IMPLICATIONS OF THE LAND TRANSFER SURVEY'S FINANCIAL DATA FOR THE FARMER MAC SECONDARY MARKET

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ABSTRACT

"Implications of the Land Transfer Survey's Financial Data for the Farmer Mac Secondary Market."

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An hedonic pricing model is used to analyze differences in rural mortgage loan interest rates taken from ERS's Land Transfer Survey. Statistically significant differences among fixed rate mortgages were found among lenders, regions, land uses, and ownership classes. Fewer significant differences were found among variable rate mortgages.

INTRODUCTION

One economic justification for establishing a secondary market in agricultural mortgage loans is to reduce market imperfections by increasing market competition and opportunities for arbitrage between market participations. If this effect is to be meaningful, one first needs to demonstrate that significant imperfections exist in the market.

Analysis of cross-sectional data on interest rates on rural land transfers showed significant differences exist among lenders, regions, ownership classes, and land uses during 1985 and 1986, especially for fixed-rate mortgages (FRM's). Although these results do not control for loan quality distinctions, they are consistent with the hypothesis that a secondary market could significantly affect the allocation of credit in rural land markets.

DESCRIPTIVE CHARACTERISTICS OF THE DATA

The Land Transfer Survey (LTS) was designed to collect information on the characteristics of transferees, methods of transfer and finance, and land use for transactions during 1984-86. In all, 38 states were included in the survey. The unit of land used is the parcel which may be any size and may be part or all of a farm, ranch or forest. The questionaire was mailed to 33,000 participants. After a followup request, useable responses pertaining to 7,232 parcels of land (1,005,554 million acres) were obtained. Agricultural land included farmland, range, pasture, orchards, greenhouses, livestock houses, and land used for other intensive purposes. Of the respondents, 61.8 percent reported having some agricultural land and 91.8 percent of those reported using their land for farming.

The sample extracted for analysis from the LTS were observations that met several criteria. First, the sample needed to reflect commercial transactions. Our focus was on credit terms--interest rates, prices, and closing--so we selected only voluntary, arm's length transactions. Second, observations were required to report both an interest rate and a price. Third, only loans from a single lender were extracted. Fourth, only lenders and years (1985/86) with sufficient representation were selected for study.

Table 1 shows the distribution of observations by lender, year, and loan type (fixed or variable rate). The ratio of variable rate mortgages (VRMs) to fixed rate mortages (FRMs) is also shown. Note these observations. First, the largest number of mortgages in 1985 and 1986 were seller-financed. Second, roughly 75 percent of all loans were FRMs. Commercial banks and thrifts were the most likely to originate VRMs. Third, the participation of the FCS and the FmHA in the mortgage market in these years was minimal. Each of these observations is intuitive, but not necessarily obvious. In the discussion surrounding the passage of the Agricultural Credit Act of 1987, for example, lobbyists argued that the Federal Agricultural Mortgage Corporation (Farmer Mac) was needed because FRMs were no longer available in the market. This was evidently not the case in two years prior to the legislative debate.

Table 2 shows the occupational breakdown of mortgage purchasers. Two observations are pertinent. First, tenant farmers are about twice as likely as any other group other to use a VRM. Second, more than half of the mortgages purchased in both years were purchased by nonfarmers. These observations are consistent with the interpretation that farmer-owners had limited access to farm

mortgage credit during 1985 and 1986, although additional information is required to validate such an hypothesis.

The survey's 38 states were aggregated into 10 geographic regions, as shown in Table 3. Two observations should be highlighted. First, VRMs are not the predominate loan type in any region of the country, although differences appear important between regions and between years. Second, it seems remarkable that the percentage of VRMs was almost exactly the same in 1985 and 1986.

Table 4 shows the acreage distribution of land classes included in the survey sample. Note these observations. First, because the total proportion of VRMs on an acreage basis (31.1 percent in 1985 and 49.7 percent in 1986) is greater than the equivalent distribution on an observation basis (25.7 percent in table 3), VRMs are apparently more common in purchases of large land tracts. Second, pastureland purchases are the only class of purchases discussed in this paper in which VRMs consisted more than half of all loans made in 1985 and 1986. Purchases of rural residences, not surprisingly in view of the home mortgage market, are also often VRM loans. Third, most of the land purchased and recorded in the LTS was agricultural land and pastureland. The observation that VRM's were more important in large land purchases and the predominate loan type for pastureland purchases suggests that commercial farmers, particularly dairy farmers, had the most incentive to lobby for FRM financing through Farmer Mac.

EMPIRICAL MODEL AND RESULTS

In order for competition to reduce market imperfections, market imperfections must exist. The Farmer Mac secondary market could increase the arbitrage between regional markets and improve the pricing of loan characteristics. This suggests

the applicability of an hedonic pricing model employing interest rates as the dependent variable (Y) and loan characteristics as the independent variables (Xi's). If these characteristics are statistically significant, then we can assume that market imperfections exist in the market for agricultural mortgage loans. A secondary market could therefore significantly improve the pricing of farm mortgage credit.

The basic model used in this analysis had the following form:

$$Y = \beta_o + \beta^a_i \Sigma^8_{i=1} X^a_i + \beta^b_j \Sigma^{10}_{j=1} X^b_j + \beta^c_k \Sigma^5_{k=1} X^c_k + \beta^d_l \Sigma^9_{l=1} X^d_l + \beta^e_m \Sigma^n_{m=1} X^e_m + \epsilon$$

where: a = lender class, i = 1, 2, ... , 8

b = region class, j = 1, 2, ... , 10

c = borrower occupation classes, k = 1, 2, ..., 5

d = land classes, l = 1, 2, ..., 9

e = other independent variables, m = 1, 2, ..., n

The land classes included in the final regressions were collapsed into 3 discrete, mutually-exclusive land classes, agricultural land (more than 50 percent agricultural land), pastureland (more than 50 percent pastureland), and other land (not otherwise classified). The "other independent variables" included such explanatory variables as land price, closing costs, and dummy variables for year and loan type, and not all variables were included in each trial. In each case, interest rates are the dependent variable. The model assumed a linear form.

Preliminary review of the data regressions on subsets of the data suggested several observations. First, regressions on VRM data yield substantially different results from FRM data. When these data are pooled, dummy variables for VRMs are statistically significant. Second, expected relationships among credit terms (for example, between downpayments and interest rates) were more reliable

for some lenders than for others. Third, differences based on t-statistics among regions, lenders, land classes, and ownership classes vary over time making it difficult to generalize. These problems suggested that it is preferable to employ an F-statistic to test the broad significance of differences among classes of variables. The remainder of this paper will therefore concentrate on the results obtained from this approach.

The basic hypothesis of each F-test is that the each of the coefficients in a given class of independent variables are equal (alternatively, they are statistically indistinguishable). Thus, we write:

H_o: $\beta_1 = \beta_2 = \ldots = \beta_i$

H_a: $\beta_1 \neq \beta_2 \neq \ldots \neq \beta_i$

Therefore, if the calculated F-statistic exceeds the critical value, in this case $\alpha = .05$, then we reject the null hypothesis and accept the alternative hypothesis.

Table 5 records the results of F-statistics developed for these classes of independent variables: lenders, private lenders, regions, borrower occupation groups, and land classes. Model 1, which uses VRM data exclusively, showed failure to reject H_o in the case of private lenders, regions, and borrower occupation groups. Thus, the interest rates on VRM's offered among private lenders, regions, and borrower occupation groups are statistically indistinguishable. Interest rates were, by contrast, statistically different among all lenders and land classes for VRM's, among all classes tested for FRM's, and among all classes tested for data pooled with respect to VRM's and FRM's.

These results were consistent with the t-statistics computed by regressing each of the independent variables in each class separately on interest rates. It was,

in fact, clear that classes, such as lenders, could be divided into subclasses, as was done with private lenders, and significant differences could be obtained. The small sample size of these subclasses suggested, however, that such tests should be used with caution and they are not reproduced here. It is worth noting, nonetheless, that dummy variables for individual years and for VRM's were consistently significant. The coefficients of variation (r^2) in all of these regressions were relatively modest, falling in the range of 15 to 30 percent.

IMPLICATIONS FOR MORTGAGE POOLING UNDER FARMER MAC

One economic justification for forming a secondary market is to reduce market imperfections by increasing the competition among lenders and different classes of borrowers. The existence of significant differences among different classes of rural mortgage loans does not necessarily imply a highly imperfect market because the data available in the LTS were insufficient to control for loan quality and other significant financial variables. The results given here are, however, consistent with this result.

Clearly, the establishment of a secondary market for commercial mortgage loans will affect VRM's and FRM's differently. The terms on VRM's appear to be more homogeneous than FRM's with respect to private lenders, regions, and borrower occupation classes. This could be the result of greater competition to originate VRM's perhaps because VRM's impose interest rate risk on borrowers or because VRM funding is more closely tied to loanable funds other than deposit accounts which could imply cost-plus pricing. Another possibility is that in serving a larger customer base FRM's also serve a more diverse class of customers, particularly with respect to risk characteristics, which would lead to greater sorting in the marketplace.

The structure of regional farm mortgage markets will affect the performance of the secondary market for a number of reasons. First, the Farmer Mac underwriting standards are likely to exclude seller financed loans from sale. Second, the market share of the Farm Credit System (FCS) will likely affect the performance of a FCS pooler, should the FCS designate an exclusive pooler as the law allows. Third, the legislation was intended to promote availability of fixed-rate mortgages. Fourth, the probability of mortgage prepayment is, in part, related to loan terms and structural characteristics. Fifth, the secondary market is likely to reduce regional differences in interest rates and credit terms. The LTS provides insight into these kinds of issues although clearly the data were not collected with the objective of analyzing credit terms with an eye on the secondary market.

The need to control for loan quality in future research is obvious. Farm mortgages differ in quality because farm borrowers have different equity positions and management expertise, and because farmland has different uses. A dairy farm, for example, will generate cash income throughout the year while a cash-grain operation may generate cash only once a year. Their price-risk may also differ because the Federal government supports dairy prices while some types of grain (buckwheat, for example) are not supported. In as much as crop and livestock enterprises are not evenly distributed around the country, these differences could explain observed regional differences in the LTS data. If lenders prefer lending to some types of farm operations, differences in the LTS data associated with lenders could also be affected. Land types could be similarly affected. Unfortunately, controlling for loan quality is not possible given the current format of the LTS.

Table 1: Distribution of lenders by loan type, 1985-86

Lender	1985 VRM	1985 FRM	1985 Ratio	1986 VRM	1986 FRM	1986 Ratio
Seller	22	495	4.4	13	395	3.3
Other individual	4	21	19.0	4	33	12.1
Federal land bank	0	14	0.0	0	18	0.0
Insurance company	1	10	10.0	6	4	150.0
Commercial bank	137	207	66.2	144	239	60.3
FmHA	4	14	28.6	1	13	7.7
Thrift companies	45	56	80.4	35	71	49.3
Mortgage company	3	26	11.5	3	30	10.0
Total	216	843	25.6	206	803	25.7

Table 2: Distribution of observations by purchaser occupation, 1985-86

Occupation	1985 VRM	1985 FRM	1985 Ratio	1986 VRM	1986 FRM	1986 Ratio
Farm owner	44	153	28.8	38	145	26.2
Nonfarmer	132	537	24.6	132	523	25.2
Retired farmer	2	9	22.2	1	14	7.1
Tenant farmer	12	25	48.0	10	23	43.5
Other	28	124	22.6	25	97	25.8
Total	218	848	25.7	206	802	25.7

Table 3: Regional distribution of observations by loan type, 1985-86

Lender	1985 VRM	1985 FRM	1985 Ratio	1986 VRM	1986 FRM	1986 Ratio
Pacific	6	52	11.5	6	52	11.5
Mountain	3	72	4.2	6	53	11.3
Northern plains	13	44	29.5	11	46	23.9
Southern plains	7	27	25.9	9	33	27.3
Lake states	15	169	8.9	1	24	4.2
Corn belt	90	202	44.6	43	194	22.2
Delta states	0	15	0.0	5	21	23.8
Northeast	49	140	35.0	52	147	35.4
Appalacia	28	63	44.4	61	137	44.5
Southeastern	7	65	10.8	12	96	12.5
Total 1/	218	849	25.7	206	803	25.7

1/ The totals in tables 1 and 2 differ slightly because of enumeration error (4 observations) and because Production credit association loans (4 observations) were dropped.

Table 4: Frequency of observations by land class and loan type, 1985-86

Land class	1985 VRM	1985 FRM	1985 Ratio:	1986 VRM	1986 FRM	1986 Ratio:
	Acres	Acres	Percent	Acres	Acres	Percent
Agricultural land	6489	29390	22.1	8936	27225	32.8
Pasture	11614	20639	56.3	17972	21724	82.7
Forest land	1940	12857	15.1	3577	8633	41.4
Mineral land	3	10	30.0	0	58	0.0
Recreational land	294	1313	22.4	104	743	14.0
Idle land	984	3724	26.4	1101	4788	23.0
Rural residence	388	1054	36.8	487	1151	42.3
Subdivision land	44	411	10.7	48	517	9.3
Commercial land	12	102	11.8	2	61	3.3
Total	21768	69500	31.3	32227	64900	49.7

Table 5: Regression results from the Land Transfer Survey, 1985-86

H_o: $ß_1 = ß_i$, H_a: $ß_1 \neq ß_i$

Dependent variable: Interest rates

	VRMs		FRMs		Pooled data	
F-test hypothesis	F-value	Pr > F	F-value	Pr > F	F-value	Pr > F
Lenders	4.37	0.0008	66.28	0.0001	60.82	0.0001
Private lenders 1/	2.22	0.0844	4.09	0.0068	5.85	0.0007
Region	1.90	0.0581	5.51	0.0001	3.30	0.0009
Borrower occupations	0.62	0.6048	4.56	0.0037	3.30	0.0195
Land classes	4.47	0.0351	8.51	0.0036	10.82	0.0010
Degrees of freedom	3/396		3/1619		3/2040	
Critical F-value:						
$\alpha = .05$	2.62		2.61		2.60	
$\alpha = .01$	3.83		3.80		3.78	

1/ Commercial bank, insurance company, thrift, and mortgage company originations.