INTEREST RATES CHARGED AND AMOUNTS LOANED BY MAJOR FARM REAL ESTATE LENDERS

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▲ Data on lending activities of major farm real estate lenders are summarized. The loan data show the amount of loans made and repaid during each year as well as the amount outstanding at the beginning of each year. The interest rate data show the contractual rates charged on new loans during each year plus estimates of the average rates on all outstanding loans at the beginning of each year. When data from primary sources are not available, the procedure used to obtain estimates is described. The USDA method for estimating interest charges is detailed along with some recent estimates.

▲ Keywords: Loans made, loans outstanding, interest rates, and interest charges.

INTRODUCTION

Farm real estate interest rates and loan data have many uses:

- To calculate interest charges on farm real estate loans.
- To estimate supply and demand for farm real estate loans (*5*).[1]
- To trace the relationship of the agricultural finance and national money markets (*6*).
- To explain the relative market shares of the farm real estate lenders (*7*).
- To predict future levels of interest rates and outstanding loan balances, information which can be used by farm borrowers and lenders in their financial investment decisions (*12*).

In the past, USDA's Economics, Statistics, and Cooperatives Service (ESCS), formerly the Economic Research Service, relied on the Farm Credit Administration for much of the interest rate and loan data, which it collected from farm mortgages recorded at county recorders' offices. However, in 1972 this practice was discontinued. To compensate, ESCS began to rely more heavily on data obtained directly from the farm real estate lenders, particularly Federal land banks, life insurance companies, and the Farmers Home Administration.

However, the other lenders, commercial banks, and individuals did not maintain many of the data series previously estimated.

In this article, we have two objectives: first, to identify which financial data are based on primary data and second, to estimate data no longer available from primary sources. Of course, these two objectives are complementary—observed relationships between primary data series should provide the basis for an estimation procedure. We measure these relationships statistically and use the results to provide estimates for the data series no longer available. These estimates are based on the discovered historical patterns and primary data which continue to be available.

We now proceed to identify the primary data, discuss the methodology used to estimate missing data series, and report the results in tables.

ORIGIN OF THE DATA

For any one lender, all loan information is summarized from three series: loans outstanding at the beginning of each year, loans made during the year, and loans repaid during the year. The loans outstanding data are stock variables listed as liabilities in the balance sheet of those who borrowed to purchase real estate. Loans made and loans repaid are flow variables and summarize debt flows during some time period. Loans made do not, however, necessarily represent net additions to real estate loans outstanding nor do loans repaid represent net reductions in loans outstanding. Many new loans are made to retire old ones. In fact, some lenders require borrowers to refinance their old loans if they want to

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[1] Italicized numbers in parentheses refer to items in the Bibliography at the end of this article.

increase the amount borrowed. Thus, the loans made data represent loans made to retire old loans as well as to buy more real estate. The loan repayment series reflects contractual payments on loan balances plus loans retired through refinancing.

Corresponding to loans outstanding are average interest rates on outstanding loans, referred to hereafter as the average rate. And corresponding to loans made are average interest rates charged on new loans, referred to hereafter as the new rate. The average rate reflects the average cost of real estate loans outstanding as of January 1. The new rate is the average cost of new loans acquired during a calendar year. The two, of course, are related: as changes occur in the new rate, the average rate on outstanding balances changes.

Which of the series are based on primary data? In tables 1 through 8, columns and some individual entries carry bibliographic references to indicate whether they came from primary sources. Estimates are footnoted as such. In some cases, a data entry has both a footnote and a bibliographic reference, which means an estimate is published.

Farm Real Estate Loan Data

First, consider the data on farm real estate loans outstanding. They are presented in table 1 as of January 1 for 1951 through 1977 for the five major lenders: Federal land banks, life insurance companies, commercial banks, the Farmers Home Administration, and individuals and others. Except for individuals and others, all data in table 1 originate from primary sources. The Farm Credit Administration for Federal land banks, the American Council of Life Insurance Companies (formerly the Institute of Life Insurance Companies) for life insurance companies, the Federal Deposit Insurance Corporation for banks, and the Farmers Home Administration all collect and report the data presented in this table.

The individuals and others series, the only one estimated in table 1, is supported by some primary data. Every fifth year, census benchmarks provide an opportunity to assess the error associated with the series and to make revisions. But data from the Census of Agriculture are known to be underreported, especially during recent censuses, which makes it a less reliable guide.

Table 1—Farm real estate loans outstanding by lender, January 1, 1951-77

Year	Total farm real estate debt[1]	Federal land banks	Life insurance companies	Farmers Home Administration	Commercial banks	Individuals and others[1]
	1,000 dollars					
1951	5,031,405	946,469*(8)*	1,352,635*(15)*	220,813*(8)*	985,954*(15)*	2,525,534*(15)*
1952	6,575,831	997,573*(8)*	1,541,874*(15)*	233,366*(8)*	1,017,360*(15)*	2,785,658*(15)*
1953	7,138,808	1,078,493*(8)*	1,716,022*(15)*	244,722*(8)*	1,069,398*(15)*	3,030,173*(15)*
1954	7,633,117	1,179,889*(8)*	1,892,773*(15)*	252,542*(8)*	1,091,949*(15)*	3,215,964*(15)*
1955	8,133,576	1,280,944*(8)*	2,051,784*(15)*	265,249*(8)*	1,161,308*(15)*	3,374,291*(15)*
1956	8,912,210	1,497,165*(8)*	2,271,784*(15)*	295,903*(8)*	1,275,429*(15)*	3,571,929*(15)*
1957	9,716,931	1,744,052*(8)*	2,476,543*(15)*	336,677*(8)*	1,298,113*(15)*	3,861,546*(15)*
1958	10,248,982	1,919,281*(8)*	2,578,958*(15)*	385,176*(8)*	1,315,530*(15)*	4,050,038*(15)*
1959	10,926,699	2,088,791*(9)*	2,661,229*(15)*	419,991*(9)*	1,407,548*(15)*	4,349,140*(15)*
1960	11,877,163	2,359,841*(9)*	2,819,542*(15)*	446,261*(9)*	1,523,051*(15)*	4,728,468*(15)*
1961	12,592,134	2,563,772*(9)*	2,974,609*(15)*	469,972*(9)*	1,591,762*(15)*	4,992,019*(15)*
1962	13,499,964	2,827,973*(9)*	3,161,757*(15)*	523,654*(9)*	1,640,790*(15)*	5,345,109*(15)*
1963	14,841,351	3,051,973*(9)*	3,391,183*(15)*	703,493*(9)*	1,870,216*(15)*	5,824,486*(15)*
1964	16,515,804	3,309,883*(9)*	3,780,537*(15)*	855,586*(9)*	2,136,571*(15)*	6,433,227*(15)*
1965	18,863,838	3,718,170*(9)*	4,287,671*(15)*	1,013,096*(9)*	2,416,634*(15)*	7,218,267*(15)*
1966	20,893,232	4,280,675*(9)*	4,801,677*(15)*	1,163,211*(9)*	2,607,404*(15)*	8,040,265*(15)*
1967	22,790,437	4,957,836*(9)*	5,213,587*(15)*	1,333,004*(9)*	2,770,010*(15)*	8,516,000*(15)*
1968	24,832,098	5,609,265*(9)*	5,539,600*(15)*	1,487,682*(9)*	3,060,551*(15)*	9,135,000*(15)*
1969	27,008,905	6,126,369*(9)*	5,763,500*(15)*	1,620,777*(9)*	3,333,259*(15)*	10,165,000*(15)*
1970	28,746,514	6,714,172*(9)*	5,733,900*(15)*	1,800,418*(9)*	3,545,024*(15)*	10,953,000*(15)*
1971	29,900,686	7,187,140*(9)*	5,610,300*(15)*	1,952,869*(9)*	3,772,377*(15)*	11,378,000*(15)*
1972	31,790,848	7,918,185*(9)*	5,564,300*(15)*	2,162,881*(9)*	4,218,482*(15)*	11,927,000*(15)*
1973	35,271,019	9,104,930*(9)*	5,643,300*(15)*	2,293,604*(9)*	4,792 186*(15)*	13,437,000*(15)*
1974	40,857,567	11,073,276*(9)*	5,964,800*(15)*	2,446,213*(9)*	5,458,278*(15)*	15,915,000*(15)*
1975	46,179,656	13,863,752*(9)*	6,297,400*(15)*	2,644,583*(9)*	5,966,282*(15)*	17,407,639*(15)*
1976	51,140,631	16,563,886*(9)*	6,726,000*(12)*	2,826,745*(9)*	6,296,000*(12)*	18,728,000*(12)*
1977	56,613,811	[2] 19,126,749	7,400,000*(12)*	[2] 3,040,062	6,781,000*(12)*	20,266,000*(12)*

[1] Estimate. [2] Preliminary.

Note: Italicized numbers in parentheses refer to items in the Bibliography at the end of this article.

Table 2—Annual totals of new farm real estate loans made by lenders, 1951-77

Year	Total farm real estate loans[1]	Federal land banks	Life insurance companies	Farmers Home Administration	Commercial banks	Individuals and others
			1,000 dollars			
1951	1,772,834	214,220(*8*)	407,000(*4*)	34,163(*8*)	458,422(*14*)	659,029(*14*)
1952	1,777,230	254,581(*8*)	372,000(*4*)	34,247(*8*)	483,677(*14*)	632,725(*14*)
1953	1,870,977	289,772(*8*)	428,000(*4*)	24,379(*8*)	483,990(*14*)	644,836(*14*)
1954	1,904,144	306,276(*8*)	413,000(*4*)	37,057(*8*)	500,080(*14*)	647,731(*14*)
1955	2,398,745	487,489(*8*)	515,000(*4*)	52,793(*8*)	582,001(*14*)	761,462(*14*)
1956	2,397,354	522,357(*8*)	514,000(*4*)	62,120(*8*)	527,949(*14*)	770,928(*14*)
1957	2,238,092	398,993(*8*)	407,000(*4*)	65,797(*8*)	502,726(*14*)	863,576(*14*)
1958	2,385,113	429,424(*8*)	438,000(*4*)	62,666(*8*)	554,913(*14*)	900,110(*14*)
1959	2,753,834	572,064(*9*)	496,000(*4*)	53,864(*9*)	605,380(*14*)	1,026,526(*14*)
1960	2,561,630	503,888(*9*)	464,000(*4*)	51,586(*9*)	541,022(*14*)	1,001,134(*14*)
1961	2,967,087	632,517(*9*)	552,000(*4*)	94,964(*9*)	623,318(*14*)	1,064,288(*14*)
1962	3,461,459	644,706(*9*)	619,000(*4*)	221,423(*9*)	732,934(*14*)	1,243,396(*14*)
1963	4,127,717	742,860(*9*)	866,000(*4*)	198,909(*9*)	880,351(*14*)	1,439,597(*14*)
1964	4,773,155	998,081(*9*)	1,047,000(*4*)	218,367(*9*)	994,628(*14*)	1,515,079(*14*)
1965	5,317,216	1,235,154(*9*)	1,149,000(*4*)	238,113(*9*)	1,036,524(*14*)	1,658,425(*14*)
1966	5,476,966	1,337,250(*9*)	994,000(*4*)	239,111(*9*)	1,055,992(*14*)	1,850,613(*14*)
1967	5,171,792	1,267,580(*9*)	837,000(*4*)	243,041(*9*)	1,036,109(*14*)	1,788,056(*14*)
1968	5,124,710	1,101,322(*9*)	772,000(*4*)	226,383(*9*)	1,134,051(*14*)	1,890,954(*14*)
1969	5,336,520	1,165,895(*9*)	540,000(*4*)	275,613(*9*)	1,069,867(*14*)	2,285,145(*14*)
1970	5,074,660	1,016,820(*9*)	314,000(*4*)	240,814(*9*)	1,063,728(*14*)	2,439,298(*14*)
1971	6,805,191	1,555,008(*9*)	503,000(*4*)	321,690(*9*)	1,516,582(*14*)	[2]2,175,312
1972	[3]8,454,510	2,251,035(*9*)	700,000(*4*)	345,199(*9*)	[3]1,944,703	[2]3,213,573
1973	[3]11,399,900	3,284,680(*9*)	1,006,000(*4*)	387,985(*9*)	[3]2,324,093	[2]4,397,142
1974	[3]11,618,200	4,243,479(*5*)	1,007,000(*4*)	364,979(*9*)	[3]2,282,004	[2]3,720,738
1975	[3]11,771,603	4,411,268(*9*)	1,075,000(*4*)	355,161(*9*)	[3]2,172,718	[2]3,757,456
1976	[3]13,471,908	[4]4,700,861	[5]1,540,000	496,299	[3]2,575,000	[2]4,159,748
1977	[3][5]17,232,005	[4][5]5,817,000	[5]2,564,100	[5]457,665	[3][5]3,532,000	[2][5]4,861,240

[1] Obtained by adding across lenders. [2] Unpublished ESCS data. [3] Estimate. [4] Unpublished Farm Credit Administration data. [5] Preliminary.

Note: Italicized numbers in parentheses refer to items in the Bibliography at the end of this article.

Fortunately, another primary data source can be used to estimate outstanding farm real estate debt held by individuals and others: sample data on new loans made from the Farm Real Estate Market Development survey. But the reliable loans made data are combined with a rather arbitrary assumption relating to repayments of debt by individuals and others, which suggests some improvements in the series are possible.

For Federal land banks, three different loans outstanding series are reported. ESCS publishes two and the Farm Credit Administration publishes a third (see *8, 14*). Including or excluding Federal land bank loans in Puerto Rico largely accounts for differences between the two ESCS series. Meanwhile, the Farm Credit Administration's published series includes not only loans made in Puerto Rico but also some rural home loans. This report uses the series published by the Farm Credit Administration because it is consistent with their loans made and interest rate data which we use later.

Life insurance companies report two different data series on loans outstanding. One series reports farm mortgage loans outstanding for U.S. life insurance companies held by borrowers in both the United States and Canada while the other series excludes loans made by the companies to Canadian borrowers. The series reported in table 1, which is the same one reported by ESCS, excludes farm loans made in Canada by U.S. life insurance companies.

The Farmers Home Administration series in table 1 includes only direct and insured loans for farm ownership. The ESCS series includes other types of FmHA loans as well.

Table 2 contains a summary of new loans made by lenders. Only commercial bank data for 1973 through 1977 are estimates. Earlier, they had been based on the Farm Credit Administration's farm mortgage survey as had been the individuals and others series. But for individuals and others, the Farm Credit Administration survey data were supplanted with data from the Farm Market Real Estate Development survey. For the other lenders, the same sources that report loans outstanding also report loans made.

Finally, loans repaid and refinanced are estimated residually and reported in table 3. To obtain an estimate of repayments in year t (R_t) loans outstanding at the end of the year (L_{t+1}) are subtracted from loans outstanding at the beginning of the year (L_t) and then added to loans made during the year (N_t).[2]

$$R_t = L_t - L_{t+1} + N_t \qquad (1)$$

To obtain the table of repayment ratios (ρ_t) reported in table 4, repayments during year t are divided by loans outstanding at the beginning of year t ($\rho_t = R_t/L_t$).

Farm Real Estate Interest Data

In general, interest rate data are based on fewer primary data than are the loan data. For example, the only average interest rates based on primary data are those reported for the Federal land banks. All other series (except for the FmHA rate which is set by law) are estimates (see table 6).

The average interest rate on new loans in table 5 is more reliable—based on more primary data than the average rate series. The Federal land bank series is based on primary data. For odd years before 1960, the life insurance company series are based on the Farm Credit Administration's surveys of farm mortgages recorded. Beginning in 1960, they are based on primary data collected and prepared by ESCS. The new loan rates for commercial banks and individuals (not the others part) for odd years up to 1971 are based on the Farm Credit Administration's farm mortgage survey. After 1972 the new rates for commercial banks and individuals (except for 1976) are based on survey data from the Farm Real Estate Market Development survey.

The method of estimation for those series not based on the primary data will be discussed in the following section. Since all the data in tables 7 and 8 are estimates, their derivations will also be discussed in the next section.

[2] This method of estimating loan repayments includes bad debts written off and loans in the process of foreclosure as part of repayments.

Table 3—Annual totals of new farm real estate loans repaid to lenders, 1951-77

Year	Total farm real estate loans[1]	Federal land banks[1]	Life insurance companies[1]	Farmers Home Administration[1]	Commercial banks[1]	Individuals and others[1]
	1,000 dollars					
1951	1,228,408	163,116	217,761	21,610	427,016	398,905
1952	1,214,253	173,661	197,852	22,891	431,639	388,210
1953	1,376,668	188,376	251,249	16,559	461,439	459,045
1954	1,403,685	205,221	253,989	24,350	430,721	489,404
1955	1,620,111	271,268	295,000	22,139	467,880	563,824
1956	1,592,633	275,470	309,241	21,346	505,265	481,311
1957	1,706,041	223,764	304,585	17,299	485,309	675,084
1958	1,707,396	259,914	355,729	27,850	462,895	601,008
1959	1,804,824	301,014	337,687	29,048	489,877	647,198
1960	1,846,659	299,957	308,933	27,875	472,311	737,583
1961	2,059,938	368,316	364,852	41,282	574,290	711,198
1962	2,119,391	420,706	389,574	41,584	503,508	764,019
1963	2,453,264	484,950	476,646	46,816	613,996	830,856
1964	2,635,121	589,794	539,866	60,857	714,565	730,039
1965	3,077,822	672,649	634,994	87,998	845,754	836,427
1966	3,579,761	660,089	582,090	69,318	893,386	1,374,878
1967	3,130,131	616,157	510,987	88,363	745,568	1,169,056
1968	2,947,903	584,218	548,100	93,288	861,343	860,954
1969	3,598,911	578,092	569,600	95,972	858,102	1,497,145
1970	3,920,488	543,852	437,600	88,363	836,375	2,014,298
1971	4,181,430	823,963	549,000	111,678	1,070,477	1,626,312
1972	4,974,339	1,064,290	621,000	214,476	1,371,000	1,703,573
1973	5,813,352	1,316,334	684,500	235,376	1,658,000	1,919,142
1974	6,296,111	1,453,003	674,400	166,609	1,774,000	2,228,099
1975	6,810,628	1,711,134	646,400	172,999	1,843,000	2,437,095
1976	7,998,728	2,137,998	866,000	282,982	2,090,000	2,621,748
1977	[2]9,231,349	[2]2,491,800	[2]1,264,100	[2]225,209	[2]2,413,000	[2]2,837,240

[1] Estimate. [2] Preliminary.

Table 4—Annual ratios of farm real estate loans repaid during year to loans outstanding at beginning of year, 1951-77

Year	All lenders[1]	Federal land banks[1]	Life insurance companies[1]	Farmers Home Administration[1]	Commercial banks[1]	Individuals and others[1]
1951	.204	.172	.161	.098	.433	.158
1952	.185	.174	.128	.098	.425	.139
1953	.193	.174	.146	.067	.431	.151
1954	.184	.174	.134	.096	.395	.152
1955	.199	.212	.144	.083	.403	.167
1956	.179	.184	.136	.072	.396	.135
1957	.176	.128	.123	.051	.374	.175
1958	.167	.135	.138	.072	.352	.148
1959	.165	.144	.127	.069	.348	.149
1960	.155	.127	.110	.063	.310	.156
1961	.164	.144	.123	.088	.361	.142
1962	.157	.149	.123	.079	.307	.143
1963	.165	.159	.141	.067	.328	.143
1964	.159	.178	.143	.071	.334	.113
1965	.165	.181	.148	.087	.350	.116
1966	.171	.154	.121	.060	.343	.171
1967	.137	.124	.098	.066	.269	.137
1968	.119	.104	.099	.063	.281	.094
1969	.133	.094	.099	.059	.257	.147
1970	.136	.081	.076	.049	.236	.184
1971	.139	.115	.098	.057	.284	.143
1972	.156	.134	.112	.099	.325	.143
1973	.165	.145	.121	.103	.346	.143
1974	.154	.131	.113	.068	.325	.140
1975	.147	.123	.103	.065	.309	.140
1976	.156	.129	.129	.100	.332	.140
1977	[2].163	[2].130	[2].171	[2].074	[2].356	[2].140

[1] Estimate. [2] Preliminary.

HOW THE DATA WERE ESTIMATED

Estimating Loans Outstanding and New Loans Made

Considering loans outstanding first, only those held by individuals and others requires estimation. ESCS analysts routinely estimate loans held by individuals and others (table 1).

Historically, the estimates have been based on primary data on loans made, obtained from the Farm Credit Administration's farm mortgage survey and, since 1971, from a USDA survey on loans made by individuals. However, the lack of reliable benchmarks on outstanding loans leaves the accuracy of this series somewhat questionable.

Repayment ratios calculated for each lender (table 4) offer evidence that the individuals and others loans outstanding data are less than reliable. Repayment ratios for lenders except individuals and others show significant positive correlation. The correlation between repayment ratios of individuals and others, however, is insignificant. Moreover, after 1971, the repayment ratio of individuals and others is assumed to be constant—a questionable assumption since all other series vary considerably year to year.[3]

The loans made data, as with the loans outstanding data, are based mostly on primary data (the publication source is shown for each in table 2). Only loans made by commercial banks after 1971 are estimated without the benefit of primary data.

To complete the loans made data, we regressed the repayment ratios for commercial banks $(\rho_{cb})_t$ on the weighted average of the loans repayment ratios of Federal land banks and life insurance companies $(\bar{\rho}_t)$ over 1951-71:

[3] The simple correlations between the data on repayment ratios for commercial banks, life insurance companies, and Federal land banks ranged from 79 to 83 percent. The simple correlations of repayment ratios between individuals and others and commercial banks, life insurance companies, and Federal land banks were 0.11, −0.11, and 0.15, respectively.

Were the repayment ratios for individuals and others after 1971 equal to a weighted average of the Federal land banks and life insurance companies ratios, their loans outstanding for January 1, 1977 would have been $21.4 rather than the $20.3 million reported in table 1.

$$\rho_{cbt} = 0.0822 + 1.9414\ \bar{\rho}_t. \quad R^2 = 0.84. \qquad (2)$$

Commercial bank repayment ratios for years after 1971 were then obtained by substituting each year's known value of $\bar{\rho}_t$ into this equation. The resulting estimated repayment ratio was next multiplied by loans outstanding at the beginning of the year, to obtain estimated repayments of commercial bank loans. Finally, we added loan repayments to the year's change in loans outstanding to obtain the amount of loans made: The procedure can be summarized as:

$$N_t = L_{t+1} - L_t + R_t \qquad (3)$$

where:

$$R_t = (0.0822 + 1.9414\ \bar{\rho})\ L_t$$

Estimating Interest Rates

The new rate series in table 5 requires little estimation. For life insurance companies, only the new rate for even numbered years before 1960 need to be estimated. For commercial banks and individuals, the new rate for even numbered years before 1973 and the year 1976 need to be estimated. Since for each year in which estimates are needed, rates based on primary data precede and follow, the new rate estimate is simply an average of the two.

The average rates of interest on loans outstanding (table 6) are all estimates, except for those supplied by the Federal land banks. The reason for such widespread use of estimates is the difficulty of measuring the average rate. Logically, to find the average rate on outstanding loans would require that interest rates on all loans made and not repaid be recorded and weighted by that portion of the original loan outstanding as of some point in time. This measurement obviously is a task too big to be performed routinely. Thus, in practice, only periodic measurements of the average rate are taken, while those for interim years are estimated.

In the past, ESCS estimated the average rates between benchmarks by calculating a weighted average of the new rate and the average rate at the beginning of the

Table 5—Average interest rates on new farm real estate loans made by lender for years 1951-77

Year	Federal land banks	Life insurance companies	Farmers Home Administration[1]	Commercial banks	Individuals
			Percent		
1951	4.1*(8)*	4.3*(10)*	4.0	5.3*(10)*	4.9*(10)*
1952	4.2*(8)*	[2]4.5	4.0	[2]5.4	[2]5.0
1953	4.2*(8)*	4.8*(10)*	4.0	5.5*(10)*	5.0*(10)*
1954	4.2*(8)*	[2]4.7	4.0	[2]5.5	[2]5.0
1955	4.2*(8)*	4.6*(10)*	5.0	5.5*(10)*	5.0*(10)*
1956	4.3*(8)*	[2]4.9	5.0	[2]5.7	[2]5.1
1957	5.2*(8)*	5.2*(2)*	5.0	5.9*(2)*	5.2*(2)*
1958	5.2*(8)*	[2]5.3	5.0	[2]5.9	[2]5.3
1959	5.5*(8)*	5.3*(2)*	5.0	5.9*(2)*	5.4*(2)*
1960	6.0*(3)*	6.1*(3)*	5.0	[2]6.0	[2]5.5
1961	5.6*(3)*	5.9*(3)*	5.0	6.2*(16)*	5.5*(16)*
1962	5.6*(3)*	5.8*(3)*	5.0	[2]6.1	[2]5.5
1963	5.6*(3)*	5.8*(3)*	5.0	6.1*(16)*	5.5*(16)*
1964	5.5*(3)*	5.7*(3)*	5.0	[2]6.1	[2]5.4
1965	5.5*(3)*	5.8*(3)*	5.0	6.1*(16)*	5.4*(16)*
1966	5.8*(3)*	6.3*(3)*	5.0	[2]6.3	[2]5.5
1967	6.0*(3)*	6.7*(3)*	5.0	6.5*(16)*	5.7*(16)*
1968	6.7*(3)*	7.4*(3)*	5.0	[2]6.9	[2]6.0
1969	7.7*(3)*	8.5*(3)*	5.0	7.3*(16)*	6.2*(16)*
1970	8.7*(3)*	9.3*(3)*	5.0	[2]7.5	[2]5.4
1971	7.9*(3)*	8.6*(3)*	5.0	7.8*(16)*	6.5*(16)*
1972	7.4*(3)*	8.3*(3)*	5.0	[2]8.0	[2]6.9
1973	7.5*(3)*	8.6*(3)*	5.0	[3]8.2	[3]7.2
1974	8.1*(3)*	9.5*(3)*	5.0	[3]8.6	[3]7.5
1975	8.7*(3)*	10.0*(3)*	5.0	[3]8.8	[3]7.6
1976	8.7*(3)*	9.8*(3)*	5.0	[2]8.8	[3]7.7
1977	[4]8.4*(3)*	[4]9.3*(3)*	5.0	[3][4]8.9	[3][4]7.8

[1] Legal maximum rate which Farmers Home Administration can charge. [2] Estimate. [3] Unpublished ESCS Farm Market Real Estate Development survey data. [4] Preliminary.

Note: Italicized numbers in parentheses refer to items in the Bibliography at the end of this article.

Table 6—Average interest rates on farm real estate loans outstanding, by lender, January 1, 1951-77

Year	Weighted average for all lenders[1]	Federal land banks	Life insurance companies[1]	Farmers Home Administration[1]	Commercial banks[1]	Individuals[1]
			Percent			
1951	4.6	4.1*(13)*	4.3*(13)*	4.0	5.1*(13)*	4.6*(13)*
1952	4.6	4.1*(13)*	4.4*(13)*	4.0	5.2*(13)*	4.7*(13)*
1953	4.6	4.1*(13)*	4.4*(13)*	4.0	5.2*(13)*	4.7*(13)*
1954	4.7	4.1*(13)*	4.5*(13)*	4.0	5.3*(13)*	4.7*(13)*
1955	4.7	4.1*(13)*	4.5*(13)*	[3]4.2	5.3*(13)*	4.8*(13)*
1956	4.7	4.1*(13)*	4.6*(13)*	[3]4.3	5.3*(13)*	4.8*(13)*
1957	4.8	4.1*(13)*	4.6*(13)*	[3]4.4	5.4*(13)*	4.9*(13)*
1958	4.8	4.2*(13)*	4.7*(13)*	[3]4.5	5.5*(13)*	4.9*(13)*
1959	4.9	4.4*(13)*	4.8*(13)*	[3]4.6	5.6*(13)*	4.9*(13)*
1960	5.0	4.6*(15)*	5.0*(15)*	[3]4.6	5.7*(15)*	4.9*(15)*
1961	5.0	4.8*(15)*	5.1*(15)*	[3]4.7	5.8*(15)*	4.9*(15)*
1962	5.1	4.9*(15)*	5.2*(15)*	[3]4.8	5.9*(15)*	5.0*(15)*
1963	5.2	5.0*(15)*	5.3*(15)*	[3]4.8	6.0*(15)*	5.1*(15)*
1964	5.3	5.1*(15)*	5.4*(15)*	[3]4.9	6.0*(15)*	5.1*(15)*
1965	5.3	5.2*(15)*	5.5*(15)*	[3]4.9	6.0*(15)*	5.1*(15)*
1966	5.3	5.2*(15)*	5.5*(15)*	[3]4.9	6.0*(15)*	5.1*(15)*
1967	5.4	5.4*(15)*	5.6*(15)*	[3]4.9	6.0*(15)*	5.1*(15)*
1968	5.5	5.6*(15)*	5.7*(15)*	5.0	6.2*(15)*	5.2*(15)*
1969	5.6	5.7*(15)*	5.8*(15)*	5.0	6.3*(15)*	5.2*(15)*
1970	5.7	6.0*(15)*	5.9*(15)*	5.0	6.5*(15)*	5.3*(15)*
1971	5.9	6.4*(15)*	6.0*(15)*	5.0	6.7*(15)*	5.4*(15)*
1972	6.0	6.5*(15)*	6.2*(15)*	5.0	7.1*(15)*	5.5*(15)*
1973	6.2	6.6*(15)*	[2]6.3	5.0	7.4	[2]5.7
1974	6.5	7.0*(15)*	6.6	5.0	7.7	6.0
1975	6.9	7.8*(15)*	6.9	5.0	8.0	6.1
1976	7.1	8.2	7.2	5.0	8.3	6.1
1977	[4]7.2	[4]8.2	[4]7.6	5.0	[4]8.5	[4]6.2

[1] Estimate. [2] Revised. [3] Estimated using equation (4). [4] Preliminary.

Note: Italicized numbers in parentheses refer to items in Bibliography at the end of this article.

Table 7—Average interest rates on farm real estate loans outstanding, by lender and region, January 1, 1977[1]

Region	All lenders[2]	Federal land banks[2]	Life insurance companies[2]	Farmers Home Administration[2]	Commercial banks[2]	Individuals and others[2]
			Percent			
Northeast	7.46	8.25	7.86	5.00	8.63	6.59
Lake States	7.26	8.17	7.78	5.00	8.55	6.53
Corn Belt	7.41	8.17	7.78	5.00	8.55	6.53
Northern Plains	7.24	8.16	7.77	5.00	8.54	6.52
Appalachian	7.65	8.27	7.88	5.00	8.65	6.61
Southeast	7.80	8.28	7.88	5.00	8.67	6.62
Delta States	7.43	8.07	7.68	5.00	8.45	6.45
Southern Plains	7.24	8.07	7.68	5.00	8.45	6.45
Mountain	7.23	8.16	7.77	5.00	8.54	6.52
Pacific	7.19	8.05	7.67	5.00	8.42	6.43
Alaska	7.83	8.15	7.76	5.00	8.53	6.51
Hawaii	7.63	8.00	7.62	5.00	8.37	6.39
United States	7.38	8.17	7.78	5.00	8.55	6.53

[1] Data were estimated in this table from official USDA figures for average interest rates on outstanding loans and from loans outstanding, which are not necessarily the same in amount as those reported in tables 1 and 6. [2] Estimated.

Table 8--Interest charges on farm real estate loans outstanding, by region, 1972-76[1]

Region	1972	1973	1974	1975	1976
			1,000 dollars		
Northeast	113,087,328	134,966,192	166,206,944	194,494,176	210,660,672
Lake States	203,027,296	234,283,872	281,318,144	325,089,536	369,434,368
Corn Belt	455,550,976	524,481,536	613,522,432	725,680,384	855,681,792
Northern Plains	218,279,296	252,192,016	290,630,144	329,998,080	388,723,456
Appalachian	151,416,464	178,592,816	219,386,032	268,116,848	306,513,408
Southeast	146,825,648	180,423,488	230,411,296	280,788,992	309,178,112
Delta States	129,802,736	149,190,192	175,324,336	203,837,632	228,735,072
Southern Plains	207,056,624	250,586,896	307,414,784	354,630,144	392,582,912
Mountain	203,911,424	235,262,016	273,355,264	318,417,920	366,006,784
Pacific	250,016,176	289,466,624	348,012,032	408,369,664	459,189,760
Alaska	274,573	292,489	300,864	305,213	271,016
Hawaii	2,379,031	3,520,140	4,284,706	4,673,795	4,777,349
United States	2,081,626,110	2,433,257,730	2,910,166,270	3,414,401,790	3,891,754,240

[1] Data were estimated from official USDA figures on average interest rates on outstanding loans and from loans outstanding, which are not necessarily the same in amount as those reported in tables 1 and 6.

preceding period (*10, 11*). But after 1973, when a new rate from the farm mortgage survey was no longer available, ESCS discontinued publishing the average rates for lenders even though new rates from the Farm Market Real Estate Development survey and from the lenders themselves were available to maintain the series. We now integrate these new rates into estimates of average rates for lenders other than Federal land banks.[4]

As previously done by ESCS, the average rate on outstanding loans could be computed as a weighted average of the interest rate charged on new loans during the preceding period and of the average interest rate on loans outstanding at the beginning of the previous period. Logical choices for the weights are N_t/L_{t+1}, the percentage of loans outstanding which were made in earlier periods and not yet repaid. In equation form, the estimate would be:

$$\bar{r}_{t+1} = [r_t N_t + \bar{r}_t (L_t - R_t)]/L_{t+1} \qquad (4)$$

This method of estimation would be reliable if the average rate on loans repaid equalled the average rate on loans outstanding at the beginning of the period and not repaid. But it does not. Historically, loans with higher rates tend to be repaid faster than loans with lower rates. Thus, in place of $\bar{r}_t$ in equation (4), an estimate $\hat{r}_t$, is required, which is the rate on loans outstanding at the beginning of the period and not repaid.

Logically, there should be a close relationship between $\bar{r}_t$ and $\hat{r}_t$. To measure this relationship statistically, requires that values of $\hat{r}_t$ be obtained. These values were solved for by replacing $\bar{r}_t$ by $\hat{r}_t$ in (4). Since the only unknown is $\hat{r}_t$, it can be solved using the expression below:

$$\hat{r}_t = (\bar{r}_{t+1} L_{t+1} - r_t N_t)/(L_t - R_t) \qquad (5)$$

With values of $\bar{r}_t$ thus obtained, the relationship between ($\hat{r}_t$) and ($\bar{r}_t$) was measured statistically by regressing $\hat{r}_t$ on $\bar{r}_t$ over 1951-71. The statistical relationships are:

$$\hat{r}_t = 1.147\ \bar{r}_t^{\,.913} \qquad R^2 = .98 \qquad (6)$$

for life insurance companies.

$$\hat{r}_t = .934\ \bar{r}_t^{\,1.031} \qquad R^2 = .97 \qquad (7)$$

for commercial banks, and

$$\hat{r}_t = 1.305\ \bar{r}_t^{\,.825} \qquad R^2 = .92 \qquad (8)$$

for individuals.

Now, the average rate can be found recursively beginning in 1973 by using the 1972 ESCS estimate of $\bar{r}_t$ to predict $\hat{r}_t$ which can then be used to estimate $\bar{r}_{t+1}$. Then $\bar{r}_{t+1}$ can be used to estimate $\hat{r}_{t+1}$, and so on. Thus, in a recursive manner, we estimated the average rate on outstanding loans using primary data on new loans, the new interest rate, loans outstanding, and a statistical relationship between the average interest rate estimated by ESCS and a calculated number for the average rate on loans carried over from the previous year.

[4] The new rates reported in table 5 are, for the most part, contractual rates of interest. The actual cost of loan funds available to the borrower may be somewhat higher. For example, Federal land bank borrowers are required to purchase stock in the Federal land banks with part of their loan, making their effective rate higher than their contractual rate reported in table 5.

Estimating Interest Charges

The amount of interest charged was estimated from the data on outstanding loans and average rate data by lender. Loans outstanding at the end and beginning of a period were multiplied by one-half the average rates in effect at the beginning and end of the period, and the results were added.

State level interest charges to be used in State farm income estimates required that some efforts be made to disaggregate the national level interest charge figures. This requirement, of course, placed a great strain on the existing data base. Average interest rates are available by State only for Federal land banks, but this provides a key for estimating State-level interest charges for other lenders.

First, we obtained a State weight equal to the average State rate divided by the average national rate for Federal land banks. Using this weight, we estimated an interest charge for each lender by State by multiplying the national average rate for lenders other than Federal land banks by each of the 50 State weights.

Next, the beginning and end of period average State rates (by lender) were divided by two and multiplied by beginning and end of period outstanding loans in each State and then added. In addition, by summing the interest charges and dividing by the average level of outstanding loans over the period, we obtained an all-lender rate for the period. Regional estimates of interest charges and regional average rates are summarized in tables 7 and 8.

CONCLUSIONS

Farm real estate finance data are available from a wide variety of published and unpublished sources. We have collected these data, provided estimates where needed, and reported the results in a way that distinguishes estimates from primary data. Research relating to the farm real estate loan market should benefit not only from having this data available in one place but also from having the distinction made clear from primary data and estimates. This distinction is important for researchers who model the farm finance market because, to the extent possible, relationships examined should be explored using primary data.

In some cases, estimates must be used. For example, ESCS must supply data on interest charges on farm loans, but lacks the necessary primary data to do so. So average rates, a key variable in the calculation of interest charges, are estimated. We discussed a method for making estimates of average rates and how these estimates are used by USDA to calculate interest charges.

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