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Clearance Sales in the Farmland Market?

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The ultimate loss financial institutions bear for foreclosed loans is determined by their success in liquidating their acquired property portfolios. This study examines the price received for land sold by private individuals and financial institutions from 1977 through 1990. After adjusting for quality differences, financial institutions received on average 9.2% less than private individuals. Further analysis reveals that commercial banks received a discount of 5.8%, the Farm Credit System (FCS) a 9.2% discount, and Farmers Home Administration (FmHA) a 14.7% discount. For this sample of 13,375 Kansas sales, it is estimated that the sum of the transfers from financial institutions to land buyers amounted to $9.2 million.

Key words: acquired property, dynamic pricing theory, financial institutions.

Introduction

Financial institutions providing credit to production agriculture are recovering from the worst decade since the 1930s. Loan defaults during the 1980s left many agricultural lenders holding a sizeable portion of farm real estate. As of 30 June 1988, Stam, Gajewski, and Koenig estimated that 7.93 million acres of farmland were held by financial institutions. This land was valued at roughly $3.3 billion. The amount of acquired property held by financial institutions was as high as 8.98 million acres as of December 1987. The peak of almost 9 million acres was the highest since 1937, when the leading lending agencies held roughly 28 million acres of farmland (Stam, Gajewski, and Koenig). The ultimate loss financial institutions bear for defaulted loans is determined by the success that these agencies have in liquidating their acquired property portfolios.

The purpose of this article is to examine the farmland market during the recent financial crisis and the associated recovery. Specifically, the quality of the land sold by financial institutions and the price financial institutions received when selling farmland compared to privately sold tracts will be examined. Given the size of public support to the Farm Credit System (FCS), the Farmers Home Administration (FmHA), and to some extent commercial banks through the Federal Deposit Insurance Corporation (FDIC), it is important to ascertain how well the financial institutions have done in obtaining "fair" market prices when liquidating acquired property. The 1987 Farm Credit Act provided a line of credit of up to $4 billion to the FCS, although the FCS has assessed only a modest amount of that credit. The General Accounting Office (GAO) estimates that the cumulative losses of the FmHA from 1976 through 1989 amount to $8.3 billion [U.S. General Accounting Office (USGAO) 1990]. Thus, taxpayers are providing substantial backing for the loan losses. The ultimate size of the loss is tied directly to the ability of the financial

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institution to obtain a "fair market" price for the acquired asset. If buyers of acquired property can obtain land at a discount when purchasing it from a financial institution, the amount of the discount can be viewed as a subsidy. Therefore, the results of this study are of particular interest to farmers, lenders, taxpayers, and policy makers. The interest of the U.S. Congress is indicated by the recent GAO study that examined the sales procedures for acquired properties by the Farmers Home Administration (USGAO 1991).

The FCS, the FmHA, and to some extent commercial banks are regulated by law on the procedures they can use to sell acquired property.[1] Specifically, the Agricultural Credit Act of 1987 placed restrictions on the management and sales practices of the FCS and FmHA. Former FCS borrowers have the right to repurchase or lease repossessed property at "fair market" value or the right to match other lease or purchase offers. Former FmHA borrowers have these same rights. In addition, the FmHA has other restrictions which require the FmHA to offer its properties to only family-sized operators for a period of three years. Prior to the 1990 Farm Bill, the FmHA would sell property at the lower of market price or capitalization value of the land. Commercial banks are less regulated as a whole, but there are some restrictions, such as the length of time that land may be held before it has to be sold.

The remainder of the article is organized as follows. First, a Bayesian dynamic optimal pricing model is presented to provide a theoretical base for this study. Included in this discussion are related liquidity considerations. Next, a hedonic pricing model is presented to account for quality differences between parcels of land. A discussion of the data follows. Detailed analysis documenting differences in land quality among financial institutions and private sales is included. Next, the econometric results are presented. Finally, the article closes with a discussion of the related policy conclusions and implications.

A Theoretical Model of Dynamic Pricing Behavior

It has long been recognized that liquidity costs are incurred with the quick sale of illiquid assets. Hirshleifer suggests that liquidity is "an asset's capability over time of being realized in the form of funds available for consumption or reinvestment—proximately in the form of money" (p. 1). Land is one of the more illiquid assets currently used in agricultural production (Barry, Baker, and Sanint). Measurement of liquidity costs has been an elusive goal. The liquidity cost of land must be considered by lenders when closing or foreclosing on a real estate loan. In addition to the risk of default, it is important to consider the costs associated with default. One such default cost that has not been measured or identified is the cost of liquidating acquired property.

The cost of liquidating acquired property is likely to vary by financial institution depending on the strategy the institution uses in liquidating its acquired property portfolio. A financial institution that has the capability to manage agricultural properties and has a low opportunity cost on the funds provided by the liquidation of the acquired properties likely will be able to reduce liquidation costs associated with the sale of that parcel of land. A financial institution that does not have policies for property management or a high opportunity cost of the funds provided by liquidation of the property likely will want a quick sale. This quick sale probably will result in the financial institution suffering larger liquidation costs.

Work by Lippman and McCall suggests that the liquidity of an asset is related to the frequency of offers, costs associated with holding an asset, predictability of the market, and size of the opportunity cost associated with alternative investments.

Formal theoretical models explaining pricing behavior in thin markets and liquidity are found in the economics literature. Lazear considers the dynamic pattern of pricing in an optimal search model. His model has been applied in the housing market (Sass) and can be adapted to the farmland market. Following Lazear's model of clearance sales, assume a two-period world for expositional ease. This assumption of a two-period world is relaxed later in the analysis.[2] The risk-neutral agent's problem is to maximize expected

profits,

$$\text{(1)} \qquad \text{Maximize } R_1, R_2: \quad R_1(1 - F(R_1)) + (1 - H)(R_2)(1 - F(R_2))F(R_1),$$

where R_1 is the asking price in period 1, R_2 is the asking price in period 2, H represents the percentage costs associated with holding the asset if it is not sold in the first period, $1 - F(R_1)$ is the probability that the buyer's value of the good is larger than the asking price in period 1, and $1 - F(R_2)$ is the probability that the good sells in period 2. A buyer in the second period is assumed to have an identical distribution of value as one in the first period in this problem. This assumption will also be relaxed in later analysis. H is greater than or equal to zero and less than 1.

An increase in H suggests that the cost of holding and operating an asset increases. The first term in the maximand is the probability that the parcel of land will sell in the first period times the asking price. For expositional simplicity, it is assumed that the prior on the buyer's price is distributed uniformly between zero and one in the first period. The second term in equation (1) is the net price received in the second period times the probability the asset sold in the second period times the probability the asset did not sell in the first period. Bayes' theorem is used to determine the distribution of a sale in the second period. The second period distribution is uniform between zero and R_1. This problem is similar to equation (20) in Lazear.

Equation (1) can be viewed as a dynamic programming problem and is solved recursively. Using Lazear's solution methods, the optimal decision rules for pricing the land in period 1 and period 2 are:

$$\text{(2)} \qquad R_2 = R_1/2$$

and

$$\text{(3)} \qquad R_1 = 2/(H + 3).$$

If holding costs (H) are zero, the optimal solution is to set the price in the first period to $\frac{2}{3}$ and the price in the second period to $\frac{1}{3}$. If H is greater than zero (e.g., $H = .5$), then the price in the first period will be lower than if the costs of holding the asset are equal to zero ($R_1 = \frac{4}{7}$) and the price in the second period will be lower ($R_2 = \frac{2}{7}$). Notice that the rate at which prices fall from the first period to the second period is the same, regardless of H. In this example, prices in the second period are always $\frac{1}{2}$ of what they were in the first period, regardless of the holding costs. Thus, agents who have a large cost associated with not making a sale in period 1 are willing to ask less in the first period and in the second period.

Farmers likely will have a lower holding cost from period to period than financial institutions. A private landowner has the management expertise to continue to operate the parcel of land for an additional period at a fairly low cost. This could be done by continuing to farm the land as in the past or to cash rent the parcel to previous tenants. A financial institution may not have the managerial capacity to operate repossessed farmland at costs as low as those at which a farmer may operate. Some financial institutions may not be set up to own, operate, and manage farms. Fees for management are often as high as 10% of gross income. This will be a variable cost to a financial institution. Deterioration also may occur on the parcel due to lack of management. Financial institutions often have foreclosed on multiple tracts of land simultaneously. Thus, due to the sheer numbers of tracts being managed at one time, oversight likely will be diminished, which will exacerbate parcel deterioration.

The assumption of a two-period world also can be relaxed. If the amount of time the seller is willing to accept offers is extended, the time path of pricing suggests that the initial price offering will be higher and the rate of decline will be slower (Lazear). A financial institution is more likely to have a limited time horizon than a private landowner due to the opportunity cost of fund reinvestment. Under this assumption, a financial institution will offer a parcel of land for sale at a lower initial price and will decrease the price at a faster rate than a private individual.

This section has provided a theoretical basis for a testable hypothesis. Land sold by financial institutions will be sold at a price lower than land sold by private individuals. Given the differences in constraints imposed by law, it is likely that if a discount exists, it will differ by financial institution.

Hedonic Pricing Theory

The sale price of a parcel of farmland is influenced by many attributes. To test whether the price of land sold by financial institutions is similar to the price of land sold by private individuals, it is necessary to adjust for quality differences. The hedonic approach to market analysis will account for these quality differences.

The economic definition of a hedonic price is the marginal cost that an individual is willing to pay to obtain a desired characteristic. The process of estimating hedonic prices for quality differences can be traced back to the early work of Waugh in 1929. Ladd and Martin looked at the impact of production input characteristics on the demand for agricultural inputs. They asserted that inputs such as land are useful in the production process because of the characteristic of that input. Palmquist further developed the hedonic model for differentiated factors of production (land).

Several studies have examined farmland prices using hedonic models. These include studies by Sandrey et al.; Miranowski and Hammes; Ervin and Mill; Gardner and Barrows; Palmquist and Danielson; Jennings and Kletke; and Torell, Libbin, and Miller. However, none of the previous studies have attempted to isolate the effect of seller on the price of land.

A hedonic pricing model is used to test whether a financial institution receives a price that is less than the price that a private individual receives when selling land. The hedonic pricing model is used to account for the fact that land is a differentiated factor of production so that a comparison can be made directly between sellers. A general hedonic pricing model for land can be specified as:

$$P = g(z_1, \ldots, z_n, m_1, \ldots, m_n), \tag{4}$$

where P is the price of land, the z_i's are quality characteristics such as soil quality, improvements, location, etc., and the m_i's are market characteristics. Market characteristics were included to account for demand and supply changes over time. This is important given the cross-sectional time series nature of the data set used. The hedonic pricing model estimated is:

$$\begin{aligned} Land = {} & a_0 + a_1 Q_1 + a_2 Q_2 + a_3 R_1 + a_4 R_2 + a_5 Crop + a_6 Con + a_7 Imp \\ & + a_8 Min + a_9 Irr + a_{10} Acres + a_{11} West + a_{12} East + a_{13} Jan \\ & + a_{14} Feb + a_{15} Mar + a_{16} May + a_{17} Jun + a_{18} Jul + a_{19} Aug \\ & + a_{20} Sep + a_{21} Oct + a_{22} Nov + a_{23} Dec + a_{24} Yr89 + a_{25} Yr88 \\ & + a_{26} Yr87 + a_{27} Yr86 + a_{28} Yr85 + a_{29} Yr84 + a_{30} Yr83 \\ & + a_{31} Yr82 + a_{32} Yr81 + a_{33} Yr80 + a_{34} Yr79 + a_{35} Yr78 \\ & + a_{36} Yr77 + a_{37} Seller, \end{aligned} \tag{5}$$

where *Land* is the logged per acre price for a tract of land,[3] Q_1 is a binary variable representing high quality land, and Q_2 is a binary variable representing low quality land; average quality land is the default. R_1 is a binary variable representing paved road access, and R_2 is a binary variable representing dirt road access; gravel is the default. *Crop* is the logged percentage of land which is cropland, *Con* is a binary variable which is one if the land was sold on contract, *Imp* is a binary variable which is one if the land contains improvements, *Min* is a binary variable which is one if mineral rights were included in the sale, *Irr* is a binary variable which is one if the tract was irrigated, and *Acres* is a variable measuring the size of the parcel in acres. *West* and *East* are binary variables for the region of the state in which the sale was located; *Central* is the default variable in this equation. The month variables are binary variables representing the month of the sale.

These variables were included to correct for seasonality in land sales if any existed. These variables are interpreted as the difference from land sold during the month of April. The year variables were included to account for general market changes in land price. The base year was 1990. *Seller* was included as a binary variable representing whether the seller of the land was a bank, the Farm Credit System, or Farmers Home Administration.

Econometric Considerations

Equation (5) can be written more compactly as:

$$\ln(P_i) = a + b\ln(X_i) + c\text{BIN}_i + e_i, \tag{6}$$

where P_i is the sales price, X_i is the vector of continuous exogenous variables, and BIN_i is the vector of binary variables, for the ith parcel of land. The regression coefficients are a and the vectors are b and c. The error for the ith parcel of land is e_i.

The coefficients of the vector b can be interpreted as elasticities. To facilitate the use of logarithms, any $x_{ij} = 0$ were redefined as $x_{ij} = m$, where m is some small, nonzero number. Only one continuous variable could reach zero. This variable was cropland percentage. If the percentage of cropland on the parcel of land was equal to zero, the percentage of cropland was then set to 1%.

The coefficients in the vector c can be used to calculate the relative effect on price due to the binary variables. For each coefficient, c_j in the vector c, the percentage change in land price with the presence of the jth factor can be calculated by:

$$g_j = \exp(c_j) - 1. \tag{7}$$

See Halvorsen and Palmquist for additional detail. The econometric results are presented with the calculated g_j for the binary variable.

Data

The data for this study were collected by members of the Kansas Society of Farm Managers and Rural Appraisers for the purpose of assisting their members in appraising agricultural real estate. Because this data set is used for comparable sale data for real estate appraisals, much effort has been exerted to ensure data accuracy. In cases where the accuracy of the data was a concern, a follow-up phone call to verify the data was made.[4] This study covered the 14-year period beginning in January 1977 and ending in December 1990. The total number of usable sales for this study was 13,375, representing 2,691,861 acres. The low number of sales for the individual years was 701 in 1985 and the high was 1,368 sales in 1990. The total number of sales reported for this period was 19,249. Roughly 5,800 sales were unusable for this study because the parcel was small (some sales reported contained a house and five acres) or because incomplete data were reported for the transaction. After these deletions were made, the remaining sales used for the study represented 69% of the original sales reported. Data reported included land quality, road access, amount of cropland, whether or not the sale was financed with a land contract, improvements, mineral rights, irrigation, size of the parcel, location in the state, and type of seller.

Quality of the land parcel is a subjective estimate by the member of the Kansas Society of Farm Managers and Rural Appraisers. The estimate is based upon soil type, slope, erosion and/or erosion potential, presence of noxious weed problems, etc. The overall objective of the quality variable is to obtain an expert opinion as to whether or not the quality is abnormally high or low compared to other tracts. Roughly 15% to 20% of the sales data are obtained from two or more different sources. Thus, the quality of the reported data can be verified in these cases. Normally, the estimates of quality and all other factors reported from two or more sources are the same. In those cases where they are not (e.g.,

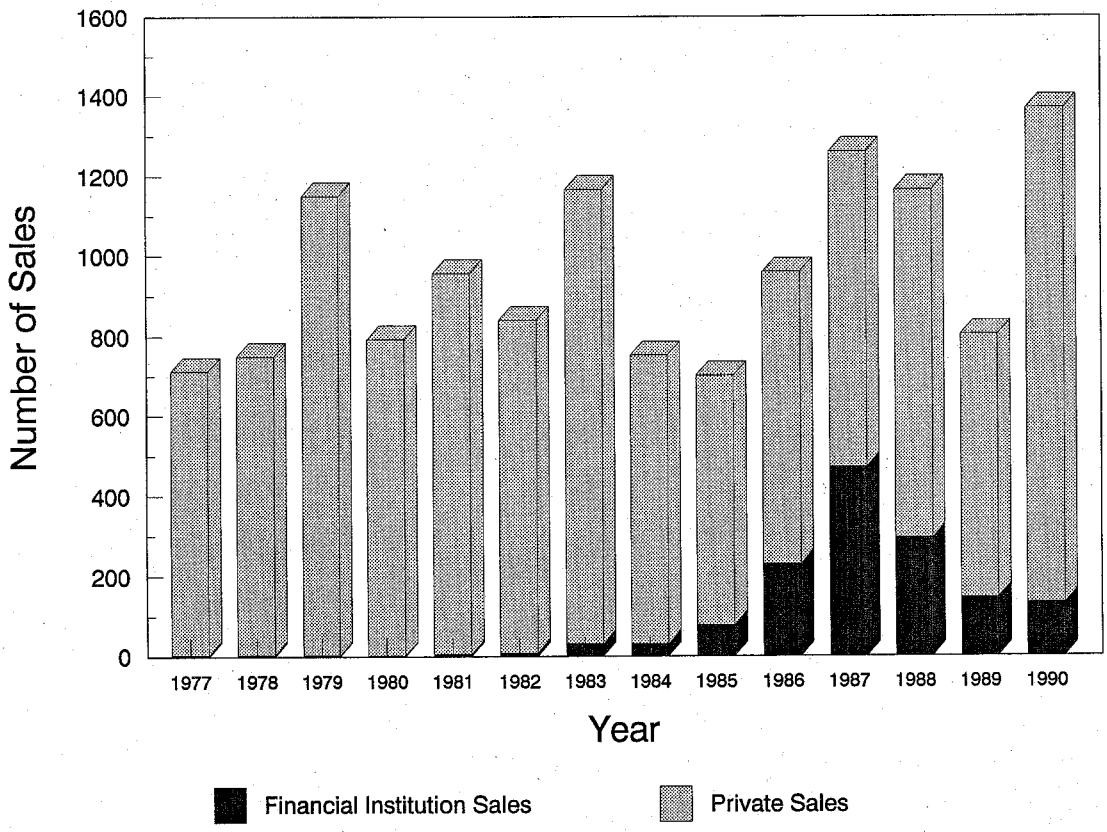

Figure 1. Total, financial institution, and private sales of Kansas land, 1977-90

one reporter estimates high quality and one estimates average quality), the data are coded as average.

Figure 1 illustrates the number of total sales of Kansas land between 1977 and 1990 and the number of sales by financial institutions. Approximately 94% of all land sales by institutions occurred between 1985 and 1990. However, only 47% of the total transactions took place during these five years. In 1987 alone, sales by financial institutions represented 37.4% of the total sales for that year.

Quality Factors of Sales by Financial Institutions and Individuals

Table 1 compares the sales between financial institutions and individuals from 1977 through 1990. Financial institutions had a substantially lower average price per acre than private individuals. However, these numbers are not directly comparable due to differences in quality factors. Financial institution related sales had fewer parcels which were classified as good quality, more parcels which were average quality, and slightly more low quality sales. The percentage of the parcel which was cropland was lower for institution sales than private sales.

Sales made by financial institutions had a higher percentage of transactions sold on contract. This may be explained in part by the fact that a financial institution can be more successful in selling the parcel quickly if it is willing to set up the land purchase as a loan to the new buyer. Sales by institutions conveyed mineral rights to the buyer on a larger percentage of the sales. When a borrower signs a mortgage, the financial institution typically incorporates wording which places a lien on mineral rights also. In addition, institution

Table 1. Comparison of Sales Between Financial Institutions and Individuals in Kansas, 1977-90

	Financial Institutions	Individuals
Average Price ($/acre)	369	549
Average Parcel Size (acres)	214	200
	(%)	
Land Quality:		
Good	19.8	32.4
Average	65.6	55.9
Low	14.6	11.7
Road Surface:		
Hardtop	13.6	19.0
Gravel	70.9	66.1
Dirt	15.5	14.9
Cropland	61.3	66.5
Contract	9.8	6.7
Improvements	22.7	22.2
Mineral Rights	69.4	38.7
Irrigation	10.1	6.0
Region:		
Eastern	42.4	30.4
Central	31.2	42.3
Western	26.4	27.3

sales had irrigated acreage present on a larger percentage of the transactions than did private sales.

The location of the parcel was a factor which was different depending on whether the seller was private or a financial institution. For this study, the state of Kansas was divided roughly into thirds, with the three sections designated eastern, central, and western. The eastern third of the state is primarily western Corn Belt agriculture with corn and soybeans as the dominant crops. The central third is mainly dryland wheat and milo agriculture. The western third of the state is irrigated corn and soybeans or summer fallow wheat and milo. These western parts of the state both have substantial amounts of pasture. Findings of this study show that the eastern region had a substantially higher percentage of financial institution sales than private sales, and the central region had a notably lower percentage of institution-related sales than private sales. The western region did not produce a substantial difference in institution and private sales.

Quality Factors of Sales among Categories of Financial Institutions

It is also beneficial to look at a breakdown of the financial institution sales by lender category to document if differences between lenders were present. Table 2 shows the percentage of total sales by institution according to the year in which the sale occurred. The sales are shown for the Farm Credit System (FCS), commercial banks (banks), and the Farmers Home Administration (FmHA). The pattern of sales for these institutions reflects very few farmland sales caused by financial distress prior to 1983. The years 1983 and 1984 saw increases in sales by all three categories of institutions. FCS and bank sales increased up through the peak in 1987 and declined in 1988, 1989, and again in 1990. FmHA sales were proportionally lower in 1985 and 1986 than those of the other institutions. This is attributed to the court-imposed moratorium on collateral acquisition during this period. FmHA sales also peaked in 1987.

Table 3 summarizes the quality factors of the parcels acquired by these institutions.

Table 2. Percentage of Farmland Sales by Institution by Year, 1977-90

Year	Number of Sales	FCS	Banks	FmHA	All Institutions
		(%)			
1977	712	.0	.3	.0	.3
1978	749	.0	.4	.0	.4
1979	1,150	.0	.2	.0	.2
1980	793	.0	.1	.0	.1
1981	956	.1	.4	.0	.5
1982	840	.1	.6	.2	1.0
1983	1,166	.5	1.2	.9	2.6
1984	752	.5	1.3	2.1	4.0
1985	701	7.7	3.1	.1	11.0
1986	959	19.8	3.8	.4	24.0
1987	1,260	21.8	6.0	7.4	35.1
1988	1,165	16.1	5.3	.9	22.4
1989	804	7.0	5.9	4.0	16.8
1990	1,368	3.8	3.1	2.7	9.6

Note: Numbers may not add due to rounding.

Prices received by banks were the highest, followed by FmHA, and then the FCS. It is important to keep in mind that few FmHA sales occurred in 1985 and 1986, the period reflecting the bottom of the market, while the FCS sold large amounts of land during this period. Findings showed that land quality for FmHA parcels was generally lower than for the other institutions. The percentage of cropland on the average tract in each category was highest for bank-related sales and lowest for FCS sales. Land was sold on contract more frequently for FCS sales and less on FmHA and bank-related sales.

Improvements were found more frequently on FmHA sales and less frequently on bank

Table 3. Quality Factors by Financial Institution, 1977-90

	FCS	Banks	FmHA
Number of Sales	819	320	200
Average Price ($/acre)	354	418	357
Average Parcel Size (acres)	223	201	194
	(%)		
Land Quality:			
Good	20.4	24.8	12.0
Average	65.8	61.4	73.0
Low	13.8	13.8	15.0
Road Surface:			
Hardtop	11.6	15.0	17.5
Gravel	73.3	70.3	63.9
Dirt	15.1	14.7	18.6
Cropland	60.0	65.4	62.6
Contract	12.0	8.8	7.0
Improvements	21.9	14.7	38.5
Mineral Rights	72.4	58.1	74.0
Irrigation	9.4	11.6	7.0
Region:			
Eastern	42.2	39.1	52.0
Central	29.4	35.3	30.0
Western	28.4	25.6	18.0

Table 4. Premiums and Discounts for Kansas Land, 1977-90

Variable	Parameter Estimate	Percentage Effect	*t*-Statistic
Intercept	6.978	—	228.47*
Good Quality	.251	28.5	34.70*
Low Quality	−.243	−21.6	−24.03*
Cropland	.107	—	45.53*
Irrigation	.392	48.0	29.31*
Acres	−.193	—	−36.97*
Improvements	.170	18.5	21.81*
Hardtop Road	.087	9.1	10.40*
Dirt Road	−.031	−3.1	−3.32*
Eastern Region	.062	6.4	7.97*
Western Region	−.251	−22.2	−30.63*
Mineral Rights	.021	2.1	2.28*
Contract	.065	6.7	5.24*
January	−.028	−2.8	−1.95
February	.019	1.9	1.33
March	−.013	−1.3	−1.04
May	.008	.8	.63
June	−.021	−2.1	−1.43
July	−.002	−.2	−.10
August	−.034	−3.3	−2.31*
September	−.003	−.3	−.20
October	−.035	−3.4	−2.44*
November	−.019	−1.9	−1.26
December	−.018	−1.8	−1.24
1989	−.046	−4.5	−2.84*
1988	−.047	−4.6	−3.23*
1987	−.180	−16.5	−12.47*
1986	−.210	−18.9	−13.70*
1985	.010	1.0	.56
1984	.179	19.6	9.89*
1983	.331	39.2	20.28*
1982	.383	46.7	21.74*
1981	.496	64.2	29.04*
1980	.476	61.0	29.06*
1979	.389	47.6	26.54*
1978	.216	24.1	12.23*
1977	.177	19.4	9.60*
Financial Institutions	−.096	−9.2	−8.65*
Adjusted R^2	.595		
F-Value	532.8*		
Degrees of Freedom	13,337		

An asterisk (*) indicates significance at the 5% level.

sales. FCS tracts sold had improvements on a higher percentage of the parcels than the bank sales. Mineral rights were conveyed least often on bank sales and most often on FmHA sales. Irrigation was present most frequently on bank sales, followed by FCS, and then FmHA parcels.

Pricing Model Results

The hedonic pricing model in equation (5) was estimated with OLS using 14 years of data. The parameter estimates along with the *t*-ratios are presented in table 4. This table also presents the percentage effect on land price calculated from the coefficients on the

binary variable. Coefficients on the continuous variables, cropland and acres, are directly interpretable as elasticities. The signs on the quality factors are all as expected. The only variables *not* significant at the 5% confidence level are the 1985 binary variable, and several of the monthly binary variables. The fact that the monthly binary variables are not significant indicates that no statistical difference in price occurs between many months and April. The adjusted R^2 for the model is 59.5%. The statistical quality of this study compares favorably with previous hedonic pricing models. Palmquist and Danielson reported adjusted R^2s of about 41%; Torell, Libbin, and Miller reported R^2s of 61% and 74%; and Miranowski and Hammes reported R^2s of 51%, 38%, and 33%.

Good quality tracts were found to bring a premium of 28.5%, while low quality tracts sold at a discount of 21.6% compared to tracts rated as average quality. Income potential is greater on higher quality land and consequently land was expected to sell for a higher price. Low quality tracts were similarly expected to bring a discount since they have lower income-producing potential. In this study, the quality of the tract of land caused land values to differ by nearly 50%, which is comparable to the 60% found by Palmquist and Danielson.

The elasticity for an additional percentage of cropland was .107. The premium was large because of the higher earning potential of cropland relative to pasture. The presence of irrigation on a tract added an average of 48% to the sale price relative to nonirrigated land.

The discount associated with the size of the parcel was .193. On average, a 1% increase in the size of the parcel will decrease selling price by .193%. This result is as expected based upon the theoretical model presented earlier and the work by Sass. This is also consistent with the results of Palmquist and Danielson, and Torell, Libbin, and Miller.

The estimated value of improvements on a percentage basis is 18.5%. Sales were grouped according to the highest quality road surface adjacent to the property. The paved road premium was 9.1%, and the dirt road discount was 3.1%. If the road surface in Kansas is hardtop, the parcel of land is close to a town or city or the parcel is located on a major road. Thus, the premium may measure the effect of nonagricultural land use potential.

The premium associated with a tract located in the eastern third of Kansas was 6.4%. The discount for a tract located in the western region was 22.2%. Annual rainfall decreases from the east to the west in Kansas. Also, population per square mile decreases in Kansas from the east to the west. Thus, a premium associated with land in the east and a discount relative to land in the west is reasonable.

A premium of 6.7% was found for selling land on contract. A seller who finances the purchase may be willing to extend credit on easier terms than would be available through a financial institution under the same conditions. The buyer can justify the premium since the interest rate may be lower than would be available commercially. Also, often when a sale is made on contract, realtor fees are not involved in the transaction. Customary realtor fees in Kansas are from 5 to 6%. An average premium of 2.1% was estimated for a tract when mineral rights were included in the sale. This estimate may seem low for Kansas at first glance. However, if the mineral rights are of substantial value, they usually are sold separately.

The seasonality of land price was examined using monthly binary variables. April was chosen as the default month because most land sales in Kansas occur during this month. The seasonality patterns can be examined in table 4. A joint F-test was also performed to test the null hypothesis that all monthly binary variables are equal to zero. The results indicate that this hypothesis can be rejected. The calculated F-value is 2.40 with an associated level of probability of .6%.

Yearly binary variables were included to account for aggregate movements in land price. These parameters suggest that Kansas land values increased every year from 1977 through 1981. Kansas land prices then declined from 1981 to 1986, and have recovered since 1986. These estimates closely match aggregate measures of price movements in the Kansas land market.

The estimated discount associated with the sale of a parcel by a financial institution was 9.2%. The direction of this result is as predicted by the model. An institution may want to sell the land quickly so that it can reinvest the money in assets with a greater cash rate of return than real estate. In addition, some financial institutions may not be set up to properly manage acquired properties. Thus, a quick sale may be less costly than holding the property for a period of time with the objective of reducing liquidity costs. In addition, Kansas has a law against corporate land ownership. A corporation can only hold agricultural real estate for 10 years. Thus, this discount in some cases may represent a financial institution accepting a low offer to avoid having to liquidate a property later at a larger discount.

Sensitivity of the Institution Discount to Time-varying Parameters

Other hedonic pricing models were run to further examine the robustness of the seller discount. The first alternative model was to allow each of the estimates of parameters a_1 through a_{12} in equation (5) to vary each year. This analysis was performed to analyze whether time-varying premiums and discounts for quality variables would account for the difference in seller. However, the results of this more unrestricted model suggest that the financial institution seller discount is -9.5% with a t-ratio of -8.89. Thus, the magnitude and the statistical significance are robust to time-varying premiums and discounts for quality characteristics.

Test for a Constant Institution Discount

A second alternative model was estimated to determine if the discount can be viewed as a constant percentage over time. This hypothesis was tested by calculating 13 interaction variables. Each binary year variable was multiplied by the seller variable. A joint F-test was constructed to test whether all of the parameter estimates on the 13 interaction variables were jointly equal to zero. The calculated F-value was 1.36 with a probability level of 16.8%. The null hypothesis, that the seller discount is constant over time, cannot be rejected at usual levels of confidence.

Financial Institution and Quality Interaction

The third alternative hedonic pricing model which was considered took the first alternative model and additionally allowed parameters a_1 through a_{12} to vary if the seller was a financial institution. An F-test was constructed to jointly test whether the 12 financial and quality interaction variables were jointly significant. This analysis was performed to examine whether or not quality factors were valued differently if the seller was a financial institution rather than a private seller. There was no difference in the quality premiums based upon the seller. The test of this hypothesis resulted in a calculated F-value of 1.412 with a probability of 15.2%. The results from the average model are presented because of the ease of interpretation. The results of the alternative models do not vary substantially with regard to the financial institution's effect on sale price.

Differences among Banks, FCS, and FmHA

A final hedonic pricing model was estimated, further stratifying the seller variable. Table 5 presents the results when the seller variable was separated into private sellers, commercial banks, FCS, and FmHA. The quality variables, the month binary variables, and the yearly binary variables have almost identical estimates to those reported in table 4. Land sold by the Farm Credit System on average received a price discount of 9.2%, compared with a 5.8% discount received by commercial banks. Land sold by FmHA received a discount of 14.7% on average. The hypothesis that the FmHA discount was equal to the FCS discount was equal to the commercial bank discount was tested. The calculated F-statistic

Table 5. Estimated Costs Associated with Liquidating Acquired Property, 1977-90

Variable	Parameter Estimate	Percentage Effect	*t*-Statistic
Intercept	6.977	—	228.37*
Good Quality	.251	28.5	34.67*
Low Quality	−.243	−21.6	−24.08*
Cropland	.107	—	45.64*
Irrigation	.390	47.7	29.19*
Acres	−.193	—	−36.92*
Improvements	.171	18.6	21.90*
Hardtop Road	.086	9.0	10.36*
Dirt Road	−.031	−3.1	−3.36*
Eastern Region	.063	6.5	8.03*
Western Region	−.251	−22.2	−30.64*
Mineral Rights	.022	2.2	2.41*
Contract	.065	6.7	5.26*
January	−.029	−2.9	−1.98*
February	.019	1.9	1.31
March	−.014	−1.4	−1.11
May	.008	.8	.63
June	−.022	−2.2	−1.51
July	−.003	−.3	−.21
August	−.034	−3.3	−2.27*
September	−.003	−9.3	−.21
October	−.034	−3.3	−2.40*
November	−.019	−1.9	−1.28
December	−.018	−1.8	−1.24
1989	−.046	−4.5	−2.84*
1988	−.050	−4.9	−3.43*
1987	−.180	−16.5	−12.36*
1986	−.210	−18.9	−13.63*
1985	.011	1.1	.60
1984	.181	19.8	10.04*
1983	.332	39.4	20.40*
1982	.384	46.8	21.84*
1981	.498	64.5	29.15*
1980	.478	61.3	29.14*
1979	.390	47.7	26.61*
1978	.218	24.4	12.33*
1977	.178	19.5	9.68*
Farm Credit	−.097	−9.2	−6.94*
Commercial Banks	−.060	−5.8	−2.88*
Farmers Home	−.159	−14.7	−6.03*
Adjusted R^2	.596		
F-Value	505.8*		
Degrees of Freedom	13,335		

An asterisk (*) indicates significance at the 5% level.

for this hypothesis was 4.59. This hypothesis is rejected at the 5% level of significance. Thus, the hypothesis that the discount across financial institutions is equal is rejected.

Sensitivity of Discounts to Sample Period

The regression models were also rerun using data from the 1984 to 1990 time period. The discounts received by the institutions remained nearly the same, with an FCS discount of 9.2%, a commercial bank discount of 6%, and an FmHA discount of 14.1%. All of the discounts were significant at the 1% level of significance. Thus, these discounts appear to be robust to the choice of sample period.

Discussion

As discussed in the theory section, the discount associated with the seller being a financial institution can be explained in a number of ways. The first is to view the discount as a liquidity cost discount. This is the discount associated with increases in H [equation (1)]. If one wants to sell land quickly, there is usually a discount associated with a quick sale. Rather than adding additional staff or hiring outside consultants to properly manage acquired property, it may be less costly to simply sell the land at whatever price can be obtained.

A second justification of this institution discount would be that the financial institution is not well equipped to manage properties. The financial institution may be facing financial stress and cash is needed to provide liquidity immediately. The value of the cash is such that the lender is willing to take the first offer in order to convert the asset into cash. This reason was illustrated in the theoretical model by limiting the time horizon. A related reason for a discount is that land ownership by certain financial institutions is limited by law.

Still another justification may be provided by the thinness of the market. The theoretical model suggests that land would be offered initially at a lower price and that the offer price would fall at a faster rate in a thin market. In addition to the legal constraints placed on financial institutions, psychological factors associated with a financial institution selling a tract of land could be a reason for institutions facing a "thinner" market than private individuals. For example, other farmers in the area may be unwilling to bid on a neighbor's land that has been repossessed by a financial institution. A final justification for financial institutions receiving less than private sellers for an identical parcel of land could be differing management incentive structures. This is illustrated by the differences among the financial institutions. For example, commercial banks are private institutions, the Farm Credit System is a private institution with backing from the federal government, and the FmHA is a government agency.

This study has documented that a substantial discount exists when financial institutions liquidate acquired property. It is likely that this discount can be attributed to a number of factors, rather than one specific cause. However, the cost of liquidating property is a factor that lenders need to recognize when considering foreclosing on a loan.

The size of the discount for the reported sales in Kansas is large. Using the 320 commercial bank sales reported in Kansas, commercial banks' acquired property sales strategy cost \$1.6 million from 1977 through 1990. For the 819 FCS sales, the acquired property sales strategy cost \$5.9 million. The FmHA sales strategy cost \$2 million.[5] Thus, purchasers of farmland from financial institutions were able to obtain farmland for roughly \$9.5 million less than they would have paid if they had purchased the land from private sellers in this sample of land sales.[6] This transfer may be thought of as having two components: the cost of foreclosure and the cost differences of different financial institutions in liquidating land. Assuming that 5.8% is the cost of foreclosure (the discount received by commercial banks), the additional cost incurred by the FCS was \$2.2 million, and the additional cost incurred by the FmHA was \$1.2 million.

Conclusions

The objective of this study was to determine whether farmland parcels sold by financial institutions varied in their characteristics from land sold by individuals, and then to determine whether these differences impacted the sale prices of the parcels. A theoretical Bayesian dynamic optimal search model was applied to the farmland market to demonstrate the rationale for financial institutions receiving less than farmers. A hedonic pricing model was estimated for the Kansas farmland market for the years 1977 through 1990. The majority of the sales by financial institutions occurred between 1985 and 1990. In 1987, financial institutions accounted for 35% of total sales in Kansas. In general,

financial institutions sold fewer good quality and more average quality parcels. The percentage of the parcel which was cropland was lower for institutions. Institution sales had a higher percentage of transactions which were sold on contract. More institution sales on a percentage basis had improvements and irrigation present on the parcel. The hedonic pricing model was used to adjust for the above quality differences between land sold by institutions and private individuals and to test the hypothesis from the theoretical model. On average, financial institutions received 9.2% less than a private seller received for land sold. This discount is robust to time-varying premiums and discounts for quality factors. The discount was a constant percentage over time. The results of this study also suggested that the difference between what financial institutions received and what individuals received was the constant percentage, and was not the result of financial institutions pricing quality characteristics of the parcel differently than land sold by private individuals.

The discount is also statistically different depending on the financial institution. Commercial banks on average received a discount of 5.8%, while the Farm Credit System (FCS) received an average discount of 9.2% and the Farmers Home Administration (FmHA) received a 14.7% discount. The magnitude of this discount suggests that the cost of liquidating acquired property is an important consideration that needs to be included when calculating the costs of defaulted loans. Liquidation costs also play a role in determining whether to restructure a loan or to foreclose on a loan. Lins and Robison provide a model for calculating the loan losses from foreclosure versus restructuring. The anticipated value from the liquidation of acquired property plays an important role in determining the lender's least cost strategy. If the costs associated with the liquidation of property are not fully included, the lender will likely restructure fewer loans than optimal and foreclose on more loans than are optimal.

In addition, this study questions the restrictions placed on the management and sales of acquired property of the FCS and the FmHA through federal law. For this sample of 13,375 Kansas sales, it is estimated that financial institutions received $9.5 million less than private individuals for the same quality land. If one adjusts for differences in the use of land contracts, the difference is still $9.2 million. The sum of the additional discounts that the FCS and the FmHA received above what commercial banks received amounted to $2.2 and $1.2 million, respectively. Clearly, a shift of wealth of this magnitude from financial institutions (and ultimately, in some cases, taxpayers) to land buyers is in need of an open dialogue. Further analysis which documents the costs and benefits of such restrictions is needed.

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Notes

[1] For a more complete explanation, see Stam, Gajewski, and Koenig.

[2] Time discounting is not considered in the presented analysis for expositional ease. When time discounting is considered, the qualitative results do not change for the theoretical model presented.

[3] The data are discussed in more detail in the data section.

[4] Special thanks are due to Dr. John R. Schlender, professor of agricultural economics, Kansas State University, for providing the compilation and accuracy checking of these data over the 14-year period.

[5] The above estimates do not adjust for differences in the percentage of land sold under contract by institutions and private individuals. If one adjusts for the premium of being able to sell under contract, the discounts for commerical banks, the FCS, and the FmHA are $1.5, $5.7, and $2 million, respectively.

[6] It is estimated that the farmland sales data bank contains roughly one-fourth to one-third of all Kansas farmland sales.

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