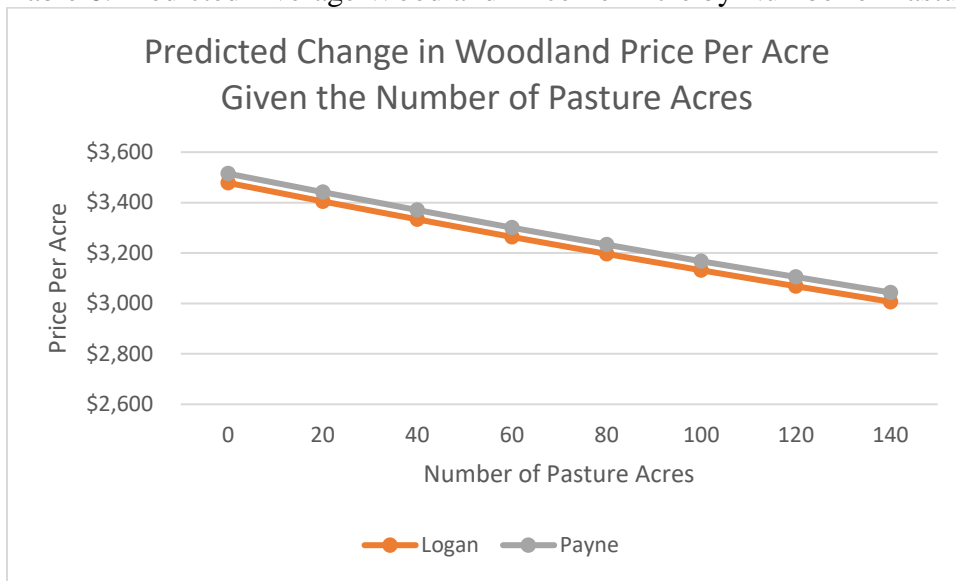
The r-square, t-stat, and f-value all confirm that the model is a good fit for our overall significance (Table 5). The r-squared explains more of the variation in the model. Many regressions were performed to get the most accurate r-square. Regression analysis results show that all the coefficients are statistically significant. The pasture and cultivated acre coefficients are negative relative to the woodland acres, meaning that woodlands acres sell for a higher price per acre than cultivation and pasture acres. The t-test is greater than two being an absolute value then it is considered statistically significant, meaning it has a direct effect on our y (price per acre). The positive coefficient on the square of pasture simply says that the amount of decline for pasture slows as acreage gets larger. The p-value for all the coefficients confirm that we can reject the null hypothesis. In other words, the coefficients are meaningful to the model at a level of significance of .02.

Table 5: Regression Summary Output

R square	0.222	
F-Statistic	12.827	
	<i>Coefficients</i>	<i>t Stat</i>
Intercept	2737.147	16.69721
Cultivation	-9.30852	-2.89067
Pasture	-3.72854	-3.11038
Past. Sq	0.002576	2.441968
Month	-10.0776	-2.2447
Payne	1049.848	7.127999
Logan	1013.099	6.118067

The same trend as in Table 4 applies to the price of woodland acres as the number of pasture acres increases in using the regression model with combined acre tracts. Table 4 shows predicted price of woodland acres with no cultivated acres and increasing pasture acres in Logan and Payne Counties. The change in woodland price per acre ranged from \$73.54 to \$61.18 as pasture land increased from 0 to 140 for both counties.

Table 6: Predicted Average Woodland Price Per Acre by Number of Pasture Acres



Conclusion

The focus of this study was to test the different land uses on price per acre between Cultivation, Pasture, and Woodlands acreages. Since woodland acres are the only land type left out of the analysis, we are making the assumption that woodland acres have a positive effect on price per acre in the market areas as defined (Payne, Logan, and Lincoln Counties). After conducting many tests, it was decided that the most relevant data provided the most accurate analysis was the regression analysis. Using this data, the researchers were able to form the conclusion that tracts that had woodland acreage were typically sold for a higher price per acre

than tracts without woodlands acres. This is because the pasture and cultivated acre coefficients statistically significant and negative relative to the woodland acres.

Due to the rising popularity of recreational activities over recent years, the demand for an escape from the urban life has never been higher. With different cost-share programs offered by the wildlife department paired with recreational land increasing seven percent, there will be a greater demand for recreational tracts in the years to come (ASFMRA). One issue that might arise within the appraisal profession is appraisers not conducting research testing theories that some market areas are rapidly changing in values and become outdated in their methods of reaching their value conclusions. One way to solve this potential issue is to conduct regression analysis as they are simple to conduct with multiple variables from a smaller data set as their might not be many sales in some areas across Oklahoma. It is also helpful to maintain an open dialogue between appraisers in similar specialized areas. With many professionals sharing their findings and discussing trends that they have noticed, the appraisal industry as a whole would be more informed and knowledgeable about the market areas within Oklahoma. This is currently done through ASFMRA, where appraisers around the state gather to meet and talk about such topics throughout the year while also talking ongoing courses required by the state.

Also just for fun and the current economic crash caused by the COVID-19 Virus, it is in the opinion of the researcher that the future of the real estate markets in Oklahoma are unpredictable. Many farmers and ranchers may not be able to cover their expenses due to the fluctuating markets. This could cause more farmers to consider converting their land into recreational tracts by planting trees, creating new ponds, and marketing the tracts with the highest and best use of recreational to get a higher price per acre. After this has set in I think it would be interesting to do another regression analysis in the same way and see how they have

changed. Of course, this regression analysis does not tell us everything but it does clearly show us, with statistical evidence, that woodland acres increases the value per acre more than cultivation and pasture acres within these three counties of study.

Works Cited

“Hunting for Recreational Properties.” *Hunting for Recreational Properties* / CCIM Institute, www.ccim.com/cire-magazine/articles/hunting-recreational-properties/?gmSsoPc=1.

“Kansas Land Values Book 2019.” *Kansas Land Values Book 2019* / *AgManager.info*, 16 Apr. 2020, www.agmanager.info/land-leasing/land-buying-valuing/kansas-land-values-book-2019.

Johnson, Kyle. “Trees, Trees, and More Trees- How Much Is Too Much?” *Oklahoma Wildlife Department*, 2020.

“ASFMRA- Ag News.” *ASFMRA AgNews - April 23, 2019*, 22 Apr. 2019, www.asfmra.org/blogs/asfmra-press/2019/04/22/asfmra-agnews-april-23-2019.

Wild, Martin. “What Drives Land Prices in Your Market?” *ASFMRA*, 2009, www.asfmra.org/resources/asfmra-journal/journal-2009.