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THE INFLUENCE OF FARM MORTGAGE LOAN TERMS ON FARM REAL ESTATE VALUES

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The influence of credit terms on farm real estate values is a subject on which there are divergent views. Some suggest that readily available credit and liberal terms contributed to the strong gain in farm real estate values in recent years [2, p. 3]. Credit terms frequently cited as contributing to this situation are increases in Federal Land Bank loan limits from 65 percent of normal agricultural value to a maximum of 85 percent of appraised value of real estate and FHA loan participations with up to 100 percent financing [15].

A number of analysts support the view that financing terms affect farmland values. For example, Gale indicates that low equity financing increases effective demand for farmland [7], Atkinson includes new regulations permitting increased lending by Federal Land Banks as one of the factors causing "recent big increases in land values" [1], and Franci commenting on the same regulation says, "A farmer with a given amount of investment capital, therefore, can bid more for farmland and still finance the loan under the revised downpayment provisions" [6].

On the other hand, van Vuuren argues that conditions existing in the credit market may have little affect on farm real estate values. He says, "Credit money converts potential land demand into effective demand—whether this money has an additional influence independent of any market force seems doubtful—" [19, p. 60].

Empirical studies pertaining to factors affecting farm real estate values are not very helpful. Many are silent on the matter [4, 11, 17, 18]. Others recognize that credit terms or availability of credit may have an effect on farm real estate values but do not include these variables in a way which show their separate effect on farm land

values [13, 16]. Some who have included finance variables in their model have either concluded that the effect on land price was small [8], or a consistent relationship could not be found [12].

The null hypothesis examined in this paper is that financing variables such as a loan to present market value of security, amount of security, percent of purchase price financed and term of loan do not affect the market price of land. This paper reviews some concepts bearing on this question, proposes a model and an empirical test of the above hypothesis.

FINANCE TERMS AND FARM REAL ESTATE VALUES

Economic theory indicates land has value because it is capable of earning income. Capitalization of this stream of income determines present market value of land. Though Crowley [3] has suggested market appreciation of land should also be included, finance terms have been excluded from the capitalization formula. This omission recognizes that in a competitive environment, market forces equilibrate the rate used to discount cash flows with market rate of interest and thereby give no special advantage to credit terms.

If expected rate of return from land is above the market rate of interest on loans, land acquisition will occur resulting in higher prices of land as buyers are induced to acquire the asset. However, as the price of land increases, rate of return falls toward the rate of interest on loans until a new equilibrium is established. It can be shown that when expected rate of return from land is above the interest rate on loans, liberal loan terms—longer maturities and low downpayments—increase the margin between present value of pro-

Most of the analysis was done while the author was a 1973-74 "Visiting Scholar" with the Research Division of the Farm Credit Administration and on leave from the Department of Agricultural Industries, Southern Illinois University, Carbondale, Illinois.

jected cash inflows and outflows than would be the case with more conservative terms. However, liberal loan terms are not the underlying cause of expected land price rise. The increase in land prices is due to initial disparity between interest rate on the loan and rate of return on farm land.

Liberal loans permit those having small downpayments to bid alongside those of greater means until rates used in discounting cash flows are in equilibrium with the lending rate. Thus, financing terms may help speed adjustment and encourage wider distribution of farm ownership but they are not seen as the cause of the price rise. Even in the absence of the group of buyers who must utilize liberal loan terms in order to purchase land, market action by the smaller group of buyers who are capable of making larger downpayments and meet repayment requirements of shorter term loans would force land prices to the new higher equilibrium level. Viewed from this perspective, loan terms are not seen as having an added or separate effect on price of land. Instead, they are seen as speeding or retarding an adjustment which would have taken place anyway.

THE MODEL

In order to test the hypothesis that credit terms have no significant effect on farm land values, a multiple regression model using cross-sectional data was developed. The model focuses on the question of whether finance terms were associated with the sale price of individual farm real estate transfers. It does not examine whether average level of sale prices was affected by finance terms available.

Data were obtained from the Federal Land Bank's Management Information Service's loan and farm sales registers. A major concern in utilizing these data was to adequately measure productive capability of each tract. In order to account for this likely source of variation in sale price, two areas of near uniform soil and climatic conditions were selected. One area, composed of about 12 counties, was in South Dakota and the other, containing about 20 counties, was in north central Iowa. In the South Dakota area only cash grain farms located in area class 3 and classified as "C" farms were selected.¹ In this study area the selection procedure was designed to produce a group of tracts of nearly homogeneous productivity

to minimize this source of variation in price paid per acre.

In the Iowa area a different approach was used. The selection procedure included all cash grain farms classed as either "A" or "B" and located in areas 1, 2, or 3. Different gradations of areas and farm classes were used as a proxy for tract productivity and, therefore, entered the analysis as a separate variable.

These procedures resulted in 79 sales in the South Dakota area and 157 sales in the Iowa area. Sales were distributed over an approximate two-year period including the latter part of 1971, 1972, and the first part of 1973. Because transfers used in the analysis occurred about the same point in time, demand and supply conditions which determined price paid per acre were assumed to be independently determined. In practice this assumption means that supply of tracts for sale in the study period was not affected by price paid for land in the study period. This independence permitted use of a single equation model to explain price paid per acre (PPAC).

The model assumed that sale price per acre would be a function of three kinds of characteristics: 1) those related to the tract, 2) those related to buyer and seller, and 3) those describing the way in which the tract was financed.

Characteristics of the Tract

Tract productivity (TP) was accounted for by the experimental design in South Dakota and measured by gradation of area and farm class in the Iowa area as previously described. A negative correlation was expected in the Iowa area as farm productivity was indexed from 1 to 6 with 1 being tracts of higher productivity and 6 those with lowest productivity. In addition, it was hypothesized that sale price per acre would have positive association with the year of sale (YEAR). This recognized that farm real estate values trended upward during the 18-24 month study period and that tracts sold in the latter part of the period might carry higher prices than those sold earlier.

It was further hypothesized that small size tracts (ACSLD) would sell for a higher price per acre than larger tracts. This relationship has been noted by appraisers and documented by other studies of this type [11, 18]. Three additional characteristics of the tract were expected to have a

¹ Area ratings (ranked from 1-5) take into account such factors as community advantages, stability, dependability and amount of income. Farm ratings (ranked from A-E) take into account the condition of buildings, hazards, debt carrying capacity, size, durability of sales, etc.

positive influence on price paid per acre. These were the percentage of the tract cultivatable (PCTCL), buildings value per acre (BVAC) and non-agricultural influences (NOAGI). The latter variable was measured on a scale ranging from 0-2 with zero indicating no influence, 1 as slight and 2 moderate to great.

Characteristics of the Buyer and Seller

Two factors hypothesized to affect sale price were reason for purchase (REPUR) and reason for selling (RFSAL). Purchases for farm expansion, non-agricultural development and rural dwellings were expected to command higher price than purchase for other purposes.

Sales for settling estates, family transfers and sales to provide funds for an emergency or bankruptcy were hypothesized to represent sales which would bring a lower price. Reason for purchase and reason for sale entered the model as dummy variables.

Some analysts believe that "successful operators" are capable and willing to pay more for land and, therefore, have included a variety of buyer characteristics in their models [8]. However, it would seem that a good manager would not pay any more for a tract than its market price. To do so would capitalize superior management ability into land values. Though this view would exclude borrower characteristics from the model, data were available to test this hypothesis. As there was substantial correlation between assets, net worth, age and total net income of the borrower, it was decided to test this hypothesis by using the single variable, borrower's assets (ASET).

Finance Characteristics

A third group of factors examined were those related to terms and conditions of the loan used to finance the purchase. Four finance related variables were examined: Ratio of loan to present market value of security (LPMV), percentage of purchase price financed (PCTF), term of loan (TERM), and ratio of acres appraised to acres in the sale tract (RAAAS).

If finance variables affect land values it would be expected that LPMV and PCTF would have positive influence. Larger values of these variables represent smaller equity needs by the buyer and, thereby, facilitate acquisition of the specific tract. Longer loan maturities (TERM) are also expected to have positive influence on price paid per acre as longer maturity loans represent smaller annual payments.

It was not entirely clear how the ratio of acres in the security to acres purchased would affect sale price. One possibility is that availability of ample land for security facilitates financing a tract and, hence, encourages high values. On the other hand, if the ratio is looked upon as a requirement for purchase, it would discourage buyers who do not have adequate security and, thereby, tend to weaken values. Thus, no hypothesis is made regarding directional influence of the variable RAAAS.

The interest rate on the land bank loan was omitted from the analysis because it was virtually the same on all tracts (minimum value 7 percent and maximum value 8 percent).

The complete model can be written:

$$PPAC = f(\text{YEAR TP ACSLD PCTCL BVAC NOAGI RFSAL RFPUR ASET LPMV PCTF TERM RAAAS})$$

The above model was estimated in two stages. The first stage included all attributes related to the tract, buyer's assets and reason for selling and buying. The second stage added four finance related variables. This two-stage procedure was followed in order to provide a clearer picture of collective impact, if any, of finance variables on sale price of farm real estate.

Empirical Results

Estimates of model parameters without finance variables show that all variables in both areas have the hypothesized sign except the dummy variable indicating reason for selling in the Iowa area and reason for buying in the South Dakota area (Table 1). Coefficients for these two variables had large standard errors. Intercorrelations between variables exceeded .45 in only one instance and that was between ACSLD and PCTCL in the Iowa area.

The regression coefficient measuring impact of year of sale on price paid per acre was positive, in both areas, and was significantly different from zero at the 1 percent probability level in Iowa but not significant in the South Dakota area. The nonsignificant coefficient in South Dakota might have occurred because South Dakota values rose only about half as much as in Iowa.

The coefficient for the tract productivity variable in the Iowa area was negative as hypothesized and statistically different from zero at the 1 percent level of probability. In both areas, larger tracts sold for less per acre than smaller tracts and sale price of land increased as building value

Table 1. ESTIMATED PARAMETERS AND STATISTICS OF A REGRESSION MODEL DESIGNED TO EXPLAIN VARIATIONS IN THE PER ACRE PRICE OF FARM TRACTS SOLD IN TWO MIDWEST AREAS

Variable Name or Statistic	Regression Model Without Finance Variables		Regression Model With Finance Variables	
	South Dakota	Iowa	South Dakota	Iowa
Regression coefficient (Standard error)				
Year	1.00(5.21)	36.92(10.95)***	-2.76(5.24)	35.35(11.11)***
Tract productivity index	NA	-29.33(3.85)***	NA	-29.07(4.01)***
Acres in tract	-.10(.03)***	-.32(.12)***	-.10(.03)***	-.27(.12)**
Building value per acre	.47(.12)***	.57(.09)***	.46(.12)***	.58(.09)***
Percent of tract cultivable	.35(.19)*	.27(.51)	.44(.17)**	.50(.57)
Non-agricultural influence	3.05(31.56)	76.35(23.13)***	-29.96(30.36)	72.83(23.33)***
Buyer's Assets	.13(.03)***	.01(.02)	.12(.03)***	.00(.02)
Reason for sale	-16.65(7.06)**	10.79(14.22)	-13.59(6.64)**	11.12(14.65)
Reason for purchase	-1.55(13.18)	3.30(15.31)	-8.07(12.35)	.14(16.61)
Loan to PMV of security			.51(.38)	.46(.57)
Percent of tract financed			-.46(.15)***	-.31(.44)
Term of loan			1.24(.77)	-2.89(2.73)
Ratio of acres in se- curity to acres sold			.01(.03)	.18(.17)
Number of observations	79	157	79	157
Multiple correlation coefficient (r)	.68	.69	.75	.70
Coefficient of deter- mination (R ²)	.46	.48	.57	.49
NA Not applicable				
*** .01 probability				
** .05 probability				
* .10 probability				

increased. Regression coefficients for these variables in both areas were statistically different from zero at the 1 percent probability level.

The value of the coefficient for the variable measuring proportion of land cultivated was positive in both areas as expected. However, the coefficient was not statistically significant in the Iowa area but was significantly different from zero at the 10 percent probability level in the South Dakota area. Hindsight suggests the selection process tended to result in a relative homogeneous group of observations with regard to this characteristic and may have caused the low statistical significance of this variable.

The coefficient for non-agricultural influence carried the expected positive sign in both areas. However, in South Dakota the regression coefficient was not statistically significant but then only a few sales were reported to have been affected by non-agricultural influences.

The regression coefficient for assets of the buyer showed a positive association with price paid for land in both areas. In the South Dakota area the coefficient was statistically significant at the 5 percent probability level but in the Iowa area it was not significant at the 10 percent level. The results make it difficult to judge the effect of buyer's assets on sale price per acre.

Inconsistent signs for the dummy variables, reason for purchase and reason for sale, between the two study areas are believed to be related to characteristics of the data. In the two study areas a majority of purchases were classified as being for expansion and other purposes which were believed to result in a higher price. As the typical transfer in these areas was for farm expansion, market price on most tracts contain this believed enhancement to value. Thus, it may not be possible, using these data, to isolate the separate effect of various reasons for buying land on selling

price. This is especially true in the South Dakota area where about 90 percent of all transfers were for farm expansion.

Similar reasoning might also explain opposite signs on the variable, reason for selling. In the Iowa area, about two-thirds of sales were reported to be related to estate settlement, family transaction, or other reason which was thought to cause the tract to be sold for a lower price. In the South Dakota area, one-third of sales had this characteristic. Perhaps the preponderance of this type of sale in Iowa once again set the market tone and therefore did not permit the model to adequately discern between "normal" sales and those which were hypothesized to result in lower price.

Similarity of results in the two study areas was also depicted by values of multiple correlation coefficients and coefficient of determination. They were about .68 and just under .50 respectively in both areas.

Addition of the financing variables increased the coefficient of determination from .46 to .57 in the South Dakota area and from .48 to .49 in the Iowa area (Table 1). All regression coefficient values which were significantly different from zero at the 10 percent probability level or better when parameters of the model were estimated without the finance variables retained the same sign and remained statistically significant in the equations which contained the finance variables.

In only one instance out of eight possibilities (4 credit related variables in two areas) did a credit related variable have a statistically significant impact on price paid per acre of farmland. And, in this instance the sign of the coefficient was other than expected. In the South Dakota area the regression coefficient measuring impact on price per acre of varying percentages of purchase price financed was negative and significantly different from zero at the 1 percent probability level. In all other instances, regression coefficients were not significantly different from zero at usually accepted probability levels, although most had the hypothesized sign.

A possible explanation for the negative coefficient for the variable, percent of tract value financed, in the South Dakota area may be its intercorrelation with NOAGI ($-.24$). Because non-agricultural influences often represent elusive and transitory values, it may be that the land bank

in South Dakota required relatively more equity funds when financing tracts so affected. Thus, the statistically significant negative coefficient established in the South Dakota area may represent a lender's adaptation to risk rather than representing a casual factor determining farm land values.

SUMMARY AND IMPLICATIONS

It was hypothesized that credit related variables such as downpayments, terms of loan and the ratio of acres in the security to acres sold do not affect level of farm land prices. A cross-section model was developed using data provided by the Omaha Land Bank in a South Dakota and an Iowa area. The statistical results support the hypothesis as none of the credit related variables had both a correct sign and were statistically different from zero at usually accepted probability levels.

A disturbing feature of the empirical results is the relatively high proportion of total variation in purchase price per acre which remains unexplained. Though errors in specification could be large, it is noted that percentage of land price variation between tracts explained by this study is not out of line with other studies which utilize cross-sectional data [4, 9, 11, 18]. Perhaps this is indicative that other factors related to the area in which the tract is located affect land prices and that "the land market" is really composed of many micro-market areas. Alternatively, it may suggest that knowledge about the land market is imperfect and that the unexplained residual is a measure of the size of this imperfection.

Findings in this study show that the major group of factors affecting prices of farmland are various characteristics associated with the tract rather than financial terms. Interest rate is the one finance variable capable of affecting land values; it is argued that the decision to invest in land is related to prospective rate of return on farm land relative to cost of loan funds. Viewed from this perspective the explanation for the tremendous surge in farm land values since 1971 would seem to be due to improved farm income prospects rather than to liberalization of financing. Thus, it may be concluded that finance terms may determine who buys land rather than greatly affecting the price paid.

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