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# **Determining factors in South Dakota Farmland Market Prices 1976-1984**

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by

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## TO THE READER

A cross-sectional econometric study of factors explaining variation in per-acre sales prices of South Dakota farmland tract from 1976-1984 is covered in this technical bulletin. Land tract, location and financial/lender explanatory variables are used to explain real (inflation-adjusted) per-acre price during this period. Single equation OLS equations are developed for seven regional models and a statewide model. Analysis of covariance procedures are used to examine the added contribution of location variables and financial/lender variables. The stability of coefficients over this time period is also tested.

The time period examined (1976-1984) is one of volatile changes, both increases and decreases, in nominal and real farmland prices and interest rates. This cross-sectional study is one of the earliest to report statewide and regional farmland price trends in a recent period of farmland price increases and decreases.

The report should be of particular interest to economists, agricultural researchers, financial analysts, public officials and other professional people interested in farm real estate market developments. Knowledge of multiple regression statistical procedures is assumed.

The Federal Land Bank of Omaha provided detailed data on South Dakota farmland sales transactions from 1976-1984. Much of the research results reported in this bulletin is based on our analysis of this data base. We wish to thank the many people of the Federal Land Bank of Omaha for their fine cooperation in providing us with this dataset.

We also wish to thank our reviewers, Tom Dobbs and Charles Lamberton, SDSU Economics Professors; Mary Brashier, SDSU Agricultural Experiment Station and Professor Bruce Johnson, Department of Agricultural Economics, University of Nebraska, Lincoln, Nebraska for their constructive comments and criticisms.

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## SUMMARY

Farmland prices in South Dakota and most surrounding states increased dramatically in the 1970's and sharply declined for several years after 1981.

This report examines the significance of selected variables influencing farmland sale prices in South Dakota and in different regions of the state between January 1976 and June 1984. The intent is increased understanding of farmland price influencing factors in a period of volatile economic changes.

### Procedures

Potential factors explaining farmland price variation are identified and econometric models (single equation OLS) are developed to explain variation in farmland prices in (a) South Dakota and in (b) different regions of the state. Cross sectional data from 7202 credit-financed farmland sales are used to examine relationships between the dependent variable, deflated per acre sale price, and selected explanatory variables. Statewide and seven regional models are developed which all include land tract, location and financial/lender explanatory variables.

F-tests are performed to determine the significance of the added location and financial/lender variables. Another F-test is performed to test for significance of stability of coefficients across time periods.

The time period selected (January 1976 - June 1984) is a volatile economic period of rapidly changing interest rates, inflation rates and farmland prices. The entire time period and three subperiods are analyzed in all regional and state models and used to test for stability of coefficients. The subperiods are: (1) 1976-1978; (2) 1979-1981½ and (3) 1981½-1984.

### **Summary of Empirical Results**

The largest number of sale transactions are reported in the east-central and northeast regions (1,503 and 1,445 sales respectively). Price per acre is

highest in the southeast and east-central regions and lowest in the south-central and western regions. The average number of acres purchased is eight to nine times greater in the western region than in the east-central and southeast regions. Conversely, the lowest percentage of cropland sold per tract is in the western region while predominantly cropland tracts are sold in the southeast and east-central regions. (See Map 1 for location of regions).

Real interest rate (adjusted for inflation) is the only financial variable with significant changes in mean values over time. Real interest rates were approximately zero in 1979-81 and exceeded 5% in the last period (late 1981-1984). Seller financing was the dominant source of financing in all regions except in southeast South Dakota where the Federal Land Bank had a slightly higher share of credit financed sales.

#### Empirical Results - State Model

The overall  $R^2$  of the state model varies from 0.678-0.713 by time period. Most land tract and location variables are significant in all time periods. Significant land tract variables in all time periods are percent cropland acres, percent irrigated acres, deflated building value per acre, nonfarm influence and farm income security class. Acres purchased and principal products grown have significant coefficients in all except one time period.

The added regional location variables are collectively significant at the 0.01 confidence level in all time periods. Coefficients for southeast and east-central, northeast and north-central regions are positive and significant in all time periods relative to the central region. Farmland sale prices in the south-central and western regions are significantly less than farmland prices in the central region.

The added financial/lender variables are collectively significant at the 0.01 confidence level. In most time periods, only real interest rate and percent cash seller received are individually significant variables.

#### Empirical Results of Regional Models

Most land tract variables are significant with expected signs of coefficients in all regional models in all time periods. The magnitude of specific coefficients varies considerably among regions and across time periods.

Percent cropland, percent irrigated tract, deflated building value per acre, nonfarm influence and farm income security class are significant in most time periods. Other land tract variables (acres purchased and principal products) are significant in some regions but not in others.

Location variables are collectively significant at the 0.01 confidence level in all regions over the entire time period. These variables are also collectively significant in all subperiods except in the central (1976-78) and Western (1979-84) regional models.

There are regional differences in the sign of the time trend coefficient across the three subperiods. This coefficient is negative in all periods in the south-central and western regions indicating real (inflation adjusted) prices were declining from 1976-84 even though nominal prices were increasing until 1981. The time trend coefficient is positive from 1976-78 in the central and north-central regions and negative thereafter. Real farmland prices in eastern South Dakota were increasing from 1976-1981 and sharply declining thereafter.

For the entire 1976-1984 period, the added financial/location variables are collectively significant at the 0.05 or 0.01 confidence level in all regions of eastern and central South Dakota and nonsignificant in the south-central and western regions. However, financial/lender variables are not collectively

significant in most subperiods in any region. In general, farmland prices are not significantly different between seller and mortgage lender financed tracts.

For the entire 8½ year period, real interest rates have negative and significant coefficients in all except one region. However, real interest rate coefficients are not statistically significant ( $p=.10$ ) in most regional models in any subperiod.

The null hypothesis that no structural changes have occurred in coefficients across subperiods is rejected at the 0.01 confidence level for all regional and state models. This implies that parameter estimates have changed significantly over the 8½ year time period and coefficients of farmland price models need to be re-estimated.

### Conclusions and Implications

Major conclusions and implications of this study are:

- (1) Farmland prices vary significantly by region and land use in all time periods. Farm prices change over time at different rates by region and land use--reflecting differential impacts of macroeconomic and international economic developments on various agricultural sectors and regions.
- (2) Land use and location variables explain most of the variation in farmland prices in all regions and time periods. Land use variables are proxy variables for agricultural productivity and estimated net returns which are the key factors affecting farmland prices.
- (3) Structural changes have probably occurred in the farmland markets during the volatile 8½-year time period.
- (4) Real (inflation adjusted) interest rate changes influence real farmland price changes. There is little evidence that other individual financial/lender variables systematically explain farmland price variation.

# FARMLAND MARKET PRICE DETERMINANTS IN SOUTH DAKOTA, 1976-1984

## INTRODUCTION

Agricultural land price trends and expectations are important to agricultural producers and lenders, landowners, buyers and sellers of farm real estate, land appraisers and public officials. Improved understanding of farmland price trends and factors involved in their determination can assist these decision makers.

Changing farmland prices affect the level of and distribution of landowners wealth and significantly influence lending policies of agricultural lenders concerned with the security of their loans. Farmland prices influence property tax assessments, property tax revenues and publicly sponsored farm credit programs. Farmland price changes also influence the behavior of persons and institutions which may wish to invest their capital in farm real estate.

South Dakota is a major agricultural state that is often characterized as a "land of infinite variety". Its agricultural land base of nearly 44 million acres includes 13 land resource areas and over 500 distinct soil series (Malo and Westin, 1978). Agricultural land values<sup>1</sup> reported by farm operators in 1982 varied from less than \$170 per acre in Jones and Shannon counties to over \$1,100 per acre in Lincoln and Union counties (U.S. Census of Agriculture, 1982).

Farmland values in South Dakota vary greatly by region and over time. For example, South Dakota's average farmland values increased from \$39 per acre in 1910 to a peak of \$71 per acre in 1920. Values then declined to a low of \$12

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<sup>1</sup>The term "agricultural land values" or "farmland values" is used by the U.S. Department of Agriculture to reflect census or survey respondents estimated value of their farm or of agricultural land in their locality. In most cases the farms have not been recently sold, although estimated value is heavily based on sale prices of nearby tracts. The term farmland prices refers to recorded price of actual farmland sales.

per acre in 1941. Farmland values then began a 40 year upward trend (Swinson and Janssen, 1985).

South Dakota farmland values increased at a steady 3 to 5% annual rate from 1950 to 1973. From 1973 to 1981, farmland value increases accelerated to 17% per year with some year-to-year increases exceeding 25%. This boom in land values was directly related to major changes in international economic and trade policies and rapid growth in export demand.

South Dakota farmland values peaked in late 1981 and early 1982 and have since declined. Changing federal economic policies (leading, for example, to high deficits/spending, interest rates and exchange rates) and unfavorable export market developments have been major contributing factors (Janssen, 1985).

The factors that have influenced recent changes in farmland prices in South Dakota and its various regions are the underlying bases for this study. The primary purpose is to gain a better understanding of agricultural land markets in South Dakota.

### RESEARCH OBJECTIVES AND PROCEDURES

The main objective of this study is to determine the significance of selected variables influencing farmland prices in South Dakota and in different regions in the state between January 1976 and June 1984. Specific objectives are to:

- (1) identify factors explaining variation in agricultural land market prices in South Dakota.
- (2) develop econometric models to explain variation in farmland prices in (a) South Dakota and in (b) different regions of the state.
- (3) determine the significance of added location, financial and lender variables to explain variation in farmland prices, statewide and by region.
- (4) test for possible changes in structural relationships that may have occurred due to volatile changes (both increases and decreases) in agricultural land prices during this time period.

The time period examined includes three distinct trends in South Dakota agricultural land prices:

(1) farmland sale prices accelerating faster than the rate of general price inflation (1976-78).

(2) farmland prices increasing but at a rate less than the inflation rate (1979-mid-81), and

(3) declining farmland prices (late 1981-84).

Multiple regression and analysis of covariance are the statistical methods used to complete the objectives of this study. Cross sectional data from individual sale tracts are used to estimate the relationships between the dependent variable, deflated per acre farmland price, and selected explanatory variables.

Cross sectional farmland price models are developed for two levels of data aggregation: state and regions. Regional models based on Crop Reporting Districts in the state allow for price adjustments due to locally specific agricultural characteristics and other factors. Land tract, location and financial/lender explanatory variables are included in each model.

#### **DATA SOURCES AND LIMITATIONS**

Individual farmland sales tract data, collected by the Federal Land Bank of Omaha, Nebraska are used in this study to complete the research objectives. Officials at each Federal Land Bank Association (FLBA) office record information on all bonafide farmland sales known to them within their territory.

Farmland sales of 40 acres or more are recorded on prescribed "Farm and Ranch Sale Sheet". This sale sheet provides information on the location and legal description of the tracts, buildings, price paid, financing terms of the transaction, principal products, income potential and other key variables (a copy of the FLB farmland sale sheet is available in appendix 1).

A total of 7,202 farmland sales are analyzed in this study. The Federal Land Bank of Omaha recorded a total of 9,746 sales during the time period from January 1976 to June 1984. Out of 9,746 sales, 1,470 equity financed sales are deleted because only credit financed sales (mortgage and contract for deed) are examined in this study. Another 1,074 sales are deleted because of no information or unusable information on key explanatory variables including financing terms, agricultural land use or major enterprises.<sup>2</sup>

South Dakota has nine Crop Reporting Districts (CRDs) which have been regrouped into seven regions. All three western South Dakota CRDs have been combined into one region, because of the relatively low number of agricultural land sales in each of these districts. The regions used in this study are: southeast, east-central, northeast, north-central, central, south-central and western (Map 1).

## REVIEW OF EMPIRICAL LITERATURE

Explanation of farm real estate price variation has been an important topic in agricultural economic research. Researchers have used econometric analysis, with time series or cross sectional data at different levels of geographic aggregation (national, state, county or individual sale tract) to determine the factors influencing variation in farmland prices.

### Time Series Models - Selected Studies

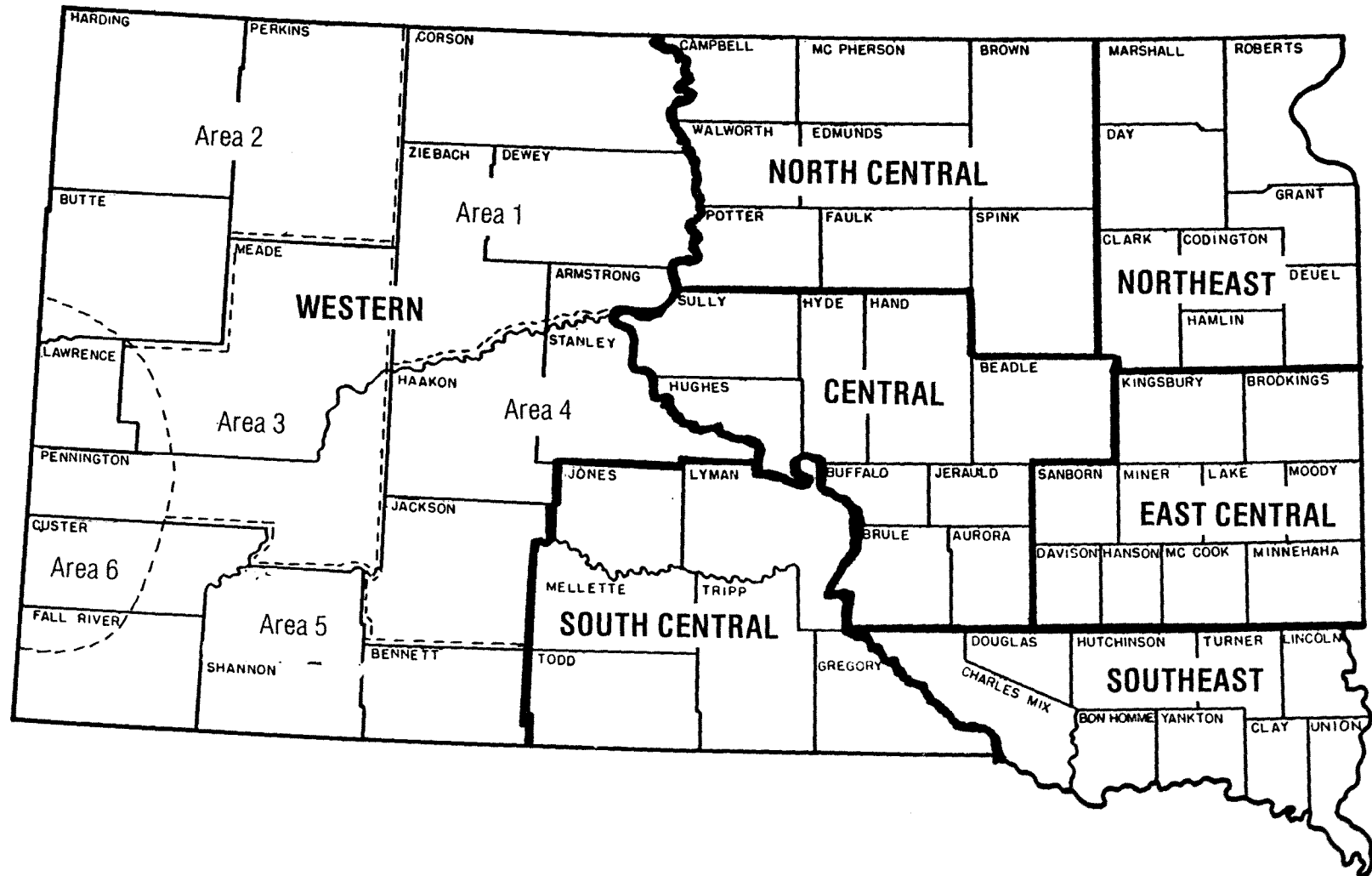
Modern econometric analysis of U.S. farmland prices developed in the 1960s with studies by Tweeten and Nelson (1966), Tweeten and Martin (1966), Herdt and Cochrane (1966), and Reynolds and Timmons (1969).

Tweeten and associates developed recursive models and found the main sources of land price increases were farm enlargement pressures, capitalized benefits of farm programs and capital gains expectations.

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<sup>2</sup>There were no significant differences between included and deleted sales concerning regional location, average tract size and price per acre per year. The included sales appear to be representative of major characteristics of all reported sales.

# Boundaries of Regions



Herdt and Cochrane, using a simultaneous equation model, found technological advances (productivity increases) to be the main sources of real price increases over time.

Time series results from recursive models developed by Reynolds and Timmons indicated that most of the land price variation was explained by expected capital gains, government farm program payments, farm enlargement and rates of return on common stock.

Duncan (1977) presented a single equation model to explain the farm real estate market in the U.S. He developed a time series model of the U.S. farmland values and used data from 1929 to 1975. He also found that farm enlargement pressures, expected capital gains and farm incomes were the main determinants of U.S. farmland prices.

Shalit and Schmitz (1984) investigated the impact on land prices of credit granted on the basis of net wealth. They mentioned that the accumulation of farm real estate debt accelerates the rate of increase of farmland values up to the level where the amount of debt burdens the farmers and forces them to sell some land. A growing number of forced sales leads to declining prices and strengthening of credit terms to reduce debt size. This cycling behavior of farm real estate debt destabilizes farmland values.

#### Cross Sectional Models - Selected Studies

Hammill (1969) used four variables (population/distance, crop production value index, percent rural nonfarm and percent urban) to explain variation in Minnesota county farm real estate values in 1959 and 1964. Location theory was the framework for a study of Indiana county farmland values. Nonfarm factors were found to influence farmland values through four variables: population density, transportation costs, property taxes and rural wages (Scharlach and Schuh, 1962).

Vollink (1978) divided North Carolina into four land market regions in order to analyze farmland sales data in 1975-1976 obtained from the Federal Land Bank of Columbia, South Carolina. He used a single equation model and tested the significance of explanatory variables including reason for purchase, size of tract, nonfarm influence, financier and pounds per acre of tobacco allotments. He found most of these variables had significant coefficients.

Carriker, et al (1984) used cross-sectional data furnished by the Federal Land Bank of Omaha for estimating Nebraska agricultural land prices from 1978 to 1982. They found that percent of land cultivated, percent in pasture, urban influence, irrigation and time were significant factors. Location variables, specified as county binary variables, were significant additional factors in their regional models. In all but one region, a structural change in coefficients occurred over this time period.

Janssen and Swinson (1985) developed several equations to explain variation in per-acre land price in four South Dakota counties. They compared two time periods, 1979-80 and 1981-82. Soil productivity, proportion of cultivated acres, location, distance to local and regional market centers and farm buildings were significant. Credit financing terms were not significant explanatory variables. Structural changes in farmland prices occurred between periods of rising and declining prices.

The inclusion of financial/credit variables in cross sectional studies represents growing interest in estimating impacts of financing terms on farmland prices.

The impact of financial variables on farmland prices in Iowa, Nebraska and South Dakota during the early and mid 1970's has been analyzed in two studies (Herr, 1975, Osburn and Johnson, 1978). The results indicated that financial variables did not significantly explain variation in farmland price level.

Swinson (1984) reached the same conclusion for two regions of South Dakota during a period of declining land prices and rapidly changing financial terms.

Thomson and Kaiser (1985) using a cross-sectional time series approach for a longer period of rising farmland prices (1971-1981). They found coefficients for "real" interest rates and percent borrowed were significant and negative while seller financing resulted in an increased deflated price per acre relative to financing by FLB and other institutional lenders. Their data set was provided by the Federal Land Bank of Columbia, SC and included over 3000 sales.

This study builds on earlier work by Swinson and Janssen and is closely related to the Carriker, et al study of Nebraska farmland markets. In turn, these studies incorporate many ideas from other studies reviewed herein.

## FARMLAND MARKET MODEL DEVELOPMENT

### Farmland Market Characteristics

Farmland markets, like most real-world markets, have several characteristics which do not meet the standards of a purely competitive market. Key characteristics of farmland markets are:

(1) Land is a heterogeneous product; each parcel has unique characteristics (location, soil productivity, improvements and amenities).

(2) Farmland is a spatially confined, highly durable resource with a very inelastic supply function in the relevant price range. Consequently transaction prices are largely determined by economic demand factors.

(3) Land is transferred in a localized market with relatively few buyers and sellers at any point in time. Approximately 3% of farmland parcels are transferred to new owners each year and most buyers are local farmers expanding their existing operation or purchasing their first tract.

(4) Transaction prices may be influenced by characteristics and motives of market participants and by differentiated credit terms. Most farmland sales are credit financed (75-90% of all tracts sold depending on year). The major sources of financing (sellers, FLB, FmHA, commercial banks and insurance companies) offer considerable variation in credit terms at any point in time (Carriker et al (1984), and Barlowe, 1971).

Farmland markets meet the standards of "workable competition" even though these markets are not purely competitive, (Kohls, Uhl 1985, p 188).

Agricultural economic researchers have identified several key factors that explain farmland price movement over time: expected returns from the land; farm technological advance; inflation; tax policy; price and income support programs and other institutional factors.

Researchers have also identified several factors that influence farmland prices in a given time period. The key factors are expected returns from the land, location, soil productivity, major enterprises or land uses, improvements, interest rates, population density and urbanization.

### Model Specifications

In this study, models are developed to examine statewide and regional variations in South Dakota farmland sale prices. The statewide model is used to explain farmland price and to test selected hypotheses for the entire state. Regional models are developed to explain farmland prices in each of seven regions in South Dakota (Map 1).

The unit of observation for estimation of all models are individual sale tracts. The statistical equation used in this study is:

$$PPA = b_o + b_i X1_i + b_j X2_j + b_k X3_k + e$$

where PPA = deflated per acre farmland price

$X1_i$  = land tract variables

$X2_j$  = location variables

$X3_k$  = financial/lender variables

$b_o$  = intercept

$b_i, b_j, b_k$  = beta coefficients, respectively, of land tract,  
location and financial/lender variables, and

$e$  = error term

Abbreviations, definitions, type and expected sign of all explanatory variables are shown in Table 1. Several explanatory variables assume continuous values while others are binary variables. For each set of binary variables (nonfarm influence, principal products, farm income security class, primary lender and regional/county location) one dummy variable is included in the intercept.

### Selection of Time Period and the Dependent Variable

The 1976-1984 time period is one of volatile changes in farmland prices and inflation and interest rates. For this reason these years were selected for analysis of South Dakota farmland price changes. Three major interrelated

Table 1. Abbreviations, types, expected sign, and definitions of variables used to analyze per-acre farmland price.

<u>Dependent Variable</u>	<u>Type<sup>a</sup></u>	<u>Exp. Sign<sup>b</sup></u>	<u>Definition</u>
PPA	C		Deflated per-acre farmland price (GNP-PCE adjusted)
<u>Explanatory Variables</u>			
<u>X1i = Land Tract Variables</u>			
Acres purchased	C	-	Number of acres purchased
Percent cropland	C	+	Percent of tract cultivated
Percent irrigated	C	+	Percent of tract irrigated
Dbvpa	C	+	Deflated building value per acre (GNP-PCE adjusted)
Product <sub>i</sub>	D	+	Principal product or enterprise
Nonfarm	D	+	Degree of nonfarm influence. If degree is estimated as moderate or great then nonfarm influence is present; otherwise, no influence is present.
Farm class	D	+	Farm income security class or income-stability measure. If security is listed as A or B, then farm class = 1; zero otherwise (See Appendix 1 - Farm and Ranch Sale Sheet)
Time	C	+	Month of sale (1 = January 1976.....102 = June 1984)
<u>X2j = Location Variables</u>			
Counties <sub>c</sub>	D	+	County binary variables included only in regional model. One county is in the intercept of each regional model.
Regions <sub>r</sub>	D	+	Regional binary variables are included only in the statewide model. The central region is in the intercept of the state model.
<u>X3k = Financial Variables</u>			
Percent financed (borrowed)	C	+	Percent of purchase price financed by lender
Percent cash seller received	C	-	Percent of purchase price seller received upon settlement
Real interest rate	C	-	Interest rate (inflation adjusted by previous 12 month percentage change in the GNP-PCE deflator) (1972 = 100)
Term Lender <sub>j</sub>	C	+	Note term, length measured in years Primary lender, where:
LSell			LSell = seller, which is included in the intercept
LFLB	D	-	LFLB = Federal Land Bank
LFmHA	D	-	LFmHA = Farmers Home Administration
LOther	D	-	LOther = All other lenders

<sup>a</sup>Type of variable: C = continuous variable  
D = binary (zero-one dummy) variable

<sup>b</sup>For each set of binary variables listed, one binary variable is included in the intercept.

<sup>b</sup>Expected sign of beta coefficient. For some variables, the expected sign varies by time period or specific location.

trends in farmland price changes, inflation rates and interest rates occurred during this period.

Farmland prices were rapidly increasing from 1976 to 1978. Nominal interest rates were relatively low and the general price inflation rate was increasing. From 1979 through mid-1981 real (inflation adjusted) farmland prices started to decline (but nominal land prices were still increasing) and interest rates increased.

The inflation rate also peaked in 1981. During this period, the Federal Reserve shifted to a tighter monetary policy which influenced the level of interest rates, exchange rates and other variables impacting farmland prices over time. After mid-1981, nominal and real farmland prices sharply declined, high nominal interest rates prevailed, the inflation rate declined rapidly, and real interest rates sharply increased.

The dependent variable, deflated per acre price, is used instead of nominal per acre price. This specification permits analysis of real price changes during a volatile economic time period. Deflated per acre price is calculated as the nominal per acre price divided by the GNP deflator index for personal consumption expenditures (GNP-PCE, 1972 = 100).

#### Selection of Explanatory Variables

Three categories of explanatory variables used in this model are land tract, location and financial/lender variables.

##### Land Tract Variables

Land tract variables describe land use characteristics and other tract-specific characteristics excluding location and financial/credit attributes. Specific land tract variables used in this study are acres purchased, percent cropland, percent irrigated, deflated building value per acre, principal products, nonfarm influence and farm class (Table 1).

The relationship between the number of acres purchased and per-acre farmland price is expected to be negative. Farmland buyers operate within a budget constraint which limits the size of tract they can purchase. Moreover, a high percentage of farm land is purchased for farm expansion. As a result, more buyers are interested in smaller tracts, so they can operate it within their existing operation.

Percent cropland in the sale tract is expected to show a positive influence on per-acre farmland price. In the same locality, the expected net return per acre of cropland is generally higher than expected net returns from pasture land.

Percent irrigated is also expected to have a positive relationship to the dependent variable.<sup>3</sup> The use of irrigation technologies has increased crop production. As a result, it potentially increases the income of owners and it reduces some production uncertainties.

The dependent variable, deflated per acre price, includes the estimated value of buildings on the tract. Building values are estimated by Federal Land Bank loan officers using a replacement cost (less depreciation) approach. Buildings usually (but not always) add value to a sale tract and a positive relationship to per acre farmland price is expected. The dominance of farm expansion buyers may cause many buyers to place a lower valuation on farm building sites. Building value is included on a per acre basis to determine the proportion of estimated building value recaptured. Building value per acre is deflated by the GNP-PCE deflator (1972 = 100).

Principal products raised on the tract are included as binary variables. Principal products are included because producers tend to select cropping

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<sup>3</sup>The variable percent irrigated is not included in the south central, central and east central regions because no credit-financed sale tracts in these regions contained irrigated acres.

patterns which provide the highest expected returns subject to some management, risk and technical constraints. Net returns per acre are expected to vary based on particular cropping patterns most suited to each tract. Principal products differ from region to region because of soil type, climate, management and other reasons. Detailed categories of principal products in the state model and regional models are shown in Table 2.

The nonfarm influence explanatory variable is included to show the direct impact of alternative uses of this farmland for residential, industrial, commercial or other nonfarm developmental purposes.<sup>4</sup> Farmland with conversion potential to these uses in the near future generally sells for a higher price.

Farm class is an income security measure developed by FLB officials to delineate tracts based on their relative income level and stability of income over time.<sup>5</sup> All sale tracts are classified by FLB official for its general income stability and the quality of the general area and surrounding properties. Only tracts with the highest classifications (A or B) are included in this binary variable and a positive relationship to per acre price is expected.

A monthly time trend variable is also included to reflect different sale dates, linear trends in deflated prices over time and future speculative trends in land price. The time variable coefficient is generally expected to show a positive sign in the 1976-78 period and a negative sign in the later time periods, although some regional differences may exist.

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<sup>4</sup>The nonfarm influence variable is not included in the South Central region in the 1979-81½ time period because no sale tracts were recorded where price was influenced by nonfarm factors.

<sup>5</sup>The farm class variable is only used in the southeast and east central regions. It is not present in other regions, because agriculture in the rest of South Dakota has higher yield/production risk.

Table 2. List of principal products used in state and regional models.

State and Regions	Principal Products <sup>a</sup>			
State	Pcowhay	Pcorn	Pwheat	Pgrain
Southeast	Pcowgrain	Pcorn	---	---
East-central	Pcowgrain	Pcorn	---	---
Northeast	Pcowhay	Pgraincorn	---	---
North-central	Pcowhay	Pgraincorn	Pwheat	---
Central	Pcowhay	Pgraincorn	Pwheat	---
South-central	Pcowhay	Pgraincorn	Pwheat	---
Western	Pcowhay	Pgraincorn	Pwheat	---

Where Pcorn = Corn or soybeans  
Pwheat = Spring wheat and winter wheat  
Pgraincorn = Corn, feed grains, and mixed grains  
Pgrain = Feed grains and mixed grains  
Pcowhay = Range cattle, other cattle, and roughage  
Pcowgrain = Range cattle, other cattle, roughage, and mixed grains

<sup>a</sup>Principal products in South Dakota vary by region, reflecting the diverse agriculture in the state. Pcowgrain is in the intercept of the southeast and east-central regional models. This variable includes all of the major products except corn or soybeans, which are included in the Pcorn variable.

In all other regions, the principal products of Pcorn and Pgrain are combined to form the principal product pgraincorn. Pcowhay is in the intercept of these regional models.

### Location Variables

Location binary variables are included to reflect differential spatial impacts of per-acre net returns, population density, property tax rates and other location specific attributes. County binary variables are used in the regional models, while regional binary variables are included in the statewide model.

### Financial/Lender Variables

Financial variables used in the model are percent financed (borrowed), percent cash seller received, real interest rate, term length and primary lenders.

Percent financed (borrowed) is the percent of purchase price financed by lenders. Term (years to repay) is the length of time to repay the note or contract. Percent financed and term are included to test how lower downpayment and longer repayment periods affect price per acre.

Both variables affect cash flow feasibility of farmland purchase and are generally believed to affect marketability of tracts. However, their significance in effecting price per acre is less certain.

In a capital budgeting framework, the expected sign of both coefficients depends on the relationship between the buyer's after-tax loan interest rate (ATLIR) and after-tax required rate of return (RRR). If ATLIR exceeds RRR, then percent financed and term length variables are expected to have negative coefficients. If RRR exceeds ATLIR then both variables are expected to have positive coefficients (Lins, et al 1981, pp. 121-128).

As the percent of purchase price financed increases, a lower downpayment is required. This may encourage a buyer to pay a higher price if the person perceives his discount rate as higher than ATLIR. In these circumstances, longer repayment periods decrease annual payments and allows the buyer to pay a higher price.

However, buyers willingness to pay more, because of these financing terms, may not be observed in actual sales transfer data if the level of buyer competition made it unnecessary to pay the maximum bid price. Furthermore, the buyer's discount rate and marginal tax rate are not observed variables. This implies the expected signs of both coefficients cannot be determined apriori.

The percent of cash received by the seller at time of settlement may also affect sale price per acre because of possible risk and income/capital gains tax implications for the seller. A negative coefficient is expected because of the impact of progressive marginal tax rates on major increases in annual income. Also, risk averse sellers (in contract for deed sales) may settle for a lower per acre price during periods of financial stress in exchange for a higher initial cash payment because of possible buyer default risk.

Price per acre is expected to decrease whenever the contract interest rate increase, due to total financing cost over the loan term. However, the contract interest rate is also highly correlated with the inflation rate and may not exhibit its expected sign.

The real interest rate is adjusted for inflation and is defined as the contract interest rate minus the inflation rate for the previous 12 months (Thompson and Kaiser, 1985). The previous inflation rate is estimated by the annual percentage change in the GNP-PCE deflator and is a proxy for the expected future inflation rate. A negative relationship is expected between real interest rates and per acre sale price.

The primary lender financing the sale is included to account for differences in financing terms by lender that are not incorporated into other financial variables. The Federal Land Bank (FLB), Farmers Home Administration (FmHA), sellers and other lenders (commercial banks, or insurance companies) are the categories of lenders developed in the model. Thompson and Kaiser (1985) found

that seller financed sales had a significantly higher per acre price than farmland financed by institutional lenders in the southeastern U.S. from 1971 to 1981. No prior assumption of the sign of specific lender coefficients is made in this study.

### Significance Tests for Added Sets of Variables

The collective contribution of added location variables and added financial/lender variables is examined by using an "added variables" F-test. This approach permits testing a subgroup of coefficients in a model and their collective added explanation of variance of the dependent variable. To perform the added variables test, three equations are defined as components of the complete model.

Equation	I is $PPA = f(X1_i)$	Land tract variables only
	II is $PPA = f(X1_i, X2_j)$	Land tract and location variables
	III is $PPA = f(X1_i, X2_j, X3_k)$	Land tract, location and financial/lender variables

Equation III represents the complete model specification while equations II and I are restricted subsets of the complete model. The statistical equation used to perform the F-test for the added county variables is:

$$F\text{-value} = \frac{(RSSE-USSE)/k}{USSE/n-p-1} \quad (\text{Johnston, p 192-199})$$

where RSSE = restricted error sum of squares of equation I

USSE = unrestricted error sum of squares of equation II (with  
added county variables)

k = number of added parameters in equation II less number of  
parameters in equation I

p = number of explanatory variables in unrestricted equation

n = number of sales (observations)

The denominator of this equation is equivalent to the unrestricted mean square error. The statistic is tested for a critical value of  $F_{\alpha}$  with k degrees of freedom in the numerator, n-p-1 the degrees of freedom in the denominator and  $\alpha$  is the probability level of significance ( $p=0.05$ ).

A similar statistical equation is used to compute the F-tests for the added financial/lender variables. In this case the restricted model is equation II while the unrestricted model is equation III.

The format for reporting empirical results of the statewide and regional models is to present coefficients and their standard errors for the complete model (equation III) and summarize the added variable tests for location and financial/lender variables. The adjusted  $R^2$  of each equation (I, II, III) for the state and regional models are reported in Appendix Table 1. A more complete analysis of coefficients for equation I and II are available in Haque (1986).

## EMPIRICAL RESULTS

### Review of Selected Statistics

Mean values of selected variables included in the state and regional models by time period are reported in Table 3.

A total of 7,202 farmland sales are included in the statewide model for the entire time period (January 1976 - June 1984) examined. Approximately one third of the transactions occur in each of the three subperiods.

The largest number of transactions are reported in the east-central and northeast regions (1,503 and 1,445 respectively). The southeast and north-central regions also show more than 1,100 transactions over the 8½ year period. These four regions account for 73% of farmland transactions.

Price per acre is highest in the southeast and east-central regions and lowest in the south-central and western regions. Mean sale prices in the

Table 3. Mean values of selected variables of state and regional models by time period.

Region	Time Period	# of Sales <sup>a</sup>	PPA <sup>b</sup> \$	# of Acres Purchased	Percent Cropland	Dbvpa \$	Percent Borrowed	Percent Cash	Real Interest	Years to Repay	Lsell <sup>c</sup> %	LFLB %	LFmHA %	Lothor %
State	1976-84	7202	287.02	349	68.1	17.96	80.4	55.9	2.37	19.2	53.9	35.2	7.3	3.6
	1976-78	2365	285.36	367	68.7	18.16	81.3	55.2	1.44	19.8	55.5	32.2	8.5	3.8
	1979-81½	2414	295.82	373	67.0	17.35	80.9	55.8	0.09	19.7	53.5	37.2	6.7	2.6
	1981½-84½	2423	279.88	309	68.4	18.37	78.9	56.6	5.56	18.2	53.0	36.2	6.6	4.2
Southeast	1976-84	1210	457.57	142	80.1	24.26	78.6	63.1	2.78	20.1	46.0	48.0	3.5	2.5
	1976-78	378	442.16	150	77.4	30.94	80.6	62.9	1.54	20.5	45.9	43.1	5.8	5.2
	1979-81½	373	501.71	150	80.4	23.78	79.6	62.0	0.27	20.3	46.5	51.1	1.6	.8
	1981½-84½	459	434.40	128	82.2	19.16	76.0	64.0	5.83	19.7	45.2	50.1	3.2	1.5
East-central	1976-84	1503	374.85	174	76.6	27.65	79.2	51.7	2.17	18.0	61.0	32.0	4.0	3.0
	1976-78	563	362.05	181	76.9	23.68	79.2	49.2	1.47	18.1	65.7	27.0	4.7	2.6
	1979-81½	474	389.72	183	76.0	26.88	79.7	51.0	-0.07	18.2	61.4	32.4	4.6	1.6
	1981½-84½	466	375.19	158	76.9	33.22	78.6	55.6	5.31	17.7	54.2	37.5	3.6	4.7
Northeast	1976-84	1445	266.65	224	71.3	16.81	82.3	52.9	2.21	18.9	55.2	31.4	8.8	4.6
	1976-78	516	251.60	232	71.9	16.01	83.5	52.1	1.27	19.5	55.4	30.6	10.8	3.2
	1979-81½	478	282.09	219	70.4	17.37	82.2	51.6	0.15	19.5	56.2	34.5	6.6	2.7
	1981½-84½	451	267.49	221	71.5	17.13	81.2	55.3	5.47	17.6	54.0	29.0	8.8	8.2
North-central	1976-84	1144	209.23	335	66.1	14.84	81.9	59.2	2.37	19.7	49.8	34.7	10.1	5.4
	1976-78	385	215.51	341	63.6	11.57	80.8	56.3	1.40	19.9	55.5	27.0	11.6	5.9
	1979-81½	390	206.45	366	63.1	14.28	83.9	63.4	0.16	20.6	45.3	38.2	11.2	5.3
	1981½-84½	369	205.62	296	71.9	18.85	80.0	57.8	5.72	18.6	48.7	39.2	7.3	4.8
Central	1976-84	681	186.10	413	62.8	7.74	80.0	59.8	2.61	20.0	49.7	40.0	8.3	2.0
	1976-78	183	200.98	423	65.0	7.27	80.0	60.8	1.55	22.1	48.3	40.9	8.7	2.1
	1979-81½	260	198.44	440	64.4	7.25	80.7	62.5	0.27	20.8	46.0	40.3	10.7	3.0
	1981½-84½	238	161.17	376	59.1	8.64	78.3	55.9	5.98	17.6	54.8	39.0	5.4	0.8
South-central	1976-84	560	155.68	513	52.1	5.07	81.6	53.3	2.10	19.1	57.6	27.1	12.5	2.8
	1976-78	161	165.66	663	53.5	5.77	83.0	59.2	1.42	20.4	50.5	31.6	13.6	4.3
	1979-81½	208	162.76	509	54.3	4.90	80.7	51.2	-0.10	19.4	59.7	27.4	11.0	1.9
	1981½-84½	191	139.57	392	48.8	4.66	81.6	50.7	5.07	17.9	61.4	23.0	13.0	2.6
Western	1976-84	659	169.17	1224	41.7	13.74	78.6	51.0	2.43	19.5	58.4	30.3	7.4	3.9
	1976-84	179	154.47	1529	44.0	16.42	80.9	51.8	1.61	21.2	54.4	34.0	8.3	3.3
	1979-81½	231	179.42	1250	41.1	15.17	78.2	47.9	-0.11	19.7	59.1	34.1	3.8	3.0
	1981½-84½	249	170.34	982	40.6	10.49	73.3	50.5	5.38	18.2	60.8	24.0	10.9	5.2

<sup>a</sup>Refers to number of credit-financed farmland transactions included in the analysis which is somewhat less than the total number of farmland sales.

<sup>b</sup>Deflated per-acre farmland price using the GNP-PCE index deflator (1972-100).

<sup>c</sup>The variable Lsell is included in the intercept term of each complete regional and state model.

south-central region are roughly one third of mean sale prices in the southeast region.

Deflated price per acre increased from 1976-81 and then declined in the mid 1981-84 period in all regions of eastern and western South Dakota. Peak mean prices occurred during the 1976-78 period in the north-central, central and south-central regions. The greatest absolute and percentage change in mean prices between time periods occurred in the southeast region.

The average number of acres purchased is roughly eight-nine times greater in the western region than in the east-central and southeast regions. Conversely, the lowest percentage of cropland sold per tract is in the western region, while predominantly cropland tracts are sold in the southeast and east-central regions. In general, the average number of acres sold and percent cropland are inversely related across regions.

Building values per acre (Dbvpa) are about 6% of average per-acre purchase price in South Dakota. The proportion of building value to purchase price is highest in the east-central region (6.5 - 8.5%) and lowest in the south-central region (3 - 3.5%).

There are few regional differences in mean values of credit financing terms. Real interest rate is the only financial variable with significant changes in mean values over time. Real interest rates are approximately zero in 1979-81 and exceeded 5% in all regions from late 1981-84.

Regional differences in real interest rates reflect different regional distributions of primary lenders and contract interest rates charged since the general inflation rate is assumed constant across regions.

Seller financing is the dominant source of financing in all regions except in southeast South Dakota, where the FLB has a slightly higher share of credit

financed sales. Seller financing and the FLB had a combined 82-95% share of credit financed sales in all regions.

Nonfarm influence (not shown in Table 3) is a factor in less than 3% of sales in all regions of eastern and central South Dakota. In western South Dakota, which includes the recreation and commercial development potential of the Black Hills, nonfarm influence is a factor in 10% of sales in this time period.

Irrigated tracts are found in the southeast, northeast, north-central and western regions. The mean value of percent of irrigated acres in the western region is 5% and is less than 1% in other regions.

#### Empirical Results - State Model

In the state model, most land tract and location variables are significant ( $p=0.10$  or less) in all time periods. Percent cropland, percent irrigated, deflated building values per acre, nonfarm, farm class and principal products of corn and wheat are significant land tract variables in all time periods. Acres purchased and grain product variables are significant and have negative coefficients in all except one period (Table 4).

The added location variables are collectively significant at the 0.01 confidence level in all time periods. The southeast, east-central and northeast regions have the largest positive coefficients relative to the central region in all time periods. Furthermore, the magnitude of these coefficients increased sharply between the first and second period, indicating real farmland prices were rising more rapidly in eastern South Dakota.

The north-central region also shows a positive and significant coefficient while a negative and nonsignificant coefficient is generally shown in the south-central region. In most periods, farmland sale prices are significantly lower in the western region than in the central region.

Table 4. Results of final equation model for South Dakota.

Parameter	1976 - 1984		1976 - 1978		1979 - 1981½		1981½ - 1984½	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	91.725	8.733 ***	81.543	13.737 ***	111.019	15.654 ***	147.026	14.796 ***
<u>Land Tract Variables</u>								
Acres purchased	-0.0042	0.0015***	-0.0014	0.0019	-0.0089	0.0033***	-0.0082	0.0031***
Percent cropland	1.735	0.061 ***	1.597	0.094 ***	1.865	0.110 ***	1.606	0.107 ***
Percent irrigated	1.897	0.166 ***	1.751	0.283 ***	2.249	0.295 ***	1.551	0.269 ***
Dbvpa	1.009	0.022 ***	1.055	0.035 ***	1.056	0.041 ***	0.900	0.037 ***
Time	0.132	0.055 **	0.969	0.185 ***	0.026	0.259	-3.103	0.306 ***
Pcorn	71.215	5.615 ***	88.303	8.839 ***	78.449	10.101 ***	50.897	9.757 ***
Pwheat	-34.228	5.119 ***	-26.136	7.707 ***	-48.885	9.118 ***	-24.377	9.282 ***
Pgrain	-29.342	5.139 ***	-31.432	7.811 ***	-52.995	9.288 ***	-7.192	9.083 **
Nonfarm	174.302	8.275 ***	167.999	12.976 ***	199.295	15.264 ***	144.388	14.360 ***
Farm class	210.433	5.854 ***	210.052	10.454 ***	211.300	11.201 ***	207.374	8.825 ***
<u>Location Variables</u>								
Southeast	113.388	5.705 ***	77.962	9.429 ***	132.840	10.000 ***	127.808	9.747 ***
East-central	92.512	5.300 ***	59.518	8.823 ***	88.261	9.238 ***	111.232	9.080 ***
Northeast	70.335	5.034 ***	42.111	8.204 ***	89.737	8.788 ***	74.218	8.740 ***
North-central	20.799	5.110 ***	16.496	8.590 **	22.076	8.796 **	18.496	8.618 **
South-central	-3.205	5.928	-23.833	10.145 **	7.363	10.129	-3.715	10.003
Western	-16.199	5.986 ***	-28.614	10.247 ***	-5.475	10.454	-19.592	9.948 **
<u>Financial Variables</u>								
Percent financed	-0.043	0.080	0.006	0.128	-0.241	0.145 *	-0.055	0.138
Percent cash seller received	-0.217	0.074 ***	-0.255	0.120 **	-0.449	0.137 ***	-0.396	0.126 ***
Real interest rate	-5.361	0.555 ***	5.904	1.994 ***	3.135	1.589 **	0.009	1.523
Term	0.186	0.186	0.209	0.309	0.547	0.324 *	-0.0026	0.315
LFLB	8.557	5.829	-3.465	9.413	7.964	10.364	11.766	9.934
LFmHA	-13.271	7.938 *	-5.131	13.161	3.877	14.170	-1.669	13.569
Lother	17.652	8.048 **	4.653	13.010	12.784	15.581	9.021	13.064
<u>Summary statistics</u>								
	N = 7202		N = 2364		N = 2414		N = 2423	
	Dep. Mean = 287.023		Dep. Mean = 285.360		Dep. Mean = 295.826		Dep. Mean = 279.882	
	R <sup>2</sup> = 0.678		R <sup>2</sup> = 0.713		R <sup>2</sup> = 0.694		R <sup>2</sup> = 0.685	
	R <sup>2</sup> = 0.677		R <sup>2</sup> = 0.710		R <sup>2</sup> = 0.691		R <sup>2</sup> = 0.682	
	RMSE = 102.989		RMSE = 92.483		RMSE = 106.962		RMSE = 100.671	
	F = 659.028		F = 253.065		F = 235.930		F = 227.560	
Summary: Added Variable Tests:								
Location	F = 114.42***		F = 26.83***		F = 48.56***		F = 51.28***	
Financial/Lender	F = 21.58***		F = 3.93***		F = 3.45***		F = 4.48***	

Level of Significance \*\*\* = .01, \*\* = .05, \* = .10  
Intercept = Central region

Financial/lender variables are collectively significant in all time periods, but only real interest rates and percent cash seller received are individually significant in most time periods. The lender variable coefficients for FmHA and other lender are significant in the entire time period but nonsignificant in the three subperiods. There appears to be little support for the perception that seller financed tracts are sold at a premium price relative to mortgage financed tracts.<sup>6</sup>

The final equation model explained between 67.8% and 71.3% ( $R^2 = 0.678$  to  $0.713$ ) of South Dakota farmland price variation in each period. The adjusted  $R^2$  statistic, which accounts for variation in number of parameters and degrees of freedom in each equations varied, from 0.677 to 0.710. All final equation models are highly significant ( $p=.01$ ).

#### Empirical Results - Regional Models

For each region, a summary of statistical tests for added location and financial/lender variables are shown in Table 5. Final equation results of each regional model by time period are shown in Tables 6.1 - 6.7. Overall findings from the regional models are presented first, followed by a discussion of highlights from each regional model. Table 5 and 6.1-6.7 are presented after the overall findings are discussed and prior to discussion of highlights in each regional model.

#### Land Tract Variables

Most land tract variables are significant explanatory variables in all

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<sup>6</sup>The coefficient for LFLB and Lother are positive in most periods, indicating that private lender mortgage financed sales commanded higher per-acre prices than seller financed sales. However, the positive coefficients are generally not statistically significant.

regional models in all time periods.<sup>7</sup> The magnitude of specific coefficients varies considerably among regions and across time periods. Percent cropland and building value per acre (deflated) have positive and significant coefficients in all time periods in all regional models. The magnitude of the percent cropland coefficient varies from 1.5 - 3.5 in eastern South Dakota to 0.5 - 1.2 in the other regional models. It is consistent with relative price differences between cropland and pasture tracts in eastern South Dakota and other regions of the state.

Percent of tract irrigated has a positive and significant coefficient in almost all time periods and in all regional models where it is included. In each region, the magnitude of this coefficient is highest during the time period when farmland prices peaked.

The number of acres purchased is inversely related to sale price in all regions. It is a significant variable for the entire time period in models for the east-central, northeast, central and south central regions. The coefficient for this variable is not significant in the 1976-1978 subperiod in any model.

Principal products were significant variables in most time periods in all except the southeast and north-central regional models. The diversity of principal products across regions made it impossible to use identical sets of principal products across all regions. In most regions, there was considerable variation in magnitude of coefficients across time periods. This finding probably reflects changing relative profitability of various farm products.

Farm income security class has a highly significant and positive coefficient in all time periods in the two regions (southeast and east-central)

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<sup>7</sup>The phrase "entire time period" refers to examination of coefficients for the 1976-84 time period equation but does not refer to any of the subperiod equations. The phrase "all time periods" refers to examination of coefficients in all subperiod (1976-78, 1979-81½, 1981½-84) equations and for the overall (1976-84) time period.

in which it could be included. In both regions, the magnitude of this coefficient increased during the 1981-84 period of declining farmland prices. This implies that tracts with greater income stability potential have higher differential prices during initial periods of declining farmland prices.

Nonfarm influence is almost always a significant variable with a positive coefficient.

#### Different Time Trends

The time trend coefficient is significant over the entire time period (1976-1984) in all models except for the western region. During this 8½ year period, there is a positive and significant time trend in real prices of farmland in eastern South Dakota (southeast, east-central and northeast regions). Negative time trend in all other regions of South Dakota (Tables 6.1-6.7).

There are regional differences in the sign of the time trend coefficient across the three subperiods. The time trend coefficient is negative in all periods in the south-central and western regions, with the greatest magnitude in the 1981-84 period. This indicates that real farmland prices were declining in these regions since 1976, even though nominal farmland prices were increasing for several years after 1976.

The time trend coefficient is positive from 1976-78 in the central and north-central region and negative thereafter. In the eastern South Dakota regions, the time trend coefficient is positive in the first and middle subperiod (1976-1981½) and negative in the last subperiod (1981½-1984). In the high inflation, high interest rate period of 1979-81½, real farmland prices were increasing only in eastern South Dakota.

### Location Variables

Location variables are collectively significant at the 0.01 confidence level in all regions over the 1976-84 time period. Location variables are also collectively significant at the 0.01 confidence level in each subperiod in all except the central (1976-78) and western (1979-84) regional models (Table 5). This finding indicates that location specific attributes are significant factors in explaining farmland price variation across and within different regions of South Dakota.

### Financial/Lender Variables

Financial/lender variables are not an important set of explanatory variables in most regional models, especially compared to their results in the state model. For the entire 1976-84 period, added financial/lender variables are collectively significant at the 0.01 confidence level in eastern South Dakota (southeast, east-central and northeast regions). They are also collectively significant at the 0.05 level in north-central and central regions and nonsignificant in all other regions (Table 5).

Financial/lender variables are not significant in most subperiods in any region. In general, the longer the time period examined the more likely that financial variables are collectively significant.

Regional differences in the collective level of significance of financial/lender variables during the entire 1976-84 period may be associated with regional differences in real price trends. For example, real price trends in eastern South Dakota are positive and significant from 1976-81 and negative in the last period; financial/lender variables are collectively significant at the 0.01 confidence level.

In the north-central and central regions, financial/lender variables are collectively significant at the 0.05 confidence level, while real price trends

are positive from 1976-78 and negative thereafter. In the south-central and western regions, real price trends are negative throughout the entire time period and financial/lender variables are collectively nonsignificant. This association may indicate that sellers and institutional lenders were responding to different real price trends across regions.

Real interest rate coefficients are negative and significant in all except the south-central region in the 1976-84 period. Real interest rate coefficients are seldom significant in regional models at even the 0.10 confidence level in any subperiod. This finding contrasts with the state model where real interest rate coefficients are significant in each subperiod. It may reflect regional differences in contract interest rates charged by lenders in each period.

Coefficients for percent cash received by seller show negative signs in most models but are significant only in selected time periods in the east-central and northeast regions. Coefficients for percent financed and loan term length are not significant in most regional models and time periods.

In general, farmland prices are not significantly different between seller financed contracts and each of the mortgage lenders (FLB, FMHA and other). The negative FmHA coefficient is significant for the 1976-84 period in the southeast and northeast regions. In the east-central region the coefficient for FLB is positive and significant for the entire period and the middle (1979-81) subperiod when farmland prices peaked.

Overall there is little evidence that buyers paid significantly more for seller financed tracts than for mortgage financed tracts. This finding contrasts with results obtained by Thompson and Kaiser (1985). Their results indicated seller financed tracts sold in the southeastern U.S. from 1971 to 1981 at significantly higher prices than tracts financed by other sources. Some of the difference may be due to different model specifications and the time period

selection. The contrasting results may also imply different forms of market competition between sellers and institutional lenders in South Dakota compared to the southeastern U.S. At a minimum, it indicates that sweeping conclusions concerning the impact of seller financing are not warranted.

#### Explanatory power

The explanatory power of equations varied considerably between regions. The model for the east-central region had the most consistent adjusted  $R^2$  between periods (0.710-0.729). It also had the highest or second highest adjusted  $R^2$  in each period among all regions. The lowest adjusted  $R^2$  in each period is from the central regional model. This is the only region where the adjusted  $R^2$  is below 0.50 in any period. The western regional model had the greatest inter-period differences in explanatory power.

#### Highlights from each Regional Model <sup>8</sup>

##### Southeast region

In this region, the variables of percent cropland, percent irrigated tract, per acre building values, nonfarm influence and farm income security class have positive and significant coefficients in all time periods. The time trend coefficient is positive and significant from 1976-81 and is negative and significant in the mid 1981-84 period (Table 6.1).

The added county variables are collectively significant at the 0.01 confidence level in all time periods (Table 5). Individually, all county coefficients, except Douglas, are positive and significant in all periods. This implies higher average farmland prices in these counties than in Charles Mix County, whose coefficient is included in the intercept.

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<sup>8</sup> Readers interested only in overall findings, conclusions and implications may wish to skip this section, which is intended for readers interested in findings in specific regional models.

Table 5. Summary of statistical tests for added location and financial/lender variables in the regional models.

Regional Model	Added Location Variables				Critical	F-value <sup>a</sup>
	1976-84	1976-78	1979-81½	1981½-84½	P = .01	P = .05
	--Calculated F-values--					
Southeast	60.85***	17.94***	17.90***	17.22***	2.51-2.66	1.94-2.02
East-central	76.18***	26.67***	26.78***	30.58***	2.41-2.56	1.88-1.96
Northeast	38.44***	17.73***	15.96***	16.79***	2.64-2.79	2.01-2.09
North-central	46.73***	14.70***	14.49***	20.86***	2.64-2.79	2.01-2.09
Central	8.04***	2.55**	4.47***	4.19***	2.64-2.79	2.01-2.09
South-central	13.80***	3.64***	4.38***	12.29***	3.02-3.17	2.29-2.37
Western	7.20***	5.68***	2.15	2.36**	3.02-3.17	2.29-2.37

	Added Financial/Lender Variables					
	1976-84	1976-78	1979-81½	1981½-84½		
	--Calculated F-values--					
Southeast	17.57***	2.36**	1.82	3.91***	2.64-2.79	2.01-2.09
East-central	9.48***	0.42	1.40	1.58	2.64-2.79	2.01-2.09
Northeast	11.32***	3.48***	2.48**	2.24**	2.64-2.79	2.01-2.09
North-central	2.46**	0.97	0.29	1.63	2.64-2.79	2.01-2.09
Central	2.65**	2.16**	0.33	0.86	2.64-2.79	2.01-2.09
South-central	0.82	0.94	1.04	3.02***	2.64-2.79	2.01-2.09
Western	1.01	2.06*	0.86	1.18	2.64-2.79	2.01-2.09

Level of significance: \*\*\* = .01, \*\* = .05

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The critical F-value sare set at the 0.01 and 0.05 level of significance.  
The range of critical F-values is for degrees of freedom from 120 to .

The number of observations and parameters of each equation for each regional model is obtained from data in Tables 6.1 - 6.7.

Table 6.1. Results of final equation for southeast region.

Parameter	1976 - 1984		1976 - 1978		1979 - 1981½		1981½ - 1984½	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	97.597	29.424 ***	109.677	46.391 **	4.863	65.625	273.469	42.947 ***
<u>Land Tract Variables</u>								
Acres purchased	-0.080	0.037 **	-0.100	0.066	0.005	0.064	-0.100	0.060 *
Percent cropland	2.798	0.190 ***	2.486	0.302 ***	3.503	0.383 ***	2.480	0.284 ***
Percent irrigated tract	2.610	0.428 ***	2.736	0.664 ***	1.760	0.956 *	2.440	0.581 ***
Dbvpa	0.752	0.058 ***	0.789	0.080 ***	0.797	0.131 ***	0.738	0.095 ***
Time	0.643	0.176 ***	2.126	0.566 ***	0.499	0.968	-5.039	0.869 ***
Pcorn	-13.333	13.171	-36.492	23.783	12.607	25.247	-19.506	19.147
Nonfarm	213.759	24.763 ***	171.331	34.263 ***	323.643	47.025 ***	94.958	49.212 *
Farm class	85.230	11.895 ***	66.512	20.698 ***	77.355	24.190 ***	116.532	16.074 ***
<u>Location Variables</u>								
Yankton County	159.245	19.019 ***	153.543	30.619 ***	239.463	38.813 ***	99.453	28.995 ***
Bon Homme County	46.205	18.098 ***	49.488	30.877	21.475	36.153	48.744	26.988 *
Hutchinson County	75.593	17.635 ***	108.525	28.948 ***	68.637	33.867 **	55.251	27.606 **
Douglas County	15.765	20.244	13.281	28.388	-2.256	43.264	30.299	32.353
Union County	289.999	20.471 ***	327.591	34.343 ***	321.859	39.767 ***	217.748	31.705 ***
Clay County	241.203	19.894 ***	286.729	36.396 ***	207.416	37.318 ***	215.332	29.542 ***
Lincoln County	250.765	19.261 ***	293.476	33.389 ***	268.132	37.558 ***	195.866	28.986 ***
Turner County	195.238	18.547 ***	186.245	31.422 ***	217.021	36.168 ***	170.767	28.055 ***
<u>Financial Variables</u>								
Percent financed	-0.371	0.233	-0.370	0.384	0.137	0.548	-0.842	0.307 ***
Percent cash seller received	-0.218	0.261	-0.359	0.457	-0.731	0.529	-0.292	0.386
Real interest rate	-16.776	1.767 ***	-1.855	7.129	3.121	7.642	-3.417	4.809
Term	1.066	0.616 *	-0.673	0.995	1.551	1.251	1.327	0.918
LFLB	-14.271	19.047	-2.131	33.881	-27.084	34.357	-31.871	28.804
LFmHA	-52.023	29.417 *	23.830	49.757	-34.107	71.325	-72.517	45.211
Lothor	34.792	29.652	4.221	41.119	101.824	94.311	91.973	49.436 *
<u>Summary statistics</u>								
	N = 1210		N = 378		N = 373		N = 459	
	R <sup>2</sup> = 0.668		R <sup>2</sup> = 0.758		R <sup>2</sup> = 0.654		R <sup>2</sup> = 0.707	
	R <sup>2</sup> = 0.661		R <sup>2</sup> = 0.742		R <sup>2</sup> = 0.631		R <sup>2</sup> = 0.691	
	Dep. Mean = 457.576		Dep. Mean = 442.165		Dep. Mean = 501.709		Dep. Mean = 434.404	
	RMSE = 124.333		RMSE = 109.416		RMSE = 141.179		RMSE = 105.546	
	F = 103.880		F = 48.252		F = 28.729		F = 45.700	

Level of significiance: \*\*\* = .01, \*\* = .05, \* = .10

Intercept = Charles Mix County

Table 6.2. Final equation for east-central region.

Parameter	1976 - 1984		1976 - 1978		1979 - 1981½		1981½ - 1984½	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	235.756	22.184 ***	147.231	39.801 ***	308.109	43.577 ***	281.854	35.206 ***
<u>Land Tract Variables</u>								
Acres purchased	-0.0792	0.0244***	-0.0014	0.0410	-0.0982	0.0372***	-0.1606	0.0527***
Percent cropland	1.789	0.129 ***	1.811	0.223 ***	1.529	0.243 ***	1.934	0.213 ***
Dbvpa	0.971	0.041 ***	1.153	0.078 ***	1.019	0.077 ***	0.876	0.062 ***
Time	0.217	0.122 *	1.277	0.440 ***	0.408	0.596	-3.300	0.906 ***
Pcorn	25.168	7.659 ***	39.486	14.888 ***	28.439	17.432 *	48.246	17.530 ***
Nonfarm	238.672	23.534 ***	230.917	32.504 ***	257.184	49.274 ***	169.493	49.369 ***
Farm class	154.546	13.147 ***	98.964	26.754 ***	182.398	25.723 ***	152.268	18.374 ***
<u>Location Variables</u>								
Minnehaha County	105.968	9.853 ***	149.909	16.016 ***	84.161	17.639 ***	69.945	22.193 ***
Davidson County	-101.275	15.117 ***	-63.097	25.942 **	-135.050	27.723 ***	-93.697	30.554 ***
Hanson County	-102.751	15.440 ***	-61.395	25.716 **	-131.189	31.161 ***	-121.024	31.294 ***
Kingsbury County	-116.076	10.594 ***	-88.919	17.469 ***	-143.262	21.724 ***	-118.558	18.245 ***
Lake County	-34.411	11.688 ***	-29.438	16.237 *	-71.093	23.915 ***	-9.870	22.870
McCook County	-68.878	10.113 ***	-56.716	17.029 ***	-91.465	17.178 ***	-82.231	23.194 ***
Miner County	-145.293	11.421 ***	-113.133	19.450 ***	-184.265	23.871 ***	-115.532	21.204 ***
Moody County	75.595	10.300 ***	51.490	16.055 ***	85.393	21.461 ***	84.622	17.099 ***
Sanborn County	-134.769	14.044 ***	-107.529	31.120 ***	-169.408	23.643 ***	-148.705	25.898 ***
<u>Financial Variables</u>								
Percent financed	0.117	0.595	0.143	0.336	0.000	0.378	0.067	0.320
Percent cash seller received	-0.365	0.193 *	-0.141	0.320	-0.931	0.397 **	-0.707	0.325 **
Real interest rate	-9.385	1.292 ***	4.100	4.949	7.121	4.488	0.204	4.497
Term	-0.287	0.469	-0.273	0.834	-0.164	0.863	-0.090	0.749
LFLB	41.573	15.591 ***	1.220	27.033	70.881	29.172 **	27.577	26.271
LFmHA	17.745	20.933	9.150	35.007	60.465	40.097	35.760	36.761
Lothar	24.543	18.393	25.119	31.967	27.101	41.707	16.606	27.251
<u>Summary statistics</u>								
	N = 1503		N = 563		N = 474		N = 466	
	R <sup>2</sup> = 0.713		R <sup>2</sup> = 0.722		R <sup>2</sup> = 0.742		R <sup>2</sup> = 0.738	
	R <sup>2</sup> = 0.709		R <sup>2</sup> = 0.710		R <sup>2</sup> = 0.729		R <sup>2</sup> = 0.725	
	Dep. Mean = 374.853		Dep. Mean = 362.057		Dep. Mean = 389.720		Dep. Mean = 375.192	
	RMSE = 100.807		RMSE = 97.373		RMSE = 101.076		RMSE = 97.107	
	F = 160.138		F = 61.074		F = 56.518		F = 54.342	

Level of significance: \*\*\* = .01, \*\* = .05, \* = .10

Intercept = Brookings County

Table 6.3. Results of final equation for northeast region.

Parameter	1976 - 1984		1976 - 1978		1979 - 1981½		1981½ - 1984½	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	152.399	15.056 ***	133.976	21.349 ***	165.039	26.434 ***	287.580	28.992 ***
<u>Land Tract Variables</u>								
Acres purchased	-0.0250	0.0109**	-0.0085	0.0158	-0.0056	0.0197	-0.0513	0.0193***
Percent cropland	1.808	0.085 ***	1.471	0.126 ***	1.850	0.152 ***	1.966	0.155 ***
Percent irrigated tract	1.638	0.533 ***	0.727	0.628	2.633	0.916 ***	1.766	1.546
Dbvpa	0.995	0.047 ***	0.788	0.084 ***	1.138	0.069 ***	0.922	0.088 ***
Time	0.461	0.087 ***	0.557	0.254 **	0.919	0.411 **	-2.561	0.516 ***
Pgrncrn	19.459	7.236 ***	42.510	10.869 ***	35.735	14.161 ***	-4.037	11.995
Nonfarm	72.595	19.384 ***	78.336	23.139 ***	-12.501	37.765	163.621	44.032 ***
<u>Location Variables</u>								
Marshall County	-19.819	10.408 *	25.721	14.424 *	-13.477	19.552	-84.230	19.300 ***
Roberts County	-9.098	8.438	25.126	12.018 **	16.552	15.624	-80.669	15.181 ***
Day County	-80.348	9.775 ***	-39.434	13.994 ***	-57.479	18.816 ***	-142.444	17.111 ***
Grant County	-36.158	7.062 ***	-29.031	10.613 ***	-41.343	12.119 ***	-52.497	12.808 ***
Clark County	-93.776	7.420 ***	-81.008	9.910 ***	-89.575	14.037 ***	-120.138	14.136 ***
Codington County	-66.742	7.443 ***	-40.400	11.053 ***	-93.553	13.166 ***	-90.063	13.306 ***
Hamlin County	-37.766	7.337 ***	-6.006	11.075	-45.592	12.222 ***	-83.423	13.791 ***
<u>Financial Variables</u>								
Percent financed	-0.084	0.131	-0.215	0.201	-0.287	0.245	-0.318	0.256
Percent cash seller received	-0.328	0.114 ***	-0.445	0.171 ***	-0.396	0.213 *	-0.243	0.207
Real interest rate	-4.585	0.914 ***	3.390	2.704	3.137	2.478	-2.838	2.429
Term	0.688	0.305 **	1.183	0.471 ***	0.494	0.499	0.790	0.596
LFLB	2.366	8.872	-11.012	12.142	1.464	15.733	4.085	18.523
LFmHA	-30.150	12.436 **	-17.412	17.983	-26.963	22.681	-38.508	23.914
Lothar	13.637	12.059	9.208	20.551	3.462	23.700	9.873	20.393
<u>Summary statistics</u>								
	N = 1445		N = 516		N = 478		N = 451	
	R <sup>2</sup> = 0.524		R <sup>2</sup> = 0.516		R <sup>2</sup> = 0.613		R <sup>2</sup> = 0.573	
	R <sup>2</sup> = 0.517		R <sup>2</sup> = 0.496		R <sup>2</sup> = 0.595		R <sup>2</sup> = 0.553	
	Dep. Mean = 266.649		Dep. Mean = 251.6		Dep. Mean = 282.098		Dep. Mean = 267.493	
	RMSE = 74.012		RMSE = 62.693		RMSE = 74.462		RMSE = 74.613	
	F = 74.745		F = 25.136		F = 34.461		F = 27.513	

Level of significance: \*\*\* = .01, \*\* = .05, \* = .10

Intercept = Deuel County

Table 6.4. Results of final equation for north-central region

Parameter	1976 - 1984		1976 - 1978		1979 - 1981½		1981½ - 1984½	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	208.390	10.115 ***	188.809	16.429 ***	187.355	17.807 ***	214.832	18.377 ***
<u>Land Tract Variables</u>								
Acres purchased	-0.0003	0.0033	0.0032	0.0061	0.0019	0.0042	-0.0296	0.0105***
Percent cropland	0.939	0.068 ***	1.021	0.114 ***	0.849	0.115 ***	0.810	0.126 ***
Percent irrigated tract	1.442	0.244 ***	1.926	0.480 ***	0.998	0.432 **	1.495	0.374 ***
Dbvpa	0.875	0.028 ***	0.956	0.061 ***	0.804	0.052 ***	0.875	0.041 ***
Time	-0.399	0.066 ***	0.122	0.253	-0.682	0.322 **	-2.019	0.391 ***
Pgrncrn	9.221	7.475	18.169	13.266	-1.928	12.542	1.617	13.174
Pwheat	4.749	4.880	-1.919	8.218	13.569	7.852 *	2.964	9.270
Nonfarm	104.307	10.007 ***	123.943	15.620 ***	73.896	14.876 ***	134.959	25.762 ***
<u>Location Variables</u>								
McPherson County	-76.005	5.565 ***	-68.384	9.039 ***	-68.710	9.235 ***	-81.118	10.846 ***
Spink County	-27.545	5.311 ***	-27.265	11.365 **	-5.179	9.505	-43.254	7.787 ***
Campbell County	-78.794	6.928 ***	-70.427	11.420 ***	-70.136	12.469 ***	-85.472	12.075 ***
Potter County	-58.675	5.992 ***	-48.680	11.379 ***	-46.757	10.263 ***	-72.225	9.463 ***
Faulk County	-67.577	5.894 ***	-67.416	9.505 ***	-49.587	9.659 ***	-93.996	11.633 ***
Edmunds County	-60.240	5.225 ***	-53.448	8.459 ***	-53.646	8.552 ***	-72.945	10.484 ***
Walworth County	-52.336	6.494 ***	-30.960	10.119 ***	-65.732	10.902 ***	-58.002	13.613 ***
<u>Financial Variables</u>								
Percent financed	-0.218	0.100 **	-0.286	0.168 *	-0.163	0.172	0.010	0.188
Percent cash seller received	-0.097	0.085	-0.031	0.157	-0.062	0.159	-0.247	0.145 *
Real interest rate	-1.357	0.652 **	2.969	2.450	-0.267	1.551	0.972	1.950
Term	0.353	0.214	0.125	0.361	0.319	0.377	0.460	0.380
LFLB	0.061	6.784	-5.163	12.187	-0.087	12.726	6.958	10.819
LFmHA	-6.591	8.872	0.028	15.232	-3.532	15.812	-8.366	16.269
Lothar	-1.274	8.635	1.454	14.717	-3.118	14.931	-19.966	15.734
<u>Summary statistics</u>								
	N = 1144		N = 385		N = 390		N = 369	
	$R^2 = 0.674$		$R^2 = 0.683$		$R^2 = 0.653$		$R^2 = 0.752$	
	$\bar{R}^2 = 0.668$		$\bar{R}^2 = 0.664$		$\bar{R}^2 = 0.633$		$\bar{R}^2 = 0.737$	
	Dep. Mean = 209.237		Dep. Mean = 215.514		Dep. Mean = 206.454		Dep. Mean = 205.628	
	RMSE = 50.905		RMSE = 49.055		RMSE = 49.454		RMSE = 50.261	
	F = 105.594		F = 35.552		F = 31.517		F = 47.896	

Level of significance: \*\*\* = .01, \*\* = .05, \* = .10

Intercept = Brown County

Table 6.5. Results of final equation for central region.

Parameter	1976 - 1984		1976 - 1978		1979 - 1981½		1981½ - 1984½	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	182.257	11.482 ***	166.915	23.182 ***	174.730	19.719 ***	161.757	14.379 ***
<u>Land Tract Variables</u>								
Acres purchased	-0.0118	0.0037***	-0.0105	0.0095	-0.0137	0.0061**	-0.0082	0.0042**
Percent cropland	0.598	0.074 ***	0.590	0.148 ***	0.513	0.143 ***	0.566	0.084 ***
Dbvpa	0.763	0.072 ***	0.776	0.158 ***	0.817	0.130 ***	0.804	0.077 ***
Time	-0.357	0.085 ***	0.564	0.387	-0.525	0.370	-1.542	0.271 ***
Pgrncrn	21.971	5.864 ***	6.957	10.584	34.319	11.128 ***	10.397	7.142
Pwheat	4.011	6.235	-0.445	12.646	2.880	11.431 ***	3.890	7.190
Nonfarm	67.191	15.493 ***	8.564	23.662	224.455	31.045	-6.314	23.031
<u>Location Variables</u>								
Sully County	-12.265	6.921 *	-8.287	15.018	-6.957	12.016	-10.108	7.949
Hyde County	-42.820	8.016 ***	-55.991	16.504 ***	-35.243	15.655 **	-31.476	8.467 ***
Hand County	-28.015	6.401 ***	-24.199	15.206	-30.686	10.811 ***	-21.492	7.158 ***
Hughes County	-1.739	6.769	-8.089	15.135	19.359	11.798	-18.760	7.701 **
Buffalo-Jerauld County	-28.668	7.462 ***	-29.788	18.680	-24.600	13.916 *	-26.389	7.470 ***
Brule County	-30.972	7.762 ***	-34.681	13.156 ***	-33.748	16.563 **	-6.372	9.327
Aurora County	-10.403	7.152	-19.143	11.539 *	15.873	16.427	-6.774	8.886
<u>Financial Variables</u>								
Percent financed	-0.012	0.107	0.123	0.198	-0.079	0.187	-0.011	0.144
Percent cash seller received	0.032	0.101	0.027	0.184	-0.054	0.181	-0.137	0.143
Real interest rate	-2.911	0.780 ***	6.365	4.132	0.092	2.074	0.902	1.322
Term	-0.0481	0.261	-0.528	0.624	0.173	0.455	0.244	0.311
LFLB	-4.393	8.043	-17.779	16.382	-7.296	14.628	1.064	9.855
LFmHA	-12.530	11.045	-17.427	24.587	5.174	18.459	-6.511	14.362
Lothar	-2.978	14.085	-58.348	27.355 **	-0.260	22.662	37.791	22.863 *
<u>Summary statistics</u>								
	N = 681		N = 183		N = 260		N = 238	
	R <sup>2</sup> = 0.461		R <sup>2</sup> = 0.425		R <sup>2</sup> = 0.519		R <sup>2</sup> = 0.619	
	$\bar{R}^2$ = 0.444		$\bar{R}^2$ = 0.350		$\bar{R}^2$ = 0.477		$\bar{R}^2$ = 0.582	
	Dep. Mean = 186.100		Dep. Mean = 200.984		Dep. Mean = 198.444		Dep. Mean = 161.17	
	RMSE = 46.750		RMSE = 46.795		RMSE = 51.309		RMSE = 30.494	
	F = 26.873		F = 5.678		F = 12.257		F = 16.744	

Level of significance: \*\*\* = .01, \*\* = .05, \* = .10

Intercept = Beadle County

Table 6.6. Results of final equation for south-central region

Parameter	1976 - 1984		1976 - 1978		1979 - 1981½		1981½ - 1984½	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	136.292	10.394 ***	139.533	19.916 ***	119.976	17.516 ***	165.437	15.874 ***
<u>Land Tract Variables</u>								
Acres purchased	-0.0043	0.0016***	-0.0005	0.0020	-0.0139	0.0036 ***	-0.0060	0.0039
Percent cropland	0.740	0.062 ***	0.694	0.106 ***	1.022	0.114 ***	0.502	0.093 ***
Dbvpa	0.929	0.083 ***	0.879	0.182 ***	0.986	0.164 ***	1.019	0.095 ***
Time	-0.432	0.069 ***	-0.599	0.294 **	-0.958	0.279 ***	-1.134	0.276 ***
Pgrncrn	13.610	4.494 ***	33.456	8.744 ***	-4.895	7.662	17.356	6.583 ***
Pwheat	10.785	5.227 **	28.0043	8.173 ***	-8.176	11.012	15.365	8.113 *
Nonfarm	43.140	12.822 ***	39.238	20.789 *			40.187	13.596 ***
<u>Location Variables</u>								
Jones County	-27.496	5.848 ***	-16.891	9.638 *	-14.600	11.712	-49.605	8.897 ***
Lyman County	-0.920	4.479	12.028	7.874	7.326	9.875	-16.908	5.696 ***
Mellette County	-33.121	6.469 ***	-29.736	12.423 **	-13.200	12.055	-51.980	8.237 ***
Todd County	-5.546	6.014	-15.973	12.014	15.839	10.424	-28.070	8.028 ***
Gregory County	13.382	3.846 ***	7.606	8.497	19.367	5.930 ***	0.267	5.731
<u>Financial Variables</u>								
Percent financed	-0.048	0.108	-0.275	0.199	0.070	0.180	-0.283	0.184
Percent cash seller received	-0.048	0.093	0.019	0.194	-0.066	0.171	-0.264	0.129 **
Real interest rate	0.220	0.646	-1.766	2.647	3.832	1.596	0.810	1.334
Term	0.116	0.220	0.278	0.439	0.189	0.351	0.354	0.341
LFLB	4.231	7.489	0.495	15.887	-9.328	12.963	32.723	10.267 ***
LFmHA	-6.860	9.254	-13.818	21.412	-7.491	15.567	28.281	12.565 **
Lothor	-1.019	11.175	25.089	21.455	-10.521	21.065	-12.559	15.540
<u>Summary statistics</u>								
	N = 560		N = 161		N = 208		N = 191	
	$R^2 = 0.622$		$R^2 = 0.654$		$R^2 = 0.645$		$R^2 = 0.738$	
	$\bar{R}^2 = 0.609$		$\bar{R}^2 = 0.607$		$\bar{R}^2 = 0.612$		$\bar{R}^2 = 0.708$	
	Dep. Mean = 155.69		Dep. Mean = 165.660		Dep. Mean = 162.767		Dep. Mean = 139.578	
	RMSE = 32.763		RMSE = 32.786		RMSE = 33.412		RMSE = 25.574	
	F = 46.928		F = 14.027		F = 19.155		F = 25.347	

Level of significance: \*\*\* = .01, \*\* = .05, \* = .10

Intercept = Tripp County

Table 6.7. Results of final equation for western region

Parameter	1976 - 1984		1976 - 1978		1979 - 1981½		1981½ - 1984½	
	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error	Parameter Estimate	Standard Error
Intercept	167.995	23.722 ***	141.128	20.635 ***	170.219	37.421 ***	216.702	46.944 ***
<u>Land Tract Variables</u>								
Acres purchased	-0.0016	0.0017	-0.0011	0.0010	-0.0048	0.0039	-0.0030	0.0044
Percent cropland	0.962	0.166 ***	0.879	0.127 ***	0.941	0.285 ***	1.137	0.353 ***
Percent irrigated tract	1.021	0.309 ***	1.345	0.293 ***	1.795	0.537 ***	0.207	0.588
Dbvpa	1.148	0.054 ***	1.201	0.032 ***	1.350	0.105 ***	0.991	0.226 ***
Time	-0.264	0.177	-0.144	0.328	-1.881	0.886 ***	-4.084	1.143 ***
Pgrncrn	136.201	21.784 ***	30.332	18.885	155.066	38.365 ***	153.465	41.593 ***
Pwheat	2.569	12.599	12.097	9.258	-2.562	21.339	-7.257	28.165
Nonfarm	225.378	16.674 ***	86.428	21.780 ***	212.159	29.416 ***	236.194	29.478 ***
<u>Location Variables</u>								
Area 1 <sup>a</sup>	-79.038	14.885 ***	-59.831	12.808 ***	-72.224	25.283 ***	-76.969	30.039 ***
Area 2	-87.003	17.616 ***	-63.314	15.151 ***	-67.797	31.060 **	-90.143	33.864 ***
Area 3	-62.133	15.962 ***	-59.012	15.026 ***	-73.952	26.001 ***	-30.829	31.907
Area 4	-63.916	16.304 ***	-38.738	14.367 ***	-61.131	26.375 **	-42.325	34.421
Area 5	-48.844	17.005 ***	-51.636	14.181 ***	-37.836	27.962	-35.708	35.590
<u>Financial Variables</u>								
Percent financed	-0.023	0.230	0.202	0.188	-0.132	0.380	-0.079	0.493
Percent cash seller received	-0.111	0.200	-0.151	0.178	-0.159	0.344	-0.572	0.425
Real interest rate	-3.032	1.695 *	-5.744	3.575	6.081	4.584	5.405	5.482
Term	-0.209	0.578	-0.198	0.513	1.679	1.006 *	-1.935	1.119 *
LFLB	2.545	15.625	-0.387	13.355	-25.510	26.438	20.783	32.159
LFmHA	-2.294	21.805	-24.795	20.912	-12.358	43.174	52.768	40.611
Lothor	-4.804	22.938	-15.037	23.531	-59.822	40.153	-11.865	45.333
<u>Summary statistics</u>								
	N = 659		N = 179		N = 231		N = 249	
	R <sup>2</sup> = 0.693		R <sup>2</sup> = 0.943		R <sup>2</sup> = 0.749		R <sup>2</sup> = 0.576	
	R <sup>2</sup> = 0.683		R <sup>2</sup> = 0.936		R <sup>2</sup> = 0.725		R <sup>2</sup> = 0.539	
	Dep. Mean = 169.176		Dep. Mean = 154.474		Dep. Mean = 174.424		Dep. Mean = 170.236	
	RMSE = 97.028		RMSE = 39.228		RMSE = 97.058		RMSE = 116.829	
	F = 72.147		F = 131.258		F = 31.414		F = 15.518	

Level of significance: \*\*\* = .01, \*\* = .05, \* = .10

Intercept = Black Hills area

<sup>a</sup>The location of each multi-county area is shown on the map

The added financial/lender variables are significant at the 0.05 confidence level in all except the middle (1979-81½) period, even though few individual coefficients are significant by subperiod. Real interest rates, loan term length and FmHA have significant coefficients for the 1976-84 equation.

The explanatory power of the model (adjusted  $R^2$ ) varied from 0.631 in the 1979-81 period to 0.742 in the 1976-78 period.

#### East Central region

The coefficients of percent cropland, deflated building value per acre, Pcorn, farm class and nonfarm influence are positive and significant in all time periods in the east-central region (Table 6.2). The acres purchased coefficient has a negative sign and is significant in all except the 1979-81 period. The time trend coefficient is significant in all periods, positive from 1976-81 and negative in the last subperiod (Table 6.2).

Collectively, the added county variables are significant at the 0.01 confidence level (Table 5). Individually, all of the county coefficients are significant at the 0.01 confidence level. All of the counties but Minnehaha and Moody have negative coefficients. These two counties exhibit higher average sale prices than found in Brookings county which is included in the intercept.

The added financial/lender variables are collectively significant for the entire time period but are not significant in any subperiod. Individually significant coefficients in some time periods are percent cash received, real interest rate and LFLB. The adjusted  $R^2$  is quite high and is very consistent between subperiods (0.710 - 0.729).

#### Northeast region

In this regional model, the variables percent cropland, percent irrigated, deflated building value per acre, Pgraincorn and nonfarm influence have significant ( $p=0.05$  or  $0.01$ ) and positive coefficients. Acres purchased has a

negative coefficient and is significant in the overall 1976-84 period and in the last subperiod. The time trend coefficient is significant in all periods and has a positive sign for 1976-81 and a negative sign thereafter (Table 6.3).

The added county variables are collectively significant at the 0.01 confidence level (Table 5). Individually, most county coefficients are significant and have negative coefficients relative to Deuel County farmland prices (Table 6.3).

In this region, the added financial/lender variables are collectively significant at the 0.05 confidence level in all time periods (Table 5). Individually significant variables in some time periods are percent cash received, real interest rate, term and LFMHA. Percent financed, percent cash received, real interest rate and LFMHA have negative coefficients. The adjusted  $R^2$  is lowest (0.496) in 1976-78 and highest (0.595) in the 1979-81 time period.

#### North-Central region

The coefficients of percent cropland, percent irrigated, deflated building value per acre and nonfarm are positive and significant at the 0.01 confidence level in all time periods. The coefficient for acres purchased is significant only in the last period. The time trend coefficient is negative and significant from 1979-84 (Table 6.4).

The added county variables are collectively significant at the 0.01 confidence level (Table 5). All of the county coefficients are individually significant at the 0.05 confidence level in all time periods and have negative coefficients relative to Brown County.

The added financial/lender variables in this region are collectively significant at the 0.05 confidence level in the 1976-84 period but are not collectively significant in any subperiod (Table 5). Individually significant coefficients in some time periods are percent financed and real interest rate.

The adjusted  $R^2$  varies from 0.633 in the middle period to 0.737 in the final period.

#### Central region

In the central region, the coefficients for acres purchased, percent cropland, deflated building value per acre and nonfarm influence are significant in the 1976-84 period and most subperiods. The coefficient for principal product of corn is positive in all periods and significant in 1979-81 and in the entire time period. The time trend coefficient is negative and significant from 1979-84 (Table 6.5).

The added county variables in this region are collectively significant ( $p=0.05$ ) in all time periods (Table 5). Most county coefficients are negative relative to the intercept containing Beadle County. Coefficients for Buffalo-Jerauld, Hyde and Hand counties are significantly lower.

The added financial/lender variables are collectively significant at the 0.05 confidence level in the entire period and in the 1976-78 subperiod (Table 5). Real interest rate is the only significant financial variable; it is significant only for the entire time period. The coefficient for other lender is significant and negative for 1976-78 and significant and positive in the last (1981½-84) subperiod.

In all time periods, the explanatory power is lower for the central regional model than for all other regional models. The lowest  $R^2$  (0.350) is reported in the 1976-78 period. A possible reason is that there are less intraregional differences in farmland prices and cropland/pasture price differential in the central region than in all other regions of South Dakota.

#### South-Central region

In the south-central region, the coefficients for acres purchased, percent cropland, deflated building value per acre, Pwheat, Pgraincorn and nonfarm are

statistically significant in most or all time periods. The time trend coefficient is significant and negative in all time periods (Table 6.6). This implies that real farmland prices were declining throughout the study period.

The added county variables in this regional model are collectively significant at the 0.01 confidence level in all time periods (Table 5). Individually significant county coefficients are Jones, Mellette and Gregory. Gregory is the only county with a positive coefficient relative to the intercept which includes Tripp County.

Except for the 1981½-84 period, the added financial/lender variables are not collectively or individually significant. In the latter period, coefficients for LFMHA and LFLB lenders are positive and significant ( $p = 0.05$ ). The adjusted  $R^2$  varies from 0.645 to 0.738 across subperiods.

#### Western region

In the western region, the coefficients for percent cropland, percent irrigated, deflated building value per acre, nonfarm and Pgraincorn are statistically significant at the 0.01 confidence level in most or all time periods. The time trend coefficient is negative in all time periods and is significant from 1979-84 (Table 6.7). This finding also occurred in the south-central region. It is interesting to note that both of these regions have the lowest percent of cropland and are most dependent on the cow-calf industry which has faced adverse economic trends during most of this period.

The added location (area) variables are collectively significant in all except the middle (1979-81½) period (Table 5). County groups in northwestern South Dakota (Area 1 and Area 2) have significantly lower coefficients relative to the Black Hills region in all time periods.

The added financial lender variables are not collectively significant in any time period in this region (Table 5). Individually, real interest rate is

significant, with a negative coefficient over the entire time period, while loan term has a positive and significant coefficient from 1979-1984 (Table 6.7).

## STATISTICAL TESTS FOR STABILITY OF COEFFICIENTS

The last objective of the study involves testing for structural changes in farmland markets by testing for stability of coefficients across the three different time periods which exhibit different trends in land prices and interest rates. The statistical equation used to conduct an F-test for this purpose is:

$$\text{Calculated F-value} = \frac{[SSE_T - (SSE_1 + SSE_2 + SSE_3)]/k}{(SSE_1 + SSE_2 + SSE_3) / (n+m+p-3k)}$$

(adapted from Maddala, 1977, p 198-201)

where  $SSE_T$  = error sum of squares in the entire time period (1976-84)

$SSE_1$  = error sum of squares in the first time period (1976-78)

$SSE_2$  = error sum of squares in the second time period (1979-81½)

$SSE_3$  = error sum of squares in the last time period (1981½-84)

k = number of parameters including the intercept

n = number of observations(sales) in the first time period

m = number of observations(sales) in the second time period

p = number of observations (sales) in the last time period

This statistic is compared to a critical value of  $F_\alpha$  with k degrees of freedom in the numerator,  $n+m+p-3k$  degrees of freedoms in the denominator; and  $\alpha$  is the probability level of significance ( $p=.01$ ). In essence, this test compares the unexplained variances of each model for the entire time period to the sum of the unexplained variances for the individual time periods.

The null hypothesis of no structural change is rejected at a specified probability level if the test statistic is significant. Rejection of the null hypothesis implies that parameter estimates have changed significantly between one or more of the three time periods.

Results of the F-test of stability of coefficients for the state model and each regional model are presented in summary form in Table 7. The calculated F-value is significant at the 0.01 confidence level in all regional and state models. These F-test results reject the null hypothesis that no structural changes have occurred. On the other hand they validate that structural changes in coefficients occurred in South Dakota and in all of its regions over the 1976-84 time period.

Several changes in financial and international economic conditions may be related to structural changes in coefficients. For example, from 1979 to 1984, the U.S. dollar strengthened relative to currencies of major trading partners. As a result the international buyers of agricultural products found it very expensive to buy U.S. products.

This is one significant cause of decline in U.S. agricultural export market performance. Such a decline reduces farmland prices more rapidly in the major grain producing regions, including eastern South Dakota, than elsewhere in the United States.

The sign of the time variable coefficient changed from positive to negative in most of the regions. It is interesting to note that the coefficient sign of this variable is negative in the last period in all of the regions. During this time period, nominal and real farmland prices declined sharply.

On the other hand, in the 1976-78 time period, the time coefficient is positive in all regions except for the south-central and western regions. Deflated land prices in these two regions declined in all three time periods,

Table 7. Summary of statistical tests of stability of coefficients in the state and regional models.

Region	Time Period	Number of Observations	<u>Final Equation Results</u>		
			RMSE	R <sup>2</sup>	F-value
State	1976-84	7202	102.989	.677	659.028
	1976-78	2364	92.483	.710	253.065
	1979-81½	2414	106.962	.691	235.930
	1981½-84½	2423	100.671	.682	227.560
			<u>F-Test for Stability of Coefficients</u>		
			Calculated F-value = 19.27		
			Critical F-value = 1.79 <sup>a</sup>		
Southeast	1976-84	1210	124.333	.661	103.880
	1976-78	378	109.416	.742	48.252
	1979-81½	373	141.179	.631	28.729
	1981½-84½	459	105.547	.691	45.700
			<u>F-Test for Stability of Coefficients</u>		
			Calculated F-value = 7.1		
			Critical F-value = 1.79 <sup>a</sup>		
East-central	1976-84	1503	100.807	.709	160.138
	1976-78	563	97.373	.710	61.074
	1979-81½	474	101.076	.729	56.518
	1981½-84½	466	97.107	.725	54.342
			<u>F-Test for Stability of Coefficients</u>		
			Calculated F-value = 5.18		
			Critical F-value = 1.79 <sup>a</sup>		
Northeast	1976-84	1445	74.013	.517	74.745
	1976-78	516	62.693	.496	25.136
	1979-81½	478	74.462	.595	34.461
	1981½-84½	451	74.613	.553	27.513
			<u>F-Test for Stability of Coefficients</u>		
			Calculated F-value = 8.99		
			Critical F-value = 1.88 <sup>a</sup>		

Table 7 - continued

Region	Time Period	Number of Observations	Final Equation Results		
			RMSE	R <sup>2</sup>	F-value
North-central	1976-84	1144	50.905	.668	105.594
	1976-78	385	49.055	.664	35.552
	1979-81½	390	49.637	.633	31.517
	1981½-84½	369	59.217	.635	43.692
F-Test for Stability of Coefficients					
Calculated F-value = 4.73					
Critical F-value = 1.88 <sup>a</sup>					
Central	1976-84	681	46.750	.444	26.873
	1976-78	183	46.795	.350	5.678
	1979-81½	260	51.309	.477	12.257
	1981½-84½	238	30.494	.582	16.744
F-Test for Stability of Coefficients					
Calculated F-value = 6.49					
Critical F-value = 1.88 <sup>a</sup>					
South-central	1976-84	560	32.763	.609	46.928
	1976-78	161	32.786	.607	14.027
	1979-81½	208	33.412	.612	19.155
	1981½-84½	191	25.574	.708	25.347
F-test for Stability of Coefficients					
Calculated F-value = 5.87					
Critical F-value = 1.88 <sup>a</sup>					
Western	1976-84	659	99.281	.668	89.639
	1976-78	179	39.228	.936	131.258
	1979-81½	231	97.058	.725	31.414
	1981½-84½	249	116.828	.539	15.518
F-Test for Stability of Coefficients					
Calculated F-value = 3.78					
Critical F-value = 1.88 <sup>a</sup>					

<sup>a</sup>Critical F-value for each equation in each region is given for the 0.01 probability level.

but the magnitude of decline is greatest in the last time period. The time variable coefficient is also negative in the north-central and central regions in the second time period, but the magnitude of decline is greatest in the last time period. This implies that only land prices in eastern South Dakota were increasing more rapidly than the inflation rate in the middle (1979-81½) subperiod.

In most regions the coefficients for location variables, nonfarm influence, and principal products also changed considerably in magnitude across time periods, especially between the second and the last time period. This finding reinforces the assumptions that farmland market price behavior is time specific and location specific concerning the magnitude of price adjustments over time.

The sign coefficients of different financial variables change in different regions in the three time periods. This indicates that variation in financial terms occurred over time which validates that structural changes may have occurred in farmland prices. During 1979, the Federal Reserve changed its monetary policy which influenced the level of interest rates, exchange rates, and other variables impacting farmland prices over time.

Finally, the adjusted  $R^2$  changed considerably over time in all regions, except for the east-central region. The magnitude of changes exceeded 0.20 in the central and western regions and 0.10 in the other regions. This finding further suggests that structural changes in coefficients may have occurred.

## CONCLUSIONS AND IMPLICATIONS

Several conclusions and implications can be drawn from this study.

First, South Dakota farmland prices significantly differ by region and land use in all time periods. Regional price differences, at a point in time, are primarily due to differences in agricultural productivity, land use and location factors. This implies that real estate appraisers should continue to emphasize these factors in their work and concentrate their efforts toward improved measures of productivity and location factors.

Second, farmland prices change over time at different rates by region and land use. The differential impact of export markets on corn and soybean regions, relative to small grain and rangeland areas, is indirectly captured in the regional model results for eastern South Dakota compared to results for central and western South Dakota.

This indicates that macroeconomic policy and international economic developments have differential impacts on various agricultural sectors. This leads to differential changes in farmland prices, since land is a residual earnings claimant.

Third, land use and other land tract variables contributed the most information explaining farmland price variation in all regions and time periods. Agricultural land use variables are closely related to or proxies for agricultural productivity and estimated net returns. However, the relative impact of specific land use variables, such as percent cropland, varies with changing economic conditions over time.

Urbanization and other nonfarm influences are direct factors explaining farmland price behavior in some local markets. These factors need to be carefully appraised in recreational and rural urban fringe farmland markets because

their relative importance is associated with the pace of economic development activities in the region.

Fourth, the significance of added location variables, collectively and individually, implies that further study is needed to discover which location-specific variables best explain per-acre prices in local and regional farmland markets. South Dakota has great variation in soil productivity, population density, and economic infrastructure that is often location-specific. The relative importance of these specific variables has not been determined in this study.

Fifth, structural changes have probably occurred in the farmland market during the volatile 8½-year time period. This implies that changing economic conditions influence the explanatory powers of various factors affecting land price variation. This suggests that parameter estimates change significantly across different time periods and that land price models need to be reestimated over time.

Finally, the evidence is mixed concerning the relative importance of financial/lender variables in explaining farmland price variation with cross-sectional data.

Financial/lender variables are collectively significant ( $p=.05$ ) in most regional models and in the state model over the entire time period (1976-84). However, they are seldom significant in the shorter subperiods.

It appears that changes in real interest rates influences changes in real farmland prices, a finding which conforms with traditional microeconomic theory. However, a relatively long time period is needed to empirically "capture" this relationship.

This study provides little evidence that individual financial variables, other than interest rates, are systematically important in explaining farmland sale price variation after accounting for the influence of land tract and

location factors. Also, there is little supporting evidence for the proposition that seller-financed tracts in South Dakota command a significantly higher per-acre price than mortgage financed sales in this time period.

These findings when compared to results from other studies including financial/lender variables (Herr, 1975; Osburn and Johnson, 1978; Thompson and Kaiser, 1985) suggest that:

- (1) Regional differences may exist in the relative importance of financial variables in explaining farmland price behavior. Furthermore, the level and type of competition between institutional lender financing and seller financing may vary by region and over time.
- (2) Selection of time period studied is probably related to the relative importance of financial/lender variables.
- (3) Cross-sectional-time series studies (in different regions) over longer time periods are needed to fully assess the impact of financial/lender variables on farmland prices.

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Appendix Table 1. Explanatory Power (adjusted  $R^2$ ) of equations in the state model and in each regional model by time period.

<u>Region</u>	<u>Equation<sup>a</sup></u>	<u>1976-84</u>	<u>1976-78</u>	<u>1979-81½</u>	<u>1981½-84½</u>
			--Adjusted $R^2$ --		
State	I	0.639	0.689	0.652	0.690
	II	0.671	0.707	0.689	0.679
	III	0.677	0.710	0.691	0.682
Southeast	I	0.518	0.638	0.486	0.591
	II	0.629	0.735	0.625	0.677
	III	0.661	0.742	0.631	0.691
East-central	I	0.560	0.593	0.592	0.568
	II	0.697	0.713	0.728	0.722
	III	0.709	0.710	0.729	0.725
Northeast	I	0.400	0.358	0.494	0.430
	II	0.493	0.478	0.586	0.544
	III	0.517	0.496	0.595	0.553
North-central	I	0.570	0.579	0.557	0.631
	II	0.665	0.664	0.638	0.733
	III	0.668	0.664	0.633	0.737
Central	I	0.393	0.276	0.437	0.557
	II	0.434	0.319	0.487	0.584
	III	0.444	0.350	0.477	0.582
South-central	I	0.565	0.593	0.579	0.588
	II	0.610	0.608	0.611	0.685
	III	0.609	0.607	0.612	0.708
Western	I	0.668	0.924	0.729	0.539
	II	0.683	0.933	0.726	0.539
	III	0.683	0.936	0.725	0.536

<sup>a</sup>Equation I includes only land tract explanatory variables  
Equation II includes land tract and location explanatory variables  
Equation III is the final equation with coefficients reported in this manuscript, and includes land tract, location, and financial/lender variables.

**The Federal Land Bank of Omaha**  
**FARM AND RANCH SALE SHEET**

**IDENTIFICATION**

1. Assoc. No. and Branch Code \_\_\_\_\_ Sale Number \_\_\_\_\_ Month and year of sale \_\_\_\_\_  
 2. FLB loan number (Complete only if there is or will be an FLB loan on property) \_\_\_\_\_  
 3. Name of purchaser \_\_\_\_\_  
 4. Citizenship of purchaser: If purchaser is a U.S. citizen, leave both digits blank. If purchaser is not a U.S. citizen, complete both digits as follows: First digit (1-Resident alien) (2-Nonresident alien). Second digit (1-Canadian) (2-French) (3-Japanese) (4-Arabic) (5-North Central European) (6-Scandinavian) (7-Other known citizenship) (8-Unknown) \_\_\_\_\_

**LOCATION AND DESCRIPTION**

5. County (Where major portion of property is located) (Code) \_\_\_\_\_ N State \_\_\_\_\_  
 6. Section, Township, and Range \_\_\_\_\_ S \_\_\_\_\_ W E \_\_\_\_\_  
 7. Type of non-farm influence (0-None) (1-Comm. or indus. devel.) (2-Residential devel.) (3-Military installation) (4-Interstate hwy.) (5-Other hwy.) (6-Public and/or private recreation land) (7-Other factors) (8-Combination) (9-Mineral rights) \_\_\_\_\_  
 8. Degree of non-farm influence (0-None) (1-Slight) (2-Moderate) (3-Great) \_\_\_\_\_  
 9. Area class 1-2-3-4 and Farm class A-B-C-D \_\_\_\_\_  
 10. Principal product sold (Code) \_\_\_\_\_ Secondary product sold (Code) \_\_\_\_\_

**BUILDINGS**

11. Livestock or poultry facility capacity (No. of head - one time, intensive feeding facilities only) \_\_\_\_\_  
 12. Type of facility (1-Broilers) (2-Eggs) (3-Other poultry) (4-Dairy) (5-Swine) (6-Beef) (7-Other livestock) \_\_\_\_\_  
 13. Assigned value of principal dwelling (If none, leave blank) \_\_\_\_\_ \$ \_\_\_\_\_  
 14. Total assigned value of all buildings, including dwelling (If none, leave blank) \_\_\_\_\_ \$ \_\_\_\_\_

**LAND**

15. Acres in permanent pasture (If none, leave blank) \_\_\_\_\_  
 16. Acres cultivated (If none, leave blank) \_\_\_\_\_  
 17. Total acres purchased \_\_\_\_\_

**TERMS**

18. Purchase price (per acre \$ \_\_\_\_\_; per head - ranches only \$ \_\_\_\_\_) Total consideration \_\_\_\_\_ \$ \_\_\_\_\_  
 19. Cash seller received or will receive at closing (Down pay't if contract; same as line 18 if cash sale) \$ \_\_\_\_\_  
 20. Percent of purchase price financed with first and/or second mortgage or contract \_\_\_\_\_ %  
 21. Amount of purchase price financed by FLB (If none, leave blank) \_\_\_\_\_ \$ \_\_\_\_\_  
 22. If FLB financed, show second mortgage lender; if not FLB financed, who is the primary lender? (0-None) (1-FmHA) (2-PCA) (3-Insur. Co.) (4-Comm. Bank) (5-Seller) (7-Other) (8-Comb.) (9-Unknown) \_\_\_\_\_  
 23. Note (or contract) term (If none, leave blank) \_\_\_\_\_  
 24. Interest rate stated on the note or contract (If unknown or not applicable, leave blank) \_\_\_\_\_ %  
 25. Primary reason for purchasing (1-Establish own farm) (2-Expansion) (3-Investment) (4-Non-ag development) (5-Rural home) (7-Other) (9-Unknown) \_\_\_\_\_  
 26. Method of sale (1-Auction - open bid) (2-Auction - sealed bid) (3-Private sale) (4-Realtor sale) (5-Other) (5-Unknown) \_\_\_\_\_  
 27. Reason for sale (01-Settle estate) (02-Voluntary liquidation) (03-Involuntary liquidation) (04-Retire) (05-Leave farming) (06-Estate planning) (07-Realize appreciation) (08-Purchase other land) (09-Other) (10-Unknown) \_\_\_\_\_

**RELATIONSHIP TO BENCHMARK**

28. Sale relates to benchmark number (If no relationship, leave blank) \_\_\_\_\_  
 29. Comparison to benchmark (1-Above) (2-Below) (3-Equal) \_\_\_\_\_ Productivity \_\_\_\_\_ Improvements \_\_\_\_\_ Location \_\_\_\_\_  
 30. Loan officer's code \_\_\_\_\_  
 31. This price indicates an AV per (acre or head) on the above benchmark of \_\_\_\_\_ \$ \_\_\_\_\_  
 32. Type of Sale (1-Bona fide) (2-Non-bona fide) \_\_\_\_\_

**IRRIGATION**

(If not irrigated, skip items 33-35)

33. Total acres irrigated (Include crop and pasture) \_\_\_\_\_  
 34. Method of irrigation (1-Gravity) (2-Hand- or wheel-moved sprinkler) (3-Self-propelled sprinkler) (4-Solid set sprinkler) (7-Other) (8-Combination) \_\_\_\_\_  
 35. Classification of water supply (1-I) (2-II) (3-III) (4-IV) \_\_\_\_\_

**GRAZING LAND**

(Applies only to livestock ranches)

36. Total livestock carrying capacity - total AUs (number of head - cow-calf basis) \_\_\_\_\_  
 37. Percent of carrying capacity from assured leases \_\_\_\_\_ %  
 38. Type of assured lease (0-None) (1-Taylor Sec 15) (2-BLM) (3-Nat'l forest) (4-State) (5-Private) (6-Grazing ass'n) (7-Other) (8-Combination) \_\_\_\_\_  
 39. Number of months available for grazing (Pasture season) \_\_\_\_\_

**Boldface items must be completed on all sales. Others are optional depending on the sale.**

Remarks: (Continue on reverse, if necessary) \_\_\_\_\_

