

Staff Papers Series

Staff Paper 91-48

December 1991

USE OF CREDIT EVALUATION PROCEDURES AT AGRICULTURAL BANKS IN MINNESOTA: 1991 SURVEY RESULTS

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USE OF CREDIT EVALUATION PROCEDURES AT AGRICULTURAL BANKS IN MINNESOTA: 1991 SURVEY RESULTS

The application of credit evaluation procedures has a long and varied history. In agriculture their use has grown more recently due to widespread loan losses of lending institutions during the 1980s and prospects for a highly competitive lending environment in the 1990s. Credit evaluation has also become an area of innovation, as evidenced by the variety of formal and informal methods in use and currently under development. Formalized credit evaluation procedures have been identified for their potential to improve the ability of the lender to uniformly differentiate between acceptable and unacceptable borrowers and ultimately improve overall loan portfolio performance. In addition, these procedures can improve communication between bank lending personnel, between lender and borrowers, and between lender and examiners.

This report summarizes the results of a recent survey of agricultural banks located in Minnesota. The survey was part of a broader, multi-state effort to identify and assess the credit evaluation procedures in use by agricultural banks throughout the Midwest, South Central, and Eastern regions of the U.S. Our report is organized into the following sections;

- a brief description of the survey and respondent banks,
- a summary of credit evaluation procedure characteristics of all respondents,
- a more in-depth description of formal credit evaluation systems,
- a summary tabulation of the variables used in formal credit evaluation systems, and

- concluding observations.

SURVEY AND RESPONDENT BANKS

Agricultural banks located in Minnesota were contacted with a mail survey during January 1991. Banks were selected for the survey based on the importance of agricultural loans in their overall lending activities, as reported in the December 1990 FDIC Call Report. If agricultural loans (loans to finance agricultural production and other loans to farmers plus real estate loans secured by farmland) exceeded \$5 million or represented 50 percent or more of net loans, the bank was included in the survey. These selection criteria yielded a total of 238 Minnesota banks. The survey was mailed to the chief executive officer of the bank in each case and reminders were sent to the nonrespondents.

Information requested on the survey fell into several general categories. First, the bank was to categorize the credit evaluation procedure in use as either formal or informal – regardless of whether it was a manual or computerized system. Banks using a formal evaluation system were requested to provide additional detailed information on how the system was used in making and monitoring loans, and the extent of use. Since formal evaluation systems can be quite "information-intensive," parts of the survey posed questions about the quality and availability of borrower information.

A total of 158 banks returned the mail survey. That represents a 67 percent response rate. Summary characteristics of the surveyed and responding banks are reported in Table 1. Mean total assets of responding banks was about \$42.4 million in December 1990, which was slightly higher than the average assets of all banks in the survey (\$39.6 million). Total

Table 1. Survey Bank Characteristics^{a/}

<u>Characteristic</u>	<u>Survey Banks^{b/}</u>		<u>Responding Banks^{c/}</u>	
	<u>Mean</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>
	----- \$000s -----			
Total Assets	39,594	42,421	4,039	386,575
Total Loans	22,205	23,679	1,109	289,418
Total Agric. Loans	7,077	7,579	855	34,365
Agric. Nonreal Estate Loans	5,087	5,480	653	29,944
Agric. Real Estate Loans	1,990	2,099	83	7,121

a/ Based on December 1990 FDIC Report of Condition.

b/ 234 banks.

c/ Respondents were 158 banks.

assets of responding banks ranged from \$4.0 million to \$387 million. Average total loan volume of responding banks was reported to be \$23.7 million of which \$7.6 million was agricultural loans. This represented an agricultural loan ratio (agricultural loans/total loans) of .32. The range of the agricultural loan ratio among responding banks was from .04 to .89 and suggests large variation in their involvement in agricultural lending. Nonreal estate loans accounted for about 72 percent of the end-of-year agricultural loan volume at all survey and responding banks. We conclude that the characteristics of banks responding to the survey were highly similar to those of all banks in the survey. Therefore, survey respondents appear to be generally representative of agricultural banks in Minnesota during 1991.

EVALUATION PROCEDURES AND BORROWER FINANCIAL INFORMATION

The initial survey question asked bankers to identify which of four descriptions most closely characterized the credit evaluation procedures they use. A second question asked about borrower financial statements and the credit evaluation frequency with which they are required.

Type of Evaluation Procedure

A majority (47 percent) of the responding banks indicated that they were using a formal "credit scoring" procedure for making credit decisions, and/or for pricing, and/or for reviewing farm loans (see Table 2). A formal procedure includes the use of a numerical scale for several important variables, which are combined into a borrower credit "score." Significantly fewer banks (14 percent) reported they used a "credit classification" scheme in which financial ratios and other factors are compared with established minimum acceptable levels. Credit classification does not involve an explicit weighting of individual factors since a single score is not derived for the borrower. Since the lender may make trade-offs to determine acceptability of borrowers that meet some standards and fail others, a classification procedure is a more informal approach to credit evaluation. Similar percentages of banks responded that they either evaluated common ratios and factors with no established cut-off levels (15 percent), or they just required borrower financial statements (19 percent) and loan officers (or the loan committee) determined how the information would be evaluated.

Table 2. Type of Credit Evaluation Procedure Used

Procedure in Use	Percent of All Banks ^{a/}
Formal (Numerical) Risk Rating (a Credit Scoring System)	47
Ratios and/or Factors with Established Cut-off Levels (a Credit Classification System)	14
Ratios and/or Factors Without Established Cut-off Levels	15
Financial Statements Required, but Procedures Are Left to Loan Officers	19
Other Procedures	5

a/ Respondents were 158 banks.

When combined, formal (credit scoring) and semi-formal (credit classification) procedures are employed by over 60 percent of all responding banks. This represents a significant proportion of all agricultural banks in Minnesota. In addition 58 percent of the responding banks indicated that they were interested in developing a more formal system for evaluating farm loans. Forty-eight percent of banks already using formal scoring systems expressed an interest in making their procedures more formal.

Required Financial Statements

Current balance sheets and projected cash flow statements were required of new and existing farm borrowers by nearly all banks. However, new farm borrowers were not as frequently required to submit balance sheets and cash flow statements from prior years as reflected in Table 3. Even the percent of banks where existing borrowers must present actual cash flows from the current year was sharply lower at 70-74 percent. Banks required income statements from new borrowers less frequently than either balance sheets or cash flows. Interestingly, a higher percentage of banks reported that income statements and tax returns were requested of existing borrowers (than of new borrowers). This was an unexpected result. Reconciliation of balance sheet and income statement information was required by just 64-69 percent of the banks and suggests that banks were less frequently concerned with the internal (accounting) consistency of those two financial statements when making a credit decision.

Banks using formal credit scoring systems typically required financial statements more frequently than banks employing more informal methods of evaluation. The data in Table 3 shows that the percentages of these banks requiring statements were higher for both new and existing borrowers for all categories of financial statements. This result was expected since formal credit systems would typically require more financial information from which to derive ratio measures and ultimately credit scores.

Table 3. Frequency that Financial Statements are Required for Agricultural Loans of Significant Size

Statement	All Banks ^{a/}		Banks with Credit Scoring Systems ^{b/}	
	New Borrowers	Existing Borrowers	New Borrowers	Existing Borrowers
Balance Sheet				
This Year's	92	98	96	100
Last Year's	64	c/	67	c/
2 Years Prior	62	c/	72	c/
Income Statement				
This Year's	80	92	84	92
Last Year's	67	c/	70	c/
2 Years Prior	74	c/	81	c/
Reconciliation	65	64	67	69
Cash Flow Statement				
Next Year's Projection	94	94	96	95
This Year's Actual	67	70	72	74
Last Year's Actual	52	c/	59	c/
Tax Returns				
This Year's	87	97	92	99
Last Year's	71	c/	77	c/
2 Years Prior	81	c/	91	c/

a/ Respondents were 158 banks.

b/ Respondents were 74 banks.

c/ Not applicable

Use of Formal Credit Scoring

Banks found it difficult in some cases to differentiate between a formal, credit-scoring system and the procedure they were using (see Table 4). A total of 134 banks (84 percent of the responding banks) indicated they used a formal evaluation system, even though many of them employed informal methods to evaluate their farm borrowers. For example, 17 banks (71 percent of the responding banks) indicated they computed financial ratios and used other factors in evaluation, but did not have established cut-off levels for those measures. These

Table 4. Banks That Identified Use of a Formal Credit Procedure by Type of Evaluation Procedure Actually in Use

Procedure in Use	Responding Banks That Indicated Use of a Formal Evaluation System	
	(banks)	(percent)
Formal (Numerical) Risk Rating (a Credit Scoring System)	74	100%
Ratios and/or Factors With Established Cut-off Levels (a Credit Classification System)	19	86
Ratios and/or Factors Without Established Cut-off Levels	17	71
Financial Statements Required, but Procedures are Left to Loan Officers	16	52
Other Procedures	8	100
Total	134	84

banks felt they were using a formal credit evaluation procedure. Various reasons may be possible for the perception that their procedures were formal. Clearly no standard usage of the term "formal" has been imposed on banks through examiners or the banking literature. Thus, the variation shown in Table 4 could be due to the lack of a generally accepted definition. The focus of our remaining analysis is on the 74 banks with true "formal" credit scoring systems and comparisons with all banks (including credit scoring banks) that responded to the survey. The all bank summary measures are presented for comparison.

One might expect that there would be a significant difference between number of borrowers and/or number of loan officers at banks employing credit scoring systems compared to banks using more informal methods. Formal procedures may be computerized or involve sufficient standardization of evaluations to allow each loan officer to handle a larger number of borrowers. The results in Table 5 suggest that the size distributions of farm borrowers were nearly identical. Thus, it appears that banks with credit scoring systems did not systematically have more farm borrowers to evaluate. The mean number of loan officers was also highly similar. Banks using credit scoring systems employed an average of 2.11 loan officers, which was only slightly higher than the 1.95 loan officers reported by all banks. Interestingly, just 40 percent of banks with credit scoring systems reported that it was computerized. This compares with 28 percent among all banks responding to the survey. Manual credit evaluation procedure may confer certain advantages for loan officers over computer-based systems which this survey did not anticipate.

Table 5. Distribution of Number of Farm Borrowers

Farm Borrowers	All Banks ^{a/}	Banks with Credit Scoring Systems ^{b/}
	----- (percent) -----	
Less than 100	37	39
100-199	42	40
200-299	11	10
300-399	6	7
400 and over	4	4

a/ Respondents to the question were 123 out of 158 banks.

b/ Respondents to the question were 70 out of 74 banks.

GENERAL CHARACTERISTICS OF FORMAL CREDIT
EVALUATION SYSTEMS IN USE

This section summarizes various general characteristics of the credit evaluation systems in use at banks that indicated they used a formal procedure to evaluate their farm borrowers.

Loan Type as a Criterion

When differentiating between farm real estate and nonreal estate loans, banks most frequently use the underlying collateral or security offered as the criterion for determining the method of evaluation (see Table 6). Purpose of the loan appeared to be of secondary

Table 6. Criteria Use in Credit Evaluation to Differentiate Between Real Estate and Nonreal Estate Loans

Criteria	Banks With Credit Scoring Systems ^{a/}
	(percent)
Collateral or Security	59
Purpose of Loan	25
Other	16

^{a/} Respondents to the questions were 32 out of 74 banks.

importance. Since the response of banks to the question was quite low it is difficult to draw a general conclusion.

The adoption of credit evaluation procedures among Minnesota banks is relatively recent (see Table 7). High percentages of all banks (79 percent) and banks with credit scoring systems (83 percent) had used their evaluation systems for 5 years or less. When all banks and banks using credit scoring are compared, the percentages of banks by years of use are nearly identical. Moreover, the recovery of use suggests that more banks became involved in credit evaluation as a consequence of farm financial stress experienced in the early and mid-1980s.

Table 7. Years Credit Evaluation System Has Been in Use

Years	All Banks ^{a/}	Banks With Credit Scoring Systems ^{b/}
	----- (percent) -----	
Under 1 Year	11	13
1 to 2 Years	21	24
3 to 5 Years	47	46
6 to 10 Years	17	17
Over 10 Years	4	0

a/ Respondents to the question were 131 out of 134 banks.

b/ Respondents to the question were 72 out of 74 banks.

Satisfaction with Systems in Use

About 80 percent of all banks and 86 percent of banks using credit scoring reported they were reasonably satisfied with their current credit evaluation procedures. Where dissatisfaction was expressed about the current procedure, it frequently indicated that lenders were searching for ways in which improvements could be made. Sources of dissatisfaction were quite diverse as shown in Table 8. Several banks in both categories indicated that a more uniform and objective process is desired. Related general statements were that improvements of various types were needed, in some cases so that firms of quite different size and/or type could be evaluated with the same system. One interesting difference

Table 8. Sources of Dissatisfaction with Present Credit Evaluation System

Source of Dissatisfaction	All Banks ^{a/}	Banks with Credit Scoring Systems ^{b/}
	(percent)	
Would like a more uniform, objective process	19	13
Farm data are inadequate	19	0
Design needs improvement	15	20
New system which needs refinement	15	13
Needs simplification (more understandable)	15	0
Some farms are not handled well	11	13
Should be computerized	7	7
Not detailed or thorough enough	7	7
Not enough ratio analysis	4	7
Too time - consuming	4	7
Setting weights and score levels is difficult	0	13

a/ Respondents to the question were 27 banks.

b/ Respondents to the question were 15 banks.

between the two bank categories was that banks without credit scoring systems felt that farm records data were severely inadequate to accomplish credit evaluation, while credit-scoring banks did not find data to be a source of dissatisfaction. Similarly, banks not using credit scoring indicated their procedures need to be simplified to make them more understandable.

An inference is that banks using credit scoring have been able to achieve a degree of simplification in the process of adopting their current procedures. Banks using credit scoring expressed that they found it difficult to set weights on ratios and factors and to establish credit scores at appropriate levels.

Level of Use

Frequency of use is one indicator of adaptability and overall usefulness of a credit evaluation system. We break responses on frequency of use into two general categories - existing borrowers and potential borrowers. Survey responses indicated that a high percentage of existing borrowers were evaluated using the credit evaluation procedure in place (see Table 9). A somewhat higher level of use appears to occur among banks with credit scoring systems.

When the responses are tabulated by percent of banks using credit evaluation a different pattern emerges. High percentages of banks (75 and 80 percent) applied credit evaluation to all potential borrowers (e.g., first-time applicants), but sharply lower percentages of banks uniformly applied credit scoring to all their existing farm borrowers. Just 27 percent of banks with credit scoring systems used them to evaluate all their existing borrowers. This percentage was even lower among all banks reporting use of credit evaluation systems. We interpret this to mean that banks frequently have borrowers who either have strong credit records or the loan amounts are considered too small to merit a credit evaluation.

Table 9. Level of Use of Credit Evaluation System

Use Category	All Banks ^{a/}	Banks with Credit Scoring Systems ^{b/}
	(percent of borrowers)	
System Used for Existing Borrowers	86	89
	(percent of banks)	
System Used for All;		
Potential Borrowers	75	80
Existing Borrowers	22	27
System Results Shared with Borrowers	50	54

a/ Respondents to the question were 134 banks.

b/ Respondents to the question were 74 banks.

While a relatively high percentage of existing borrowers was typically evaluated by agricultural banks only about half of the responding banks shared the credit evaluations with their farm borrowers (Table 9). This practice was similar across banks with credit scoring systems and those using other formal methods of evaluation. The fact that many agricultural bankers do not provide the results of credit evaluation to their farm borrowers suggests a dilemma. Credit evaluations theoretically summarize the strengths and weaknesses of a farm operation and could convey valuable information to the borrower about areas of financial

position, performance, etc. that make them more (or less) creditworthy. In addition, the results could be used to substantiate the lender's decision and convince the borrower of the fairness of that decision. A potential disadvantage is that the borrower may perceive the system to be inadequately or incorrectly accounting for various subjective factors such as credit history, character, or management ability. We expect that this dilemma led some bankers to conclude that the potential disadvantages outweigh the gains associated with a policy of providing credit evaluations to borrowers.

Banks were requested to rank the reasons why they did not apply credit evaluation to all potential and all existing farm borrowers. Percentages of banks ranking reasons as first or second most important are summarized in Tables 10 and 11. Banks most frequently selected knowledge of the borrower's financial position as the reason for not evaluating all potential and existing borrowers. Slightly less important were previous repayment by the borrower and small loan size. Banks using credit scoring are more likely to evaluate all potential borrowers regardless of loan size as reflected by the 25 percent of respondents which ranked it as an important factor in Table 10 (compared to 55 percent among all banks). Interestingly, this pattern does not also emerge among existing borrowers (Table 11).

Although the number of respondents to the question was quite small, we do not observe the expected pattern between bank categories in Tables 10 and 11. It was expected that banks with credit scoring systems would be generally more likely to evaluate all

Table 10. Primary Reasons for Not Using a Credit Evaluation System on All Potential Farm Borrowers

Reasons	All Banks ^{a/}	Banks with Credit Scoring Systems ^{b/}
		(percent)
Knowledge of borrower's financial position	65	50
Previous repayment ability of the borrower	58	50
Size of loan is small	55	25
Current bank deposit customer	18	6
Lack of complete information	23	25
Other	13	25

^{a/} Respondents to the question were 40 out of 134 banks.

^{b/} Respondents to the question were 16 out of 74 banks.

borrowers due to the availability of a uniform procedure. This pattern tended to occur for potential borrowers in Table 10 (as reflected by the lower percentages), but not for existing borrowers in Table 11 where information was presumably more consistently available. Lack of complete borrower information was not a primary reason for the responding banks.

Table 11. Primary Reasons for Not Using Credit Evaluation on All Existing Farm Borrowers

Reason	All Banks ^{a/}	Banks with Credit Scoring Systems ^{b/}
	(percent)	
Knowledge of borrower's financial position	77	79
Previous repayment ability of the borrower	60	48
Small size of loan	50	56
Current bank deposit customer	17	21
Lack of complete information	11	13
Other	3	4

a/ Respondents to the question were 40 out of 134 banks.

b/ Respondents to the question were 16 out of 74 banks.

Availability of Borrower Information

Banks tended to fall into two categories when asked how more precise and accurate information on borrowers would affect their current credit evaluation procedures (see Table 12). Relatively larger percentages of banks reported that either no effect would occur or that they would implement a more precise system. Banks using credit scoring were slightly more likely to make no changes, while other responding banks would tend to make changes to

Table 12. Effect of More Precise and Accurate Information on Credit Evaluation System

Effect	All Banks ^{a/}	Banks with Credit Scoring Systems ^{b/}
		(percent)
No effect	39	45
More borrowers would be evaluated	26	28
Implement a more precise system	51	43

a/ Respondents were 134 banks.

b/ Respondents were 74 banks.

improve precision of their evaluation systems. One interpretation is that banks not using a credit scoring procedure may be typically requesting a broader set of financial and nonfinancial information from their borrowers, which if more readily available would result in greater precision and confidence in the result. Credit-scoring banks would appear to be less concerned with the need for increased precision. The ability to evaluate more borrowers was not an important consequence of having the additional information. This latter response is consistent with the earlier finding that a high percentage of borrowers were already being evaluated.

Uniformly high percentages of banks reported that they were seeking more detailed and accurate information on borrower farm income, nonfarm income and withdrawals, and projections of cash flow and income (Table 13). This is not surprising because loan officers

Table 13. Types of More Detailed and Accurate Information Desired from Farm Borrowers

Information Desired	All Banks ^{a/}	Banks with Credit Scoring Systems ^{b/}
		(percent)
Farm income	63	64
Nonfarm income and withdrawals	74	74
Balance sheet	45	41
Cash flow and income projection	70	74
Other	17	21

a/ Respondents to the question were 84 out of 134 banks.

b/ Respondents to the question were 42 out of 74 banks.

may spend a considerable amount of time to assemble sufficient farm business data for credit analysis. The high percentages of banks that want projected (proforma) cash flows and farm income are indicative that future borrower repayment ability and performance are the major concerns of bankers. Although historical information is important to the evaluation process, it appears to be of secondary importance when gauging the credit capacity of a borrower. Greater detail and accuracy on nonfarm income and withdrawals would appear to be related to the desire for improvements in availability of cash flow data.

Banks clearly and uniformly felt that inadequate farm records were the factor that most severely limited the availability and use of improved borrower information in credit evaluation (Table 14). Lenders could require their borrowers to provide such records as a condition for loan application. However, they may be hesitant to make such a requirement to avoid driving acceptable borrowers to competing lending institutions. As a consequence, banks find they must either absorb the costs of developing credit profiles of their farm borrowers or assume the risks of not doing so. Concern over requiring farmers to present adequate farm records is evidenced by the high ranking given to the desire to develop a borrower relationship.

Table 14. Factors that Limit Use or Availability of More Precise and Accurate Borrower Information

Factor	All Banks ^{a/}	Banks with Credit Scoring Systems ^{b/}
	(mean ranking) ^{c/}	
Inadequate farm records	1.4	1.4
Limited time of bank personnel to obtain and validate information	2.2	2.2
Desire to foster a business relationship with the borrower	2.6	2.6

^{a/} Respondents to the question were 94 out of 134 banks.

^{b/} Respondents to the question were 46 out of 74 banks.

^{c/} A rank of 1 indicates the factor is most limiting and a rank of 4 indicates the factor is least limiting.

Use in Lending Activities

The primary reasons a bank would use a credit evaluation system may include; developing information on which to base a lending decision, assessing risk in the loan portfolio, and establishing borrower credit limits or interest rates. Bank responses indicated that the purposes for using credit evaluation were highly similar across banks and across types of loans (Table 15). Banks reported that monitoring borrower progress and evaluating risk were the most important tasks for which they evaluated both nonreal estate and real estate loans. Assessment of risk in the agricultural loan portfolio ranked second in importance. It appears that banks using credit scoring systems gave these purposes slightly higher mean ranks than other banks in the survey. We interpret these primary uses as expressions that agricultural banks have adopted formal credit evaluation to achieve improved control over their lending activities. This is highly consistent with the growing use of credit evaluation systems since the mid-1980s. Finally, banks indicated that determining credit limits and advising borrowers on their financial progress were secondary justifications for using credit evaluation systems.

Lending Decisions

The decision to lend or not lend is often based on multiple factors, some (or many) of which are summarized in a credit score or overall credit evaluation result. Banks were asked to identify the amount of weight they give to the credit evaluation system result when making loan approvals (Table 16). With regard to loan approval approximately half of the responding banks gave credit evaluation results a weighting of 7 or 8 (out of 10). Thus, while a credit system result was a highly significant part of the decision, it was not

Table 15. Purposes for Using a Credit System to Evaluate Farm Loans by Type

Purpose by Loan Type	All Banks ^{a/}		Banks with Credit Scoring Systems ^{b/}	
	Mean Rank ^{c/}	% Ranking as Important ^{d/}	Mean Rank ^{c/}	% Ranking as Important ^{d/}
<u>Nonreal Estate Loans:</u>				
Monitor progress and evaluate risk	8.4	80	8.8	84
Determine borrower credit limits	6.8	33	6.0	30
Determine interest rate	5.6	25	5.5	25
Assess riskiness of bank's ag portfolio	7.3	60	7.7	65
Counsel borrower on status or progress	6.1	38	6.2	43
<u>Real Estate Loans:</u>				
Monitor progress and evaluate risk	7.9	68	8.4	77
Determine borrower credit limits	6.1	35	5.7	32
Determine interest rate	5.4	27	5.2	20
Assess riskiness of bank's ag portfolio	6.9	57	7.0	59
Counsel borrower on status or progress	5.6	33	5.4	33

a/ The number of banks responding varied between 129 and 105, with 101 complete responses.

b/ The number of banks responding varied between 71 and 63, with 61 complete responses.

c/ A ranking of 10 indicates a primary purpose and a ranking of 1 indicates the purpose is not significant.

d/ Percent of banks indicating a rank of 8,9, or 10.

Table 16. Importance of Credit Evaluation Results in Farm Loan Approval and Pricing Decisions

Importance by Use of Result	All Banks ^{a/}	Banks with Credit Scoring Systems ^{b/}
	(percent)	
<u>For loan approval:</u>		
9 or 10 (highest weight)	21	22
7 or 8	48	49
5 or 6	22	19
3 or 4	7	8
1 or 2 (lowest weight)	2	2
<u>For loan pricing:</u>		
9 or 10 (highest weight)	18	20
7 or 8	35	33
5 or 6	21	19
3 or 4	8	7
1 or 2 (lowest weight)	18	21

a/ Respondents to the question were 125 out of 134 banks.

b/ Respondents to the question were 73 out of 74 banks.

considered to be the sole determining factor. The importance of credit system results should not be underestimated either since 69 percent of all responding banks and 71 percent of banks using credit scoring systems give their system result a weighting of 7 or higher. Few banks give the result a weight of 4 or lower.

Other factors which loan officers consider when deciding to approve or disapprove a loan are summarized in Table 17. The factors which were most frequently mentioned by banks were credit history of the borrower, borrower character, and quality of collateral. These items may be excluded entirely or only indirectly reflected in a formal credit evaluation system due to the inherent subjectivity involved in their assessment. A loan officer may use these factors to modify the credit system result and justify the decision to

Table 17. Factors Used in Addition to Credit Evaluation System Results for Loan Approval

Factor	All Banks ^{a/}	Banks with Credit Scoring Systems ^{b/}
	(percent)	
Credit (repayment) history of borrower	20	22
Character of borrower	22	31
Cash flow/repayment capacity	13	26
Financial Strength	10	15
Collateral	14	22
Management ability	0	10
Trends and economic outlook	0	8
Loan purpose	2	1
Family assistance	4	6
Loan size	3	4
Banking relationship	3	4
Other	4	13

a/ 157 banks provided additional responses.

b/ 72 banks provided additional responses.

extend a loan. Another factor which fits this category is management ability of the borrower, which was cited by banks using credit scoring but not by other banks in the survey. We interpret this to mean that banks with credit scoring systems find it difficult to codify overall management ability into a single measure for use in their existing systems. It was interesting to see that several banks also cited factors which might ordinarily comprise parts of the credit evaluation system. Cash flow and repayment capacity, financial strength measures, and trends in business performance were frequently mentioned factors that bankers use in conjunction with their credit system results to make loan approval decisions.

Loan Pricing Decisions

Fewer banks use credit evaluation system results for making differential interest rate decisions. In fact loan pricing is frequently one of the last tasks for which banks would consider the development and use of a credit evaluation system. Banks that use credit system results for pricing have done so usually after extensive refinement of their systems, and after achieving a significant level of confidence in their results. This characterization is reflected by bank responses in Table 1. Just over half of the banks gave high weight (7 or higher) to credit system results when setting loan interest rates. Significant percentages of banks, also gave low weight to credit evaluation results in determining loan rates (26 percent for all banks and 28 percent for banks using credit scoring systems). In several cases banks indicated that they provided the same rate to all borrowers.

Additional factors that enter the loan rate decision are summarized in Table 18. Bank responses suggest to us that the focus is on profitability of the loan and its inherent risk. Additional pricing factors which were identified either improve profitability of the loan (by

Table 18. Factors Used in Addition to Credit Evaluation System Results for Pricing Loans

Factor	All Banks ^{a/}	Banks with Credit Scoring Systems ^{b/}
	(percent)	
Competition	13	15
Banking relationship	9	8
Collateral	11	11
Borrower history	7	8
Financial strength	7	10
Repayment ability, cash flow	4	6
Risk to the bank	5	7
Loan size	5	7
Time spent with borrower	3	4
Loan term	3	3
Cost of funds	3	6
Other	4	10

a/ 157 banks provided additional responses.

b/ 72 banks provided additional responses.

reducing the cost of lending and, therefore, justify a lower rate) or reduce lending risk (and, thus, carry a smaller rate premium). Competition (competitor rates), banking relationship with the customer (deposits, insurance, etc.), collateral, borrower credit history, and financial strength of the borrower were all frequently cited as factors which influence the interest rate decision in addition to the credit system results.

Less frequently mentioned factors included repayment ability, risk to the bank, loan size, time spent with the borrower, and the bank's cost of funds. It is interesting to note that several banks cited many of the same additional factors for loan pricing and for loan approval. This suggests that the two decisions are quite closely related. It may also indicate that the application of credit evaluation system results to either decision is at a fairly early stage of development among agricultural banks.

Frequency of Evaluations

Once the initial loan evaluation is completed, a bank has the option to continue periodically using the credit evaluation system to monitor borrower financial progress. The frequency of that evaluation may vary considerably among banks due to type of loan, loan quality, availability of loan officer time, and several other factors. Banks were asked to indicate how frequently they evaluate farm real estate and nonreal estate loans (Table 19). A consistent pattern emerged from bank responses that reflects the greater frequency of evaluating nonreal estate loans. Annual evaluation of nonreal estate loans occurred among 82 percent of all banks and 86 percent of banks using a credit scoring system. Small percentage of the banks performed evaluations of nonreal estate loans more frequently than once a year. The annual cycle of using credit systems to evaluate nonreal estate loans suggests that it occurs at the time of loan renewal or when a seasonal line of credit is negotiated.

Farm real estate loans are less likely to be evaluated annually using the credit evaluation system. While annual evaluation was reported by many banks, it was nearly as common for banks to apply credit evaluation only at the time of loan origination or at intervals longer than annual but less than 5 years. Less frequently evaluation of farm real

Table 19. Frequency that Farm Borrowers are Evaluated by Type of Loan

Frequency by Loan Type	All Banks ^{a/}	Banks with Credit Scoring Systems ^{b/}
	(percent)	
<u>Nonreal Estate Loans:</u>		
At time of origination only	3	4
Semi-annually or more frequently	11	8
Annually	82	86
Not Annually, but within 5 years	4	2
More than 5 years	0	0
<u>Real Estate Loans:</u>		
At time of origination only	30	24
Semi-annually or more frequently	6	6
Annually	37	43
Not Annually, but within 5 years	27	27
More than 5 years	0	0

a/ Respondents to the question were 133 (nonreal estate) and 123 (real estate) out of 134 banks.

b/ Respondents to the question were 72 (nonreal estate) and 67 (real estate) out of 74 banks.

estate loans may be considered adequate by many banks. Since farmers with real estate loans are also likely to have nonreal estate loans at the bank, an evaluation of the nonreal estate loan side provides information about the ability of the farm business to service both categories of debt.

DESCRIPTION OF CREDIT SCORING MODELS

Banks using formal credit evaluation procedures were requested to enclose additional information about the credit scoring system they currently use. Out of the 158 banks responding to the survey 61 banks returned worksheets or print-outs of credit scoring models. Another 6 banks submitted copies of their credit classification schemes. These examples were sufficient to identify 1) the general categories of variables and specific measures used for evaluation, and 2) the weight assigned to each category of variable.

Categories and Measures of Variables

Variables used by agricultural banks were separated into 8 categories as reported in Table 20. All credit scoring models were found to include indicators of borrower liquidity solvency, repayment capacity, and collateral. Management and other factors were included in over half of the models, but indicators of profitability and financial efficiency were noticeably absent from many credit scoring models. The low percentage of models that incorporated profitability contrasts sharply with the widespread use of repayment capacity. Although these two indicators are related, banks appear to focus on cash flow of the farm business to service debt and less on overall profitability. In part this difference is attributable to how earnings measures are classified in Table 20. Many banks included indicators of change in net worth. In some cases these were computed as the annual average change in total net worth. In other cases models specified the change in earned net worth where retained earnings (and profitability) represents the primary source of change in net worth. In each case net worth change or trend was classified as an indicator of repayment capacity.

Table 20. Variables and Measures Used in Credit Scoring Models

Variable Category	Measure	Percentage of Models Using ^{a/}
PROFITABILITY:		16
1.	Off-farm Income	5
2.	Profit Margin Ratio	5
3.	Earnings Trend	3
4.	Net Cash Income	2
5.	Rate of Return on Assets	2
6.	Rate of Return on Equity	2
LIQUIDITY:		100
1.	Current Ratio	72
2.	Intermediate Ratio	49
3.	Working Capital	5
4.	Current Equity/Intermed. Equity	3
5.	Current Assets/Intermed. Assets	2
6.	Long Term Ratio	2
7.	Working Margin	2
SOLVENCY:		100
1.	Debt/Asset or Debt/Equity Ratio	85
2.	Equity/Asset Ratio	15
3.	Net Worth	3
4.	Net Capital Ratio	2
REPAYMENT CAPACITY:		100
1.	Net Worth Change or Trend	69
2.	Debt Servicing or Debt Service Coverage Ratio	31
3.	Repayment History	28
4.	Repayment Capacity	10
5.	Cash Flow Ability or Margin	8
6.	Net Farm Income/Total Liab.	5
7.	Cash Flow Coverage Ratio	3
8.	(Net Farm Inc. + Int.)/Total Liab.	3
9.	Term Debt Coverage Ratio	3
10.	Current Debt Ratio	2
11.	Debt Payment Size	2
12.	Net Earnings/(Fam. Liv. + Prin.)	2

Table 20. Variables and Measures Used in Credit Scoring Models (continued)

Variable Category	Measure	Percentage of Models Using ^{a/}
FINANCIAL EFFICIENCY:		30
1.	Operating Expense Ratio	16
2.	Interest Expense Ratio	11
3.	Capital Turnover Ratio	2
COLLATERAL:		100
1.	Collateral (Coverage) Ratio	77
2.	Collateral Protection	13
3.	Collateral Liquidity	11
4.	Collateral Margin	7
5.	Guarantee	2
MANAGEMENT:		52
1.	General Management	31
2.	Individual, Character, Cooperation	15
3.	Credit Management	3
4.	Production Management	3
OTHER:		67
1.	Other Credit Factors	20
2.	Financial Statements; Farm Records	15
3.	Documentation	8
4.	Previous Bankruptcy; Restructuring	7
5.	Collected Balance	3
6.	Communications	3
7.	Years to Amortize	3
8.	Accounting Status	2
9.	Enterprise Trends	2
10.	Officer Servicing Time	2
11.	Split Financing	2
12.	Years Farming	2

a/ Percentages are based on 61 credit scoring worksheets and forms which responding banks returned with their surveys. Percentages in variable categories reflect the percentage of all models that included one or more measures in the category.

Each category of variable included a variety of measures. Liquidity was typically measured by the current ratio or the intermediate ratio. Solvency was captured by either the debt/asset ratio or the corresponding debt/equity ratio in 85 percent of the credit scoring models. Collateral coverage, protection, and liquidity were frequently included as measures of the assets provided as security to the loan(s) in case of default. The collateral coverage ratio (or its inverse, the loan/collateral ratio) occurred in 77 percent of the models. Repayment capacity measures were the most diverse. While changes in net worth were the most frequently used measure, the debt service ratio, or debt service coverage ratio, were included in 31 percent of the sample models. Repayment history was also listed among the repayment capacity measures in 28 percent of the cases. Individual credit scoring models frequently included more than a single measure of repayment capacity (as indicated by the percentages shown in Table 20). Finally, it is interesting to note that management, character, and cooperation of the borrower (factors that are frequently cited by lenders as key determinants in making a loan) were included in only 31 percent of the submitted credit scoring models. In those models general management characteristics were most often used as the measure.

Weighting of Variable Categories

The weights (or points) assigned to variable categories are good indicators of the relative importance assigned to each factor in the overall credit score. Percentage weights reported in Table 21 reflect average levels of importance. Where weights were not readily

Table 21. Percentage Weights Assigned to Variable Categories in Submitted Credit Scoring Models^{a/}

Variable Category	Range	Average Weight Overall ^{b/}	Average Weight if Included ^{c/}
		(percent weight)	
Repayment Capacity	12-64	25.3	25.3
Liquidity	4-45	20.8	20.8
Solvency	6-40	20.3	20.3
Profitability	8-25	2.4	14.6
Financial Efficiency	10-35	2.8	16.8
Collateral	9-50	18.2	18.2
Management	4-38	4.5	14.6
Other	4-28	5.4	17.5

a/ All weights are interpreted at the "best" rating.

b/ 61 credit scoring models were submitted by responding banks. Responses with zero weights are included in the mean.

c/ Only credit scoring models which included measures in the associated category are included in the means. Zero weights are excluded from the mean.

stated, they were derived based on the points assigned to the best ratings on each of the measures used in the model.

Repayment capacity received the highest average weight with 25.3 percent of the overall score being determined by measures in that category. The range was also wide with weights varying between 12-64 percent. Borrower liquidity and solvency were given similar

weights on average at about 20 percent each. Collateral was the fourth most heavily weighted category at 18.2 percent. It is worth noting that collateral ranks somewhat lower in importance than repayment capacity. This is evidence that banks are placing more importance on cash flow and capacity to repay out of earnings than on the ability to liquidate assets and recover the loan amount.

Measures of profitability, financial efficiency and management ability carried quite small percentage weights (from 2.4 to 4.5 percent) when all 61 models were used in tabulating of the mean weights. However, the mean weights associated with those factors were significantly higher at 14.6 to 16.8 percent of the total credit score when only models that included those measures were used in the computation. In each of these categories the range of assigned weights was quite large, reflecting the diversity of opinion which individual banks have about their relative importance in determining credit quality.

CONCLUDING OBSERVATIONS

The survey of credit evaluation procedures at Minnesota's agricultural banks revealed several conditions and trends which we found important to emphasize.

First, a relatively high percentage (61 percent) of the responding banks indicated they used a formal credit scoring or credit classification system. The primary uses were to evaluate farm loans as part of the loan approval process, to monitor loan progress, and to assess risk. The pricing of farm loans was of secondary importance. Most credit evaluation systems were introduced within the past 5 years. Although they were quite recently adopted, over 80 percent of the banks indicated they were satisfied with their current evaluation

procedures. Interestingly, there was also a strong desire among responding banks to make refinements that would increase objectivity and uniformity of their existing evaluation procedures.

Second, bank responses generally indicated that credit scoring model results alone were not sufficient for making lending and loan pricing decisions. In this regard they viewed the models as assisting but not replacing loan officers, due to the need to incorporate additional and often subjective factors in the evaluation procedure. Additional, subjective factors such as the credit history of the borrower, borrower character, and management ability were often used to modify the credit score result. The role of subjective factors may be a significant reason why only half of the banks share the credit evaluation results with their farm borrowers. In this regard, agricultural banks should consider alternative ways that they can communicate aspects of the credit evaluation result which are considered useful for the borrower to know - particularly when the bank is monitoring loan progress and risk.

Third, banks used their credit evaluation systems on a high percentage of their existing farm borrowers. Similarly, a high percentage of banks performed formal credit evaluations on all their potential borrowers. Knowledge of the borrower's financial position, previous repayment history, and small loan size were the primary reasons cited for not formally evaluating some borrowers.

Fourth, inadequate borrower information was seen as a limitation to the implementation of a more precise credit evaluation system. Projected cash flows, farm and nonfarm income, and family withdrawals were selected as the most important types of desired information. Banks ranked the inadequacy of farm records over their desire to foster

a business relationship with the borrower as the primary reason for the lack of information. It would appear that banks need to develop a long term strategy for acquiring the borrower information they seek.

Fifth, formal credit scoring models appear to place relatively high levels of importance on factors such as repayment capacity of the borrower, liquidity and solvency of the business, and collateral position of the bank. Relatively less emphasis is given to farm profitability and financial efficiency indicators. This latter result may be due to the combination of 1) the lack of borrower information from which to derive appropriate financial measures of profitability and efficiency, or 2) the desire of banks to focus more on cash flow performance. Credit scoring models that were returned with the surveys indicated that a variety of measures are currently being used to capture the desired information in each variable category.