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CREDIT EVALUATION PROCEDURES AT AGRICULTURAL BANKS IN THE NORTHEAST AND EASTERN CORNBELT

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Abstract

The results of a mail survey of agricultural banks in the Northeast and Eastern Cornbelt indicate that a little over half use formal credit evaluation systems in assessing and\or pricing farm loans. Of those with formal evaluation systems, over 40 percent (about one-quarter of all banks) use credit scoring or classification procedures. However, there is widespread interest among all the banks surveyed in developing more formal systems. The evaluation system was used on all new borrowers at 60 percent of the banks and on all existing borrowers at 43 percent. The formal systems were given considerable weight in the loan approval decision, but were usually not the sole determining factor. At some banks the system determined the interest rate on loans. In other cases it was not used at all in the rate decision. A large number of variables were used in credit scoring models, with cash flow, solvency and collateral variables being given most weight. There is little agreement as to the correct variables or appropriate weights to use in such models.

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This research was conducted as a part of an effort by the Credit Scoring Subcommittee of North Central Regional Project NC-161, of which Eddy LaDue serves as chairman. In addition to the authors of this publication, other participants in the project are Paul Ellinger and Peter Barry of the University of Illinois, Cole Gustafson of North Dakota State University, Glenn Pederson of the University of Minnesota and David Leatham of Texas A&M University. The survey used in this study was developed under the leadership of Paul Ellinger. Similar studies are being conducted in the Midwest, Northcentral states and Texas.

CREDIT EVALUATION PROCEDURES AT AGRICULTURAL BANKS IN THE NORTHEAST AND EASTERN CORNBELT

The loan loss experience of the 1980's and the competitive environment of the 1990's have led most agricultural lending institutions to try to improve the quality of their loan portfolios. One approach to improvement that is widely accepted as having considerable potential is the use of more formalized risk rating procedures. In addition to potentially improving the lender's "batting average" in making good loans, more formalized evaluation procedures also have the advantage of providing; (1) a more standardized, easily understood, procedure for loan officers to use in communicating with senior management about agricultural loans, and (2) a tool for evaluating the riskiness of loans, that examiners may understand and accept.

Researchers have developed and evaluated a number of credit scoring and classification models (for examples, see Miller and LaDue, Turvey and Brown or Lufburrow, Barry and Dixon). Although these research models helped sharpen understanding of the credit evaluation issues and provided an assessment of some of the alternatives, they have not been widely used by lenders in actual lending decisions.

At the same time lending institutions have been developing and using a variety of scoring and classification models (for example, see Tongate). They have used ideas from the research referred to above, but are often primarily based on the experience of the loan officers involved.

The objective of this research is to identify and assess the credit evaluation procedures in use by agricultural bankers in the Northeast and Eastern Cornbelt. We first present a description of the survey used to collect the data. This is followed by; (1) descriptive information on the character of the population of banks surveyed and those responding, (2) the character of loan evaluation procedures used by responding banks, (3) a detailed description of the characteristics and use of formal credit evaluation systems employed by banks, (4) a summary of the variables used in the credit scoring and classification models, and (5) conclusions.

The Survey

All agricultural banks in the study area were asked to complete a mail survey. Agricultural banks were defined as banks that reported "loans to finance agricultural production and other loans to farmers" plus "real estate loans secured by farmland" for the December 1990 FDIC Call Reports of at least; (1) $5 million, or (2) 50 percent of the bank's net loans. The study area is referred to as the Northeast and Eastern Cornbelt. It includes the states of Michigan, Ohio, West Virginia, Virginia and all states northeast thereof.

The survey was mailed to a senior agricultural loan officer whenever such a person could be identified. In other cases it was sent to the senior loan officer or the chief executive officer. Reminders were sent to non-respondents. Confidentiality of individual bank data was assured.

The survey requested information on the character of the credit evaluation procedure used and whether it included a formal credit evaluation system. If a formal credit evaluation system was used, information was requested on; (1) the characteristics of the system, (2) how the system was used in the lending function, and (3) the amount of use made of it.

Characteristics of Responding Banks

Of the 213 agricultural banks in the study area, 100 responded to the questionnaire. This included 36 responses from Ohio, 16 each from New York, Michigan and Pennsylvania, five from Virginia, four each from Maryland and Delaware and one each from Vermont, Maine and West Virginia.

Responding banks had average assets of $1.4 billion, of which about $917 million was loans (Table 1). Total deposits were about $1.1 billion, indicating an average loan to deposit ratio of 86 percent. The agricultural loan portfolio averaged about $14 million with approximately half secured by farmland and half production loans.

Table 1. Characteristics of Agricultural Bank Population and Responding Sample 100 Northeast and Eastern Cornbelt Banks

Characteristic	All Banks	Responding Banks
	--Thousand Dollars--	
Total loans	1,222,555	917,100
Total assets	2,390,395	1,409,982
Total deposits	1,380,439	1,067,019
Equity	126,869	82,150
Net income	8,623	9,809
Ag production loans	7,305	7,761
Loans secured by farm R.E.	7,096	6,123
Total ag loans	14,401	13,884

Responding banks were somewhat smaller than non-responding banks. This is not surprising since the large money center banks tend to report large agricultural loan portfolios relative to other banks, but the loan officers in those banks report that they do not make loans to farmers[1]. For example, Citibank, Chemical and National Westminister banks report a combined total of $204 million of agricultural loans, but loan officers indicate they do not (or no longer) make farm loans. Excluding these very large banks from the all bank totals would make the characteristics of non-respondent much more like the respondents.

Credit Evaluation Procedures Used

All respondents were asked to provide information on the character of the credit evaluation system they used and the financial statements that they required farm borrowers to provide.

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1 For a discussion of this issue, see LaDue, E. L. and K. C. Carraro "The Effect of Interstate Banking on Farm Lender Market Shares in New York State." NJARE. 15(1):61-65, April 1986. Follow-up with some of the banks for this survey confirm the inconsistency between Call Reports and loan officer perspective for money center banks.

Character of Credit Evaluation Systems

The character of the credit evaluation systems in use by respondent banks vary considerably (Table 2). The most formal of the systems includes use of a credit scoring system. With a credit scoring system, the borrower is evaluated on a numerical scale for several important variables. These ratings are weighted and combined into a score for the borrower which is used to assist with the loan decision, evaluation, pricing or review. Only 13 percent of the banks used a credit scoring system.

Table 2. Type of Credit Evaluation Procedure Used
100 Northeast and Eastern Cornbelt Banks, 1991

	Type of Evaluation Procedure	Percent of Banks
1.	Numerical risk rating in use (credit scoring system)	13
2.	Ratios (factors) and cut-off points identified (credit classification system)	16
3.	Some ratios identified, no cut-off points established	26
4.	Specific financial statements required, loan officer makes decision	43
5.	No established procedure	2

Somewhat less formal evaluation procedures included use of a credit classification system. With a classification system, sets of ratios are calculated for each loan. Loans that surpass established cut-off points for each ratio are considered acceptable. Others are rated unacceptable, or must be explained by the loan officer. In other cases, particularly where the system is used for review of loans or pricing, cut-off points for these variables are used to categorize loans into groups, (i.e., excellent, good, acceptable, high risk). Sixteen percent of the banks used this type of evaluation system.

Twenty-six percent of the banks identified ratios or variables that were calculated for each loan but no specific cut-off values for these ratios or variables were established by the bank. Assessment of the importance and critical values for the variables were left to the judgement of the loan officer.

Nearly half of the banks do not specify which ratios are critical and leave the evaluation procedures up to the loan officer or committee. These institutions only specify a set of financial statements that are required for agricultural loans of significant size. Only two percent of the banks have no established procedure and leave the loan evaluation procedure entirely up to the loan officer.

Formal credit scoring or classification systems are in use at only about one-quarter of the banks in the region. This low percentage could imply that lenders do not believe that such procedures are effective or that the systems are being developed at the more innovative banks and there has not been sufficient time for widespread adoption. Based on the proportion of banks that are interested in

developing more formal credit evaluation systems, it appears that the latter is the case. Seventy-three percent of the banks said that they were interested in developing a more formal system. Interestingly, this result also holds for the banks that currently have the most formal systems. Seventy-five percent of the banks with credit scoring or classification systems were interested in developing even more formal systems.

Financial Statements Required

The frequency with which financial statements are required for loans of significant size varied somewhat by statement (Table 3). Current balance sheet and income statements are required of most borrowers, particularly new borrowers. This is likely, at least in part, the result of the documentation requirements of regulators and examiners. Reconciliation of the income statement and balance sheet is apparently considered to be of much less value since it was required of less than half of the borrowers. A cash flow projection for next year was required by about 80 percent of new borrowers, but only about two-thirds of the existing borrowers. Actual cash flow statements were required by only two-thirds of new borrowers and a little over half of existing borrowers. Recent tax returns were required of 88 percent of new borrowers and about 79 percent of existing borrowers.

Table 3. Frequency that Financial Statements are Required 100 Northeast and Eastern Cornbelt Banks, 1991

Type of Statement & Frequency	All Banks		Banks with Scoring or Classification Systems	
	New Borrowers	Existing Borrowers	New Borrowers	Existing Borrowers
	--Percent--			
Balance Sheet				
This year's	99	98	99	99
Last year's	72	62	67	71
Two years ago	60	54	59	65
Income Statement				
This year's	87	84	93	91
Last year's	75	60	84	76
Two years ago	74	56	82	74
Reconciliation	44	39	40	39
Cash Flow Statement				
Next year's projection	78	64	84	67
This year's actual	67	58	79	74
Last year's actual	54	44	66	59
Tax Returns				
This year's	88	79	91	87
Last year's	84	62	90	78
Two years ago	75	54	80	69

It might be expected that banks with more formal evaluation systems would require more financial statements to insure the availability of data to make the calculations. In general, this is observed in the data. The banks with the most formal credit evaluation systems, that is, those with credit scoring or credit classification systems, required all of the statements except the balance sheet more frequently than other banks. However, the difference was not striking and the balance sheet requirements for new borrowers were the same to slightly lower than the requirements of all banks.

Formal Credit Evaluation Procedures

Banks that used a formal credit evaluation procedure were asked to provide information on the character of their procedure and how it is used. A formal credit evaluation procedure was defined as any pre-specified procedure used across all or a class of borrowers utilizing at least one specific measure for determining risk assessment of a farm borrower. This could involve a credit scoring technique that encompasses various measures, or use of one variable, such as the debt to asset ratio, to identify borrowers that should be avoided. A total of 57 banks indicated that they used a formal procedure. The information they provided is summarized in the remainder of this paper. Twenty four of these banks used credit scoring or classification systems. Since these banks are using the most formal of the systems, their responses are frequently separated out for comparison to the total group and the 33 banks with other, less formal, systems.

Somewhat surprisingly, the bankers did not perceive the credit evaluation categories used in Table 2 as clearly identifying formal systems. Although all of the banks with credit scoring systems identified their procedures as formal, some with credit classification systems did not consider their systems formal, and some bankers where the bank specified only the statements required considered their systems to be formal (Table 4).

The 57 banks reported that their agricultural loan portfolios contained an average of 216 farm borrowers[2]. Those banks with credit scoring or classifications systems reported an average of 274 borrowers. A majority of the banks had fewer than 200 farm borrowers, although 13 percent had more than 400 borrowers (Table 5). Nearly a quarter of those with scoring or classification systems had over 400 borrowers, but over half had fewer than 200. Three-quarters of those with other systems had fewer than 200.

Characteristics of Systems

Although real estate loans are often considered to be basically different from nonreal estate loans, only 23 percent of the banks (13 banks) with formal credit evaluation systems maintained different credit evaluation systems for the two types of loans. Most of the differences resulted from the type of security available and the purpose of the loan (Table 6). However, some of the real estate systems were designed to reflect the requirements of secondary markets or federal regulations regarding real estate transactions. A few banks had different cash flow requirements for real estate loans.

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2 Throughout the remainder of this publication, averages and percentages presented are for those responding. For example, four banks did not report their number of farm borrowers. The 216 is the average for those who reported. It is assumed that those not responding to a question would have average characteristics similar to respondents.

Table 4. Bank Assessment of Whether Their Credit Evaluation Procedures Represented a Formal System 100 Northeast and Eastern Cornbelt Banks, 1991

Type of Credit Evaluation Procedure Used	Banks that Considered Their Credit Evaluation Procedure to be a Formal System[a]
	--Percent of Banks--
1. Numerical risk rating in use (credit scoring system)	100
2. Ratios (factors) and cut-off points identified (credit classification system)	69
3. Some ratios identified, no cut-off points established	62
4. Specific financial statements required, loan officer makes decision	37
5. No established procedure	0
6. All banks	57

[a] Percent of banks using the indicated credit evaluation procedure who consider their procedure to be a formal evaluation system.

Only 27 percent of the formal credit evaluation systems were computerized. Credit scoring and classification systems were no more likely to be computerized than other classification systems. Only 21 percent of such systems were computerized. Most of the credit scoring and classification systems were quite simple and were placed on a sheet of paper that the lender could relatively easily complete.

Table 5. Distribution of Number of Farm Borrowers 57 Northeast and Eastern Cornbelt Banks

Number of Farm Borrowers	All Banks	Banks with Classification or Scoring Systems	Banks with Other Systems
		--Percent of Banks--	
Less than 100	34	23	42
100 to 199	38	41	36
200 to 299	11	9	13
300 to 399	4	4	3
400 and over	13	23	6

Table 6. Type of Differences Between Real Estate and Nonreal Estate Credit Evaluation Procedures 13 Northeast and Eastern Cornbelt Banks, 1991

Type of Difference	Percent of Banks
Collateral or security	62
Purpose of loan	62
Secondary market requirements	15
Cash flow	15
Federal laws for real estate loans	8

As would be expected, credit scoring and classification systems have been in use for a shorter time than other systems (Table 7). Interest in these types of systems has increased considerably in the last few years as lenders search for ways to be more consistent between borrowers and ways to effectively communicate the degree of credit risk on individual loans to senior management of large institutions.

Table 7. Period of Use of Formal Credit Evaluation System 57 Northeast and Eastern Cornbelt Banks, 1991

Number of Farm Borrowers	All Banks	Banks with Classification or Scoring Systems	Banks with Other Systems
		--Percent of Banks--	
Under 1	6	8	3
1 or 2	9	17	3
3 to 5	44	54	37
6 to 10	24	8	37
Over 10	17	13	20

Satisfaction with Systems

Only about half of the banks (52 percent of all banks and 45 percent of banks with credit scoring or classification systems) were happy with their current credit evaluation system. This does not mean that many thought that such systems should be abolished. Sixty-four percent were interested in developing more formal systems. Further, the reasons given for dissatisfaction with their systems indicated areas in which the lenders believed that their systems could be improved (Table 8).

The greatest single dissatisfaction resulted from the fact that many of the systems were not computerized. This undoubtedly makes the systems more difficult and time consuming to use. However, the greatest general dissatisfaction, which

permeated many of the responses, resulted from the design of the systems. Many were not specifically designed to handle agricultural loans. For others, lenders believed that the systems could be considerably improved to make them more useful and easier to use. Surprisingly, inadequacy of data collected or provided by borrowers was not viewed as a major problem.

Table 8. Sources of Dissatisfaction with Credit Evaluation System 26 Northeast and Eastern Cornbelt Banks, 1991

Source of Dissatisfaction	All Banks	Banks with[a] Classification or Scoring Systems	Banks with[a] Other Systems
		--Percent of Banks--	
Should be computerized	27	42	14
Designed for commercial credit, not ag	23	17	28
Design needs improvement	19	42	0
Would like a more uniform process	12	0	21
Not detailed (thorough) enough	12	8	14
Does not handle some types of farms well	12	25	0
Not enough ratio analysis	8	17	7
System new and needs improvement	8	17	0
Time consuming	8	8	7
Data collected are inadequate	4	8	0
Uses market value and cash rather than depreciated value and accrual	4	0	7

[a] 12 banks with credit scoring or classification systems and 14 banks with other systems provided reasons for dissatisfaction.

Both computerization and design were particularly important to banks with credit scoring or classification systems. These systems also had more trouble handling different types of farms. As systems become more formal, handling enterprise-specific ratios, such as management indicators, appears to become an increasing problem.

Level of Use

With any credit evaluation system the lender must decide on which set of loans that system is to be used. The more complicated the system, particularly if the system is not computerized, the fewer the number of situations on which the loan officer will want to use the system. If the system is not used on a significant proportion of the loans, its value as a communication mechanism with senior management or as an indicator of portfolio quality is reduced. The 57 Northeast and

Eastern Cornbelt banks used their systems on over two-thirds of their borrowers (Table 9). Frequency of use for those with scoring or classification systems was similar to those with other systems.

Table 9. Level of Use of Credit Evaluation System 57 Northeast and Eastern Cornbelt Banks, 1991

Use Characteristic	All Banks	Banks with Classification or Scoring Systems	Banks with Other Systems
		--Percent of Banks--	
Percent of borrowers for which system was used for current loan	67	68	66
Percent of banks for which system is used for all:			
Potential borrowers	61	67	60
Existing borrowers	43	42	43
Percent of banks that share system results with borrower	42	35	47

The evaluation systems were used with all potential borrowers on a little less than two-thirds of the banks. They were used with all existing borrowers less frequently, 43 percent of the time.

Whether to share the results of the evaluation system with the borrower has been debated by lenders for some time. On the positive side, doing so may help convey to the borrower the character of the lender's evaluation of the loan. It provides a sort of "impartial" yardstick against which the loan can be compared. Also, in cases where the score generated by the evaluation system is used to establish the interest rate charged, it may be necessary to share the results as part of an explanation of rate. On the negative side, the borrower may perceive this as an impersonal evaluation that does not take his or her special circumstances and characteristics into account. Further, the lender may want this numerical evaluation to be part of the evaluation that is not subject to the borrowers critique, especially if subjective evaluations are a part of the system (i.e., a rating score for the borrowers management ability). Only 42 percent of these banks share their results with the borrower.

The most important reason for not using the formal credit evaluation system on either potential or existing borrowers was the loan officer's prior knowledge of the borrowers financial position (Tables 10 and 11). In these situations, the loan officer apparently makes a decision that more analysis is not required. Borrowers with good previous repayment ability were also frequently exempted. For existing borrowers, this information would be collected during the past relationship. However, previous repayment ability was also an important reason for not using the system with new borrowers. Information on repayment ability apparently comes

from prior knowledge of the loan officer or becomes obvious during the collection of data with the loan application.

Table 10. Most Important Reasons for not Using Credit Evaluation System on all Potential Borrowers[a] 57 Northeast and Eastern Cornbelt Banks, 1991

Reason	All Banks	Banks with Classification or Scoring Systems	Banks with Other Systems
		--Percent of Banks--	
Knowledge of borrowers financial position	59	45	67
Previous repayment ability of borrower	45	27	56
Size of loan (small)	48	64	33
Current bank customer (depositor)	21	9	28
Lack of complete information	17	18	17
Start-up operation (no records)	7	9	6
Discouraged by bank management[b]	3	0	6

[a] Banks were asked to rank their reasons. Most important reasons were defined as those ranked as first or second.

[b] Due to fear that auditors will make it a permanent requirement.

The third reason for not using the evaluation system was size of loan. Small loans frequently do not justify the time required to collect the data and complete the analysis. This was particularly important for those banks using credit scoring or classification systems, where size of loan was more important and previous repayment ability less important. Lack of complete information on new borrowers was important at nearly one-fifth of the banks. Lack of information continues to be a problem, even on existing loans, for a number of banks.

Affect of Added Information on Use

Most farmers find little enjoyment in working with records and, thus, keep as few as possible. The loan officer is frequently pressed for time and does not collect or require the farmer to provide the quantity or quality records that may be desirable - and are necessary for use of many formal evaluation systems. Bankers were asked the impact of having more precise and accurate information about their borrowers. About a quarter indicated that more precise and accurate information would have no affect on their current system (Table 12). However, a majority indicated that they could have a more precise system and 29 percent believed that they would be able to use the system on more borrowers if more complete and accurate information were available.

Table 11. Most Important Reasons for not Using Credit Evaluation System on all Existing Borrowers[a] 57 Northeast and Eastern Cornbelt Banks, 1991

Reason	All Banks	Banks with Classification or Scoring Systems	Banks with Other Systems
		--Percent of Banks--	
Knowledge of borrowers financial position	74	73	74
Previous repayment ability of borrower	53	40	63
Size of loan (small)	38	47	32
Current bank customer (depositor)	15	7	21
Lack of complete information	12	13	11
Start-up operation (three years data not available)	3	6	0
Discouraged by bank management[b]	3	0	5
Not designed for corporations	3	6	0

[a] Banks were asked to rank their reasons. Most important reasons were defined as those ranked as first or second.

[b] Due to fear that auditors will make it a permanent requirement.

Additional cash flow and income projection data were desired by over half of the banks (Table 13). More information on farm income, nonfarm income and withdrawals was also desired by nearly half of the banks. Types of data that were not listed on the questionnaire, but were mentioned by a few banks anyway, were consistent end of year statements and more accrual income data. These types were likely more important than the percentages in Table 13 indicate because bankers were not prompted to consider them.

Table 12. Effect of More Precise and Accurate Information on Credit Evaluation Systems 57 Northeast and Eastern Cornbelt Banks, 1991

Effect	All Banks	Banks with Classification or Scoring Systems	Banks with Other Systems
		--Percent of Banks--	
No effect on current system	25	21	28
More borrowers evaluated	29	26	31
A more precise system	70	71	69

Table 13. Types of More Detailed or More Accurate Information Desired from Borrowers 57 Northeast and Eastern Cornbelt Banks, 1991

Types of Information Desired[a]	All Banks	Banks with Classification or Scoring Systems	Banks with Other Systems
		--Percent of Banks--	
Farm income	48	50	45
Nonfarm income and withdrawals	41	42	39
Balance sheet	38	42	33
Cash flow and income projection	55	58	52
Consistent end of year statements	5	4	6
Accrual income data	4	0	6

[a] Includes all types mentioned by more than one bank.

The most important factor limiting the availability of more precise and accurate records was inadequate farm records (Table 14). Correcting this inadequacy would involve encouraging or requiring farmers to keep and provide better records. It is frequently suggested that lenders do not require more records because the perceived burden on the part of the borrower would encourage a shift to a competing lender who would not require as much information. However, although the desire to foster business by not overburdening the farmer with a lot of information requests was important, it was not nearly as important as the lack of records on the part of the farmer. Lack of time on the part of the loan officer was also an important limitation.

Table 14. Factors Limiting the Use or Availability of More Precise and Accurate Borrower Information 57 Northeast and Eastern Cornbelt Banks, 1991

Factor	All Banks	Banks with Classification or Scoring Systems	Banks with Other Systems
		--Ranking[a]--	
Inadequate farm records	1.6	1.2	1.9
Limited lender time to obtain	2.2	2.5	2.1
Desire to foster business by not overburdening borrower	2.5	2.6	2.5

[a] 1 equals most limiting and 4 equals least limiting factor.

How Credit Evaluation Systems are Used

The way that a credit evaluation system is used can be as important as its design. In some cases lender impetus for developing a formal system will influence the way it is ultimately used. In other cases lenders are experimenting with more formal systems and the type and level of use may depend on the particular factors in the system and on the level of confidence the lender has in the system.

Types of Uses

There are three basic reasons that a lender may use a credit evaluation system; (1) to make the loan decision (and counsel the borrower about the decision and performance of the loan), (2) to determine the interest rate to charge, and (3) assess the riskiness of the agricultural loan portfolio (and communicate that information to senior management and examiners). Bankers indicate that the primary reason for using the credit evaluation system is to monitor the progress and evaluate the risk of farmer borrowers (Table 15). It is also useful for the closely related functions of determining borrower credit limits and counseling borrowers. The systems were also used in determining interest rates, particularly nonreal estate rates. In a few cases rate determination was the main reason for a credit scoring or classification system. But, on average, this was the least important of the functions.

Table 15. Importance of Various Purposes for Using the Credit Evaluation System in Assessing Loans 57 Northeast and Eastern Cornbelt Banks, 1991

Loan Type and Purpose	Average Ranking[a]	Percent of Banks Ranking Important[b]
Nonreal Estate Loans:		
Monitor progress and evaluate risk	8.6	71
Determine borrower credit limits	6.3	38
Determine interest rate	5.8	25
Assess riskiness of bank's ag portfolio	6.6	41
Counsel borrower on status or progress	6.1	32
Real Estate Loans:		
Monitor progress and evaluate risk	8.3	75
Determine borrower credit limits	6.4	43
Determine interest rate	4.9	16
Assess riskiness of bank's ag portfolio	6.1	34
Counsel borrower on status or progress	6.0	32

[a] A ranking of 10 indicates a primary purpose for evaluation. A ranking of 1 indicates purpose is not a significant purpose for the evaluation process.

[b] Percent of banks ranking an 8, 9 or 10.

Although not the most important reason for using a credit evaluation system, many banks found their systems useful in assessing the riskiness of their agricultural loan portfolio. In most cases this was likely not the basic reason the system was developed, and thus, many have not seen this use for the system. In small banks where senior management is closely involved with the agricultural portfolio, there may be less reason for using the system in this way. At least one bank was hesitant to use the system on a universal basis for fear that examiners would decide they liked the system and would require it of all borrowers regardless of size or need.

Use in Lending Decisions

For most lenders the system is designed to assist rather than replace the loan officer in the lending decision. Thus, the loan decision is completely determined by the loan evaluation system in only a very few situations (Table 16). However, 70 percent of the banks gave the system a weight of 5 to 8 on a scale of 10, indicating that the system is an important, though not totally determining, factor in the loan evaluation decision. Banks with credit scoring or classification systems put only slightly more weight on their systems.

Table 16. Importance of Credit Evaluation System Results in Lending Decisions 57 Northeast and Eastern Cornbelt Banks, 1991

System use and Weight[a]	All Banks	Banks with Classification or Scoring Systems	Banks with Other Systems
		--Percent of Banks--	
For loan approval:			
9 or 10	15	9	19
7 or 8	42	41	42
5 or 6	32	36	29
3 or 4	9	14	7
1 or 2	2	0	3
For loan pricing:			
9 or 10	13	5	20
7 or 8	40	55	30
5 or 6	23	32	17
3 or 4	8	9	7
1 or 2	15	0	27

[a] A weight of 10 indicates that loan approval or pricing decision is exclusively determined by the credit evaluation procedure. A weight of 1 indicates that credit evaluation is given negligible consideration.

In the loan decision, lenders with credit evaluation system results can also be expected to consider any factors that are not included or are incompletely reflected in the system. Thus, any list of other factors, used in loan approval in addition to the

loans evaluation system results (Table 17), can be viewed as an indication of the most frequent limitations of systems as well as an indication of the other factors that lenders consider. Specific factors may be inadequately represented in loan evaluation models because they are difficult to quantify, or because the model developers do not attach as much importance to the factor as do the loan officers.

Table 17. Factors Used in Loan Approval in Addition to Credit Evaluation System Results 57 Northeast and Eastern Cornbelt Banks, 1991

Factor[a]	All Banks	Banks with Classification or Scoring Systems	Banks with Other Systems
		--Percent of Banks--	
Credit (repayment) history of borrower	28	33	23
Character of borrower	19	25	16
Total Relationship with bank	13	13	13
Management ability	9	9	10
Previous relationship with borrower	8	0	13
Cash flow	6	9	3
Value of collateral	8	5	10
References	6	0	10
Secondary source of payment	4	9	0
Maturity of present debt	4	0	6
Type and purpose of loan	6	9	3
Past profitability	4	9	0

[a] Includes all factors mentioned by two or more banks.

The factor most incompletely represented by credit evaluation systems is the repayment history of the borrower (Table 17). This may result from the lack of emphasis on credit history in the Five C's of Credit that are used by a number of lenders. Making credit history the sixth C, as has been suggested by some bankers and a few professors of agricultural finance, may be in order. Credit history is also somewhat difficult to measure, especially for new loan applicants. Unlike consumer credit situations where a standardized Credit Report (credit bureau, TRW, etc.) may be complete and accurate, much of a farmer's credit history may not show in a credit report. Converting inquiries to several creditors and input suppliers into a quantative value will require careful consideration.

The second most frequently mentioned other factor used was the character of the borrower. This is also difficult to quantify. Comparing a family divorce to shady business dealings or an unwillingness to be completely honest with the lender is difficult.

Thirteen percent of the bankers also consider the borrowers total relationship with the bank. Presumably this could be completely quantified if the lender's computer system would allow aggregation of the various deposit and loan accounts of a borrower. However, most bank systems are not at that state at this point in time.

The other factor used by a number of banks was the management ability of the borrower. Most measures of management ability are enterprise specific (for example, milk per cow, pigs per litter, bushels per acre), and thus, useful measures vary considerably between farm types.

Use in Loan Pricing

The weight given the credit evaluation system in loan pricing varies considerably from bank to bank. For a few (13 percent) it is the primary determinant (Table 16). For somewhat over half, it is given considerable weight; that is, it was given a rank of 5 through 8 on a scale of 10. However, 15 percent of the banks gave it very little weight. Many of these banks indicated that the rate on agricultural loans was generally the same for all borrowers. Banks with credit scoring or classification systems place somewhat more weight on the system in loan pricing than did banks with other systems.

The borrower's deposit relationship with the bank was the most frequently considered factor in addition to the credit evaluation system results (Table 18). Although farmers are not usually required to maintain compensating balances, they frequently have considerable funds in checking or savings accounts on a continuing basis. Lower rates to farmers with such balances can frequently be justified due to the overall effect of the customer on bank profitability.

Table 18. Factors Used in Loan Pricing in Addition to Credit Evaluation System Results 57 Northeast and Eastern Cornbelt Banks, 1991

Factor[a]	All Banks	Banks with Classification or Scoring Systems	Banks with Other Systems
		--Percent of Banks--	
Deposit relationship	21	27	17
Competition	21	27	17
Collateral	12	9	13
Loan size	10	14	7
Financial Strength of borrower	10	9	10
Most ag loans charged same rate	8	0	13
Length of loan	6	5	7
Total relationship with bank	6	9	3
Guarantee's	4	7	0
Type of farm	4	0	7
Purpose of loan	4	5	3
Cash flow	4	5	3

[a] Includes all factors mentioned by two or more banks.

Competition is also frequently considered. Competition may be difficult to quantify, and the character of competing rates may come to light after the rest of the analysis is completed and a response is being presented to the borrower.

Loan size and collateral were each mentioned by about 10 percent of the banks. Since these are generally easy to quantify and are included in a number of credit scoring models, it appears that these variables were just left out of the systems used by some banks.

Servicing and Monitoring Loans

Although loan evaluation is a very important part of the loan approval process, it is also an important part of the loan servicing and monitoring process after the loan is made. The degree and type of loan servicing and monitoring has historically varied considerably between lending institutions. Of the responding institutions 86 percent used the credit evaluation system on their outstanding nonreal estate loans on an annual basis (Table 19). The majority of the others used the system only when a loan is originated.

Table 19. Frequency That Outstanding Loans Are Evaluated with the Credit Evaluation System 57 Northeast and Eastern Cornbelt Banks, 1991

Loan Type and Frequency	All Banks	Banks with Classification or Scoring Systems	Banks with Other Systems
		--Percent of Banks--	
Nonreal Estate Loans:			
At time of origination only	10	12	8
Semi-annually or more frequently	4	0	7
Annually	86	88	85
Not annually, but within five years	0	0	0
More than five years	0	0	0
Real Estate Loans:			
At time of origination only	25	32	18
Semi-annually or more frequently	0	0	0
Annually	57	45	67
Not annually, but within five years	16	18	15
More than five years	2	5	0

Real estate loans were more likely to be evaluated with the credit evaluation system only at the time the loan is originated. Less than half of the banks evaluated these loans annually. The other banks were about evenly distributed between those who used their system only at origination of the loan and those who used the system periodically, but less frequently than annually. Those with credit scoring or classification systems were somewhat more likely to use their system only at origination of real estate loans, rather than annually.

Many of the real estate loans that were evaluated annually were likely loans to farmers with both real estate and nonreal estate loans. For most systems, an evaluation of the nonreal estate loan is also an evaluation of the real estate loans because it is for the same farm business and is dependent on the same cash flows for repayment.

Credit Classification Models

Bankers were asked to provide copies of the form that they use in their formal credit evaluation system. Some responded that they did not use a form. Their system was a procedure for collecting and analyzing data rather than a form that must be filled out. Another group provided copies of their form or computer printout (where the form was computerized) but had no critical variables or values of variables. These forms usually contained part or all of the financial statement data and some calculated ratios. In these cases the forms used in the formal credit evaluation system forced a method of collecting and summarizing the data for a farm business, but left the analysis up to the loan officer.

Six of the banks provided information on credit classification systems. These ranged from models with two variables that separated high risk from acceptable risk farms to models with several variables with several levels of risk for each. A wide variety of variables were used in these classification models. The variables and their definitions were similar to those used in credit scoring models discussed below (see Table 20). The most popular variables were debt service ratio (debt service/gross receipts), debt repayment margin ((available for debt service - debt service)/debt service), debt/asset ratio, projected cash flow coverage ratio, percent equity and debt/worth. Only two variables were sufficiently widely used to be able to calculate average critical values. They were debt/asset ratio and debt repayment margin, with critical values of 47 percent and 10 percent, respectively.

Credit Scoring Models

Variables Used

Fourteen of the banks provided information on credit scoring models that they use. A summary of the variables used and the frequency of use is presented in Table 20. A wide variety of variables were used in the models. Variables with consistent definition were given a number of different names. Conversely, a number of different definitions were used for some specific variable names. In order to standardize the analysis, definitions suggested by the Farm Financial Standards Task Force were used to assign variable names wherever possible.

Profitability measures were not widely used in these models. Although profitability is an important financial indicator for the farmer, its primary importance from the lenders point of view is its impact on farm cash flow. Thus, models with good cash flow indicators may find separate measures of profitability of less value. Also, lenders may find it more difficult to obtain the data needed for accrual based profitability measures for many farms.

About half of the models used some measure of balance sheet liquidity. The most popular measure of liquidity was the current ratio. The modest popularity of

liquidity measures likely results from the predominance of livestock, particularly dairy, enterprises in this region.

Table 20. Frequency that Measures are Used in Credit Scoring Models 14 Northeast and Eastern Cornbelt Models, 1991

Category/Measure	Percent of Models Using[a]
PROFITABILITY	**14**
1. Rate of return on assets	7
2. Earnings trend	7
3. Off-farm income	7
LIQUIDITY	**57**
1. Current ratio	43
2. Working capital	7
3. Adjusted current ratio	7
4. Long term ratio	7
5. Cash equivalents/total assets	7
6. Value of cash equivalents	7
SOLVENCY	**100**
1. Equity/asset ratio (percent equity)	64
2. Leverage ratio	29
3. Debt/asset ratio	21
4. Net worth	14
5. Debt/cow	14
6. Loan/net worth	7
REPAYMENT CAPACITY	**100**
1. Debt coverage ratio (available/required)	71
2. Debt servicing ratio (payments/gross income)	21
3. Repayment history	21
4. Debt payments/milk income	14
5. Net worth change	14
6. Debt exposure (income/liability)	7
7. Earnings/principal payments	7
8. Cash flow growth	7
9. Cash available/gross income	7

[a] For ratio categories, percent using refers to the percent of all models that used one or more measure in that category. For example, 14 percent of the models used some measure of profitability. Some models used more than one measure for each category.

Table 20. (con't) Frequency that Measures are Used in Credit Scoring Models 14 Northeast and Eastern Cornbelt Models, 1991

Category/Measure	Percent of Models Using[a]
FINANCIAL EFFICIENCY	**36**
1. Operating expense ratio (op. exp./gross income)	36
2. Capital turnover	14
COLLATERAL	**71**
1. Loan to value ratio (loan to collateral)	50
2. Guarantee	21
3. Collateral adequacy (loan secured)	14
4. Collateral margin	7
5. Collateral liquidity	7
MANAGEMENT	**43**
1. General management	29
2. Credit management	21
3. Individual, character, cooperation	21
4. Production management	14
5. Pounds of milk/cow	14
OTHER	**86**
1 Compensating (deposit) balance	29
2. Loan size	21
3. Feed costs/milk income	14
4. Youngstock/cows	14
5. Financial statements; current	7
6. Documentation	7
7. Economic conditions	7
8. Conditions on repayment terms & collateral	7
9. Purpose & structure of loan	7
10. Compliance with bank policy	7
11. Financial statement quality	7
12. Years in business	7

[a] For ratio categories, percent using refers to the percent of all models that used one or more measure in that category. For example, 36 percent of the models used some measure of financial efficiency. Some models used more than one measure for each category.

Current assets are primarily forages and ensiled grains that are being held for use in feeding. They cannot be sold and have the business continue. Forced sale of ensiled products significantly reduces their value. For these businesses, cash flow indicators are better measures of the amount of cash that will, or could be, generated by the business over the next year.

All of the models used some measure of solvency. In fact all used at least one of the three equivalent measures of leverage: debt/asset ratio, equity/asset ratio or leverage ratio. It is unclear why some models used more than one of these measures. The dollar value of net worth and debt per cow were also used.

All of the models also used at least one measure of repayment capacity. Three quarters used the most direct measure of repayment capacity, the debt coverage ratio[3]. However, a large number of other indicators were also used. Some of the alternate or supplemental measures are likely used because they are easier to obtain (i.e., repayment history, debt servicing ratio, debt exposure and debt-payments/milk-income). Others provide information on repayment capacity from a slightly different perspective. For example, net worth growth provides a historical view of the performance of the business "after all withdrawals from the business".

Only thirty-six percent of the banks used a measure of financial efficiency. The operating expense ratio was used in all cases. The turnover ratio was also used in a few models.

Most lending in agriculture continues to be done on a collateralized basis. The collateral is the secondary (last) source of repayment of loans. Most of the assets in a farm business are readily salable. Thus, collateral considerations are an important element in lending. Nearly three quarters of the credit scoring models contained some measure of the quantity or quality of the collateral provided. The most used measure is loan to value of the collateral provided. Most of the other measures were some variation of the relationship between the loan and the security that would be available in case of default. Guarantees by the Farmers Home Administration or some other entity were used in 20 percent of the models.

Although most lenders would likely agree that the most important factor determining the success of a business, and thus the repayment of a loan, is management, less than half of the models incorporated a measure of management ability. All of those incorporating some measure of management included measures of general or production management. In addition, 21 percent included some measure of credit management. As indicated in Table 17, credit history of the borrower is something that is frequently considered in addition to the results of the credit evaluation system. Apparently the difficulties of measuring management limit its inclusion in models.

Most of the models (86 percent) included other variables that are not easily categorized into the standard categories discussed above but are perceived to influence bank risk. One of the most frequently used was compensating balances. Although such balances have a collateral component, their main effect on a loan is its perceived effect on the effective interest rate received on the loan.

About one-fifth of the models incorporated loan size. Large loans were evaluated higher than small loans, likely reflecting the servicing efficiencies that large loans allow.

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3 The Farm Financial Standards Task Force defines the term debt and capital lease coverage ratio. The shorter term debt coverage ratio is used here for convenience. The information provided by the banks does not indicate whether leases are included. It is assumed that they are.

Weights Used

The ultimate importance given to variables in the various categories is indicated by the weights used in determining the score for a borrower. For each model the weights assigned to the variables in each category were summed and then averaged for all the models. The resulting effective weights are presented in Table 21.

Table 21. Weights Used for Variables in Credit Scoring Models 14 Northeast and Eastern Cornbelt Models, 1991

Category	Weight	
	Average[a]	Range[b]
Profitability	1	9- 9
Liquidity	7	9-25
Solvency	25	9-50
Repayment Capacity	30	18-50
Financial Efficiency	3	9-15
Collateral	13	8-25
Management	8	10-32
Other	13	5-50
Total	100	

[a] Average weight counting those who do not use the category as zero. Includes the sum of the weights given to all variables in a category for each model.

[b] Weight given if the category is included in the credit scoring model.

Repayment capacity received the heaviest weighting with 30 percent of a borrowers score determined by that factor. It appears that the models are placing more emphasis on cash flow than collateral. However, the real weight on collateral is difficult to determine since solvency measures also indicate the total collateral position for the farm. The only uncertainty is how much of the collateral is assigned to the lender. Measures of solvency were a close second in importance and determined 25 percent of the score. The actual collateral position also accounted for 13 percent.

Profitability and financial efficiency were given so little weight as to be basically unimportant. Liquidity and management were also given very modest weight.

The wide range of weights used for each measure indicate little agreement on what the weights should be. In general, the more frequently a measure was used, the wider the range of weights given to that measure.

Conclusions

A little over half of the agricultural banks in the Northeast and Eastern Cornbelt use formal credit evaluation systems in assessing and/or pricing farm loans. Of these systems, over 40 percent (about one-quarter of all banks) use credit scoring or classification procedures. However, 72 percent of the banks were interested in developing more formal systems.

In general the credit evaluation systems, and particularly the credit scoring or classification systems, had been in use five years or less. Lenders believed the systems were useful, but many of the systems could be improved. The credit evaluation systems were used on all potential borrowers at 60 percent of the banks, and on all existing borrowers at 43 percent of the banks. In total, two-thirds of the borrowers at these banks were evaluated using the formal loan evaluation system for their last loan. The systems were most frequently not used on small loans and on loans where the loan officer had previous knowledge of the borrowers financial position or repayment ability. In cases where lenders do not have enough information to conduct an analysis using a credit evaluation system, the primary reason is inadequacy of the farmer's records rather than the lender's unwillingness to request the data.

The results of formal loan evaluation systems are given considerable weight in the loan approval decision, but are usually not the sole determining factor. Factors considered in addition to the system results included borrower credit history, borrower character, the total relationship with the bank and management ability. Many of these factors are likely omitted from the systems because they are difficult to measure.

Use of the results of a formal loan evaluation system for loan pricing is more varied. In some cases it is the determining factor. In other cases it is not considered at all. However, many banks still fall between these two extremes. Other factors taken into consideration are the deposit relationship, competition, loan size and collateral.

Formal loan evaluation systems are used to monitor and assess the riskiness of the bank's agricultural portfolio as well as for rating individual borrowers and loans. The portfolio assessment characteristics of these systems may become increasingly important as bank size increases.

A large number of variables are used in credit scoring models used by these banks. In keeping with the increased focus of the lending community on repayment capacity and cash flows these models placed the most weight on repayment variables. Solvency and collateral were also given considerable weight. Profitability, financial efficiency and liquidity were given relatively little weight.

Clearly, the use of more formalized credit evaluation systems has expanded and advanced considerably over the past few years. The continued desire by lenders for less subjective, better documented, more consistent and higher quality loan evaluations, combined with adoption of the Farm Financial Standards Task Force recommendations, will likely foster the adoption of more and better credit evaluation systems in the future.

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