How Much Influence Does Recreation Have on Agricultural Land Values?

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Introduction

Agricultural land has many uses, including agricultural production, recreation and potentially urban conversion. In some areas, the primary value of agricultural land is its potential to be converted to commercial or residential uses. While it is known that agricultural land prices have generally increased over time, the determining factors contributing to the increases are less well known. Land prices in rural Oklahoma are reportedly increasing at dramatic rates, even in areas of low agricultural productivity. Demand for land for recreational uses and "ranchettes," rather than farm or ranch expansion, may be driving forces. Agricultural producers question whether selling property and relocating would help them capture appreciation in land values in a local market and lower their opportunity cost on the land investment. It is not known how widespread land price appreciation has been within the state nor is it known what factors are most important in different geographic regions.

Recreational opportunities such as hunting, fishing, bird watching and photography are varied in Oklahoma because of the quantity and diversity of natural resources. Utilizing farmland for recreational purposes may be no more than allowing hunters to hunt on the same tract that cattle graze, resulting in two income streams, one from the hunting lease and the other from the cattle. An agricultural credit survey of bankers in the Kansas City District found a 10 percent increase in recreational demand for agricultural land in 2003; investment and recreation were the top two reasons for agricultural land purchases in 2002 and 2003 (Henderson and Novack, 2005).

Analysis of agricultural land prices is important because rates of change are not uniform and prices are impacted by different factors in different geographic regions. While it is important to understand why land prices have changed historically, it is also important to understand how the prices are changing today and what factors are affecting current prices. The information obtained from this research will enable not only producers, but also lenders, appraisers, realtors, and public citizens to understand the relevance of recreational uses on agricultural land values. This study determines the relative importance of agricultural, recreational, and urban conversion values in determining Oklahoma land prices. The relative importance of factors on cropland and pasture prices is considered. Hedonic regression models are estimated using land price sales data.

Theory

Historically, U.S. land prices have increased with a few dips in the 1930s and 1980s (Colyer, 2004). In January 2006, the average U.S. farmland price, including land and buildings, was $1,900 per acre (Williams and Hintzman, 2006). The U.S. average for cropland values increased 13 percent from the prior year to $2,390 per acre while Oklahoma crorpland averaged $891 per acre, a 5.3 percent increase from 2005. The U.S. and Oklahoma pasture values increased 22 and 18.8 percent, respectively, to $1,000 and $760 per acre. Although cropland values are higher than pasture values, recent historical data clearly shows a gain in pasture values over cropland values.

Economic theory suggests that the value of land is derived from the net present value of future returns. Various theories have been used to explain agricultural land values, the most common being the capital asset pricing theory and the capitalization formula. The capitalization formula as stated in Moss is:

(1) agricultural land values = returns/discount rate.

The returns can be from agricultural uses, recreational uses or from urban conversion.

Most previous studies have focused on agricultural returns to land and while these returns are still significant, the returns from recreation and urban conversion are increasing.

While other theoretical models have been considered, the capitalization formula is still most commonly considered. Studies such as Barry (1980) and Chavas (1999) for ecample, approached agricultural land value research with a Capital Asset Pricing Model (CAPM). Clark (1993) argued that rational bubbles, risk aversion, and shifts in policy should be incorporated.

The importance of nonagricultural values has long been recongnized. Walter (1946) noted that differences in the capitalization rate on various properties might be from non-agricultural or non-income producing activities. Bastian (2002) suggests that competing market activities are causing agricultural land to be demanded by different input markets. Henderson and Moore (2005) as well as Bastian (2002) found recreational purposes to be significant. Henderson and Moore (2005) conducted a study on the capitalization of wildlife recreation income derived from hunting lease rates on agricultural land. Their study found that agricultural land values increased with higher income per acre from farming uses and urbanization effects. Agricultural land values were higher where hunting lease rates and recreation income was higher, concluding that recreation is impacting land values (Henderson and Moore, 2005). Henderson and Novack (2005) found that rising farm incomes and non-farm purposes supported the demand for agricultural land for recreational uses. The article describes a widening effect between the two, with cropland cash rents increasing 15 percent and cropland values increasing 32 percent in a seven year time period.

Agricultural factors such as soil productivity, land productivity, land improvements, tract size, cash rents, per capital income, government payments, interest rates, and farm income were also common variables (Bastian, 2002, Huang et al., 2006, Henderson and Moore, 2005, Falk, 1998, Moss, 1997, Burt, 1986, Flanders, 2004). Other variables such as population density, population growth, and distance to urban areas are used by Bastian (2002), Henderson and Moore (2005) and Huang et al. (2006) to determine possible effects on agricultural land values. Recreation variables include hunting lease rates, deer density, recreational income from agricultural uses, and acres of elk habitat (Bastian, 2002, Henderson and Moore, 2005). Bastian (2002), Falk (1998), Moss (1997), Burt (1986), and Flanders (2004) use time series data for land price per acre; Huang et al. (2006) and Henderson and Moore (2005) use cross sectional data.

This study further explores the importance of returns from nonagricultural purposes in determining land values. Hedonic regressions are used as in most past studies. But, we include variables to explain agricultural land values with potential returns deriving from agriculture, recreation, and urban sprawl. Total deer density and recreational income from agricultural uses account for the effect of recreational returns on land value while population density, population growth, and per capita income account for the urban effect.

Procedures

The hedonic pricing model used in this research specifies the agricultural land prices as a function of the land characteristics. The multi-level data set includes both county-level data and characteristics of the parcel. Three models are estimated with each having successively more explanatory variables. The first model includes the land use acreages and rainfall plus a dummy variable for year and random effects for the county variable and thus only considers agricultural values. The second model adds recreation income, deer density, population and income variables that measure potential returns from nonagricultural uses. The third model lets the nonagricultural variables have different effects on pasture land and cropland. All models use 2001 to 2005 data. The first model is

$$y_{itp} = \beta_{ot} + \beta_{1t}ACRES_{itp} + \beta_{2t}ACRES2_{itp} + \beta_{3t}PCROP_{itp} + \beta_{4t}PPAST_{itp} + \beta_{5t}PIRRIG_{itp} + \beta_{6t}PTIMBER_{itp} + \beta_{7t}PWASTE_{itp} + \beta_{8t}PRECREATION_{itp} + \beta_{9t}PWATER_{itp} + \beta_{8t}RAIN_{it} + \varepsilon_{itp} \quad (1)$$

where the dependent variable y is the agricultural land price per acre, i represents the individual county, t is the time period, and p is the parcel of land. The explanatory variables are defined in Table 1. This model provides estimates of statewide average land price per acre adjusted only for parcel size and rainfall.

The model with additional variables is

$$y_{itp} = \beta_{ot} + \beta_{1t}ACRES_{itp} + \beta_{2t}ACRES2_{itp} + \beta_{3t}PCROP_{itp} + \beta_{4t}PPAST_{itp} + \beta_{5t}PIRRIG_{itp} + \beta_{6t}PTIMBER_{itp} + \beta_{7t}PWASTE_{itp} + \beta_{8t}PRECREATION_{itp} + \beta_{9t}PWATER_{itp} + \beta_{10t}RAIN_{it} + \beta_{11t}RECINCOME_{it} + \beta_{12t}INCOME_{it} + \beta_{13t}POPDENSITY_{it} + \beta_{14t}POPGROWTH_{it} + \beta_{15t}DEER_{it} + \varepsilon_{itp}. \quad (2)$$

The last model includes all the previously defined variables and adds interaction terms. Interaction terms include recreation income, deer density, population density, population growth, and income, which were all interacted with percentage of pasture acres and also percentage of crop acres. The livestock cattle price variable was interacted with the percentage of pasture acres. The crop returns variable was interacted with the percent of crop acres. The third model lets characteristics such as deer density have different effects on cropland and pasture prices

$$y_{itp} = \beta_{ot} + \beta_{1t}ACRES_{itp} + \beta_{2t}ACRES2_{itp} + \beta_{3t}PCROP_{itp} + \beta_{4t}PPAST_{itp} + \beta_{5t}PIRRIG_{itp} + \beta_{6t}PTIMBER_{itp} + \beta_{7t}PWASTE_{itp} + \beta_{8t}PRECREATION_{itp} + \beta_{9t}PWATER_{itp} + \beta_{10t}RAIN_{it} + \beta_{11t}CROPINT_{it} + \beta_{12t}LIVEPRICESINT_{it} + \beta_{13t}DEERINTC_{it} + \beta_{14t}DEERINTP_{it} + \beta_{15t}RECINTC_{it} + \beta_{16t}RECINTP_{it} + \beta_{17t}RECINCOME_{it} + \beta_{18t}INCOMEC_{it} + \beta_{19t}INCOMEP_{it} + \beta_{20t}INCOME_{it} + \beta_{21t}POPDENC_{it} + \beta_{22t}POPDENP_{it} + \beta_{23t}POPDENSITY_{it} + \beta_{24t}POPGROWTHC_{it} + \beta_{25t}POPGROWTHP_{it} + \beta_{26t}POPGROWTH_{it} + \varepsilon_{itp}. \quad (3)$$

The full data set plus two subsets of the data set are used to estimate the three models: all acres, less than eighty acres and greater than or equal to eighty acres. Misspecification tests were conducted to test for normality and outliers. Plots of the residuals showed a number of outliers.

Many of the outliers on land value per acre were in Tulsa and Oklahoma counties and so all data from these counties were deleted due to their urban influence. A maximum of $3,000 per acre was set to exclude observations presumed to be non-agricultural tracts. A minimum of $150 per acre was specified because prices that are too low may represent transactions among related individuals below market value.

Graphs of crop and pasture price per acre over the five year period were created to illustrate average crop and pasture land values per acre with the adjustments made in the third model. Crop prices, for example, were obtained by setting the percentage of cropland to one and setting all other variables to their statewide mean for each year. The crop and pasture prices were then plotted over the five year period for each of the three data sets.

Data

The data include sales price of agricultural land for the time period of 2001-2005 for a total of 7,387 observations. Farm Credit Services offices in Oklahoma have collected data for many variables for all 77 counties in Oklahoma including the dependent variable, land price per acre, and the independent variables of county location, sales date and land use separated into pasture, cropland, timber, waste, irrigated cropland, recreation land use, and areas of water. Percent of water acres describes wet areas, lakes, and any other body of water included in the land sales transaction. These wet areas have potential recreation uses, but little or no agricultural value. The land use variables are specified as percentage use. Total acres per sales transaction were also used as a variable. The data included rental income of recreational uses such as hunting leases but because of concerns about its quality it was not used. The value for improvement contribution was subtracted from the net sale price to account for house, building, and other improvement values. The acres used by the improvements were also deducted in calculating the price per acre.

The remaining variables were collected as secondary data from various sources with data for each of the seventy-seven counties in Oklahoma. The Oklahoma Climatological Survey website lists average monthly rainfall amount in inches for each county based on precipitation for 1971-2000. In this research, rainfall is an average for the county developed from this data and the same number was used for 2001-2005. Rainfall is a proxy for farm yield potential. Annual livestock cattle prices were collected from the Livestock Marketing Information Center for 2001-2005. The weekly cattle prices for 500-600 lb steers were used to calculate an average annual price. The prices were lagged to allow the previous year's cattle prices to affect the current year's land values. Market value of crops sold (measured in thousands of dollars) and total cropland acres for each county were collected from the USDA 2002 Agricultural Census. The crop returns variable is calculated by dividing the market value of crops in the county by cropland acres in the county.

Total population estimates by county for the years 2001-2005 was obtained from the Bureau of Economic Analysis. The population data were used to create population growth and population density variables. Total per capita income for each year and county in thousands of dollars was obtained from the Bureau of Economic Analysis.

Deer harvest data was obtained from the Oklahoma Wildlife Commission and included the total number of deer harvested for 2001-2005 by county. Recreational income from agricultural uses, recorded in thousands of dollars, was collected from the USDA 2002 Agricultural Census data and applied to 2001 through 2005. There were eleven counties with missing values to avoid disclosing individual data. An average of the neighboring counties was calculated for the missing values. Deer harvest, population, and recreational income were divided by total county acres to obtain a more accurate measure of potential returns per acre. Descriptive statistics for variables are given in Table 1. The average land price per acre was $865.30 and average total acres on a tract were 230. Of the land use alternatives, pasture acres were the highest at 64%. Average per capita income for the 77 counties was $22,095. These prices are higher than those reported by USDA.

Results

In the first model, the percent of crop, pasture, timber, irrigated cropland, recreation, and water variables are expected to be significant and have positive signs. The percent of waste acre variable is expected to have a negative sign. The coefficients on the percent of crop acres are expected to be larger than the coefficients on the percent of pasture acres for all data sets as cropland should have higher returns for agricultural land than pasture land. The recreational land use variables, percent of recreation and percent of water acres are also hypothesized to be positive factors in the land values. Similarly, the percent of irrigated cropland is expected to have an even higher return on farmland than percent of crop and pasture acres.

As crop acres have historically yielded greater returns per acre, tract size might be expected to have a positive impact on land values if the land will be used for farm expansion. However, large tract sizes might not be an asset for other purposes. For instance, smaller acreages may have more potential buyers. Hence, no prior hypothesis was made about the sign of the acres variable. Rain is used as a proxy for yield potential and thus higher rainfall areas are expected to have higher land values.

The parameter estimates for the first model are shown in Table 2. Results indicate rain, percent of cropland, irrigated cropland, pasture, and timber acres are significant at the 0.01 level and have the expected signs for the first model. The percent of crop and percent of pasture have the smallest coefficients for less than eighty acres suggesting that agricultural returns on land prices are less for smaller tract sizes. The coefficients for percent of pasture acres were larger than percent of crop acres with both the complete data set and less than eighty acres, which means pasture land values reflect a premium over cropland values. This unexpected result may perhaps be explained by the model being limited to the basic agricultural variables and has not been adjusted by population density, population growth, income, deer density, recreation income, crop returns, or livestock prices. Much of Oklahoma cropland is in the western portion of the state where there are fewer people and thus little potential for urban conversion. The results show irrigated cropland acres have a premium over crop and pasture land acres for all data sets. Tract size as measured by acres has a negative impact on land value per acre, particularly in parcels of less than eighty acres. Although the variables have the expected sign, percent of waste acres, percent of recreation acres, and percent of water acres were not significant in land price per acre for transactions less than eighty acres.

Percent of water acres was found to be positive and significant for greater than or equal to eighty acres. A premium was indicated for tracts with greater percentages of water area over timber and almost as much as crop and pasture values for greater than or equal to eighty acres. For larger tracts, the presence of water is being capitalized into the value of the land. Also noteworthy is the importance of rainfall for tracts greater than or equal to eighty acres.

The second model (table 3) includes the variables deer density, and recreation income, which are expected to have positive signs. Variables for annual per capita income, population density and population growth by county are also included in the second model and are expected to have positive signs. The coefficient on percent of crop acres is again expected to be larger than percent of pasture acres on larger tracts due to cropland's higher agricultural returns.

Illustrated in Table 3 is a small premium for pasture values for all acres and less than eighty acres. The addition of the five variables to the second model caused shifts in the size of coefficients relative to the first model. Coefficients for percent of crop and pasture acres are much closer than in the first model for the all acres data set and for less than eighty acres. Variables that were significant in the first model were also significant in the second model and signs remained the same. The deer variable is significant for all tract sizes and the coefficient is largest on small tract sizes. Recreation income is significant for smaller tract sizes and together with the deer variable suggests a greater influence of recreational attributes on these values per acre.

Percent of irrigated crop acres has a larger coefficient than percent of crop acres and percent of pasture acres as expected. Recreation income was significant for only one data set, which may be due the lack of complete data. Population growth was not significant, but population density was significant. Percent of water acres was significant and had a positive sign for greater than or equal to eighty acres just as in the first model. One difference from the first model is that the coefficient on percent of water acres is larger than the percent of crop, pasture, and timber acres coefficient.

In the third model, interaction variables for both percent of crop acres and percent of pasture acres include deer density, population density, population growth, income, and recreation income. The parameter estimates are shown in Table 4. The livestock prices interaction term, deer interaction term with percent of pasture acres, population density interaction with percent of crop acres, population density interaction with percent of pasture acres, population growth interaction with percent of crop acres, population growth interaction with percent of pasture acres, and income variables are all significant at the 0.05 level. The crop returns interaction term is significant and has an unexpected negative sign perhaps explained by measurement errors in the data since crop income and cropland acres were from two different sources. Recreation income and its interaction terms are insignificant, but again this could reflect poor data quality rather than the unimportance of recreation value. Deer density appears to be a better measure of recreation value.

Percent of water acres are significant for the model with greater than or equal to eighty acres, an interesting result suggesting the larger tract sizes with bodies of water are of interest to people, either for livestock or recreational purposes. The percent of water acres variable has only been significant in all models for greater than or equal to eighty acres which may be from a few relatively small tracts that contain large lakes. Rain was significant for all models and data sets. Figure 1 shows the graph for all acres, Figure 2 for greater than or equal to eighty acres, and Figure 3 for less than eighty acres. These figures reflect the crop and pasture price per acre when adjusted for recreation and urban effects. As shown in the figures, overall results indicate cropland values exceed pasture land values when adjusted for nonagricultural uses.

Conclusion

The focus of the study was to determine the impacts of agricultural, recreational, and urban conversion values on Oklahoma land values. This was accomplished by estimating three models with successively larger numbers of variables. Deer density and recreational income variables were included to capture the recreational impact on land values. Although recreational income was often insignificant, the positive significant coefficients on the deer density variable supports the idea that recreation uses are an important component of land values. The urban influence also becomes apparent when variables for income, population density, and population growth are added to the model. Income and population density consistently register positive significant impacts for all data sets. When interaction terms are included in the model, population growth is also significant.

Comparing the three varying tract sizes in the study, it can be concluded that for most tract sizes in the dataset, larger tract sizes decrease the per acre land value and are particularly negative for tracts within the less than eighty acres data set. Tract size affects how the land will be used which is why tract size is important in how the land is valued. Residential or commercial uses would demand smaller sizes where an agricultural producer looking to expand might prefer a larger tract size.

The study included limitations due to the limited recreational data. Measuring recreational activities is difficult and surveys on the subject are inconsistent or are nationwide studies rather than county level. The limitations emphasize the importance of gathering accurate data such as hunting lease rates, which would enable research to become more precise.

Agricultural land purchases are made by investors, agricultural producers, and those demanding land for recreational uses, which causes the value of the land to be important to them and others such as lenders, appraisers, and realtors. When reviewing past and recent literature, certain variables (land productivity, interest rates, and cash rents) are common in the majority of the models. Although these variables are important, the more recent literature indicates an increase in recreation, urban effects, and other non-farm uses impacting agricultural land values. This study confirms that agricultural factors have impacted and will continue to impact agricultural land values, but that non-farm uses such as recreation returns are increasingly influential.

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Table 1. Variable Names and Descriptive Statistics

Variable	Units	Mean	SD	Min	Max
Land sales price (*PERACRE)*	$/a	865.30	505.03	150.0[a]	3000.0[a]
Total deeded acres (*ACRES*)	a	230.77	681.0	1.5	18506.0
Crop acres (*PCROP*)	%	0.227	0.37	0	2.81
Irrigated crop acres (*PIRRIG*)	%	0.008	0.079	0	1.0
Pasture acres (*PPAST*)	%	0.641	0.407	0	3.53
Timber acres (*PTIMBER*)	%	0.123	0.251	0	3.0
Waste acres (*PWASTE*)	%	0.003	0.021	0	0.44
Recreation acres (*RECREATION*)	%	6.7E-5	0.006	0	0.5
Water acres (*WATER*)	%	7.0E-4	0.016	0	1
Deer harvest/county acres (*DEER*)	deer/a	0.002	0.001	8.9E-5	0.006
Per capita income/county (*INCOME*)	$/person	22,095.0	2,782.0	15,664.0	31170.0
Average county rainfall (*RAIN*)	inches	38.25	7.38	17.2	53.6
Recreation income (*RECINCOME*)	$1,000/a	0.003	0.009	0	0.07
Crop income/crop acres (*CROPRETURNS*)	$1,000/a	0.045	0.033	0.007	0.23
Livestock prices (*LIVEPRICES)*	$	102.20	9.8	91.33	120.82
Population density (*POPDENSITY*)	#/a	0.058	0.056	0.002	0.64
Population growth (*POPGROWTH*)	%	30,293.62	24,731.29	2,906.0	22,1123.0

[a]Minimum and maximum price per acre set to delete outliers.

Table 2. Estimates of the Hedonic Model with Only Agricultural Variables

Dependent Variable: Land price per acre

Variable	All acres	>= 80 acres	< 80 acres
INTERCEPT	-289.54	-367.22	1335.6
	(43.631)	39.817)	(93.463)
ACRES	2898.3***	-1429.0***	-147818.0***
	(1.553)	(1.219)	(240.01)
ACRES2	0.204***	0.0961***	449.16**
	(0.014)	(0.011)	(226.71)
PCROP	587.87***	644.35***	512.28***
	(27.793)	(27.128)	(41.954)
PIRRIG	1087.95***	1141.54***	787.24***
	(69.117)	(55.95)	(210.03)
PPAST	714.57***	645.13***	602.41***
	(25.024)	(25.918)	(34.822)
PTIMBER	297.00***	288.81***	265.59***
	(30.779)	(31.188)	(45.336)
PWASTE	-608.29**	-410.63**	-680.65
	(242.27)	(194.45)	(447.08)
PRECREATION	1081.86	1331.91**	834.35
	(866.35)	(656.85)	(968.60)
PWATER	405.51	599.07**	437.31
	(306.84)	(249.23)	(883.29)
RAIN	18.806***	18.562***	2.711*
	(0.843)	(0.753)	(1.615)
YEAR 2001	-316.71***	-284.48***	-340.32***
	(16.400)	(14.185)	(30.005)
YEAR 2002	-254.6***	-238.29***	-275.17***
	(16.466)	(14.257)	(30.243)
YEAR 2003	-192.29***	-210.32***	-183.30***
	(15.781)	(13.802)	(28.511)
YEAR 2004	-115.06***	-121.84***	-119.69***
	(15.774)	(13.862)	(27.930)

Table 3. Estimates of the Model with Variables Representing Recreational and Urban Conversion Uses

Dependent variable: Land price per acre

Variable	All acres	>= 80 acres	< 80 acres
INTERCEPT	-844.644	-558.85	-33.045
	(71.520)	(61.210)	(150.30)
ACRES	-2455.52***	-1194.14***	-167513.0***
	(1.414)	(1.091)	(220.12)
ACRES2	0.174***	0.0812***	706.22***
	(0.013)	(0.009)	(207.79)
PCROP	643.45***	687.11***	563.11***
	(25.327)	(24.273)	(38.783)
PIRRIG	1204.27***	1206.57***	980.11***
	(62.633)	(49.905)	(191.82)
PPAST	702.49***	641.48***	594.35***
	(22.654)	(23.102)	(31.811)
PTIMBER	347.61***	348.32***	296.76***
	(27.942)	(27.927)	(41.495)
PWASTE	-534.81**	-357.92**	-428.09
	(219.30)	(173.29)	(407.98)
PRECREATION	862.18	1160.88**	587.73
	(784.17)	(585.23)	(883.66)
PWATER	478.32	731.33***	39.96
	(277.69)	(222.11)	(805.77)
RAIN	16.040***	12.208***	9.614***
	(0.917)	(0.822)	(1.724)
YEAR 2001	-278.15***	-259.01***	-281.41***
	(15.661)	(13.337)	(28.797)
YEAR 2002	-219.32***	-215.93***	-212.03***
	(15.464)	(13.189)	(28.522)
YEAR 2003	-178.58***	-196.87***	-158.08***
	(14.454)	(12.423)	(26.378)
YEAR 2004	-112.55***	-110.30***	-115.75***
	(14.286)	(12.358)	(25.486)
DEER	49,453.0***	48,807.0***	58,016.0***
	(4,934.41)	(4,469.53)	(8,468.47)
RECINCOME	406.43	210.89	1,895.67*
	(515.80)	(444.94)	(1,019.27)
INCOME	0.0169***	0.007***	0.035***
	(0.0022)	(0.001)	(0.004)
POPDENSITY	2,747.41***	2,691.77***	2,251.97***
	(213.51)	(201.87)	(344.07)
POPGROWTH	0.000063	-0.0001	-0.0003
	(0.00049)	0.0004	(0.0008)

Table 4. Estimates of the Hedonic Model with Interaction Terms

Dependent Variable: Land price per acre

Variable	All acres	>= 80 acres	< 80 acres
INTERCEPT	-1,154.82	-875.32	64.891
	(152.13)	(133.14)	(274.52)
ACRES	-2433.43***	-1186.28***	-16,6175.0***
	(1.405)	(1.081)	(218.88)
ACRES2	0.169***	0.078***	707.22***
	(0.013)	(0.01)	(206.68)
PCROP	1,348.35***	1175.37***	993.87***
	(164.29)	(139.19)	(302.62)
PIRRIG	1078.09***	1076.69***	876.94***
	(64.631)	(51.724)	(194.52)
PPAST	201.19	364.43**	-230.60
	(184.69)	(160.33)	(311.73)
PTIMBER	346.25***	368.85***	290.39***
	(28.208)	(28.694)	(41.501)
PWASTE	-405.91*	-290.83*	-385.20
	(218.87)	(172.59)	(408.26)
PRECREATION	739.00	1049.92*	576.89
	(777.86)	(578.87)	(880.74)
PWATER	382.34	635.54***	151.40
	(275.39)	(219.70)	(801.03)
RAIN	17.135***	12.110***	10.639***
	(0.959)	(0.857)	(1.798)
YEAR 2001	-198.85***	-189.15***	-195.84***
	(23.48)	(19.458)	(45.669)
YEAR 2002	-151.90***	-153.89***	-146.45***
	(21.865)	(18.217)	(42.31)
YEAR 2003	-76.166***	-109.02***	-54.988
	(27.182)	(22.421)	(53.361)
YEAR 2004	-46.184**	-49.812***	-48.095
	(21.641)	(18.053)	(41.7)
CROPINT	-2,398.60***	-2201.16***	-2564.24***
	(409.87)	(334.83)	(815.68)
LIVEPRICESINT	4.79***	4.622***	4.159*
	(1.213)	(1.062)	(2.154)
DEERINTC	5177.24	30,631.0***	1048.39
	(13,312)	(10,879)	(27,041)
DEERINTP	64,279***	65,734.0***	56,694***
	(5,770.23)	(5,568.99)	(9,085.81)
RECINCOME	-588.73	10.822	1,015.47
	(1,349.68)	(1,099.31)	(3,154.59)

RECINTC	2,367.44	771.88	868.73
	(2,376.04)	(1,858.94)	(5854.84)
RECINTP	1,604.44	459.52	1512.11
	(1,732.79)	(1,513.45)	(3635.99)
INCOME	0.035***	0.027***	0.036***
	(0.006)	(0.006)	(0.011)
INCOMEC	-0.031***	-0.024***	-0.018
	(0.007)	(0.006)	(0.013)
INCOMEP	-0.009	-0.019***	0.011
	(0.070)	(0.006)	(0.011)
POPDENSITY	576.41	965.30*	-101.35
	(547.44)	(518.34)	(818.40)
POPDENC	5,280.48***	3,577.93***	7056.94***
	(1,084.00)	(929.94)	(1801.60)
POPDENP	2,580.74***	2,206.41***	3009.55***
	(629.37)	(612.78)	(914.64)
POPGROWTH	0.003**	0.002	0.004*
	(0.001)	(0.001)	(0.002)
POPGROWTHC	-0.007***	-0.003**	-0.009***
	(0.002)	(0.002)	(0.003)
POPGROWTHP	-0.004***	-0.003**	-0.006***
	(0.001)	(0.001)	(0.002)

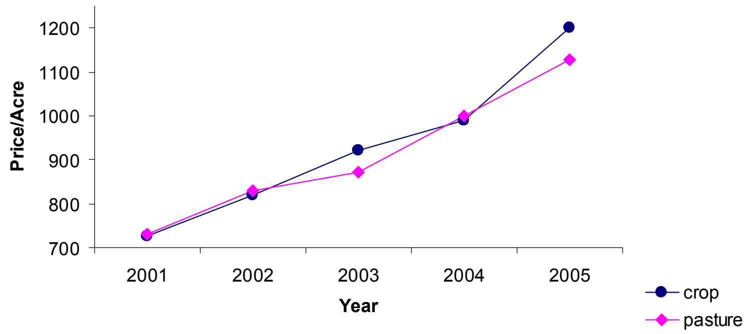

Figure 1. Crop and pasture price per acre for all acres

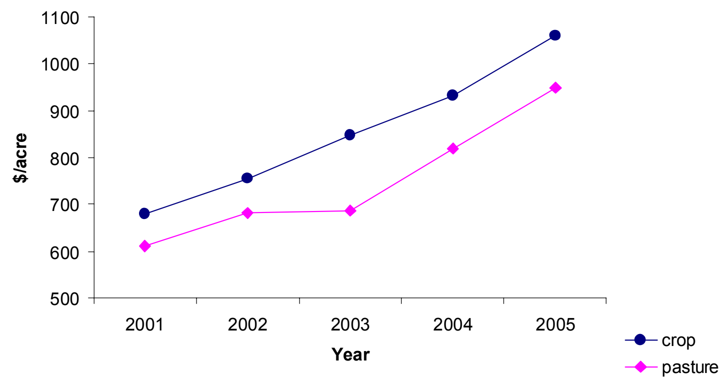

Figure 2. Crop and pasture price per acre for greater than or equal to eighty acres

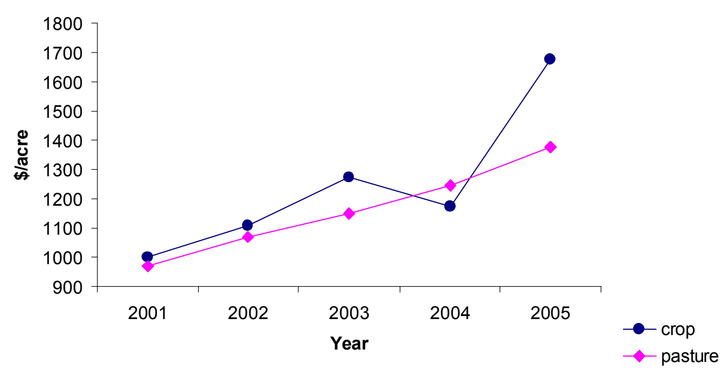

Figure 3. Crop and pasture price per acre for less than eighty acres