



The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.

Glenn Pederson is an Associate Professor at the Department of Agricultural and Applied Economics, University of Minnesota, St. Paul.

Cynthia Donovan is a former Graduate Research Assistant, Department of Agricultural and Applied Economics, University of Minnesota, and currently Research Assistant at the International Food Policy Research Institute, Washington, D.C.

Credit Rating at Agricultural Banks: Minnesota Survey Results

by Glenn Pederson
and Cynthia Donovan

The problem of predicting loan success or failure has been an important issue in bank management since the early 1940s, when consumer loans were the main focus. More recently, agricultural loan assessment has also grown in part due to the development of computers and their adaptation to bank-level information systems. As lenders have sought to improve their methods of loan analysis and monitoring, they have turned to published research and their own experience. The result has been a variety of criteria, measures, and activities that are being used to evaluate the quality of farm loans and to make related decisions about loan pricing, terms of repayment, and collateral requirements. The establishment of underwriting standards for Farmer Mac loans is an effort to make these criteria more uniform across farm lending institutions. Bank regulators are also requesting better analyses of loan portfolios in order to control losses.

This article reports the results of a recent survey of agricultural banks in Min-

nesota. The primary objective of the survey was to identify the criteria and measures currently used by agricultural banks to evaluate loan quality. Related objectives were to assess the importance of the criteria and measures used and to analyze uniformity of these criteria and measures across banks according to differences in bank size, loan portfolio characteristics, and profitability. This paper also reports estimates of the probabilities that a bank would use evaluation tools to assess farm borrowers as selected bank characteristics change. Mail surveys were sent to a random sample of 130 agricultural banks in Minnesota during 1988. Responses were received from 103 banks. Survey questions asked bankers 1) to rank loan evaluation criteria for new and existing loans, 2) to indicate their use of financial measures for each criterion, and 3) to provide information on bank size and use of a credit rating system. A total of 78 bank responses had sufficient information to be useful in our analysis. These banks varied in size from \$3.3 million to \$85.4 million in total assets. They were all agricultural banks, which means their agricultural loans represent at least 25% of their total loan volume. Survey data were supplemented with information about bank income and loan portfolio characteristics from Uniform Bank Performance Reports (UBPR) issued from 1985 through 1987.

Loan Evaluation Criteria

Credit criteria were ranked from 1 (highest importance) to 10 (lowest importance). The estimated average rankings and statistical comparisons indicate that borrower repayment ability, profitability and efficiency, collateral position, and solvency are the highest rated mentioned criteria among responding banks (Table 1).

Other factors such as credit management history, loan purpose, farm business organization, and borrower characteristics were not considered to be as important for evaluating credit quality.

Banks were also separated into those with low percentages of nonaccrual and noncurrent loans during 1984-87 (the top 20 banks) and banks with high percentages of such nonperforming loans (the bottom 20 banks). Interestingly, the ranking order of credit criteria was identical across bank groups. However, the lower mean ranking scores among the top 20 banks, when compared to the bottom 20 banks, indicate greater uniformity of opinion (and consistency of ranking) among the top 20 banks. When looking at the highest rated criteria. This suggests that overall there may not be major differences between banks as to which criteria are considered most important to evaluate. However, there may be significant differences in how those criteria are weighed or how effectively they are used in the credit evaluation process.

Comparison of the survey rankings with Kohl's "credit scorecard" in this Journal (Winter 1987) reveals that banks ranked the criteria differently even though the same criteria were included. For instance in this Minnesota survey, bankers uniformly ranked borrower repayment capacity above borrower solvency and liquidity. This ranking is the reverse of that implied by Kohl's weighing scheme.

Measures of Criteria

Bank loan officers were also asked to indicate the importance of the measure of each loan criterion. Alternative measures were listed and responses were coded so that a rating of two would indicate the measure is considered highly important and a rating of zero would indicate the

measure is not important. Survey results for eight criteria indicated that a preferred measure could be identified in each category, but alternative measures were also reasonable to consider (Table 2). For example, the most preferred measure of repayment ability was the debt service ratio (principal plus interest divided by net income) repayment ability used gross

farm income in the denominator of the ratio. The two highest rated measures of borrower profitability and efficiency were first, the annual change in retained earnings and secondly, the ratio of farm expenses (after interest and taxes) to gross farm income. These represent measures of actual borrower earnings retention and funds available for retention, respectively.

Table 1.
Ranking of Credit Criteria by Agricultural Banks

Loan Criteria	Mean Ranking Scores		
	Overall	Top 20 Banks	Bottom 20 Banks
Repayment Ability	2.29	2.14	2.55
Profitability and Efficiency	2.94	2.67	3.25
Collateral Position	3.65	3.57	3.95
Solvency	4.06	4.10	4.05
Liquidity	4.76	4.25	4.95
Credit Management History	4.94	4.65	4.95
Loan Purpose	6.03	5.25	6.45
Farm Organization	7.10	6.55	6.95
Borrower Characteristics	7.14	6.10	7.90
Other	9.89	10.00	10.00

A low ranking score indicates greater importance of that loan criterion.

Table 2.
Rating of Alternative Measures of
Loan Evaluation Criteria

Average Loan Criteria	Rating	Measure
Solvency	Total Farm Liabs./Total Farm Assets	1.81
	(Farm + Nonfarm Liabs.)/(Farm + Nonfarm Assets)	1.43
Liquidity	Current Assets/Current Liabilities	1.71
	(Cur. + Intermed. Assets)/(Cur. + Intermed. Liabs.)	1.45
Profitability	Annual Change in Retained Earnings	1.51
	(Farm Oper. Exp. - Interest - Taxes)/Gross Farm Income	1.42
Repayment Ability	(Principal + Interest Paid)/Net Income	1.64
	(Principal + Interest Paid)/Gross Farm Income	1.40
Farm Organization	Percent Farm Income from One Enterprise	1.23
	Gross Farm Income/(Gross Farm + Nonfarm Income)	1.14
Collateral Position	Amount of Loan /Market Value of Security	1.87
	Amount of Loan/Equity	1.58
Credit Management History	Liabs. Past Due (or in Default)/Total Liabilities	1.90
	Number of Creditors or Credit Lines	1.74
Borrower Characteristics	Quality of Production Records	1.76
	Age or Years of Farming Experience	1.26

An average rating closer to 2.0 indicates the measure is considered more important.

Bank Characteristics and Use of Evaluation Tools

Bank survey responses and UBPR data for 64 of the responding banks were combined to determine if there were systematic differences between those banks

using a credit rating system or a computerized farm financial analysis package (FINPACK) and those banks indicating they were not using either tool. A comparison of the top 20 banks and the bottom 20 banks indicated that a similar percentage

of banks in each group reported that they used a credit rating system (60% of the top 20 banks and 55% of the bottom 20 banks). FINPACK is a set of microcomputer programs developed at the University of Minnesota that are used for whole-farm financial planning and analysis. Since use of the FINPACK computerized program generates financial information about individual farm borrowers, it may be considered by some bankers to be a substitute for a credit rating system. A comparison of the two bank groups indicated that 45% of the top 20 banks and 25% of the bottom 20 banks used FINPACK.

Additional analysis of all 64 bank responses indicated that banks using credit rating systems or FINPACK have somewhat greater total assets than banks that do not use these tools (Table 3). Similarly, they have significantly larger agricultural loan volume per loan officer than banks that use neither tool. For example, banks that use a credit rating system report average total assets of about \$37.4 million, and those using FINPACK report assets of about \$32.7 million. This compares with average total assets of about \$21.3 million at banks that use neither tool for borrower evaluation. Two plausible explanations can be given for the positive relationship between size and use of one or both borrower evaluation tools. First, bank management may be using these tools to improve the capacity of individual loan officers to evaluate farm loans in larger loan portfolios. Secondly, managers may be attempting to standardize the borrower evaluation process when more loan officers are involved.

Survey results also indicated that those banks that use either a credit rating system or both a credit rating system and FINPACK have lower average returns on bank assets. For example, the average rate

of return was 1.18% during 1985-87 among 18 banks which reported using neither method of borrower evaluation, while the average rate of return was 0.47% among 13 banks which reported using both

Average loan delinquency is lower for banks using credit analysis tools.

tools. One explanation for the generally lower rate of return is that these banks are also typically larger and may be expected to have lower average returns on assets. Secondly, lower bank profitability should not be attributed solely to credit rating or borrower financial analysis activities since the average annual rate of return reflects overall performance of the bank, not just the loan portfolio. Moreover, the fact that a bank reports using a credit rating system or financial analysis software does not guarantee that the information being generated is of uniform quality across banks or that it is being used effectively. More significantly, the average rate of loan delinquency (as measured by the average percent of non-current agricultural loans from 1985 through 1987) is significantly lower among banks that use one or both tools of analysis.

A different situation emerges when comparing average percent of nonaccrual agricultural loans. Banks using both or neither means of borrower analysis have significantly lower percentages of nonaccrual loans. This raises an interesting problem of interpretation. At one extreme the larger agricultural banks, which use both

Table 3.
Mean Characteristics of Agricultural Banks
According to Use of a Credit Rating System
and/or FINPACK

Credit Rating Bank Characteristics	Banks That Use:			
	Neither	System	FINPACK	Both
Total Assets (\$000)	\$21,310	\$37,413	\$32,780	\$34,402
Return on Assets (%)	1.18	.66	1.14	.47
Agricultural Loans (%)	39.10	34.40	39.30	34.00
Noncurrent Agric. Loans (%)	1.85	1.68	1.17	.62
Nonaccrual Agric. Loans (%)	4.43	7.38	5.27	4.60
Agric. Loan Officers (#)	2.70	2.70	3.00	2.60
Agric. Loan/ Loan Officer (\$000)	\$ 1,302	\$ 2,168	\$ 1,918	\$ 2,510
Banks (#)	18	25	8	13

Bank characteristics are measured as 3-year averages over the period 1985-87.

tools to evaluate borrowers, have had slightly lower average percentages of noncurrent and nonaccrual farm loans from 1985 through 1987. At the other extreme, smaller agricultural banks have had com-

parable success at keeping nonaccrual loans relatively low from 1985 through 1987, without using either tool of borrower analysis. Paradoxically, those banks also had relatively higher levels of noncurrent

loans. Banks in all four categories were scattered across Minnesota, therefore, bank location is not a significant explanatory factor.

One interpretation is that smaller banks, which use neither tool, have developed other management practices to control nonaccrual loans. This theory still leaves unexplained the higher level of noncurrent loans. Another question of interpretation applies to banks that use one or both of the tools of borrower analysis. Use of a credit rating system and FINPACK may be complementary activities rather than substitutes. The use of FINPACK generates financial measures (based on borrower earnings, cash flow, and balance sheet projections) that can be incorporated into a credit rating scheme. This provides more complete and uniform information on the repayment ability, profitability, etc., of individual borrowers and potentially makes credit rating activities more effective. A third interpretation is that banks that report using a credit rating system may have just recently adopted the practice because of high levels of noncurrent and nonaccrual farm loans in their portfolios. This would be consistent with the relatively lower average return on bank assets. These interpretations are necessarily tentative, since the number of banks responding to the survey was relatively small and information was not obtained as to when each bank began to use of either the credit rating system or FINPACK.

Probability of Using Evaluation Tools

Additional analysis estimated the probability that a bank would use a credit rating system and/or FINPACK, as tools for evaluating farm borrowers. A statistical model was developed from the bank sur-

vey data. The model included total assets, return on assets, noncurrent agricultural loans, and ratios of agricultural loan volume to loan officers as predictors of a bank's use of evaluation tools. The model was then used to compute probabilities of use as bank assets, and the ratios of agricultural loan volume to the number of loan officers were varied.

The results shown in Table 4 indicate that when all of the predictors of bank use are held at their survey mean values, the probability a bank would use either a credit rating system or FINPACK is 0.62 (this represents about 6 banks out of 10); the probability of using both is 0.16 (less than 2 banks in 10); and the probability of using neither is 0.22 (about 2 banks in 10). As bank size is reduced by \$10 million (to \$21,694,000) the probability of using either tool falls to 0.51, and the probability of using neither tool increases to 0.33. As total bank assets are progressively increased, the probability of using either a credit rating system or FINPACK increases while the probabilities of using either or both tools steadily decrease. This suggests that larger banks tend to use one borrower evaluation tool.

Table 5 summarizes the changes in the probability that a bank would use borrower evaluation tools as the ratio changes of agricultural loan volume/loan officer. When the loan volume/officer ratio is at the survey mean level (\$1,892,000), the probabilities are identical to those reported in Table 4 when total bank assets are held at the mean level (\$31,694,000). However, as the ratio of loan volume to the number of loan officers is increased to \$2,892,000, the probability tends to fall that a bank would use either tool and the probability increases that both tools are used. This result is just the opposite of the changes in probability that were observed when total

Table 4.
Probability That Banks Use Tools for Borrower
Evaluation as Total Assets Vary

Total Bank Asset (\$000)	Banks That Use:		
	Neither or FINPACK	Credit System	Both
11,694	0.45	0.40	0.15
21,694	0.33	0.51	0.16
31,694 ^a	0.22	0.62	0.16
41,694	0.15	0.70	0.15
51,694	0.09	0.77	0.14
61,694	0.05	0.83	0.12
71,694	0.03	0.87	0.10
81,694	0.02	0.89	0.09
91,694	0.01	0.91	0.08

*Mean total bank assets.

bank assets were increased. One explanation for the results in Table 5 is that increases in the ratio of agricultural loan volume to loan officer may indicate that the bank is specializing in farm loans. This greater specialization in the bank's loan portfolio may justify greater financial analysis of individual customers and may emphasize the need for both tools. Additionally, loan officers may specialize in

their loan evaluation practices and integrate the use of a credit rating system, and FINPACK may be a comparatively more effective and less costly means of analyzing farm borrowers.

Conclusions

Results from the survey of agricultural banks in Minnesota suggest that there is general uniformity among banks in rank

Table 5.
Probability That Banks Use Tools for
Borrower Evaluation as Total Loan Volume
Per Loan Officer Varies

Agric. Loan Volume per Loan Officer (\$000)	Banks That Use:		
	Neither	Credit Rating System or FINPACK	Both
		Probability of use	
\$ 892	0.28	0.62	0.10
1,892*	0.22	0.62	0.16
2,892	0.17	0.60	0.23
3,892	0.12	0.55	0.33
4,892	0.08	0.48	0.44
5,892	0.05	0.39	0.56
6,892	0.03	0.31	0.66

*Mean agricultural loan volume per loan officer.

ing credit criteria and preferences for measures of those criteria. Some variation in rankings and preferences was observed between banks with low percentages of nonperforming farm loans and those with high percentages of those loans. Larger banks and banks with larger agricultural loan volume/loan officer are more likely to use a credit rating system or FINPACK to evaluate farm borrowers. An analysis of the survey results suggests that banks tend

to concentrate their use of one of these tools as total bank size increases. In comparison, banks with higher ratio of agricultural loan volume to loan officers more frequently reported that they to use both tools for evaluating borrowers. This result suggests that as banks (and their loan officers) tend to specialize more in farm loans, there are benefits that outweigh the costs of using both a farm financial analysis tool and a credit rating system.