Why Has the Price of Pasture Increased Relative to the Price of Cropland?

By Pamela Guiling, Damona Doye and B. Wade Brorsen

Abstract

Historically, cropland rental rates have been substantially higher than rental rates for pasture. Currently however, the gap between selling prices of cropland and pasture in Oklahoma has shrunk in western Oklahoma and pasture now sells for more than cropland in eastern Oklahoma. Regression results show that primarily two factors explain this shrinkage. One is that the explosion in the deer population has increased the value of controlling deer hunting rights; the other is that increases in income have created a demand for land for non-commercial farms and ex-urban development. The income approach has become less useful to land appraisers, which may be due to difficulty in measuring returns from hunting rights and hobby farming.

Introduction

Historically, cropland has sold for more than pasture, but differences between cropland and pasture per acre prices have been shrinking. In Oklahoma, the selling price of pasture is now, on average, higher per acre than cropland (Sahs). This article seeks to explain differences in the value of cropland relative to pasture. Differences in the value of cropland relative to pasture using individual transactions over a 34-year period, which allows analyses that would not be possible with the data used in most studies are examined. Past studies have not looked at why the value of pasture has increased over time relative to cropland.

The eastern half of Oklahoma is predominantly pasture, and the western half has more cropland than pasture, which allows us to analyze various agricultural and non-agricultural factors that impact cropland and pasture prices. Information obtained from this research will enable not only appraisers, but also lenders, producers, realtors and public citizens to understand changes in cropland and pasture prices.

Theory

Economic theory suggests that the value of land is the net present value of future returns. As Morton (1970) notes, capitalization theory has been used to explain the price of land since the time of classical economists such as David Hume, Adam Smith, David Ricardo and J.S. Mill. While other theoretical models have been considered (Barry 1980; Clark, Fulton and Scott 1993; Chavas and Thomas 1999), the capitalization formula is still the most commonly applied:

(1) agricultural land values = expected returns capitalization rate.

Guiling is a budget analyst, Missouri Senate Appropriations Department, Doye is a regents professor and extension economist, and Brorsen is a regents professor and Jean & Pasty Neustadt Chair, Department of Agricultural Economics, Oklahoma State University. This project was supported by the USDA Cooperative State Research, Education & Extension Service, Hatch project OKL02170.

Recent studies focus on analyzing returns from agricultural uses, the urban conversion option value, exurban uses and recreational uses. Equation (1) is the key to understanding why pasture values have increased relative to cropland. Some or all of the four sources of returns must have increased more for pasture than for cropland.

The first possibility is that returns to cattle production have increased relative to crop production. Cattle prices have been high in recent years. But, Oklahoma cropland can easily be used for winter forage production for cattle if it is planted in small grains or a winter perennial such as Jose tall wheatgrass. Furthermore, rental prices of cropland remain above rental prices of pasture (Doye and Sahs, 2007a and 2007b). Thus, while agricultural returns are a possible factor, they do not appear to tell the whole story.

The importance of urban influences have long been recognized (Walter, 1946), but recent evidence suggests that urban effects are increasing in importance. The traditional model of Capozza and Helsley (1989) is that agricultural land values include the value of the option to convert to urban uses at a future date. For many urban conversion uses, such as building a shopping center or high-density housing, cropland might be preferred. Cropland tends to have less slope and therefore construction might require less dirt movement. Also, cropland typically has fewer acres that cannot be used for commercial development. For exurban development or low-density housing, pasture with some mature trees is undoubtedly preferred. Thus, while cropland converted to pasture can have the same agricultural use value as native pasture, it has lower exurban use value than native pasture with trees . As Newburn and Berck (2006) point out, substantial development of rural areas occurs outside of city limits. In this case, someone may buy a quarter section of land and build a house, which is hooked up to a septic system rather than a sewer system. Economies of size are such that a quarter section of land is uneconomical to farm by itself, although farmland could be rented to a current farm operator. But, it is feasible (although perhaps not profitable) to manage a small cow herd or graze a few steers on 160 acres. Since 2002, the size of small farms (those with less than $10,000 in sales) has decreased (Brown 2007). Thus, if someone wants to build a house and farm part-time, cattle and therefore pasture are much more practical than cropland. In addition, pasture provides more scenic benefits.

The final source of returns is recreation. In Oklahoma, the main recreational use of agricultural land is deer hunting. Deer hunting is a non-exclusive use, since owners can graze (or farm) land and hunt on it as well. The monoculture typical of most cropland does not provide the year-round forage necessary for white-tailed deer (Masters, Bidwell and Shaw). In addition, deer require a small amount of woody cover. Pasture will clearly produce more deer than will cropland. In the 1970s, deer numbers and harvest were small, but Oklahoma now has large numbers of deer, and deer hunting is now more popular than ever (Oklahoma Department of Wildlife Conservation, 2006). The increase in importance of deer hunting could explain the increase in the value of pasture relative to cropland.

Farm income can come from crops, livestock, government payments and rent. Leistritz, Wiedrich and Vreugdenhil (1985) include expected gross income from crops while Awokuse and Duke (2004) include net returns in their studies. Flanders, White and Escalante (2004) find that cash rents are not a significant factor in determining cropland or pasture values in Georgia.

Government payment variables in models have yielded mixed results. Janssen and Button (2004) find government payments are influential for South Dakota cropland values and rents; however, land productivity has a larger effect than government payments due to policy changes in farm programs. Flanders, White and Escalante (2004) find that government payments influence Georgia cropland values and crop rents, but have less effect on pasture values and rents as pasture land has not historically been a part of farm programs. Henderson and Moore (2005) include government payments in their study and find the variable insignificant in explaining Texas farmland values, explained by including a crop receipts variable causing collinearity. We include government payments and crop returns, but crop returns are calculated in a way that does not include government payments, therefore reducing collinearity.

Other agricultural factors such as land improvements and tract size have been common variables (Bastian et al., 2002, Huang et al., 2006, Henderson and Moore, 2005, Falk and Lee, 1998, Moss, 1997, Burt, 1986, Flanders, White and Escalante, 2004). Leistritz, Wiedrich and Vreugdenhil (1985), Blasé and Hesemann (1973), and McLaren, Henning and Vandeveer (2004) include cropland and pasture acres or production as a variable.

To capture urban influences on land values, variables such as per capita income, population density, population growth and/or distance to urban areas are used by Bastian et al. (2002), Henderson and Moore

(2005), Huang et al. (2006), Blasé and Hesemann (1973), McLaren, Henning and Vandeveer (2004) and Herdt and Cochrane (1966) to determine possible urban effects on agricultural land values.

Recreational variables in studies have included hunting lease rates, deer density, recreational income from agricultural uses and acres of elk habitat (Bastian et al., 2002; Henderson and Moore 2006). Bastian et al. (2002) find competing market activities are causing agricultural land to be demanded by different input markets with recreational purposes significant. Henderson and Moore (2005) find agricultural land values in Texas are higher in areas with high hunting lease rates and recreational income.

Many studies have relied solely on surveys, whereas others have used census and USDA survey data for the dependent and some independent variables (Flanders, White and Escalante 2004; Henderson and Moore 2005; Janssen and Button 2004; Leistritz, Wiedrich and Vreugdenhil 1985; Blasé and Hesemann 1973; McLaren, Henning and Vandeveer 2004; Burt 1986). One exception is Huang et al. (2006), who obtained land sales information from transfer declarations data filed with the Illinois Department of Revenue and aggregated prices to the county level.

This study uses actual sales transaction data with sales price per acre calculated by dividing parcel sales value by the number of acres in the parcel. It further explores changes in cropland and pasture prices by addressing structural changes over time.

Procedures

Multiple regression analysis was used to model agricultural land prices as a function of land characteristics, namely factors associated with agriculture, recreational and exurban use values. Separate models are estimated for western and eastern regions of Oklahoma.

Land use variables include percent of cropland (*PCROP*), percent of irrigated cropland (*PIRRIG*) and percent of other land which includes timber, waste, water and recreational acres (*POTHER*). Annual averages by county for rainfall (*RAIN*), deer harvest (*DEER*), per capita income (*INCOME*) and population density (*POPDENSITY*) are also included. Interaction terms are included for crop returns for dryland with percent of cropland (*RETC*), crop returns for irrigated land with percent of irrigated cropland (*RETI*) and government payments with percent of cropland (*GOVC*) and percent of irrigated cropland (*GOVI*). Interaction terms are also included for percent of cropland plus percent of irrigated cropland with cattle prices (*CATTLECI*), deer harvest (*DEERCI*), per capita income (*INCOMECI*) and population density (*POPDENCI*). Dummy variables for year are included to avoid the difficulty of trying to explain movement of land prices over time, which has proven to be so difficult in past research (Falk and Lee). The model is

$$\begin{aligned} y_{itp} = {} & \beta_{oit} + \beta_{1t} ACRES_{itp} + \beta_{2t} ACRES_{itp}^2 + \beta_{3t} PCROP_{itp} + \beta_{4t} PIRRIG_{itp} + \\ & \beta_{5t} POTHER_{itp} + \beta_{6t} RETC_{itp} + \beta_{7t} RETI_{it} + \beta_{8t} GOVC_{it} + \beta_{9t} GOVI_{it} + \\ & \beta_{10t} CATTLECI_t + \beta_{11t} RAIN_t + \beta_{12t} DEER_{it} + \beta_{13t} DEERCI_{it} + \beta_{14t} INCOME_{it} + \\ & \beta_{15t} INCOMECI_{it} + \beta_{16t} POPDENSITY_{it} + \beta_{17t} POPDENCI_{it} + \varepsilon_{itp}, \end{aligned} \tag{2}$$

where the dependent variable y is agricultural land price per acre, i represents individual county, t is time period and p is parcel of land.

Data

Farm Credit Services offices in Oklahoma have collected land sales data for all 77 counties in Oklahoma since 1972. The multi-level data set (1972 to 2005) includes both county-level data and parcel characteristics including tract sales price, total acres of the transaction, county location, sales date and land use (pasture, cropland, timber, waste, irrigated cropland, recreational land use and areas of water). A four-year moving average is used for crop returns, government payments and cattle prices; hence, estimation uses only land price data from 1974 to 2005.

Parcels expected to have a large, urban option conversion value are eliminated. Data from Tulsa and Oklahoma counties are removed as they are almost exclusively urban areas. Also, data on parcels within 15 miles of Oklahoma's 12 largest urban areas are excluded.

Given the focus on agricultural land, the data set used to estimate the models is restricted to tracts containing eighty or more acres since smaller tracts are more often used for non-agricultural purposes. A maximum sales price of $3,000 per acre is set to exclude observations presumed to be non-agricultural tracts. A minimum sales price of $50 per acre is specified because prices that are too low may represent transactions among related individuals below market value.

Land use variables are specified as a percentage of total acres. The value for improvement contribution is subtracted from net sales price to account for house, building and other improvement values. Acres used by improvements are also deducted in calculating price per acre. The acres in each land use are recorded by Farm Credit Services appraisers. Appraisers used many different phrases to describe land use. We used the appraiser's description as well as available information about the crop grown on the land to classify the land use into the broad categories of irrigated cropland, dryland cropland, pasture and other. Pasture included land with permanent perennial forages such as native pasture, fescue or bermudagrass. Cropland included land harvested for crops such as wheat, corn, cotton, etc., but also included land in forages such as alfalfa, Jose tall wheatgrass or ryegrass that was used for haying or grazing but could easily be returned to producing a crop such as wheat. Our method of differentiating between cropland and pasture is consistent with USDA ERS (2008). They, however, classify land with more than ten percent trees as forest land. Given the relatively small amount of land that appraisers classified as timber, we expect that the USDA ERS definitions would classify some of our pasture as forested land.

Land sales data contain a legal description that includes section, township and range. Legal descriptions are linked to their geographic location using Arc View 3.2 shape files from the Oklahoma Natural Resources and Conservation Services (NRCS 2006) version of the Public Land Survey System (PLSS).

Distances are measured from the center of the sales transaction legal description to the closest urban center using the most direct route along a network road system so that parcels within fifteen miles of one of the twelve largest urban areas could be removed. The state is partitioned into two regions, eastern and western, where the eastern region is mostly pasture and the western has more cropland than pasture.

Cattle prices are from various issues of USDA ERS Red Meats Yearbook for 1972-2005. Cattle prices used are the annual average of weekly cattle prices for 600-700 pound steers.

The data to calculate crop returns above operating costs (excluding government payments) are from USDA NASS (2007), USDA (2002), USDA FSA (2007) - Oklahoma and Oklahoma State University (OSU 2007) enterprise budget data. Crop returns are the product of county production by commodity for each year from 1971 to 2005 (USDA NASS, 2007) and the higher of a county crop price or the loan rate (where applicable). County crop price for a given year is the product of state average price (USDA NASS, 2007) and the ratio of county loan rate to national loan rate (FSA, 2007) for all commodities except cotton and peanuts. County loan rates for cotton are from Plains Cotton Cooperative Association (2007) and county peanut loan rates are from The Clint William's Company (2007). Average crop revenue per acre is crop revenue value for the county divided by total harvested acres.

Annual per-acre costs of production for years without data were projected using the prices paid index (Brown, 2007). Net returns above operating costs per acre are crop revenue per harvested acre minus per-acre operating cost of production (OSU 2007).

The per-acre net returns above operating cost for dryland and irrigated cropland are weighted separately by total number of harvested acres for each commodity in each county for each year (USDA NASS 2007). Commodities included in this calculation are dryland barley, alfalfa hay, soybeans, grain sorghum, wheat and oats plus non-irrigated and irrigated cotton, corn and peanuts.

Total population estimates by county, total per capita income and total government payments, in thousands of dollars, by county 1972-2005 are from Bureau of Economic Analysis (U.S. Department of Commerce 2006). Population density is county population (U.S. Census Bureau 2006) divided by total county acres. Government payments are divided by base acres for all program commodities.

Deer harvest data are from Oklahoma Department of Wildlife Conservation (2006) and include total number of deer harvested for 1972-2005 by county. Deer harvest is divided by total county acres to obtain a measure of potential returns per acre. Average annual rainfall for each county over the study period is calculated using data from Oklahoma Climatological Survey (2006). Descriptive statistics for variables are given in Table 1.

Results

The two estimated regression models are in Table 2. Most, but not all coefficients have expected signs and are statistically significant.

The model is expected to show regional differences with the western region reflecting a premium for cropland and the eastern region reflecting a premium for pasture. In Table 2, the percent of cropland coefficient (*PCROP*) for the western region is indeed considerably larger than for the eastern region. But, individual coefficients are not the key since interaction terms are included. The interaction terms allow the premium for cropland relative to pasture to change over time and space.

Figures 1 and 2 are graphs of estimated cropland and pasture prices per acre over time. Cropland prices per acre, for example, are obtained by setting the percentage of cropland to one, the percentage of other land types to zero and setting all other variables to their statewide mean for each year. This is done for cropland and pasture for each region. The western region shows a premium for cropland for the entire period (Figure 1). However, the gap between cropland and pasture prices has slowly been narrowing. In 2005, the difference between the two was only $109 per acre. The eastern region reflects a premium for pasture for the last ten years (Figure 2). The interaction terms in the regression equation are the key to testing hypotheses about why pasture prices have increased relative to cropland.

For the western region, crop returns interacted with irrigated land (*RETI*) is negative and significant, and crop returns interaction with cropland (*RETC*), while negative, is not significant. Crop returns interaction with percent of cropland (*RETC*) for the eastern region is positive and significant while crop returns interaction with percent of irrigated land (*RETI*) is insignificant. The negative sign and insignificance of interaction terms for crop returns are unexpected. Error checks (comparisons of net return calculations to NASS statistics) are conducted to ensure accuracy of crop returns calculations. The problem is that changes in crop returns are not closely correlated with the rise in pasture prices relative to cropland prices.

Government payment interaction terms with percent of cropland (*GOVC*) and irrigated cropland (*GOVI*) are insignificant in the eastern region, but are significant in the western region. The eastern region does not receive as many government payments due to most land being in pasture, which helps explain the results. The cattle prices interaction term (*CATTLECI*) is positive and significant for the western region. In Oklahoma, most cropland is planted to wheat, which is grazed during winter, and thus high cattle prices may increase cropland values more than pasture. Also, the value of cropland is mostly agricultural value while pasture has more recreational and urban use value.

Population density (*POPDENSITY*) and its interaction term are (*POPDENCI*) positive and significant. Income (*INCOME*) and its interaction term (*INCOMECI*) are only significant for the western region. Interaction terms for income and population density are only significant for the western region. The deer interaction term (*DEERCI*), is negative and significant for both eastern and western Oklahoma. The negative sign is expected since hunting takes place more often on pasture than cropland or irrigated cropland.

To determine which interaction terms have the largest effects, the interaction terms are multiplied by the change in the explanatory variable from 1975 to 2005. For example, in the eastern region, deer density increased from 0.03 to 0.31. This increase of .28 multiplied times the coefficient of -915.59 for *DEERCI* shows that pasture increased $258 per acre more than cropland due to the increase in deer density. For the eastern region, the effect of deer density dominates all of the other interaction terms. For the western region, per capita income is responsible for $314 and deer for only $90 with all other effects being smaller. The effect of deer density in the west is smaller due to deer density in the west being only about half of what it is in the east. The effect of the increase in income reflects exurban development. In the east, many farms were already small at the beginning of the observation period and exurban development had already occurred. This fact explains why little premium of cropland relative to pasture was already present. The west has less pasture, and as income increases, the demand for pasture increases. This result is reflected in the increase in pasture values relative to cropland values.

Conclusion

The purpose of this study is to explain relative differences in cropland and pasture values for Oklahoma over a 34-year time period. Our results indicate an increase in pasture prices relative to cropland prices when adjusted for agricultural, recreational and urban influences for both eastern and western Oklahoma. In eastern Oklahoma, the major driver of increasing pasture values is the increasing deer herd. In western Oklahoma, deer are still a major factor, but growth of per capita income is even more important. This growth in income reflects increasing demand for exurban development. This result shows that value of pasture reflects greater recreational and exurban use values than does the value of cropland. This result may explain why appraisers now put little weight on the income approach to appraising agricultural land. The value of pasture depends on income from recreational and exurban uses that are difficult to measure.

References

Awokuse, T. O., & Duke, J. M. (2004, August). *The Causal Structure of Land Price Determinants*. Selected Paper. AAEA annual meeting, Denver, CO.

Barry, P. J. (1980, August). Capital asset pricing and farm real estate. *American Journal of Agricultural Economics, 62 (3*), 549-553.

Bastian, C. T., McLeod, D. M., Germino, M. J., Reiners, W. A., & Blasko, B. J. (2002, November). Environmental amenities and agricultural land values: A hedonic model using geographic information systems data. *Ecological Economics, 40*, 337-349.

Blasé, M. G., & Hesemann, C. (1973, July). Farm land prices: Explainable or illogical. *Southern Journal of Agricultural Economics, 5(1)*, 265-268.

Brown, J. (2007). Personal contact. USDA NASS.

Burt, Oscar R. (1986, February). Econometric modeling of the capitalization formula for farmland prices. *American Journal of Agricultural Economics, 68(1)*, 10-26.

Capozza, D. R., & Helsley, R. W. (1989). The fundamentals of land prices and urban growth. *Journal of Urban Economics 26*, 295-306.

Chavas, J. P., & Thomas, A. (1999, November). A dynamic analysis of land prices. *American Journal of Agricultural Economics, 81(4)*, 772-784.

Clark, J. S., Fulton, M., & Scott, J. T., Jr. (1993, February). The inconsistency of land values, land rents, and capitalization formulas. *American Journal of Agricultural Economics February, 75(1)*, 147-155.

Doye, D., & Sahs, R. (2007a). Oklahoma cropland rental rates: 2006-07. Oklahoma State University CR-230.

Doye, D., & Sahs, R. (2007b). Oklahoma pasture rental rates: 2006-07. Oklahoma State University CR-216.

Falk, B., & Bong-Soo, L. (1998, November). Fads versus fundamentals in farmland prices. *American Journal of Agricultural Economics November, 80(4)*, 696-707.

Flanders, A., White, F. C., & Escalante, C. L. (2004, February 14-18). *Comparing land values and capitalization of cash rents for cropland and pasture in Georgia*. SAEA Selected Paper. Annual Meeting, Tulsa OK.

Henderson, J., & Moore, S. (2005). *The impact of wildlife recreation on farmland values*. Working paper. The Federal Reserve Bank of Kansas City, Economic Research Department.

Herdt, R. W., & Cochrane, W. W. (1966, May). Farm land prices and farm technological advance. *Journal of Farm Economics 48(2)*, 243-263.

Huang, H., Miller, G. Y., Sherrick, B. J., & Gomez, M. I. (2006, May). Factors influencing Illinois farmland values. *American Journal of Agricultural Economics, 88(2)*, 458-470.

Janssen, L., & Button, B. (2004, August 1-4). *Impacts of federal farm program payments on cropland values and rental rates: Evidence from county-level data in South Dakota*. Selected Paper. AAEA annual meeting, Denver CO.

Leistritz, L. F., Wiedrich, G. D., & Vreugdenhil, H. G. (1985, December). Effects of energy development on agricultural land values. *Western Journal of Agricultural Economics, 10(2)*, 204-215.

Masters, R. E., Bidwell, T. G., & Shaw, M. G. (2005). *White-tailed deer habitat evaluation and management guide*. Extension Circular E-979. Coop. Ext. Serv., Okla. State Univ., Stillwater, Available at http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-2971/E-979web.pdf.

McLaren, R. S., Henning, S. A., & Vandeveer, L. R. (2004, February 15-18). *Marginal effects of land characteristics and purchase factors on rural land values*. Selected Paper. SAEA Annual Meeting, Tulsa OK.

Morton, W. A. (1970). The investor capitalization theory of the cost of equity capital. *Land Economics 46(3)*, 248-263.

Moss, C. B. (1997, November). Returns, interest rates, and inflation: How they explain changes in farmland values. *American Journal of Agricultural Economics, 79(4)*, 1311-1318.

Newburn, D. A., & Berck, P. (2006, July 23-26). *Modeling suburban and rural-residential development beyond the urban fringe*. Selected Paper. AAEA Annual Meeting, Long Beach, California.

Oklahoma Climatological Survey. Retrieved June, 2006, from http://climate.ocs.ou.edu/normals_extremes.html (Rainfall data).

Oklahoma Department of Wildlife Conservation (2006). Retrieved June, 2006, from http://www.wildlifedepartment.com/deerharvesttotals.htm, (Deer harvest).

Oklahoma State University (OSU). Enterprise Budgets. Retrieved February, 2007, from http://agecon.okstate.edu/budgets.

Plains Cotton Cooperative Association (2007). Personal contact, Jay Cowert. County loan rates for cotton.

Sahs, R. Oklahoma Agricultural Land Values. Retrieved March, 2008, from http://agecon.okstate.edu/oklandvalues/chart.asp?id=statewide.

The Clint William's Company (2007, February). Personal Contact: Larry Vance, Peanut county loan rates.

U.S. Census Bureau. Retrieved June, 2006, from http://www.census.gov.

U.S. Department of Commerce, Bureau of Economic Analysis. Retrieved June, 2006, from http://www.bea.gov/bea/regional/reis/drill.cfm.

United States Department of Agriculture (USDA) (2002). Agricultural Census.

United States Department of Agriculture Farm Service Agency (USDA FCS) (2007). Oklahoma state office. Base acres by county and county loan rates. Unpublished data.

United States Department of Agriculture Economic Research Service (USDA ERS). Major Land Uses: Glossary. Retrieved December, 2008, from http://www.ers.usda.gov/data/majorlanduses/glossary.htm.

United States Department of Agriculture, Economic Research Service (USDA ERS). *Red Meats Yearbook (1970-2005)*. Various issues.

United States Department of Agriculture, National Agricultural Statistics Service (USDA NASS) (2007). Retrieved January, 2007, from http://www.nass.usda.gov/Statistics_by_State/Oklahoma/index.asp.

United States Department of Agriculture Natural Resources and Conservation Services (USDA NRCS) (2006). Oklahoma state office. State legal descriptions. Unpublished data.

Walter, G.H. (1946, May 22). Non-agricultural factors in land prices. *The Journal of Land and Public Utility Economics (2)*,173-176.

Table 1. Variable names and descriptive statistics

		Western Oklahoma		Eastern Oklahoma	
Variable	Units	Mean	SD	Mean	SD
Land sales price (*PERACRE)*	$/a	540.9	329.4	541.6	319.8
Total deeded acres (*ACRES*)	a	217.1	382.2	298.2	820.4
Crop acres (*PCROP*)	%	49.1	37.8	8.7	22.5
Irrigated crop acres (*PIRRIG*)	%	1.98	12.6	0.06	2.1
Pasture acres (*PPAST*)	%	46.8	38.2	83.9	28.4
Rain (*RAIN*)	in	30.1	5.38	43.6	4.63
Deer harvest/county acres (*DEER*)	deer/100a	0.07	0.07	0.19	0.15
Per capita income/county (*INCOME*)	$1,000/person	14.3	6.05	13.1	5.42
Population density (*POPDENSITY*)	#/100a	4.3	5.29	5.0	3.59
Crop returns (dryland)	$/a	66.90	72.67	80.61	46.61
Crop returns (irrigated)	$/a	151.08	175.68	100.22	133.52
Government payments	$1,000/base a	0.028	0.018	0.084	0.202

Table 2. Regression estimates for western and eastern regions of Oklahoma

Dependent Variable:	Land price per acre	
Variable	**Western Oklahoma**	**Eastern Oklahoma**
INTERCEPT	-88.79	562.90***
	(126.08)	(175.9)
ACRES/100	-10.2289***	-6.0212***
	(0.7417)	(0.4029)
$(ACRES/100)^2$	0.08014***	0.02216***
	(0.007808)	(0.002244)
PCROP	465.44***	81.2373
	(21.4121)	(58.9343)
PIRRIG	658.59***	132.42
	(32.5397)	(322.27)
POTHER	104.48***	-257.59***
	(20.6104)	(12.9805)
RAIN	12.2899***	5.4045
	(3.7644)	(3.5672)
RETI	-0.1906**	1.129
	(0.07629)	(1.372)
RETC	-0.08509	1.117***
	(0.06221)	(0.3318)
GOVI	3219.22***	9762.48
	(744.94)	(7335.28)
GOVC	-1257.36***	-39.6252
	(353.08)	(254.26)
CATTLECI	1.3063***	1.3898
	(0.4428)	(0.9819)
DEER	-183.54***	43.96
	(67.43)	(3954.35)
DEERCI	-553.92***	-915.59***
	(80.28)	(109.39)
INCOME	16.67***	0.316
	(1.660)	(3.376)
INCOMECI	-16.09***	0.091
	(0.001.622)	(3.825)
POPDENSITY	17.30***	40.96***
	(1.42)	(3.30)
POPDENCI	7.88***	4.31**
	(0.91)	(2.42)
1974	-228.19***	-649.33***
	(34.67)	(62.1975)
1975	-203.79***	-640.14***
	(34.1624)	(61.272)

Table 2. Regression estimates for western and eastern regions of Oklahoma (continued)

Dependent Variable:	Land price per acre	
Variable	**Western Oklahoma**	**Eastern Oklahoma**
1976	-162.24***	-645.95***
	(33.9471)	(59.9556)
1977	-144.49***	-580.15***
	(34.1041)	(58.9491)
1978	-80.5632**	-528.15***
	(32.4652)	(56.957)
1979	11.8661	-489.89***
	(29.332)	(54.2661)
1980	103.22***	-439.13***
	(28.8199)	(51.8011
1981	155.27***	-412.24***
	(26.5842)	(48.7196)
1982	80.4241***	-411.67***
	(25.3014)	(47.4371)
1983	-5.8308	-429.45***
	(25.9751)	(46.8239)
1984	-81.6188***	-438.55***
	(24.6109)	(44.4331)
1985	-224.94***	-543.75***
	(23.7775)	(43.0085)
1986	-327.64***	-606.05***
	(23.8935)	(42.1262)
1987	-350.96***	-672.57***
	(23.6306)	(41.8874)
1988	-342.19***	-676.96***
	(22.4309)	(39.4115)
1989	-307.8***	-672.78***
	(21.2261)	(36.6082)
1990	-302.83***	-658.32***
	(19.4912)	(34.4381)
1991	-332.39***	-647.42***
	(19.5626)	(32.8169)
1992	-301.78***	-627.94***
	(18.5865)	(30.679)
1993	-287.75***	-606.85***
	(17.7265)	(29.5527)
1994	-290.76***	-571.05***
	(17.7434)	(28.1092)

Table 2. Regression estimates for western and eastern regions of Oklahoma (continued)

Dependent Variable:	**Land price per acre**	
Variable	**Western Oklahoma**	**Eastern Oklahoma**
1995	-286.99***	-604.91***
	(21.6894)	(62.2276)
1996	-279.21***	-514.21***
	(19.7045)	(30.0138)
1997	-280.06***	-513.25***
	(16.4633)	(23.4556)
1998	-254.24***	-435.61***
	(16.3724)	(21.8101)
1999	-257.16***	-417.0***
	(15.7095)	(19.8507)
2000	-221.67***	-351.36***
	(14.3658)	(16.9952)
2001	-194.64***	-325.98***
	(15.3053)	(16.2416)
2002	-190.08***	-253.8***
	(15.0929)	(15.8251)
2003	-155.56***	-218.72***
	(13.9114)	(15.2477)
2004	-85.3736***	-133.77***
	(14.0034)	(14.2579)

*denotes significance levels: *** 1% probability, ** 5% probability, * 10% probability

Figure 1. Cropland and pasture price per acre for western Oklahoma

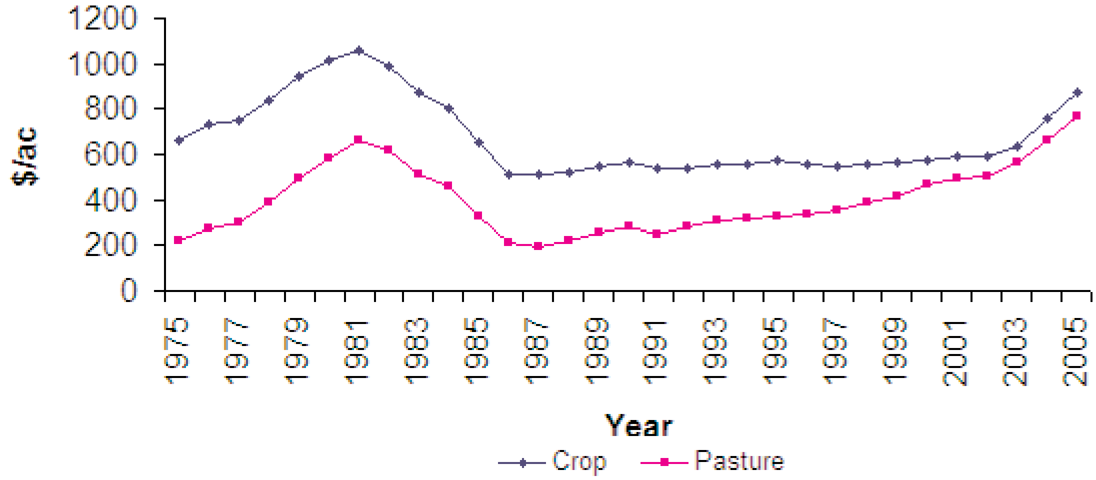

Figure 2. Cropland and pasture price per acre for eastern Oklahoma