SAUNDERS COUNTY, NEBRASKA REAL ESTATE SALES ANALYSIS OF THE FARMLAND MARKET, INCLUDING FARMLAND CONVERSION TO ACREAGES NEAR LINCOLN AND OMAHA, NEBRASKA

by

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The rapid development of acreages near urban centers has become a highly influential factor in the real estate market for farmland. Buyers of agricultural land for acreage use have been paying substantial premiums above farmland values to obtain desirable parcels for home construction. Enticed by these premiums, landowners have been splitting farmland parcels into acreage tracts rather than selling the property to an agricultural producer for continued farmland use. This study compared differences in real estate values between farmland parcels and acreage tracts in a local market where land use changes from production agriculture to acreage use were occurring. An analysis of a three-year period of unimproved, non-irrigated, and arms-length real estate sales in Saunders County, Nebraska has indicated the following findings:

- On average, acreage tracts sell for approximately $1,000 more per acre than farmland parcels.
- A farmability characteristic (defined by soil quality and cropland percentage), irrigation potential, and location are significant variables for determining farmland values.
- A farmland market price equation based on farmability levels ranging from 0 to 1 (worst to best) crossed a similarly based acreage market price equation minus associated costs for splitting farms into acreages at approximately .80, a point where rational sellers gain no net benefits by converting farmland into acreage tracts.

- Rational sellers have incentives to divide poorer quality and lower agricultural income-earning farms (farmability < .80) into acreage tracts. Selling tracts to acreage buyers gains net benefits versus selling the property in the farmland market. Higher quality farms with greater agricultural income-earning potential (farmability > .80) have a higher value in the farmland real estate market and will thus tend to be sold to agricultural producers for continued farmland use.
- Besides acreages, properties containing wooded, aesthetic areas or having unique recreational aspects can receive substantial premiums. However, obtaining a premium involves seeking and catering to those buyers willing to pay the premium, which requires increased marketing efforts and a longer time period to sell the property.

ACKNOWLEDGEMENTS

As I sit down to write this, the final portion of my thesis paper, I realize that there are many people who have helped me get to this point. I would like to recognize some of them. I apologize in advance to those who have contributed to this project and are not specifically mentioned. I do thank you!

First, as a deeply religious person, I must thank God for allowing me to finish this degree. During the course of my graduate education, I spent a year studying for the priesthood at a seminary. I knew I had made a commitment to complete some quality research for my Ag Economics degree, no matter which career path I chose. I appreciate God's guidance and patience in directing me back to Lincoln to complete my requirements. I hope that God will allow me to work in this area, using the skills I have learned for the greater good of all.

Next I must thank my advisor, Dr. Bruce Johnson. Bruce worked with me on this project from its conception. His insight on how to proceed given the complexity of the subject matter was extremely helpful. He was always accessible for questions and willing to take time out for me -- I cannot count how many times I went to his office or called with a question. Bruce continued to work with me while I was away at the seminary -- his willingness to meet with me on Saturdays or during Spring Break speaks greatly to his character. This project might have never been finished without his efforts, which went above and beyond the duties of an advisor. As someone I greatly respect, I also consider Bruce to be a great friend.

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Not formally on my committee but of equal assistance were Dr. Dinos Giannakas and Dr. Gary Lynne. These professors helped shape much of what my thesis analyzed by their role in teaching modeling and how to use it. They stirred my thought process to analyze how economic principles could be applied to current "real world" situations. Their review of their respective portions of this research greatly contributed to the finalized text of the thesis.

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I thank the Nebraska Department of Assessment and Taxation for the initial data used in this study. Their cooperation in providing this quality data has helped make this research be of the highest quality. I hope they will continue to collect and share this information with others studying this topic. Also of great help were those individuals at the Saunders County Register of Deeds Office, Assessors Office, and Farm Service Agency who aided in clarifying the real estate sales data and provided other pertinent information.

My family, ever important to me, has been a part of this project. I thank my parents for incorporating into my life a work ethic with which a project like this can only be completed. Their love to all of us in the family knows no end. I consider them the best of teachers and great examples of perfect parents. My sister, Emily, has been interested in the project from the beginning. It was so nice to have someone to talk with who really understood grad. school and research. Her advice to me was extremely beneficial.

Finally, I thank my girlfriend Dee. It is for her that this paper is written. Unlike all the others mentioned, she wasn't there when this project started. But she was. I went to grad. school so that I could better my future career and become a better provider and husband. It was my thoughts of finding someone like her that kept me going through good times and bad, to the eventual completion of my education; an education with which I hope I can provide for her all that she has dreamed of and of those things that we dream about together. She is all I ever hoped for in finding someone to love. I pray that with God's blessing we will be able to live out our dreams with each other, for each other, and in support of one another. Together we'll make our future and make it a good one. Getting to that point has been my motivation for all the hard work and long hours that have come with my college education.

That pretty much says it all. Only now does it seem appropriate to take some satisfaction in the words "I did it!". As this paper shows, however, it was not just myself, but all those mentioned and unmentioned who have helped bring this project to completion and have made it something to be proud of.

David J. Drozd

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CHAPTER I.

INTRODUCTION

When asked to indicate an ideal place to live, people often say "out in the country". A recent Gallup survey confirms this notion as 60% of respondents indicated that they would prefer to live outside cities and suburbs. (The Gallup Organization, 1998) Rural areas provide a more serene atmosphere where people envision living in a nice house with a lush, green lawn surrounded by big, colorful trees near a creek or pond. There is plenty of space and privacy—neighbors are at a respectable distance. The home is near a good school and many employment opportunities are available.

One way to attain these desirable attributes is to live on an acreage. Acreages are residential dwelling units built on parcels of land of various sizes[1] located within a reasonable commuting distance to an urban center. Commuting allows individuals to work in the city where there are more high-paying jobs, a wider variety of retail outlets and entertainment activities, and more choices among schools and education systems. Yet, at night, one can retire to a more aesthetically pleasing setting at home, away from the city’s traffic, noise, congestion, and crime. Thus, acreages can be perceived as being the “best of both worlds” for many families. Therefore, a large demand for acreages has arisen around metropolitan centers.

The increased demand for acreages has affected the agricultural real estate market dramatically. Property owners have realized that premiums can be gained if land being farmed is sold as acreage parcels. Thus, larger farms are being broken into smaller parcels for sale as acreage tracts for home building.

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[1] Many Nebraska counties require a minimum acreage size of 10 or 20 acres to complete home construction and maintain an agricultural zoning status. Acreages of smaller size typically have had a zoning variance or are part of a sub-division.

However, people have been discussing whether converting farmland into acreages is an optimal land use. An intense debate has developed concerning farmland conversion to other uses such as acreages. Attention has been given to population density, commuting distance, and personal space--fundamentally important aspects of the land use debate. (Castle, p. 27) Questions have arisen over the appropriateness of allowing the development of highly agriculturally productive "prime farmland", including how or if this development should continue. In contrast, doesn't a property owner hold the property rights to do with the land as he pleases, given that the actions are under the law? What then should the law be? What is the proper minimum size for acreages (zoning) or when should zoning variances be allowed?

In order to answer these types of questions additional research on the farmland conversion topic is needed. This study helps address the need for additional information, providing insight into the real estate markets for farmland and acreages. Quantitative measures were determined and economic analyses performed for a specific local market (Saunders County, Nebraska) to define: (1) current patterns in the real estate market; (2) what factors determine property values; and (3) which farms will be subject to acreage conversion given their productive aspects.

CHAPTER II.

PROBLEM SITUATION

It is evident that major demographic shifts are occurring in the United States. What was once a nation relying on rural agriculture has now become an economy focused on technological innovation and commerce. It was not long ago that farming was the livelihood for a large portion of American families. According to the Department of Agriculture, the farm sector comprised approximately 20% of the work force at the start of World War II. Today, less than 2% of Americans are involved in production agriculture. (USDA website, 9-27-01) People have moved away from rural areas, choosing other occupations in urban areas. More young men and women attend college or trade schools. After graduation they tend to stay in urban areas where higher-paying jobs and professional opportunities exist. Fewer college graduates who grew up in rural settings are returning to their hometown. Most often, their best career opportunities are in urban areas, so they locate there. (Mills and Hazarika, p. 329-330, 337)

The resulting increase in urban population has caused some problems. Cities have experienced “growing pains”—traffic problems, the need for more retail centers, the need for increased police and fire services, and an overall feel of congestion. Many people want to have some time away from the fast-paced city, the so-called "rat race". They want their children to grow up in a good environment—away from gangs and drugs. Nationally, according to a September 2000 Gallup survey, 95% of Americans consider crime to be at least a moderately serious problem while 83% believe drugs are a "very serious" problem. (The Gallup Organization website, 10-15-01) College graduates who grew up in a small town often find it especially hard to live in the city—rural life is familiar for them so they often seek to return to living in that setting. Thus, many people have a tremendous desire to live outside the city. However, they need to live near an urban center for employment. Acreages provide an obvious answer so the increase in demand for acreages is not surprising.

Farmers own the majority of land subject to acreage development. With fewer young people entering production agriculture, the farming population has been growing older. Many are nearing retirement age; they must plan for the dissolution of their business. Obtaining the best price for their assets is typically a high priority. Thus, the high land prices being paid for acreages are appealing to many landowning farmers. Rather than maintaining ownership of their land and receiving cash rent from another farmer, some landowners are choosing to split the land into tracts for acreage use and then selling those tracts to acreage buyers at an elevated price, using the money received for retirement or non-farm investments. This provides a good way to dissolve the farming operation, especially when returns from farming are lower than the historic norm due to low commodity prices. Enticed by these economic factors, many landowners have been dividing larger farmland properties into smaller sized tracts that provide buildable lots for acreages.

Nearly all areas with an urban center and a surrounding agricultural corridor are subject to having this type of land use conversion and its associated controversy. In Nebraska, the major urban centers are Omaha and Lincoln. Rural agricultural areas are located on all sides of these cities. Thus, both metropolitan expansion and acreage development are infringing upon surrounding farming areas. Disputes have arisen between farmers and their new neighbors concerning increased traffic, livestock facilities and their associated odors, increased property tax valuations, dust and noise from farming, and how acreage development has forced the price of farmland higher and possibly beyond the "economic reach" of agricultural producers. (Lincoln Journal Star, 7-23-00)

It is this final issue of the market price for agricultural land that is the focus of this research. It has become critical to know how the real estate market functions in complex transitional areas that are greatly affected by both urban influences and strong agricultural traditions. It is the market prices established by the motivations of acreage buyers, farm producers, speculators/property investors, and landowners participating in the real estate market that ultimately determine the future use of agricultural land.

Research Objectives

The goal of this research was to analyze real estate values in both the farmland and acreage property markets and to determine factors impacting those associated market values. The project sought to answer questions such as "What types of agricultural properties are subject to being converted to acreages?" and "What are the returns and costs associated with selling farmland as acreage parcels?"

Fundamentally, the project wanted to find a crossover point, in terms of market value, where rational sellers of farms with quality characteristics lower than this point would be enticed by net benefits to split these farm parcels and sell them as acreage tracts. Conversely, rational sellers of farms with quality characteristics higher than the crossover point would logically sell these properties in the agricultural market, where a higher selling price could be attained by maintaining the farmland in agricultural production.

Accordingly, a model needed to be developed to analyze how characteristics of a tract of land determine its value per acre in both the farmland and acreage markets. By knowing these property values, patterns in farmland conversion to acreage use could be identified; and, based on a certain parcel's characteristics, the model could predict whether that specific parcel was likely to be sold for acreage use or remain in agricultural production.

The following list details the specific components and objectives of the project:

- Provide empirical information, analysis, and insight on the Saunders County, Nebraska real estate market.
- Gather quality real estate sales data to determine market prices for farmland parcels and acreage tracts.
- Identify important factors that contribute to the values of farms and acreages.
- Develop a model to determine where it becomes economically justifiable to convert farmland into acreage parcels.
- Analyze whether other agricultural properties purchased with a special motivation besides acreage use gain price premiums in the real estate market.

CHAPTER III.

LITERATURE REVIEW

Numerous studies have been completed regarding the general topic of agricultural land values. Much of this research was incited by the sharp escalation in land values during the late 1970s and early 1980s and then the subsequent intense downward pressure on land values during the mid 1980s. In recent years, agricultural land values have seen somewhat less fluctuation, but research into land valuation topics continues to be in high demand.

Studies analyzing the array of factors contributing to rural land values in both traditional agricultural areas and on the urban-rural fringe have continued to be completed across the country. However, current research on farmland values has tended to center more heavily on urban influences and the development potential of farmland.

Several studies (Colwell and Munneke 1997; Coulson and Engle 1987; Dubin and Sung 1987; Kowalski and Paraskevopoulos 1990; Jackson, Johnson, and Kaserman 1984; Peiser 1987; Rosenthal and Helsley 1994) have examined urban land prices. (Platinga and Miller, 58) Findings indicate that location and characteristics of the site tend to be the primary determinants of value for these parcels.

Isakson and Ecker (2001) detailed the locational influences on undeveloped agricultural land values by utilizing a temporal plattage model including monocentric and spatio-temporal effects on 277 undeveloped land sales just east of Denver, Colorado. The sales occurred in the seven-year period between 1986 and 1992. While being an important part of the overall market for agricultural land, the urban fringe was not closely tied to the analyses in this project, which dealt primarily with properties located 10 to 50 miles outside the city limits of an urban center.

Studies Utilizing Rural Real Estate Sales Data

More relevant to this research were studies evaluating components of farmland values in more rural areas. Kennedy, Henning, Vandeveer, and Dai (1997) used the Louisiana Rural Land Market Survey to compile 948 sales of rural real estate across the state of Louisiana (excluding the New Orleans Metropolitan area) that occurred over the 1.5-year period from January 1993 to June 1994. They performed a hedonic analysis that utilized a regression equation modeling the price of a heterogeneous commodity (land) given an array of characteristics for specific parcels. They found factors such as tract size, distance to the largest town in the parish (county), improvement values, and paved road access had significant impacts on parcel values in most subdistricts of Louisiana. Percentages of cropland, pastureland, and timber in the tract along with road frontage were factors contributing significantly to farmland values in some subdistricts, but overall could not be classified as strong determinants of farmland values.

Similarly, Elad, Clifton, and Epperson (1994) completed a hedonic estimation for the farmland market in Georgia. They used the unpublished Farm-Rural Land Market surveys completed by the University of Georgia to analyze 1,375 statewide (excluding the Greater Atlanta area) individual land sales occurring over the four-year period of 1986 to 1989. They also concluded that tract size, presence of buildings, and location expressed through the distance from Atlanta contributed significantly to farmland values. Their data showed that tracts not having buildings sold at a significant discount while cropland acres in the tract did not have a major influence on land values. They concluded that: (1) regional locations have such an influence and (2) local markets have such variations, that making determinations on the overall "farmland market" is difficult.

Miranowski and Hammes (1984) relied on the Iowa Land Value Survey to determine county average farmland prices plus a collection of 94 farmland sales occurring over a six-year period that was used in an Iowa State University real estate appraisal course to determine how soil characteristics impact land values. They sought to determine whether farmland buyers properly discounted land values as soil quality and soil productivity declined or if buyers were paying too much for properties having meager soil characteristics. They found high significance in topsoil depth and pH values positively affecting farmland prices and potential erosivity having a highly significant negative effect. Location factors expressed through dummy variables had little to no effect on farmland values during the 1974-79 study period. Location factors would likely have larger impacts if the same analysis was completed for current market conditions given the expansion of urban areas and their increased influence on property values. The study concluded that improving soil productivity and reducing soil erosion led to higher land values, but was uncertain if the farmland market was properly discounting values as productive capacity declined.

In a recent study, Nickerson and Lynch (2001) determined differences in sales prices of properties with unrestricted development rights and those parcels selling with conservation easements or other restrictions. They accessed Maryland's Tax and Assessment database to find 224 sales transactions in three counties over a 3.5-year period. Two hundred of the sales between January 1994 and August 1997 had unrestricted development rights while 24 sold with an easement or other farmland preservation method.

The analytical framework used by Nickerson and Lynch involved a hedonic approach by developing a model to indicate what factors gave the unrestricted parcels value, and then applying this model to the characteristics of the restricted parcels. This effectively showed the price the restricted parcels would have sold for if no preservation measures had been taken on these properties, all else being equal. Similar to previous hedonic models, larger parcel size, longer distances to urban centers, and less farmable land significantly lowered values for unrestricted farms.

The Nickerson and Lynch model showed the 24 restricted parcels would have sold for an average of $5,066 per acre according to the market for unrestricted parcels versus an actual selling price average of $3,761 per acre as properties with restricted development potential. Thus, development rights based on these Maryland sales could be viewed at near $1,300 per acre during the time frame analyzed. Landowners were compensated for lost development rights via a conservation easement payment that averaged $2,537 on a per acre basis. This payment was likely given in a one-time, lump sum amount. Thus, landowners considering utilizing preservation measures would need to compare discounted expected future higher-priced unrestricted property values to discounted expected future lower-priced restricted property values plus the current easement payment in determining whether to place a conservation easement on the property.

The restricted sales did not sell outside of a 95% prediction interval of the model. However, this analysis is heavily influenced by the sizeable widths of the calculated prediction intervals due to unexplained variations in the selling prices of unrestricted parcels. Based on the prediction interval analysis, the authors conclude that "contrary to our expectations, we find little statistical evidence that voluntary permanent preservation programs significantly decrease the price of farmland in Maryland". (Nickerson and Lynch, 350) Additionally, they state that the best explanation for unchanged values after applying preservation measures is that "land buyers do not expect the land use restrictions imposed by the easement to be binding in the future". (Nickerson and Lynch, 350). This author believes the Nickerson and Lynch methodology to be sound. However, their statistical analysis, conclusions, and explanations can be questioned, given that most parties understand the legal implications of binding easements and that parcels selling for $1,300 per acre less with restrictions (all else being equal) would be considered a "significant" amount by most landowners. In addition, other statistical measures perhaps more accurate than prediction intervals could have been used to attain appropriate conclusions.

Studies Utilizing Census of Agriculture Data

The studies mentioned above all used specific real estate sales data to determine factors influencing property values for individual parcels. However, additional studies utilize aggregate data and statistics released by the Census of Agriculture. Figure 3.1 summarizes previous studies and their data source.

Figure 3.1: Summary of Data in Previous Research

Study Authors	Study State	Area	Number of Real Estate Sales	Time Frame	Data Source
Isakson, Ecker	CO	Near Denver -- just east	277	1986 - 92 7 years	County Records
Kennedy, Henning, Vandeveer, Dai	LA	Statewide except New Orleans Metro	948	1/93 - 6/94 1.5 years	Louisiana Rural Land Market Survey
Elad, Clifton, Epperson	GA	Statewide except Greater Atlanta area	1,375	1986 - 89 4 years	Unpublished Farm-Rural Land Market surveys, University of Georgia
Miranowski, Hammes	IA	Statewide -- concentrated in central Iowa	94	1974 - 79 6 years	1978 Iowa Land Value Survey and sale records collected for an Iowa State Appraisal Course
Nickerson, Lynch	MD	3 Counties -- Carroll, Howard, and Calvert	224	1/94 - 8/97 3.5 years	State of Maryland Tax and Assessment Database
Shi, Phipps, Colyer	WV	52 Counties -- all except Boone, Mingo and McDowell	N/A	1950 - 92 42 years	Census of Agriculture
Platinga, Miller	NY	Statewide except Bronx, Hamilton, Kings, Nassau, New York, Queens, Richmond, and Rockland counties	N/A	1982-1992 10 years	Census of Agriculture

The Census of Agriculture, completed every five years most recently released with 1997 data, compiles statistics on a variety of agricultural aspects by sending questionnaires to producers and landowners. This statistics are highly compatible with socio-economic data (population, per capita income, poverty) released by the Census Bureau and the Department of Commerce, making it attractive for studies analyzing these factors.

Shi, Phipps, and Colyer (1997) used a gravity model to capture urban influences in a single variable that combined urban population and distance to urban centers. The gravity model was developed under the theory that urbanization pressures increase as population increases and distances from the urban center decrease. The West Virginia area studied has witnessed growth of several nearby urban areas while effective distances have declined, both causing land prices to escalate. The study created a distance index equal to the sum of urban center population divided by the squared distance between the local area (county) and the urban center, for the three closest urban centers. This index, when used as an explanatory variable with expected real returns, expected capital gains, and the real interest rate, explained 95% of the variation in agricultural land values. Each of these variables was reliable in predicting land values, adding credence to the model. The study concludes that urban influences expressed through the distance index are a major reason why West Virginia land values are higher than the expected values associated with typical levels of agricultural returns.

Platinga and Miller (2001) also studied how population and distance influence land values and development rights. They emphasized an econometric model based on urban growth theory for analyzing land values within the state of New York. In addition, they favored determining development rights via "readily available observations of agricultural land values and determinants of these values" (Platinga and Miller, 64) rather than estimating future development rents and time periods, or comparing values of sales of similar properties containing conservation easements. They concluded that compensation of landowners through conservation easements or other preservation techniques are the most effective measures to slowing farmland conversion, stating that "preferential tax assessment is largely ineffective because returns to development greatly exceed those from agriculture, even with value assessment". (Platinga and Miller, 66).

Platinga and Miller also concluded that squared and crossed terms in their analyses were significant, indicating a non-linear relationship between land values and explanatory variables such as distance, agricultural returns, interest rates, and conversion costs. They explained that distance variables influence land prices due to amenities outside the city such as better schools and negative associations with urban areas such as crime. Finally, they concluded that current population levels, often used to determine urban influences, are not as important of a determining factor for land prices as is the potential for new residents to locate in an area, which tends to drive future development rents upward.

Previous studies have analyzed land values by focusing on real estate sales data and/or aggregate county data in a general area over a certain time period. This study maintains that general approach. The following sections provide a description of how this project analyzed land values within the farm real estate and acreage markets.

CHAPTER IV.

PROCEDURES

The Study Area

Generally, in studying the farm real estate market, a certain subset of the overall market is selected, including a specific subject area to be analyzed. This study selected Saunders County, Nebraska as the most appropriate area for analysis. Saunders County represents a diverse and dynamic real estate market in east central Nebraska. It has witnessed intense development pressure from the nearby urban centers of Lincoln and Omaha, Nebraska. See Figure 4.1.

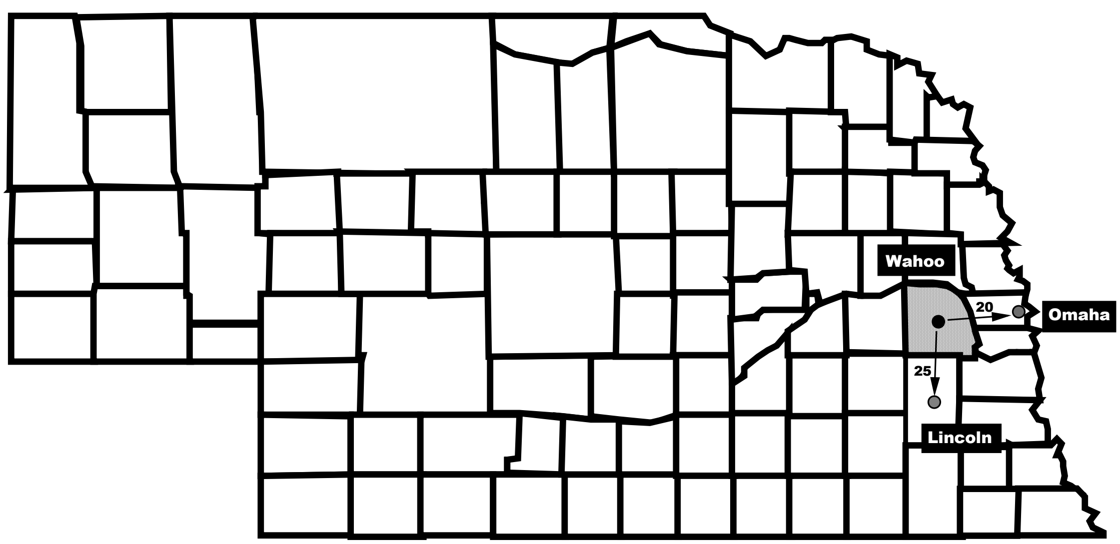

Figure 4.1: Location of Saunders County in Nebraska

Saunders County is bordered on the south by Lancaster County, where the Nebraska capital city of Lincoln is located. According to the 2000 Census, Lincoln and the surrounding area have a population of 250,291. (United States Census Bureau website, 9-27-01) The northern edge of Lincoln is approximately 11 miles from the Saunders County line. Saunders County is bordered on the east by Douglas County where Omaha, the largest urban center in Nebraska, is located. The two counties are separated by the Platte River, which is approximately 8 miles from the western edges of Omaha. The Omaha Metro and surrounding areas including Council Bluffs, IA have a current population of 716,998. (United States Census Bureau website, 9-27-01)

As an area located between two urban centers, Saunders County has seen tremendous development pressure and subsequent land use changes. According to real estate appraisers and other market professionals, the market for existing acreages and tracts for home construction is quite strong. (Pokorny, interview) Individuals and families not wanting to live inside these cities have been choosing nearby areas such as Saunders County as a more rural area to locate. Saunders County is especially attractive to those families having one spouse employed in Lincoln and the other in Omaha—commuting times and distances can be reduced for both spouses by living in Saunders County's central location.

Saunders County also has a very strong agricultural base. Farming continues to be the primary income source for many residents, especially in rural areas. Saunders County is very conducive to production agriculture. Most areas in Saunders County have highly productive soils. Bottomland soils near the Platte River and those soils in an area called the Todd Valley, which extends from the south-central part of the county northwest to the county line, provide excellent crop yields. The topography for most farms ranges from nearly level to strongly sloping, but the majority of land could be classified as gently rolling. Many farms in this area are irrigated or have the potential for irrigation. The productive capability of farmland in Saunders County is high compared to other areas, making per acre returns attractive to farmers.

This added revenue allows agricultural producers to offer higher prices to obtain farmland. Thus, farmers bid aggressively for farmland in Saunders County, adding another dynamic into the complex real estate market. Overall, given the high demand of agricultural producers and acreage buyers to purchase desirable parcels, land values have remained strong in Saunders County over the past decade.

The Data

With the study area of Saunders County selected, the data gathering process began. The Nebraska Department of Property Assessment and Taxation provided initial real estate sales data. This department compiles real estate sale information contained on sales documents. Nebraska law requires that a Form 521 Transfer Statement be completed every time a real estate property transfers ownership between parties. The 521 Statement provides useful information regarding the sale—buyer, seller, date of sale, legal description, parcel size, and selling price. It also indicates if the sale was between relatives (or not an arms-length transaction), if the sale divided a larger tract of land, and if the property was purchased for the same use. The Department of Property Assessment and Taxation combines this information with the parcel's county tax assessment data to form a "Qualified Sales Roster". Appendix A shows an example Qualified Sales Roster printout. The sales roster provides additional information such as the property's soil classes, its assessed value, property improvement information (house/buildings/bins), and notes if there were any special terms of the sale.

The data set provided covered a three-year time frame from July 1, 1996 to June 30, 1999. This real estate sales data set reflected the current market in Saunders County as data analysis began in March 2000. The data collected contained virtually no time lag, and was considered to be very current information for real estate sales data.

The quality of the data set provided was exceptional, but did require some further refinement. The data set included most real estate sales for which a valid 521 Transfer Statement was completed and documentary stamps paid on the deed filed. It included all parcels over 1 acre in size, including those with improvements. The data had to be filtered to remove existing acreages as only bare land parcels were appropriate for this analysis. Likewise, farmsteads selling with both the farmland and a set of buildings were removed from the data set. When an improved property with a house or buildings is sold, it is hard to determine how much of the selling price should be attributed to the buildings and how much value the farmland had in the sale. Sales with irrigated land or irrigation equipment can be viewed in the same manner, so only unimproved, dryland sales were used in this analysis.

In addition, only valid arms-length transactions were included in this analysis. Sales between family members often have a reduced selling price, so non-arms-length sales are not a good indication of the true market price for farmland or acreage parcels. The "between family members" question along with the notes on terms of the sale from the 521 Statement and Sales Roster printout helped identify only arms-length sales. Each sale record was evaluated separately to determine if the sale was arms-length, unimproved, dryland, and of an appropriate size, usually 10 acres or more.[2]

<u>Final Selection of Appropriate Real Estate Sales</u>

In some instances, the sales data needed clarification. Questions arose over whether certain sales were arms-length transactions or the actual boundaries and sizes of properties sold when a larger parcel was split into smaller tracts. Therefore, actual sales and property records were evaluated at the Saunders County Register of Deeds and Assessors offices. These records indicated whether particular sales were acceptable for use in this study. Moreover, perusing deed books and records within the Register of Deeds office led to the identification of additional appropriate sales for inclusion in the study that were not previously contained in the Department of Property Assessment and Taxation database. Over two weeks were spent at the Saunders County Courthouse improving the data used in this research. The **quality of the data is**

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[2] Saunders County requires a 10-acre minimum size for parcels to obtain a building permit and maintain an "agricultural" zoning status. Thus, most rural acreages are constructed on parcels 10 acres in size or larger.

a definite strength of this study, making it more accurate and more representative of the total land market in Saunders County.

The Saunders County Farm Service Agency (FSA) provided aerial photographs for each section of land in which a real estate sale had occurred. These aerial maps showed the boundaries of the various parcels. If a property contained cropland, the fields were identified and cropable acres listed. The maps illustrated where trees, waterways, terraces, streams, and roads were located, both on and near the property sold.

These maps were extremely helpful in locating properties sold and their characteristics. Each sale site was visited to gain a general feel of the area in which the sale occurred. Relevant information such as irrigation potential, conduciveness to farming, sizes of pastures, road access, and the aesthetic nature of the property was noted. This important information could not have been obtained without visiting each parcel sold.

The parcel visits helped determine the motivation of the buyer in purchasing the property. Some farms with land in the Conservation Reserve Program (CRP)[3] or near the Platte River were bought for recreational purposes, not for agricultural returns on investment. Four categories of varying motivations other than standard agricultural production were identified and separated from the true farmland sales. The four categories included: (1) parcels with large portions of trees, creek, or other aesthetic attributes; (2) CRP properties; (3) recreation properties near the Platte River; and (4) properties purchased by current acreage owners to obtain more land with aesthetic characteristics or to control new acreage construction around them.

[3] The Conservation Reserve Program compensates property owners for contracting land, especially highly erodable farmland, to be idled and planted to a natural habitat such as warm-season grasses for a designated time period, often 10 years. CRP lands are attractive places for hunting, bird watching, and other outdoor activities.

The parcel visits also helped determine if larger farms had been purchased to become "large" acreages. Sales of larger parcels (40+ acres) having new home construction were properly identified as acreage sales. The true buyer motivation in this case is for rural residential use, not agricultural production, even if the home site only occupies one acre and the balance of the tract continues to be farmed. Thus, sales thought to be for agricultural purposes based on the large amount of acres purchased were more appropriately classified as acreage sales when post-sale home construction had occurred.

All the valid real estate sales needed to be classified as a sale for continued agricultural use, acreage purposes, or one of the four categories of special buyer motivations previously listed. See Figure 4.2.

Figure 4.2: Possible Classifications of Real Estate Sales

Type	Description
1. Continued Farmland Use	Near 40 acres or larger without new home construction
2. Acreage Use	
a) Tract-size acreages	Near 20 acres or smaller, unimproved or with new home construction after the tract sold
b) Large acreages	40 acres or larger with new home construction after the sale
3. Buyer with Special Motivation	
a) Aesthetic Properties with Trees	Approximately 20% of land base classified as shelterbelt, creek, waterways, and/or waste
b) Existing Acreage Owner for Space	Owner of existing home purchases additional adjacent land
c) Platte River Recreation Properties	Property near Platte River with good hunting/wildlife attributes and/or poor farming quality due to wetness
d) CRP Properties	Sale with land in the Conservation Reserve Program (CRP)

When the parcel visit did not indicate a special motivation or home construction for acreage purposes, a determination was made to classify the sale according to whether its intended use was for continued farmland or acreage purposes. The main distinguishing factor between these uses was tract size. Farmland sales were defined as parcels near 40 acres in size or larger, reflecting the fact that farmers prefer larger parcels due to increased farming efficiency with large farm machinery.

Some acreage buyers may purchase larger land parcels in order to control the land near their future home site, ensuring their privacy by preventing adjacent future development. However, even an acreage buyer must consider the returns from the farmland on these larger parcels. Dr. Bruce Johnson, University of Nebraska-Lincoln professor and real estate specialist states, “The property’s expected returns will be included and expressed in the selling price in this case.” (Johnson, interview) Thus, sales of larger tracts, even if purchased with the motivation for a future single dwelling unit, are valid sales for inclusion in the farmland sales group. This is important since the use of secondary data does not clearly illustrate the true motivations of property buyers.

Acreage sales were defined as those sales on properties 10 to 20 acres in size. Parcels are often split into 10-acre tracts since this is the minimum size that allows for dwelling construction and an agriculturally zoned status. Twenty-acre parcels are a common way of splitting larger tracts of land since only existing roads are needed to provide access to all parcels. Eighty-acre farms being split into 10-acre tracts would require additional roads or right-of-way easements to make all tracts accessible. Completing roads or right-of-way agreements is often costly and difficult. Therefore, splitting larger farms into 20-acre acreage tracts is typical. Farmers generally do not want to buy 10 or 20 acre parcels because these tracts are too small to farm efficiently with large equipment. Thus, sales of 10 to 20 acre parcels are realistically assumed to be for acreage purposes.

Classification of the real estate sales by the motivations of the property buyers was an important step in completing this project. Various models were used to analyze the Saunders County real estate market and these models required the data to be appropriately categorized into subsets by buyer motivation. The importance of improving the original secondary data cannot be overemphasized. By individually evaluating each record of the Property Assessment and Taxation database and gathering appropriate sale information at the Saunders County Register of Deeds, Assessors, and FSA offices, the quality of the data used in this study was vastly improved. Making site inspections of each parcel to help determine which sales were to be used or excluded from the study and to ensure the buyer motivation was properly identified greatly impacted subsequent study results. The improved quality of the real estate sales data has made this study **substantially more grounded in local reality**.

CHAPTER V.

ANALYTICAL METHODOLOGY

This study utilized three general models for analyzing the Saunders County real estate market. Each of these models included a regression equation used to determine and predict the value of farmland based on parcel characteristics. Figure 5.1 provides a brief explanation of the models. The sections that follow describe the models in detail.

Figure 5.1: Brief Description and Order of Regression Models Calculated

1. Multiple Regression Model
   - ➢ Hedonic model quantitatively determining the relationship between per acre selling price of continued farmland sales and individual parcel characteristics such as size, irrigation potential, location, and farmability (soil quality and percentage cropable).
   - ➢ Regression equation takes the form of:
     Price per acre = α + (β_1 * size) + (β_2 * irrigation potential) + (β_3 * location) + (β_4 * farmability)

↓ ↓

2. Direct Application of the Multiple Regression Model
   - ➢ Characteristics of agricultural parcels purchased with a special motivation are implemented into the calculated regression equation on a case by case basis. The selling price predicted by the multiple regression model compared to the actual sale price indicates if a premium was paid by the buyer with a special motivation.
   - ➢ Example: A Platte River recreation property sells for $2,275 per acre. The model predicts the parcel's selling price or agricultural value to be $1,035 per acre. Thus, the buyer with a special motivation paid a $1,240 per acre premium for this property.

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3. Farmland "Shake Loose" Model -- Farmland Conversion to Acreages
   - ❑ Separate from the previous two models, simple regression equations for selling price based on a farmability characteristic are calculated for both the continued farmland use sales and acreage sales. A plot of the acreage price equation minus a constant splitting costs value against the farmland price equation indicates a cross-over point, the farmability level at which converting farmland to acreage tracts is economically justifiable, given net benefits from conversion.

Multiple Regression Model

The first model was based on a hedonic approach identifying parcel characteristics and other factors that contributed to property values. Similar hedonic models were used in the Kennedy et al. and Elad et al. studies.

Independent variables chosen for explaining the dependent variable of price per acre were similar to those in previous studies. A **location** variable was expressed through the average commuting distance in miles from the parcel sold to the urban centers of Lincoln and Omaha, Nebraska. Having visited each property and aided by road maps, the shortest route to the urban center relying mainly on paved roads was determined. The average of these commuting distances expressed a location variable called *AvgMile*. AvgMile was expected to have an inverse relationship with price per acre (PPA) since parcels closer to the urban centers were thought to have higher values.

The number of acres sold in the real estate sale or **tract size** was another independent variable used. Previous studies showed a significant negative relationship between PPA and the size variable. The same inverse relationship was also expected in Nebraska. The information for this variable called *Size* was indicated in the Property Assessment and Taxation database and verified by Saunders County Assessor records.

A third variable thought to be influencing unimproved, dryland property values was **irrigation potential**. Some dryland sales had occurred in areas where irrigation was prominent. Irrigated parcels tend to have higher values as crop yields and returns can be increased with the application of water. Dryland sales in these areas likely held the possibility of future irrigation and associated higher per acre values if the landowners were willing to invest in wells and irrigation systems. In addition, just being located in an area were irrigation and subsequent higher per acre prices exist, leads dryland parcels to sell at relatively higher prices. Sales of similar quality dryland farms in unirrigated areas would tend to have somewhat reduced selling prices when compared to those sales occurring in an irrigation-influenced market. Thus, the potential for or influence of irrigation was expected to have a positive impact on PPA.

The visit to the property indicated the number of irrigation systems in the area, to help determine if a dryland farm had irrigation potential. The parcel visit also showed if there were any apparent obstacles to center pivot irrigation (the most common form of irrigation in the area) such as power lines, irregular fields, canyons, residences, or other obstructions to a center pivot irrigation system. If obstacles existed, such sales were said to not have irrigation potential. In addition, the Nebraska Registered Wells Database was accessed to analyze pumping capacities in gallons per minute (gpm) on other wells in the area to determine if accessing a large quantity of underground water was likely, or if a more marginal well was to be expected, limiting irrigation potential. Sales occurring in areas where most wells were registered at less than 600 gpm were said to not have irrigation potential. Irrigation potential, denoted *IrrPot*, held a dummy variable status, with properties determined to have irrigation potential being given a value of 1.

The final and possibly most fundamental variable for explaining farmland values was a **farmability component**. Farmers mainly analyze two items when determining a parcel's farmability. Farms with more productive soils (as expressed through the land class system—Class I or 1A1 best with Class VIII or 4G worst) are valued higher as they obtain higher crop yields and subsequently more returns per acre. Similarly, parcels with a higher percentage of cropable land (fewer acres of waste, trees, waterways, creek, terraces, and roads) tend to have higher values in the farm real estate market.

For this study, a parcel's "farmability" was determined by adding the percent cropable value (Pc) to a weighted land class production measure (Pm) and dividing by 2. This calculated farmability characteristic is uniformly distributed and bounded by values of 0 and 1, with 1 being the best possible farmability level. Thus, the farmability characteristic (F) can be stated as follows:

$$0 \le F = \frac{Pc + Pm}{2} \le 1$$

Pm is calculated using the Nebraska Agricultural Land Valuation Manual. This manual contains values for each type of soil class for each county in Nebraska. An index was created by dividing the value of each soil class by the value of the top-rated or most productive soil class. See Appendix B for the Productivity Measure Index for Saunders County. For example, if an 80-acre farm had 72 acres of cropland and 12 acres of this cropland were class 1D and the remaining 60 acres were 2D, the farm's productivity measure (Pm) would be:

$$Pm = (12/72 * .813) + (60/72 * .684) = .706$$

The percent cropable or Pc in this case is 72 crop acres divided by 80 total acres or .90. Thus, the farmability characteristic or F value in this example is $F = \frac{Pc + Pm}{2}$ or $F = \frac{.90 + .706}{2} = .803$.

Grassland or pasture is not greatly desired on farmland. Although its value per acre is lower than farmland values, grassland does contribute to the overall value of a farm. To incorporate farms with grassland into the model, a farm’s percent grassland figure was divided by 2 as a way to discount its value. Thus, Pc becomes: $Pc = \frac{CropableAcres}{TotalAcres} + \frac{GrasslandAcres}{2 * TotalAcres}$. This reduces Pc, which is appropriate, since farms with grassland are less “farmable”. Farms with grassland also typically have a reduced Pm since grassland soils have lower values and subsequent lower multiplication factors on the Productivity Measure Index.

The data for determining the percent cropable (Pc) values were obtained from the FSA aerial photographs of the properties sold. These maps show field boundaries within a parcel and each field's crop acres, so a farm's total crop acres were calculated by simple addition. Pasture acres were also determined via the aerial map, aided by the parcel visit. The aerial map does not explicitly list the number of pasture acres. However, the pasture acres are identifiable on the map, especially when aided by a site inspection. The total pasture acres were either estimated or determined directly by subtracting a parcel's crop acres and acres of waste, creek, waterways, and roads from the parcel's total acres.

The farmability variable, *F*, was expected to have a strong and direct relationship with per acre farmland values. The production measure (Pm) and percent cropable (Pc) components of the farmability variable were thought to both be positively correlated with farmland values. Tracts with more productive soils and higher percentages of cropable acres were believed to be gaining premiums in the farm real estate market. It was hypothesized that the farmability characteristic would be the most highly correlated variable with farmland values in the multiple regression model. Figure 5.2 shows a summary of the variables used in the multiple regression model and the expected sign of the correlation coefficients.

Figure 5.2: Summary of Independent Variables Used in the Regression Equation for Determining Price Per Acre on Continued Farmland Sales

Variable Name	Denoted	Expected Relationship
Farmability Characteristic	*F*	Strong and Direct (+)
Irrigation Potential	*IrrPot*	Direct (+)
Location	*AvgMile*	Indirect (-)
Tract Size (acres)	*Size*	Indirect (-)

Direct Application of the Multiple Regression Model

It was hypothesized that purchases of properties with special recreational or aesthetic aspects were gaining premiums in the real estate market. Rumors of overly high-priced sales of property along the Platte River or in other areas had gained market attention. This analysis strove to determine if substantial premiums were being paid by purchasers with "special" motivations and quantify the dollar amount of any such premium.

Four categories of "special" property types were identified. First, properties with scenic and aesthetic appeal were defined as those parcels having approximately 20% or more of their land base in trees, creek, waterways, roads, and waste. Thus, buyer motivation was not specifically determined but these "aesthetic" properties were identified based on parcel characteristics. Second, adjacent properties purchased by current acreage owners for aesthetic or additional space purposes were determined by examining county records and noting attractiveness of the parcel purchased while visiting the property. Next, recreation parcels were located near the Platte River and contained hunting or habitat attributes. Finally, parcels selling with land in the Conservation Reserve Program (CRP) were identified. These farms had previously produced crops but had later been sown to native grass for wildlife habitat and erosion control to participate in this government program.

The methodology utilized the multiple regression equation calculated based on the "farmland" sales that were for continued agricultural use. The characteristics (F, IrrPot, etc) for the "special motivation" sales were to be entered into the regression equation determined by the "farmland" sales. The resulting per acre selling price prediction showed what price the sale should have received in the farmland real estate market without special buyer motivations. This predicted value would then be compared to the actual per acre selling price of the parcel purchased with a special buyer motivation, to identify if a premium had been paid for that specific parcel.

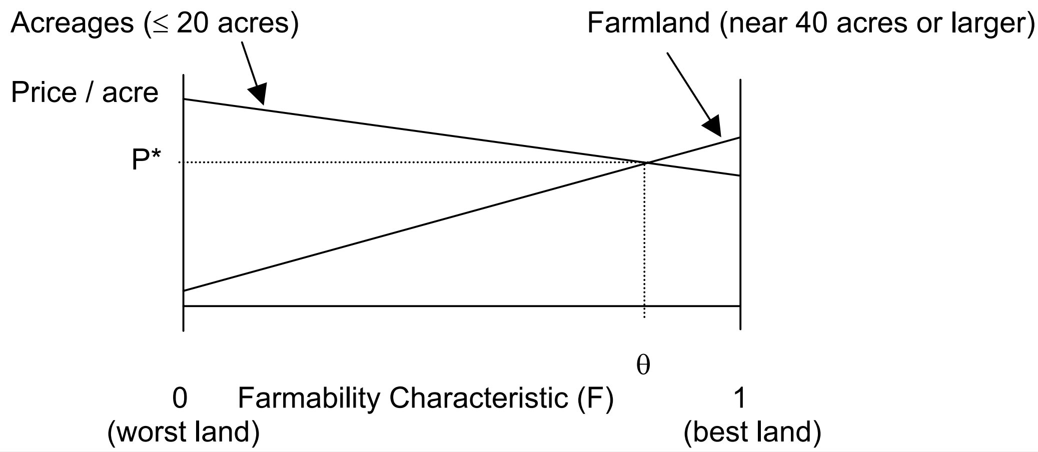
Nickerson and Lynch (2001) used a similar methodology in their Maryland study to determine the effects of conservation easements or other development restriction measures. They identified two groups of real estate sales—those selling without any restrictions and sales of parcels having a conservation easement (comparable to this study's "farmland" sales and "special motivation" sales). They performed a hedonic regression analysis on the unrestricted sales to identify the characteristics that contributed to value. Then, they applied this model to the restricted sales, entering in the characteristics of the restricted sales to find what the property would have sold for if no restrictions had been in place. They completed this on a parcel by parcel basis and found that often a large discount (sometimes $4,000 - $5,000 per acre) was given to the restricted parcels. This study also analyzed in a parcel by parcel manner to define what types of "special motivation" sales received premiums and quantify the premium amount.

Farmland "Shake Loose" Model—Farmland Conversion to Acreages

This model analyzed the potential premiums and costs associated with splitting a traditional farm into several smaller parcels as tracts for acreage home building versus selling the farm for continued agricultural use. Given the intense demand for acreage parcels, it was hypothesized that large incentives existed for landowners to provide land for the acreage market by splitting larger farms. Thus, the potential net benefits from acreage development tend to "shake" farmland "loose" from its traditional use. This analysis sought to find what farms are subject to acreage conversion, i.e. at what level they will tend to be "shaken loose" from agricultural production, given their farmability characteristics, their values in both the farmland and acreage markets, and conversion costs.

The model involved the use of a graph depicting the price paid for both farmland and acreage real estate sales based on the "farmability" of each parcel. Figure 5.3 shows a representation of the model. The vertical axis represents the selling price per acre for acreages and parcels of land remaining in production agriculture. The horizontal axis represents a parcel's "farmability" characteristic (denoted F), which is bounded by values of 0 and 1 and is uniformly distributed along the horizontal axis.

Figure 5.3: Representation of the Farmland Conversion to Acreages Model



Two separate scatter plots containing the selling prices and F values were made for the farmland and acreage groups of sales. Fewer sales were expected near the extreme farmability values of 0 and 1 since most farms possess a variety of soil types which, when calculated by soil quality class, tend to govern the farmability factor into a more average value. Single variable linear regression equations were then calculated with Price Per Acre (PPA) as the dependent variable and the farmability characteristic being the independent variable. The regression equation for the acreage market was then overlaid on a graph with the regression equation for the farmland market.

Farmability values near 0 were expected to have high acreage selling prices due to this lower quality farmland generally having more aesthetic appeal to acreage buyers, while farmland selling prices were thought to be low based on lower yields and returns on these less productive farms. F values near 1 were expected to have lower acreage selling prices as typical acreage buyers do not want to build where the landscape is flat and treeless, while farmland selling prices were expected to be high as farmers tend to pay higher prices for more productive farmland.

The farmland regression equation and the acreage regression equation intersect at a point denoted (θ, P*) on Figure 5.3. θ is interpreted as the farmability characteristic, F, that receives a price, P*, that is equivalent in both the farmland and acreage markets. Owners selling land with a farmability characteristic value of θ would not receive any premiums for selling the land to acreage buyers. For F values to the left of θ, sellers would be enticed by price premiums to split their farms into buildable lots and sell this lower quality land to acreage buyers. F values to the right of θ represent higher quality farms that have increased returns from farming and higher values in the farm real estate market. Sellers have no incentive to split these farms for the acreage market because the highest selling price will be received from another farmer who will retain the land in agricultural production.

Hence, a landowner considering splitting a farm into acreage tracts would know the premiums associated for any particular parcel's F characteristic. However, the landowner faces costs associated with splitting the farm that must be considered to determine if net benefits exist from dividing the property.

Expected splitting costs are summarized in Figure 5.4. To determine expected splitting costs, it was assumed that the farm consisted of 80 acres and was to become four 20-acre parcels, which is a typical way to split Saunders County farms. A survey of the four tracts would need to be completed for county records. Typical survey costs for this number of tracts would be $2,000 or **$25** per acre given the 80-acre parcel.

A landowner would almost assuredly hire a real estate agent to help sell the four tracts and complete other legal paperwork. It was assumed that a real estate agent would be hired any time a farm was split into tracts versus only being hired 50% of the time to sell an 80-acre farm. Thus, additional real estate commission fees are to be expected when dividing a farm. The four acreage tracts would be expected to sell for $2,500 per acre or a total of $200,000. A typical commission rate would be 6% of the total sale price or $12,000. As a farm, the 80 acres would be expected to sell for $1,500 per acre or a total of $120,000. At a 6% commission rate but only hiring an agent 50% of the time for agricultural properties, commission expense is $3,600. Thus, the increase in commission is $12,000 - $3,600 or $8,400 which equals **$105** per acre on 80 acres.

Figure 5.4: Expected Splitting Costs for Converting an 80-Acre Farm to Four 20-Acre Acreage Tracts

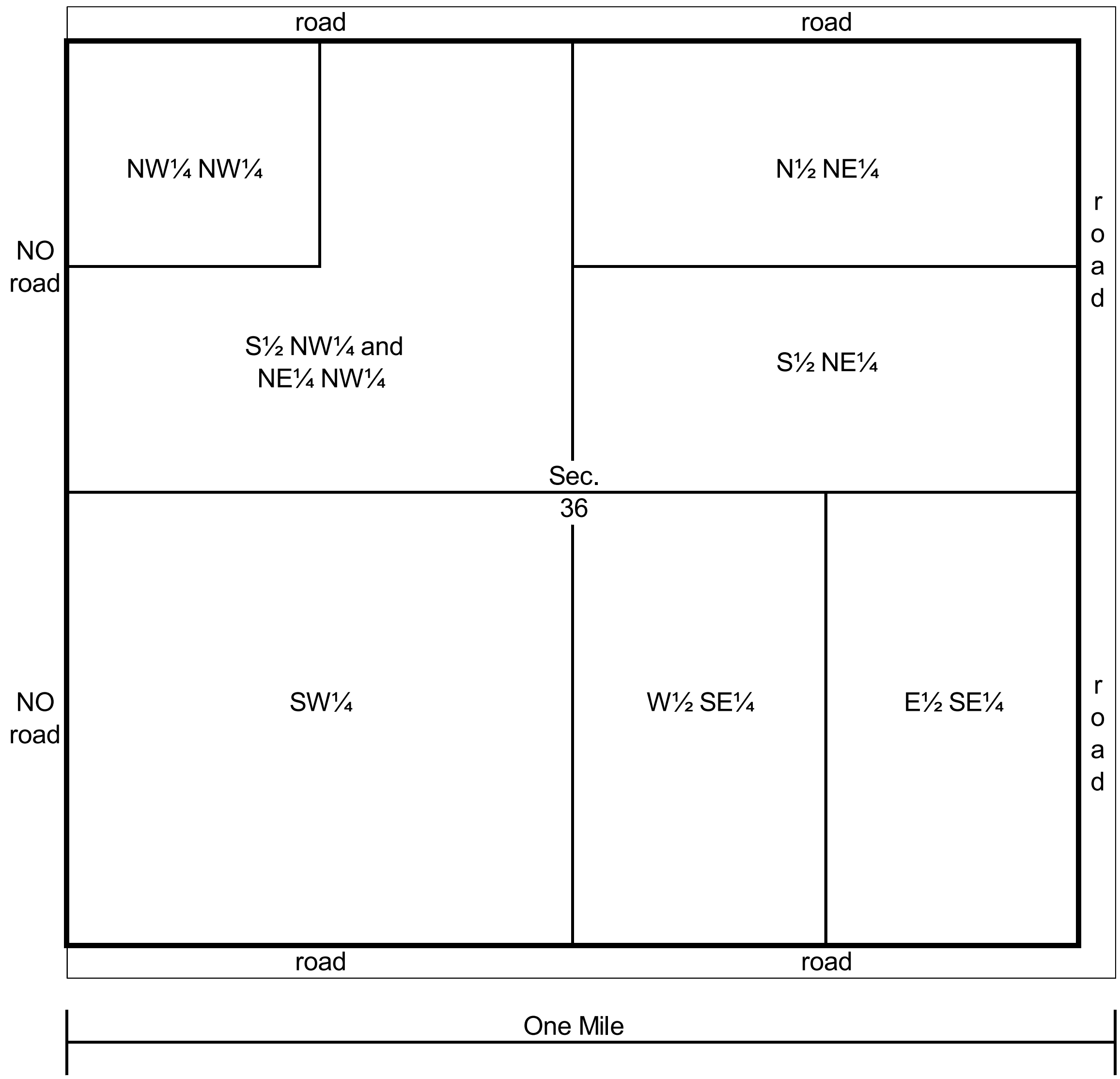
Cost	**Calculation**		**Cost Per Acre**
Survey of Tracts	$2,000 ÷ 80 acres		$ 25
Real Estate Agent Commission			
--Acreage	$2,500 * 80 * 100% * 6% =	$12,000	
--Farm	$1,500 * 80 * 50% * 6% =	$ 3,600	
--*Difference*		$ 8,400	$105
Test Wells	100 ft * $4 / ft * 4 tracts =	$ 1,600	$ 20
Time Value of Money			
--2, 20-acre tracts selling 3 months after farm	($2,500 * 40) ÷ (1.1) ^ .25 = $97,645 $100,000 - $97,645 = $*2,355*		
--1, 20-acre tract selling 9 months after farm	($2,500 * 20) ÷ (1.1) ^ .75 = $46,551 $ 50,000 - $46,551 = $*3,449*		
--1, 20-acre tract selling 15 months after farm	($2,500 * 20) ÷ (1.1) ^1.25 =$44,384 $ 50,000 - $44,384 = $*5,616*		
Total	$*2,355 + 3,449 + 5,616* =	$ 11,420	$142.75
Road Access	2,000 ft * $25 / ft * 50% =	$ 25,000	$312.50
Total Splitting Costs			*$605.25*
Rounded Total Splitting Costs			**$600.00**

A typical acreage buyer would want to be assured that quality water would be available for their home. Acreages typically utilize water accessed from a well located on the property, as municipal water lines do not extend into rural areas. Most acreages in Saunders County have their own well and underground water is adequate to abundant in supply and of high quality. However, the acreage buyer knows that a tract without available water would be unusable for home building. Thus, they will insist that a test well be completed. Typical test wells in Saunders County are drilled to a depth of 100 feet at a cost of $4 per foot. Hence, test well expense is $400 per well and for all 4 tracts, this expense totals $1,600 or **$20** per acre.

The four acreage tracts are not all expected to sell at the same time. Two 20-acre tracts would likely sell 6 months after the property was listed for sale, the third tract at 1 year after listing, and the final tract would likely sell 1.5 years after listing. These dollar flows would need to be discounted to account for the time value of money. For comparison, an 80-acre farm would likely sell three months after its listing. Thus, the first two tracts sell three months later than the farm and the other tracts nine and fifteen months respectively. Using a 10% discount rate, the $100,000 of inflows from the sale of the first two acreage tracts three months after a farm would typically sell, is only presently worth $97,645 or a $2,355 difference. The calculated differences on the later-selling tracts are $3,449 and $5,616. This totals $11,420 in time value discount cost or **$142.75** per acre on the 80 acres involved. See Figure 5.4 for further details on these calculations.

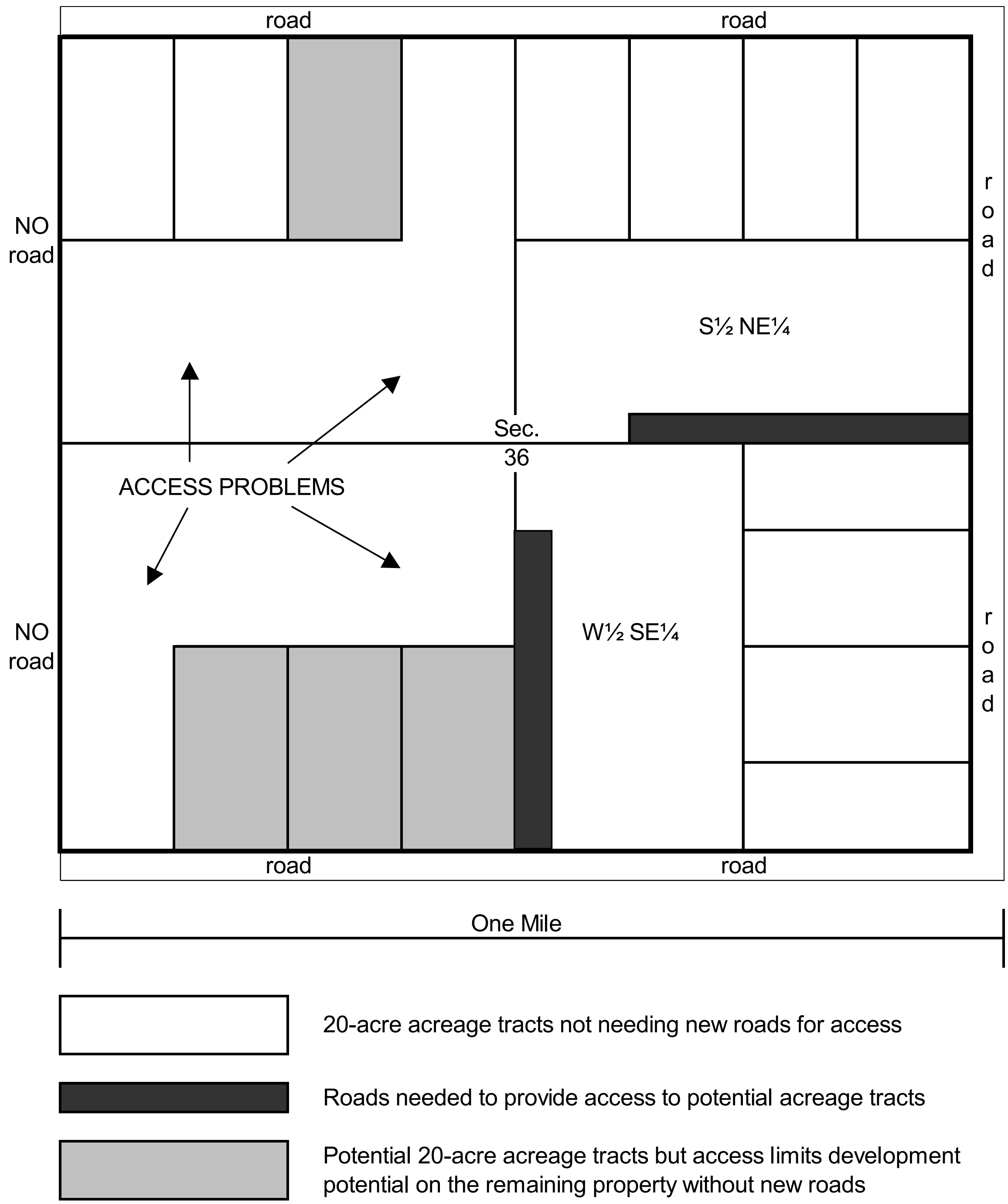
A final major splitting expense is the cost associated with providing road access to all tracts. Access is a general term referring to how one can drive onto a property. Some properties have no access problems while others can have limited access. For example, a typical square quarter section of land containing two rectangular 80-acre tracts with roads on both sides of the quarter section would have one property with good access to all potential acreage tracts, while the other property would have limited access. See Figure 5.5.

Figure 5.5: Potential Layout of a Section of Land Including Road Access



The Northeast Quarter Section fits this description as the North half has .5 miles of road access on the north and .25 miles on the east while the South half only has .25 miles of road access on the east. Providing access to four potential acreage tracts in the North half requires no additional roads while splitting the South half into typical tracts would require the seller to provide an access road so that all tracts could be utilized. See Figure 5.6. A similar situation can be seen in the Southeast Quarter of this section. Irregular parcel boundaries or the nonexistence of a county road surrounding the property can cause additional acreage development access problems as can be seen in Figure 5.6.

Figure 5.6: Potential Acreage Tract Development given Road Access



To pattern reality, it was assumed that 50% of typical 80-acre farms would have a layout that provides access to all potential 20-acre acreage tracts, while the remaining half of 80-acre farms would need to provide an access road for feasible acreage development. Providing access on an 80-acre parcel is achieved by making a road at least three-quarters of the way on the .5 mile length of the property. This equates to 1,980 feet or approximately 2,000 feet. A road with an adequate width being graded and rocked is estimated to cost $25 per foot, thus totaling $50,000. (Pokorny, interview) However, this type of access only needs to be provided for the 50% of parcels with poor access, so road access costs $25,000 or **$312.50** per acre for the 80-acre parcel. Thus, it is quite expensive to provide access, so properties with no access problems are much more likely to be split into tracts for acreage development. However, to analyze the aggregate situation of landowners deciding to split any or all properties, the $312.50 figure was used as an estimated overall cost to provide access.

The total splitting costs for surveying, real estate agent commission, test wells, time value of money, and access equal $605.25. This amount was rounded down to $600. The $600 cost to split a property can be viewed as a constant since it does not vary as a certain parcel's farmability or other characteristics change. Thus, $600 can be subtracted from the acreage regression equation that determines the acreage selling price per acre, which obtains an overall equation for the expected net price received by splitting a farm into acreage parcels.

Graphically, inclusion of these costs can be seen as a downward parallel shift of the returns curve associated with selling acreage tracts in Figure 5.3. This downward shift of the acreage price curve moves the intersection point with the farmland regression equation to the left at a F value closer to 0. The reduced value of θ illustrates that fewer higher quality farms will be converted to acreages since the costs associated with splitting a farm reduce the net benefits of converting farms to acreages. Thus, due to splitting costs, rational sellers will divide fewer parcels into acreage tracts, bringing relatively more land into the farmland real estate market where the property will obtain a higher net price received than compared to the acreage market minus splitting costs.

The farmland sales were expected to show that premiums were being paid for high quality farms while those with poor “farmability” were being discounted in the farm real estate market. This was expected to make the slope of the regression line for farmland parcels based on farmability to be relatively steep. Conversely, relatively more variability in the selling prices of acreages based on the land farmability characteristic was expected since acreage buyers base their bid price for buildable tracts on a variety of factors. Not all of these factors were captured in this one variable regression equation.

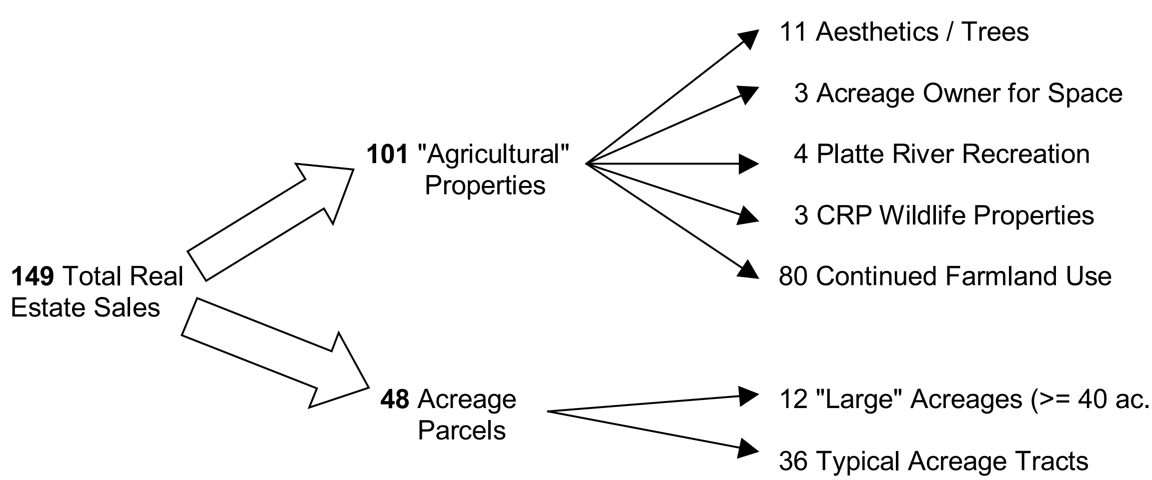
Hence, a relatively wider range of acreage selling prices with respect to farmability (F) was expected. For any given F value, the acreage market was believed to contain high-priced sales and low-priced sales based on a particular tract's appeal to the acreage buyer, creating a large variability in the prices paid for acreages. This tends to flatten the slope on the acreage regression equation. Given these factors, the value of θ was hypothesized to be between .60 and .85, illustrating that the large premiums being obtained in the acreage market cause only the highest quality farm parcels to not be under acreage development pressure.

CHAPTER VI.

DATA SUMMARY

A total of 149 arms-length, unimproved, dryland Saunders County real estate sales were deemed valid for inclusion in this study. Of this, 48 sales were identified as being for acreage purposes and the remaining 101 sales were for agricultural use. However, these "ag" sales did contain those sales that were purchased with a special buyer motivation. See Figure 6.1. A total of 21 sales had some type of special buyer motivation while 80 sales were classified as true farmland sales for continued agricultural production. In addition, new home construction had occurred on 12 parcels of 40 acres in size or larger; these sales were classified as purchases for acreage purposes.

Figure 6.1: Breakdown of Buyer Motivation of Real Estate Sales



The 101 ag sales averaged 87.0 acres in size, ranging from 26.5 to 190 acres. The 48 acreages sales averaged 29.4 acres in size, ranging from 6.1 to 154.74 acres. Removing the two smallest and two largest acreage sales showed a more representative range for the entire acreage group of 9.912 to 80 acres, averaging a size of 25.5 acres.

These largest and smallest acreage sales were not excluded from the analyses performed.

Dryland farmland sales were identified throughout Saunders County, with more sales being identified in the western and southern halves of the county. See Appendix C and Appendix D for maps showing the location of the sales used in this study. This study did not identify many dryland sales in the northeast quarter of the county, as a large portion of these parcels located near the Platte River and Todd Valley are irrigated. In addition, the Todd Valley, as a strong traditional agricultural area, tends to witness fewer ownership transfers as landowners tend to pass ownership within their family, reducing the number of arms-length sale transactions.

Acreage sales were more concentrated and tended to occur more often in the northeast quarter of the county. Areas witnessing a large number of acreage transactions included Pohocco and Union townships in northeastern and eastern Saunders County. Rock Creek and Oak Creek townships in the southwest part of the county also demonstrated active acreage markets.

The selling dates of the acreage parcels ranged from 7-30-96 to 7-21-99 while agricultural properties sold over nearly the same interval from 7-1-96 to 7-8-99. Selling prices of acreages ranged from $800 to $5,902 per acre, averaging $2,460 per acre. Agricultural land sold between $778 and $3,563 per acre, averaging $1,462 per acre.

All selling prices were adjusted for time to make them representative of the current real estate market in July 1999. Dramatic changes had been seen in eastern Nebraska land values between 1996 and the start of significantly lower commodity prices in 1998 and 1999. According to the annual University of Nebraska Farm Real Estate Market survey, the average value of eastern Nebraska dryland farmland without irrigation potential was $1,244 per acre on February 1, 1996. This amount increased by 7.40% in the 1-year period to February 1, 1997 and by 10.55% in the next year.

However, from February 1, 1998 to February 1, 1999 values fell by 1.02% only to rise by .14% in the following year up to February 1, 2000. The dollar value at that time was $1,464 per acre.

To minimize the impacts of the yearly fluctuations and track the general trends in farmland values, the change over the entire 4-year period was used to adjust the selling prices of sales used in this study.[4] The $220 change from $1,244 to $1,464 represented a 17.68% change, or 4.42% per year and .3684% per month. For each individual sale, the number of months from the sale date to July 1999 was calculated and multiplied by .003684 and then added to 1 to obtain a factor by which to adjust the sale price.[5] For example, a $1,500 per acre sale in July 1996 would need to be adjusted for 3 years or 36 months of time to be comparable to July 1999. 36 months multiplied by .003684 yields .1326 and adding 1 makes the factor 1.1326. Multiplying this factor by the original sale price of $1,500 makes the linearly adjusted sale price equal $1,699.

Acreage selling prices were also adjusted in this manner. While the change in acreage prices was likely a larger positive percentage increase than that of farmland over this period,[6] the same adjustment was used to maintain consistency. Without any accurate figures that expressed the change in acreage values over time, the farmland value changes were used as a proxy for acreage value changes over this period. This adjustment is reasonable since the acreage tracts represent unimproved dryland farmland that is being sold as smaller parcels.

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[4] The 4-year period between February 1, 1996 and February 1, 2000 starts prior to and extends past the sale dates of July 1, 1996 to July 21, 1999 of the sales used in this study.

[5] Sales occurring in July 1999 received no time adjustment.

[6] Unlike farmland values, acreage values likely saw no decline between 1998 and 1999 due to lower commodity prices since they have little effect on acreage land values. Real estate professionals believe increases in acreage values might be as high as 10% per year in this area. However, no published source is available to confirm this.

The linearly adjusted acreage prices ranged from $856 to $6,684 per acre, averaging $2,615 per acre. The 101 ag sales had linearly adjusted selling prices ranging from $853 to $3,576 per acre, averaging $1,549 per acre. Thus, on average, any sale for home construction and acreage use sold for over $1,000 more per acre than agricultural properties. In short, prices of agricultural land averaged about 59% of the price of acreage parcels. The linearly adjusted selling prices were relied upon for all analyses completed in this study.

Detailed sale information on the agricultural and acreage sales used in this study, including specific parcel characteristics, can be viewed in Appendix E and Appendix F.

CHAPTER VII.

RESULTS AND DISCUSSION

Multiple Regression Model

The 80 sales for continued agricultural use were used to determine a multiple regression equation explaining which characteristics gave farmland its value. See Figure 7.1 for regression statistics. The model had relatively good results with the farmability characteristic, irrigation potential, and the location factor expressed through the average mile variable being highly significant at the .01 level. This model explained 66.4% of the variation in per acre selling prices. The calculated intercept was a positive $586 which made intuitive sense since all farmland sells at a value greater than zero. The signs on the coefficients for all independent variables were as expected.

Figure 7.1: Multiple Regression: Adjusted Farmland Price per Acre (PPA) by Farmability Characteristic (F) by Irrigation Potential (IrrPot) by Location (AvgMile) by Tract Size (Size)

80 Continued Farmland Use Sales

Regression Statistics	
Multiple R	0.8252
R Square	0.6810
Adjusted R Square	0.6640
Standard Error	254.9721
Observations	80

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	586.21	287.5522	2.0386	0.0450	13.372	1159.039
F	1756.10	291.1494	6.0316	0.0000	1176.098	2336.097
IrrPot	571.26	82.8148	6.8980	0.0000	406.282	736.233
AvgMile	-11.70	4.2415	-2.7588	0.0073	-20.151	-3.252
Size (Ac.)	-0.812	0.7535	-1.0774	0.2848	-2.313	0.689

The only variable not contributing greatly to explaining farmland values was tract size. This variable had a P-value of .2848 and was not significant. The coefficient value of -.812 showed the expected decrease in value per acre for each additional acre of tract size. However, even a large increase in size only lowered per acre values a minor amount. For example, a typical size comparison for Saunders County would be an increase from 80 to 160 acres. This 80-acre change would only cause per acre values to drop by approximately $65, based on the -.812 coefficient calculated.

The non-significance of tract size in this study differed from the results in previous studies. Kennedy et al. and Elad et al. found tract size to be highly significant at the .01 level in their studies for Louisiana and Georgia. It is believed that tract size is an important factor for land values in Nebraska, but that it likely does not show significance unless larger parcels are sold. The largest sale in this data was 190 acres—if parcels of 240 or 320 acres had sold, a larger drop in price per acre attributable to tract size would likely have been witnessed. In Nebraska, where typical tract sizes are 80 or 160 acres, much larger sales would need to be identified before a significant decline in per acre values would be noted. In comparison, Louisiana and Georgia have a larger number of smaller, irregular-shaped farms, so a smaller change in size from 30 to 70 acres would likely have a larger impact on per acre values than a similar change in size observed in Nebraska.

The lack of significance in the size variable showed that it was not a key determinant of land values for Saunders County sales used in this study. In addition, a 95% confidence interval on the size coefficient of -.812 ranged from -2.313 to .689, showing that the negative sign of the coefficient could not be relied upon. These factors led to the conclusion that tract size should not be used as an explanatory variable in this analysis.

A multiple regression model excluding tract size also had good results. This model, based on the same 80 farmland sales, continued to show high significance at the .01 level for the farmability characteristic and irrigation potential. See Figure 7.2.

Figure 7.2: Multiple Regression: Adjusted Farmland Price per Acre (PPA) by Farmability Characteristic (F) by Irrigation Potential (IrrPot) by Location (AvgMile)

80 Continued Farmland Use Sales

Regression Statistics	
Multiple R	0.8222
R Square	0.6761
Adjusted R Square	0.6633
Standard Error	255.2417
Observations	80

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	452.86	259.8275	1.7429	0.0854	-64.634	970.351
F	1813.39	286.5539	6.3283	0.0000	1242.673	2384.117
IrrPot	563.57	82.5944	6.8234	0.0000	399.073	728.075
AvgMile	-10.99	4.1940	-2.6200	0.0106	-19.342	-2.635

PPA = 452.86 + 1,813.39 * F + 563.57 * Irr.Pot. - 10.99 * AvgMile

The location factor expressed through the average mile variable had a slight reduction in significance with a P-value now over .01 at .0106. The intercept remained positive at $453 per acre. This model explained a similar 66.3% of the variation in per acre selling prices. Comparing this to the 66.4% in the model including tract size, it is clear that size explained very little about land values in Saunders County. This latter model was thus deemed more reliable than the model that included tract size.[7]

The overall regression equation was calculated as follows:

Price Per Acre (PPA) = $452.86 + 1,813.39 * F + 563.57 * IrrPot - 10.99 * AvgMile

This equation shows that dryland farms with irrigation potential sell for approximately $560 more per acre than farms without irrigation potential. Sixteen of the 80 sales were said to have irrigation potential. The farmability characteristic, bounded by values of 0 and 1, ranged from .3284 to .9079 on the farms analyzed, averaging .7448. The model shows that if the F value can be increased, perhaps by clearing trees or converting

[7] This finalized model was tested for autocorrelation and multicollinearity problems. No fundamental problems for the model were identified.

pasture to farmland (increasing the percent cropable), land values will increase by $181.34 for every .10 increase in the F characteristic.

The 80 farmland sales had average mile values that ranged from 17.5 to 46.25 miles, averaging 30.1 miles. Based on the average mile coefficient value of -10.99, farms located closer to both urban centers in the southeast part of Saunders County were found to sell for over $325 more per acre than farms 30 miles away in the northwest part of the county.[8]

Direct Application of the Multiple Regression Model

The multiple regression model was also used to help determine if buyers with special motivations were paying premiums for certain types of properties. The characteristics of the properties purchased with a special motivation were entered into the regression equation. The subsequent per acre price determined by the model showed what price the property would have likely received if no special motivation had been present. Subtracting the model predicted price from the actual sales price (linearly adjusted for time) showed if the buyer with a special motivation had paid a premium for the property.

Figure 7.3 shows the individual sale data and model application. Overall, 12 properties sold with a premium while 9 sold for less than the model predicted. Sizeable premiums of over $150 per acre occurred on 8 properties. Two properties purchased for recreation purposes received a premium of over $1,200 per acre. This tended to make the overall average difference between the predicted and actual price a $183 premium. However, this figure is somewhat misleading given that 5 properties sold for a discount of over $150 per acre less than the price the model indicated it should receive.

[8] A variable for the shorter distance from the parcel to either urban center was also tested in the model. This LowMile variable for the influence of the closer urban center was not as highly related to farmland values as AvgMile, which evaluated the influence of both urban centers. The coefficient for LowMile was -7.95, with a P-value of .0299. LowMile values ranged from 13.25 to 43.5 miles, averaging 25.4 miles.

Figure 7.3: Analysis of Selling Prices given Characteristics of Sales with a Special Buyer Motivation and the Multiple Regression Equation

Multiple Regression Equation is: **452.86 + 1813.39 * F + 563.57 * IrrPot. - 10.99 * AvgMile**
(based on 80 Continued Farmland Use Sales)

Special Sale Code	F	IrrPot	AvgMile	Selling Price (Adjusted)	Value by Equation	Difference: SP-ValueEq.
1	0.5096	0	45.250	878	880	$ (2)
1	0.7064	0	34.375	1,372	1,356	16
1	0.5419	0	33.625	882	1,066	(184)
1	0.3209	0	32.375	907	679	228
1	0.5562	0	29.750	1,129	1,134	(6)
1	0.5976	0	29.750	1,001	1,210	(208)
1	0.5843	0	26.125	1,680	1,225	455
1	0.6733	0	23.625	1,228	1,414	(186)
1	0.6311	0	32.500	1,265	1,240	25
1	0.5691	0	30.000	1,212	1,155	57
1	0.5104	0	30.375	1,493	1,045	448
2	0.8150	0	21.625	1,721	1,693	28
2	0.6903	0	23.625	1,692	1,445	247
2	0.7030	0	24.375	1,279	1,460	(181)
3	0.7451	0	29.625	1,372	1,479	(106)
3	0.3721	1	29.625	1,632	1,366	266
3	0.4192	1	29.750	3,576	1,450	2,126
3	0.4884	0	27.500	2,275	1,036	1,239
4	0.5936	0	44.500	920	1,040	(120)
4	0.6973	0	36.750	856	1,313	(457)
4	0.5736	0	33.750	1,281	1,122	159
						$ 182.98 Avg

Conclusion: Special sales sold for a $183 premium on average compared to their predicted selling price from the multiple regression model--recreation sales received large premiums.

Key for Special Sale Code
1 = Trees/Aesthetics; 2 = Adjacent Acreage Owner; 3 = Recreation; 4 = CRP

Upon reviewing this information, the most appropriate conclusions to draw are that in some instances premiums do exist and that the amount of the premium is partially determined by the type of specialty property involved. Recreation properties tended to sell at high prices while CRP properties tended to have discounts. Recreation properties are in limited supply and thus are hard to acquire, forcing their prices higher. Conversely, CRP properties, rather than being bid higher by hunting interests, can be purchased cheaper since farmers are not aggressive purchasers of CRP properties. The CRP program requires that formerly cropped acres remain idle or in a grass habitat, usually for a period of 10 years. Farmers generally want to be able to farm the land they acquire immediately after purchase, so they tend to shy away from CRP properties having years remaining on the program contract. This reduced buyer demand lowers the selling price of CRP properties.

Aesthetically attractive properties with trees and those purchased by acreage owners for space sold with both premiums and discounts. It is believed that aesthetic properties selling at a discount were likely purchased by farmers who were not inclined to bid aggressively on properties that had relatively few cropable acres. This illustrates an overall trend that specialty properties sell under a certain set of circumstances with a specific buyer and seller whose willingness to pay and price to receive objective ultimately determine the settlement price. Thus, opportunities exist for both sellers to gain premiums and buyers to obtain bargains. However, obtaining premiums requires sellers to identify such a buyer willing to pay the premium, which takes increased marketing efforts and an extended time horizon for the increased return to be realized.

Farmland "Shake Loose" Model—Farmland Conversion to Acreages

This model calculated simple regression equations analyzing the impacts of the farmability characteristic on both farmland and acreage values. Farmability was expected to largely affect farmland values but only have small impacts on acreage values since typical acreage buyers are not as concerned with the productive capacity of land. The acreage regression equation minus $600 of splitting costs would cross the farmland regression equation at a point where a farmland owner would receive no net benefits from splitting the parcel into acreage tracts.

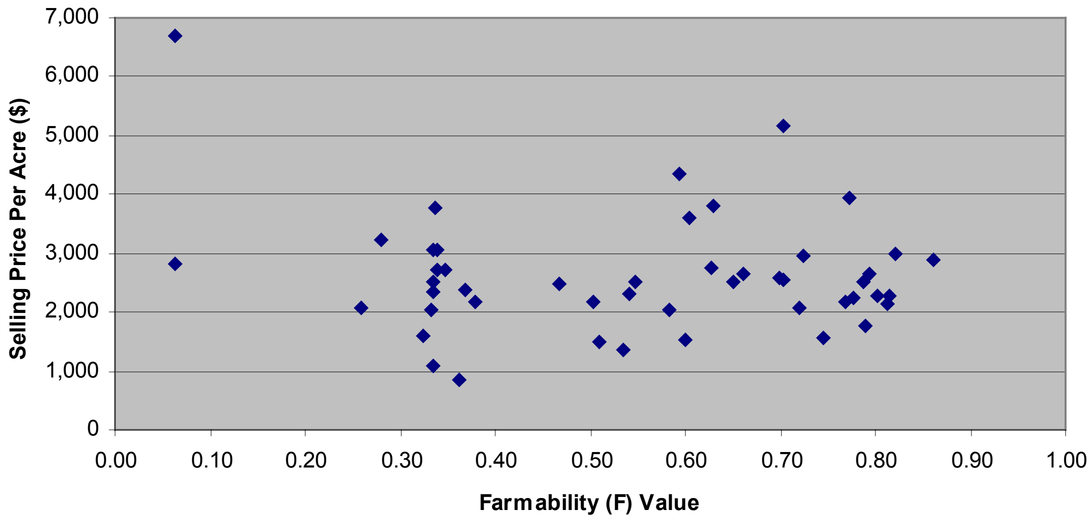
The farmland regression equation was calculated based on the 80 farmland sales plus 10 sales of aesthetically attractive properties with trees. These additional farmland sales had lower farmability characteristics that were more comparable to the types of land that acreage sales were occurring on. Given that these aesthetic properties had both premiums and discounts as specialty properties, their overall values were not inflated compared to traditional farmland. Thus, their inclusion in the analysis improved the reliability of the equation calculated, especially between F values of .30 and .50, farmability levels where few traditional farmland sales had occurred.

Based on the 90 sales, the farmland regression equation was calculated as PPA = -311.53 + 2,549.45 * F. The farmability characteristic was highly significant with a P-value of .0000. The correlation coefficient was .714 with an R-squared value of .510. The large coefficient on the F term indicated the equation had a relatively steep slope as expected.

The 48 acreage sales indicated a regression equation of PPA = 2,917.94 - 552.93 * F. As expected, the farmability characteristic was not a significant determinant of acreage values, indicated by a P-value of .4319. The slope of this regression equation was relatively flat as anticipated.

Equating the farmland regression equation with the acreage equation that included the $600 of splitting costs yielded an intersection point of .848. This showed that farms needed to have an F value higher than .848 to not have net benefits from being converted to acreages. While this figure was valid, some reasons for caution were noted. First, it was not logical for the farmland regression equation to have a negative intercept. This occurred since the minimum F value for these 90 sales was .3209 and thus the model was not well defined around an F value of 0. Secondly, the acreage data set included an apparent outlier and a wide variability of sale prices for F values near .35. See Figure 7.4.

Figure 7.4: Scatter Plot of 48 Acreage Sales Adjusted Per Acre Selling Prices Against Corresponding Farmability Characteristics

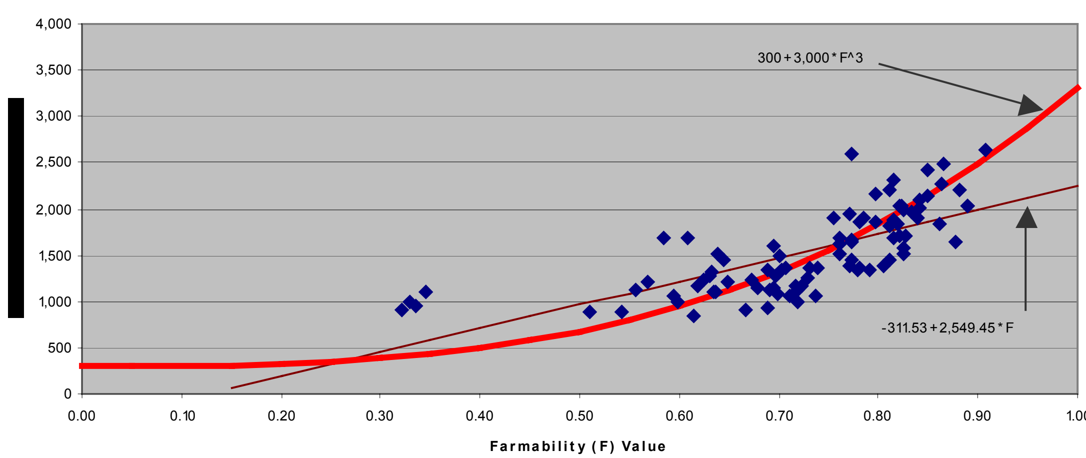


Consequently, variations to the original model were made to increase its accuracy. Different methods for calculating the farmland equation were evaluated in an attempt to obtain a more realistic intercept. It was believed that farms with an F value near 0 would have a value near $300 per acre. The most accurate new equation used this reference point and fitted a curved line through the data. Having a believed upper price bound of $3,300 per acre at an F value of 1, made the calculation of a best-fit curved line relatively simple. Continuing to use the equation form of PPA = intercept + coefficient * F, the intercept was to be 300 since at F=0, the coefficient multiplied by 0 would equal 0, leaving the believed $300 price per acre when the F value was 0. The coefficient on the F term was to be 3,000, since at F=1, 3,000 + 300 yielded the believed upper price bound of $3,300 per acre. The equation having the smallest sum of squared errors between the curved equation and actual data determined the best-fit equation. The equation with the lowest sum of squared errors was 300 + 3,000 * (F^3). See Figure 7.5.

This model was believed to be more accurate and representative of the actual price structure of agricultural land based on farmability. Farmers highly demand and aggressively bid on higher quality farms, reiterating the importance of the cubed nature on the farmability term, as per acre values tend to increase a larger amount for each additional increase in the F value as movement to higher farmability levels occurs.

This new farmland equation crossed the original acreage line at a point where F=.806. Thus, changing the farmland equation lowered the crossover point from .848, meaning that farms with slightly lower farmability levels would not be subject to acreage conversion. However, it was believed that even further improvements could be made on the acreage equation.

Figure 7.5: Linear and Curved Best Fit Equations on Scatter Plot of 90 Agricultural Sales Adjusted Per Acre Selling Prices Against Corresponding Farmability Characteristics.
80 Continued Farmland Sales and 10 Aesthetic Properties with Trees



A simple change was removing the outlying value and recalculating the regression equation. Removing the sale with a low F value near .06 and high selling price over $6,600 per acre made a large change to the equation. The slope of the line became positive based on the new equation of PPA = 2,273.97 + 456.53 * F. As expected, changes in farmability explained only a small portion of the change in acreage values as witnessed by a P-value of .4524. Equating this line to the curved farmland model yielded a crossover point of .836. This value was between the range of previously calculated crossover points, so this change did not greatly impact the overall model.

However, removing the acreage outlier did not account for the large variability in acreage selling prices between F values of .30 and .40. As seen in Figure 7.4, acreage prices are spread evenly from approximately $900 to $3,900 over this range. This wide dispersion along with the outlying acreage value make it very hard to understand what patterns are occurring in acreage values on acreages having an F value below .40. It is possible that these types of acreage parcels with low F values can receive premiums in the acreage market, but more sales, especially near F=0 would be needed to determine this.

The acreage sales with an F value above .40 tended to increase in price as farmability increased. Since previous models showed the crossover point occurred in this region, it was deemed most important to analyze these sales with higher F values. The lack of certainty about factors determining values at F values below .40 led to the conclusion that the analysis should be based on the sales that had more distinct price patterns and a higher ability to explain current farmland conversion trends.

A simple regression based on 31 acreage sales having F values above .40 yielded an equation of 2,114.72 + 704.06 * F. However, this intercept was not well defined around an F value of 0. To account for this, a value of $2,000 per acre at an F value of .45 was used as a base reference point. Based on observations of the market, it was reasonable to expect that a typical acreage tract would sell for this amount given this "average" farmability level. The $2,000 per acre figure was also supported by being near the average price of those sales occurring with F values between .30 and .40.

Thus, knowing a point value and the slope from the regression equation, yielded an overall "best" acreage equation of PPA = 1,683.17 + 704.06 * F.

This best acreage equation minus the costs of sub-dividing crossed the curved farmland sales equation at an F value of .760. Thus, farms having F values below .76 would likely be subject to acreage development. Of the 90 farmland sales used in this analysis, 45 had an F value below .76. Thus, half of the sales of typical dryland farms used in this study would have had premiums associated if these larger parcels were split for acreage development. Premiums on parcels having an F value slightly below .76 are somewhat small, so the landowner might decide to not undertake splitting procedures. In any event, the decision to split a larger parcel is completed on an individual basis; with location and access largely determining whether splitting can attain net benefits. Overall, given the range in crossover points from .760 to .848, .80 is viewed as a general farmability level where acreage development pressure will cease.

CHAPTER VIII.

CONCLUSION

A complex market for agricultural land exists due to competing uses among different buyers and sellers with varying motivations. Explaining this complexity and how it impacts agricultural land values has been a focal point of current research. Only through accurate research and analysis of the various components within the farmland market can insight be gained to help guide discussion and policy making on the controversial topic of farmland development.

This research used arms-length real estate sales of unimproved, dryland farmland to identify how certain factors are influencing the land market within a development prone area such as Saunders County, Nebraska. Gathering quality information on real estate sales and understanding the motivations of the buyers in these transactions was key in obtaining reliable results. Ample time spent reviewing county records and making personal inspections of the properties sold ensured that the best market data were obtained and appropriately classified for continued farmland or new acreage use, or for other special purposes.

Three main areas were analyzed in this study: (1) what factors gave agricultural land its value, (2) premiums on properties purchased with a special motivation, and (3) what types of farmland would be subject to acreage conversion. A multiple regression model found a farmability characteristic, the potential for irrigation, and location as significant items contributing to farmland values. The location variable was expressed through the average commuting distance in miles to the urban centers of Lincoln and Omaha, Nebraska. In contrast to previous studies in other states, the size of the farmland parcels sold did not greatly influence farmland values in Saunders County, Nebraska.

The power of this model to predict the value of specific agricultural properties was used to determine if, in fact, buyers with special motivations had been paying premiums for certain types of properties. Comparing the model's predictions to the actual selling prices of 21 specialty agricultural properties showed an average premium of nearly $200 per acre. Sales of unique properties such as those with recreation aspects near the Platte River will likely continue to gain premiums, often of substantial size.

Acreage parcels sold for approximately $1,000 more per acre than land remaining in agriculture. This considerable premium amount tended to entice many owners of farmland to split larger parcels into acreage tracts. Comparison of farmability levels and prices received in the farmland market to those in the acreage market less splitting costs showed the levels of farmability where net benefits from splitting occurred. A crossover point was found near a farmability characteristic, based on the property's soil quality and percentage of cropland, of .80. Thus, landowners of lower quality farms having a farmability characteristic less than .80 would gain net benefits from dividing these parcels into acreage tracts, while farms having an F value above .80 would attain the highest price if sold to a farmer for continued agricultural use.

One might question why, since net benefits often exist, that an even higher number of farms than the current pace are not being converted to acreages. Several possible reasons exist. First, a landowner might not be aware of the potential premium or may not be willing to undergo the added difficulties of completing the business (survey, test wells, paperwork) associated with splitting the parcel into acreage tracts. Some would rather receive a simple lump sum payment from selling the entire parcel versus waiting a longer time period for several tract payments from separate acreage buyers. Others may have strong ties to the land and are willing to give up the premium to pass the farm on to a family member or another farmer, in order that the landscape of their former property not be changed. In addition, many parcels may have limited acreage development potential due to access problems, being in an undesirable location, or having few site amenities.

A final reason the conversion pace is not higher given the net benefits is that the land market continues to be in a general state of equilibrium, meaning that current prices are bringing enough land into acreage development to meet current demand. If more farmland started being divided and listed for sale as acreage tracts, this increased available supply would allow acreage tract buyers to become more "choosy" and reduce the amount of premium paid to obtain a parcel for home construction. Landowners, knowing of these reduced prices and net benefits, would then offer less land for sale as acreage tracts. Thus, a market dynamic develops as prices help to influence both the supply and demand sides of the market.

This is important because the crossover point of .80 may change. If the demand for acreages and subsequent prices paid increases, the crossover point will occur at a higher level of farmability (F value) since additional land can gain net benefits from conversion. Conversely, if too many acreage tracts are on the market, the crossover point will fall below .80, as the increased supply of tracts will tend to lower tract values, reducing net benefits from conversion. Thus, the model developed is powerful in that if recalculated in a different time frame or area, it will adjust to show the current crossover point. Knowing this conversion level or how it has been changing over time shows landowners and policy makers trends in farmland development, so that more informed decisions can be made regarding this topic. This makes the structure of the methodology used in this research attractive for replication in other development-prone areas of the United States.

Farmland conversion to acreages and other uses will continue and in a manner that market forces dictate given current legislation. The concern over prime farmland being converted to acreages is not as applicable beyond borders 10 to 15 miles outside the urban edge since economics within this analysis illustrate few incentives to develop these high quality farmland parcels. In more rural areas, most often prime farmland has a higher value if it remains in production agriculture versus being used as acreage building tracts.

This is explained by the fact that movement away from the city limits, when viewed in one-mile increments of concentric circles, greatly expands the amount of land available for the various demands on open (buildable) land space. Within this growing selection of parcels as one moves further outside the city, are distributions of higher and lower quality farmland. As illustrated in this research, acreage development will more likely occur on lower quality farmland, as landowners with higher quality farmland have incentives to sell these parcels in the farmland market, most likely to agricultural producers willing to pay high prices for these highly productive parcels. An acreage tract buyer, greatly attracted by the location or aesthetics surrounding a certain parcel of prime farmland, would have to offer a premium large enough for that parcel to attain a higher value than its agricultural value, making it advantageous for the landowner to sell that property as one or more acreage tracts.

Thus, acreage tract buyers know that lower quality farmland is more economically efficient to purchase than prime farmland, as well as often being more desirable for their specific interests. Rational tract buyers will purchase the lower quality farmland for home building sites, unless the willingness to pay for a specific prime farmland parcel is substantially heightened. For other types of commercial or higher-density residential development location, distance, and access are so important that prices paid for the land to be developed in this manner often exceed the per acre value of even prime farmland. Thus, even though acreage development should not often occur on prime farmland in rural areas, all farmland can be subject to some type of development. Hence, prime farmland protection through conservation easements and other measures is likely appropriate, especially near the urban edge, if maintaining viable agriculture and preserving open space are deemed worthy priorities. However, farmland preservation in this manner was not a main focus of this research.

In contrast, these analyses indicate the legitimacy of concerns over the rapid development of acreages. Topics such as zoning and the density of development should be given attention and their discussion guided by additional future research. Most would agree that maintaining the beauty of the rural landscape is a worthy policy objective. How to best obtain this objective is not certain and will continue to be intensely debated.

This research shows that acreages will continue to be developed in rural areas, given the substantial demand for rural residential building sites and the large premiums for converting lower quality farmland parcels. Rural county governments located near urban centers need to consider the best ways for acreage development to occur as they plan for sustainable current and future development, as well as considering the long-run aspects of viable production agriculture. Focusing on and making the most appropriate decisions today will provide lasting benefits for the generations of tomorrow.

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