



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

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.*

Credit Evaluation: Investigating the Decision Process of Agricultural Loan Officers

Cole Gustafson, Ronald Beyer, and David Saxowsky

**Proceedings of
Regional Research Committee NC-161**

**FINANCING AGRICULTURE IN A CHANGING
ENVIRONMENT: MACRO, MARKET,
POLICY AND MANAGEMENT ISSUES**

**St. Louis Farm Credit Bank
St. Louis, Missouri
September 23-24
1991**

Department of Agricultural Economics
Kansas State University
Manhattan, KS 66506
February 1992

Copyright 1991 by author. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

CREDIT EVALUATION: INVESTIGATING THE DECISION PROCESSES OF AGRICULTURAL LOAN OFFICERS

Cole R. Gustafson, Ronald J. Beyer and David M. Saxowsky

Abstract

A personal survey of ten Red River Valley agricultural lenders provides insight on credit evaluation procedures and lending heuristics used to analyze borrower loan applications. Lenders utilize conservative credit evaluation procedures and base credit granting decisions, including levels of credit, and need for servicing action on the borrower's collateral position, level of compensating balances, and character. These variables are assessed primarily through lender judgment of real estate and chattel asset values and credit history provided by the applicant's other creditors.

Keywords: asset valuation, collateral, credit evaluation, decision models, financial statements

One outcome of the farm financial crisis of the 1980s appears to be lenders' heightened interest in modern loan analysis procedures. This is due, in part, to agricultural loan officers having been assigned partial responsibility for the recent crisis. Lenders have been faulted for administering liberal lending policies, inadequately analyzing borrowers' repayment capacities, failing to maintain current financial information on borrowers, and developing loan proposals with overly optimistic financial projections (GAO 1987, 1989). In general, commentators argue that lenders did not properly evaluate the creditworthiness of borrowers at the time of loan origination nor at periodic intervals after loan requests were granted. As a consequence, lenders, like their farm borrower patrons, experienced significant personal and financial stress while resolving delinquent loans.

Several analytic advances in farm financial accounting, credit scoring, and comparative financial standards have been developed to assist lenders with their credit decisions. However, the extent of present lender use of these techniques is unknown. A related concern is the practicality of these analytical methods when credit information is limited. Farm borrowers do not routinely maintain the types of information required by agricultural lenders making a credit decision, causing loan officers to develop lending heuristics.¹

The objectives of this study are to identify information sources which lenders now rely upon when evaluating agricultural loan proposals, to ascertain how loan officers process the

¹Nilsson defines a heuristic as task-dependent information that reduces costs of searching for a solution. In lay terms, they are referred to as "rules of thumb" or lending principles that are acquired through experience.

decision. Following sections describe previous research on credit evaluation in agriculture, loan officer survey procedures, and results of the study.

Related Literature

Agricultural lenders evaluate the creditworthiness of farm borrowers to determine potential credit risks of lending. Such determinations allow lenders to distinguish between high and low credit risks, accept or reject loan applications, price loans to borrowers, identify credit situations requiring special supervision, and examine the quality of a loan portfolio (Barry, Hopkin and Baker). Costs of a Type II lending error (granting credit when the application should be rejected) are high as lenders lose uncollected principle, associated acquisition costs, and administration costs (Lee and Baker).

Several analytical techniques have been advanced to assist agricultural lenders with credit evaluation. First, more rigorous and comprehensive financial statements supply lenders with more useful information for credit evaluation. Newport and Lins found that accrual-based financial statements measure firm profitability more accurately than farmers' traditional cash-based financial statements. Some lenders (such as Farm Credit Services of North Dakota) are beginning to prepare both historical cost valuation balance sheets and market-based balance sheets to determine sources of equity growth (Davidson, Stickney, and Weil). Equity increases due to inflation, gifts, or inheritance represent "unearned" growth and are now being discounted by these creditors because the increases do not necessarily reflect the business' financial performance.

A second innovation is the development of credit evaluation models. According to Miller and LaDue, credit screening models evaluate potential borrowers on the basis of loan application materials to discriminate between successful and unsuccessful loans whereas credit scoring models evaluate recent financial information of existing borrowers to determine the quality of unmatured loans. Chhikara, and Betubiza and Leatham each provide useful summaries of parametric and non-parametric evaluation methods that have evolved over the past two decades while Gustafson outlines areas of research need.

Standardized farm financial statements will facilitate comparative financial analyses of peer farms (Forbes). Likewise, national benchmark management ratios enable analysts to compare the cost structure and profitability of individual farm operations with industry norms (Bertelsen). This information adds another dimension to farm financial analysis. In addition to historical trend analyses, lenders would seem to have greater capacity to make cross-sectional comparisons of farming operations.

Lender adoption of these formal credit evaluation methods remains modest however. Lufburrow, Barry, and Dixon state, "In general, credit evaluations have mostly occurred through the personal observations and subjective judgments of loan officers, using what data farmers have supplied." Although Pederson and Donovan report that 62 percent of Minnesota agricultural banks use either a credit rating system or a farm financial analysis

tool (as a substitute), what the former entails is not clear. Preliminary survey data suggests less than 25 percent of agricultural lenders in Illinois, Iowa and North Dakota use a formal credit evaluation model (Ellinger).

Even when formal credit evaluation methods are used, considerable lender judgment is still required. A significant task involves verifying data provided by the borrower. Lenders' granting credit on the basis of collateral values must insure that accurate inventories of current, chattel, and real estate assets exist and are properly valued. Alternatively, lenders' granting credit on the basis of repayment capacity must concur with the borrower's future farm plans and expectations of profitability and cash flow. Relatively little is known about the sources of information on which lenders rely to make these judgments and on which areas (assets) lenders place greatest emphasis. Irwin and Baker have found that lender attitudes and judgments have a substantial influence on borrowers' choices of enterprises and business plans.

As agricultural loan officers review increasing numbers of loan applications, they gain experience and are able to develop lending heuristics (lending rules-of-thumb acquired through experience). Once developed, heuristics increase the accuracy and speed of credit evaluations possessing similar characteristics and aid decision processing when information is limited. Information on lending heuristics is important to knowledge engineers who design expert systems that attempt to replicate the decisions of loan officers. McGrann and Powell, and Phillips and Harsh have tested financial expert systems in agriculture. Increased knowledge of lending heuristics would also aid in the refinement of existing credit assessment models by identifying variables of practical importance to loan officers.

Survey Procedures

Heuristic information is gathered by personally interviewing experts with knowledge or experience in the subject area (Nilsson). The advantage of a personal interview is that critical information can be elicited in a highly efficient manner. A major limitation of the personal interview method is the possibility of interviewer bias which results in selective questioning and/or judgment of respondents' answers (Collins).

The success of the personal interview method is enhanced in this study by employing an interviewer with considerable expertise in agricultural lending. Although this expertise could bias respondents or lead to selective filtering of lenders' responses, the interviewer's experience proved critical to gaining respondent trust, assisting in the identification of rote responses provided by the respondent, and enabling further questioning when answers were perceived to be inconsistent. The interviewer took extreme care so as not to evaluate the responses or bias the lender being interviewed. All sessions were tape recorded, transcribed, reviewed, and compared with lenders' survey responses in other studies to gauge the

accuracy of the personal interview method as applied in this study.²

There are approximately 35 financial institutions (excluding Farm Credit Services and Farmers Home Administration) that extend agricultural credit to farmers in the Red River Valley of southeastern North Dakota and west-central Minnesota, which was defined as the area of interest for this study. From these, ten agricultural loan officers representing commercial banks, a credit union, and a life insurance company, were surveyed.³ Each officer represented a unique financial institution. Individual lenders were selected on the basis of their perceived ability to articulate their credit evaluation process and willingness to cooperate in the study, a non-random selection process. Trusting the interviewer and willingness to cooperate were critical because lenders were asked to describe how the institution actually conducts its affairs, as opposed to reporting stated policy.

Each surveyed loan officer had at least 5 years of farm lending experience in the study area. This geographic area is relatively homogeneous in terms of farm sizes, enterprise mixes, weather, and competition from other agricultural lenders. Hence, loan officers in the area would be expected to have similar historical experiences and face comparable lending challenges at the present.

Although lending environments are relatively homogenous and uniform, the small sample size and non-random selection process employed by this study does not permit statistical inference. No attempt should be made to generalize the results of this study to a larger population of agricultural lenders or other geographic areas.

The survey instrument contained two types of questions.⁴ The first set of questions asked the respondents to describe their methods of credit evaluation while the second section requested the loan officer's response to a set of hypothetical lending situations. The purpose of the latter was to determine the consistency of earlier responses and to elicit information from lenders who may not have experienced a specific lending situation.

²Mail surveys conducted by Gustafson, Saxowsky and Braaten; Gustafson and Solemsaas; and Gustafson, Baltezure, and Leistriz elicited information on financial institution characteristics, loan officer lending authorities, and policies regarding administration of delinquent loans that were similar to questions asked in this survey. Although this comparison is not a sufficient test of accuracy, no evidence of bias was detected.

³Loan officers from Farm Credit Services and Farmers Home Administration were not surveyed in this study because preliminary research found that credit analysis procedures for these institutions were more objective, relative to other lenders in the study area. Hence, the potential is greater for eliciting information on subjective credit analysis procedures by surveying loan officers from other financial institutions.

⁴ A copy of the survey instrument is reproduced in the thesis of Beyer.

Initially, lenders were asked to describe the characteristics of their financial institution (i.e., total loan volume, agricultural loan volume, historical loan losses, pricing policies, etc.) and their individual lending authority. Next, loan officers were questioned about which financial documents (balance sheet, income statement, cash flow statement, etc.) they used in various lending circumstances and the depth of financial analysis involved. An example of the type and format of questions asked during the interview follows:

12. Are projected income statements completed on a cash or accrual basis? In other words, are inventory adjustments considered when analyzing the profitability of a unit? If yes, which inventory items are considered? If no, why not?

- a. crop inventory
- b. livestock inventory
- c. livestock and breeding stock purchases
- d. prepaid expenses account
- e. accounts payable balance

The lenders were then asked to describe how their lending criteria changed for loans based on size, purpose, collateral, and financial position of the borrower.

For each financial document used, lenders were asked to describe their method of data acquisition. For example, did the lenders rely solely on the borrowers' estimates, attempt to verify the values presented, or utilize secondary sources of data. Finally, lenders were asked to describe how they translate their findings into a decision on credit extension or necessary servicing actions.

The personal interviews facilitated follow-up questions, explanations, and discussion; this was especially important in understanding the officers' reasons for their lending practices. For example, was the infrequent use of cash flow statements due to the farmers' inability to provide the data, the lenders' uncertainty as to the use of the data, or that the information obtained from a cash flow statement did not justify the effort needed to prepare it. These responses provided insight to the loan officers' decision process and suggest which analytical procedures they may be willing to adopt in the future.

After responding to this first set of questions, lenders were asked to react to seven hypothetical credit situations. In each situation, loan officers had to make a credit decision, ranging from situations where a borrower possessed excellent credit factors but was reluctant to provide financial information to circumstances where a borrower converts crop collateral to meet obligations to another lender.

Results

The following sections summarize the results of the ten personal interviews.

Lender Characteristics and Authority

The largest financial institution had less than \$85 million total loan volume. Agricultural loan volume at these institutions were as follows: credit union - \$0.4 million, commercial banks - \$5-15 million, and life insurance company - \$30.0 million. Six lenders indicated their financial institution had no agricultural loan losses for two years. Three lender's reported that their institutions' annual agricultural loan losses (stated as a percentage of total agricultural loan volume) had declined since 1988.

The loan officers' individual lending authority ranged from \$0 (no authority to write new loans) to \$250,000. Eight of the loan officers had less than \$100,000 of loan authority. In 1989, these lenders rejected an average of 5 to 25 percent of the applications received. In terms of loan pricing, only one lender used a specific formula to determine borrower interest rates. Remaining lenders (without specifying an order of importance) set interest rates according to the borrowers' financial position, repayment capacity, collateral position, past repayment performance, earned equity change, size of loan, checking account balance and investments in certificates of deposit (compensating balances).

Financial Documents

Financial information supplied by borrowers was an important input to the credit evaluation process for all lenders, although substantial variation occurred in the extent and type of documentation requested. The only uniform requirement among lenders was that the applicant must submit a balance sheet. This suggests that these lenders continue to place considerable reliance on the borrower's equity position; that is, they continue to practice collateral lending.

Eight of the lenders obtained income statements with each application for an operating loan, and the remaining two solicited income statements only if the application was perceived to contain above-normal risk. Three lenders requested an income statement if the application was for a chattel loan; four lenders sought such information if the application involved a real estate loan. Again, all lenders required an income statement if they perceived the loan to be high-risk, regardless of the purpose of the loan.

Only one lender routinely requested a cash flow statement. In risky applications, two additional lenders relied on cash flow information. Although cash flow statements assisted lenders in determining necessary operating credit and helped borrowers monitor their financial position, lenders indicated cash flow statements were too subjective and unreliable for predicting a borrower's future financial status.

In cases where financial statements were required, the level and type of information

requested varied by farm.⁵ Factors cited for the variation included the borrower's financial position, amount of credit requested, perceived riskiness of the loan, and previous credit record. Interestingly, loan officers did not require any financial information if levels of certificates of deposits held at the institution exceeded the amount of credit requested (compensating balances).

Verification of Balance Sheet Information

Given the apparent importance of the balance sheet to credit evaluation, it was informative to observe lenders' responses to situations where component items are incorrectly valued. If asset values (especially real estate) were perceived to be overstated, four of the lenders would prepare another statement. Another four officers indicated the inflated values would affect their credit decision, but they would not compile a revised statement. The remaining two officers would use the information "as is." Seven lenders would suggest their own estimates if farmers' valuations of chattel assets appeared incorrect, while only one lender would alter current asset information supplied by a farmer.

Lenders can assess borrowers' valuations through physical inspection of the collateral, independent appraisal, or judgment. None of the lenders used independent appraisers. Only one lender visually inspected assets and then only did so in cases of potential loan risk. Thus, most valuations were based on lender judgment. Lenders based real estate valuations on comparable sales information, and used machinery "bluebooks" and market values to determine chattel values. All lenders used livestock weights and quantities of crop inventory supplied by farmers.

Current liabilities were verified by only one lender, primarily in cases of low equity.⁶ The other nine lenders felt it was too time consuming to investigate outstanding liabilities at suppliers or unpaid real estate taxes. As for intermediate and long-term liabilities, a search of the chattel abstract can reveal property encumbrances, and a title search of real estate can reveal real estate liens. None of the lenders utilized both sources of information to check the overall accuracy of the balance sheet. Instead, they only verified the existence of liens and encumbrances on specific collateral offered as security for the loan.

⁵Methods of computing financial ratios and statistics varied slightly by loan officer. To facilitate comparisons but yet avoid bias, the interviewer ascertained each loan officer's calculation procedures but proceeded to use each lenders' own terminology during the session.

⁶The portion of intermediate and long-term debt due within one year is theoretically placed in the current liability section of the balance sheet to obtain an accurate picture of the firm's working capital position and current ratio. However, only half of the lenders followed this practice.

Verification of Income and Cash Flow Statement Information

Lenders appear to place minimal weight on income/cash flow statement and projections, these documents were routinely prepared. Determining borrowers' gross revenues was particularly difficult for lenders. The commodity prices used by loan officers have a significant impact on income statements, cash flow projections, and valuation of inventories. Seven loan officers used current market data to establish prices. The remainder used consensus prices established by a loan committee. Loan officers used numerous sources (including personal knowledge of the unit, farmer-supplied yields, multi-peril crop insurance forms, Agricultural Stabilization and Conservation Service [ASCS] county averages and documented historical averages) to evaluate whether crop yields on the application seemed reasonable. Only one lender included inventory adjustments. Remaining lenders wanted to determine if the unit can project a profit without using inventories. Three lenders required ASCS participation worksheets to verify program crop acreages and allowable acreages for non-program crops.

Off-farm income can be a significant source of revenue for many farmers. All of the lenders considered off-farm sources of income, even though the loan may have been entirely for farm purposes. Six lenders estimated potential off-farm earnings based on historical levels reported on income tax returns. The remaining four elicited the information directly from the borrower.

Nine lenders estimated farm expenses based on information the farmer supplied; however, eight compared the farmers' estimates with at least three years of historical income tax records. One lender based per acre cropland expenses on ratios predetermined by the financial institution.

An interesting exception to these policies of expense estimation involves family living expenses which all lenders felt was the most difficult expenditure to determine. They all used information supplied by the applicant, but compared the estimate to what they judged to be appropriate for the area and family situation. Generally, lenders expected annual family living expenses (including self-employment and income taxes) to range from \$15,000 to \$25,000.

Only two of the lenders performed enterprise analysis. The remaining lenders focused on the performance of the entire unit instead. Only one lender conducted sensitivity analysis. Other lenders felt their income projections were conservative and further analysis was unnecessary.

Evaluation of Information

Solvency (positive net worth) was important to all lenders whereas liquidity (current asset ratio greater than 1) was important to eight. Two of the lenders required at least 50 percent equity for new applicants; the others did not have a minimum requirement. All stated that

they would make an exception for young farmers with limited equity. Beyond liquidity and solvency, use of other ratios was limited. Three lenders did use ratio analysis to gauge production efficiency.

Six of the lenders analyzed previous financial statements (if they had them from their own past dealings with the borrower) to determine sources of equity growth (retained earnings, asset appreciation, or inheritance). Only one of the six prepared a historical cost balance sheet. Reasons for not completing this analysis include time constraints and possibility of offending applicants by asking original purchase prices. For new applicants, these six lenders generally did not require previous statements because they questioned the accuracy of balance sheets compiled by another lender. The four lenders who focused entirely on the borrower's current situation felt that data was more important to the credit granting decision.

Eight of the lenders based the maximum amount of credit they would grant on a fixed percentage of appraised collateral securing the loan. Rates varied from 50 to 80 percent with lower rates applied to machinery. This variation combined with diverse methods for determining appraised values resulted in considerable diversity in lenders' judgments of a borrowers' creditworthiness.

After granting a chattel loan, eight of the lenders updated appraisals on an annual basis to determine credit limits of borrowers. One lender updated values every other year. Only one lender updated real estate values annually. Five updated land values if servicing action was required while the remaining four did not change values once the loan was extended.

In addition to financial information, lenders placed significant weight on the borrower's personal characteristics (Table 1). Overall, honesty, integrity and production management ability were most important whereas community involvement, age and marital status were of less importance.

Information on a borrower's credit history can be obtained from a credit bureau and verified from the applicant's other creditors. Eight of the lenders used both sources while the remaining two only sought documentation from other creditors.

Hypothetical Situations

The first question determined whether lenders based their evaluations on the whole farming unit or on the marginal investment supported by loan funds (the hypothetical situation involved the purchase of an additional 160 acres). All of the loan officers considered both analyses but would grant credit if performance of the whole unit was satisfactory, regardless of whether the marginal investment showed profitable projections. Six of the officers indicated that they would discuss the risks of undertaking an unprofitable investment with the applicant in such a situation.

Next, lenders were asked if their credit decision was influenced by the purpose of the loan. Similar to the previous question, all of the lenders responded that if the borrower was creditworthy, they did not care what the loan proceeds were used for. However, lenders had to have a general understanding of purpose (agricultural, commercial, consumer) so proper disclosures could be made to the applicant.

The third situation involved an application listing above-average living expenses. As previously indicated, loan officers had difficulty determining family living expenses, especially for a new applicant. In general, the lenders were not concerned with high living expenses, unless financial viability of the firm is at issue.

The fourth situation involved a farmer in a solid financial position, but who was reluctant to provide security. Lenders were divided on this issue. One group would still extend credit (even though unsecured and lacking quality financial information) primarily because they desired additional loan volume. A prerequisite, however, was that they have general knowledge of the applicant's financial position and past repayment performance. The other group of lenders would not extend the loan without securing the obligation.

The fifth scenario involved a present borrower who diverted proceeds securing the lender's crop loan to pay another creditor. All lenders surveyed had experienced such a situation. Their first response was to counsel the borrower, then give the borrower another chance, provided other credit factors remained positive.

Next, lenders were presented with a hypothetical borrower who intended to plant specialty crops. All lenders would more closely scrutinize the loan application, but would not alter credit levels based solely on this factor. A major concern was the availability of markets for specialty crops. Interestingly, lenders would not grant credit to borrowers who must plant specialty crops and assume optimistic yields and prices for those crops in order to project a positive cash flow for the business.

Lenders were provided with an application of an inexperienced borrower to determine if evaluation procedures differed from those that are used to evaluate established borrowers. All lenders used the same method applied to experienced borrowers. However, their credit decisions varied as some required additional collateral, a FmHA guarantee, a personal guarantee, or a co-signed note.

The final situation involved an inexperienced borrower with financially strong parents. All lenders would require a personal guarantee and/or co-signed note.

Conclusion

This study surveyed ten agricultural lenders to determine information sources, credit evaluation procedures and lending heuristics employed when analyzing borrower loan applications. Lenders surveyed in the study employed conservative credit evaluation

procedures. In general, they based credit granting decisions, levels of credit and need for servicing action on the borrower's collateral position, level of compensating balances and character. These variables were assessed primarily through lender judgment of real estate and chattel asset values and information provided by the applicant's other creditors. The surveyed lenders have not adopted evaluation procedures that emphasize cash flow or income projections.

There are two important limitations of this study. First, the study's results are based on the responses of only ten lenders. A need exists to 1) expand the sample size, 2) replicate this study in other geographic areas where competitive conditions vary among lenders, agricultural enterprises and financial institution characteristics, and 3) replicate this study among other types of agricultural lenders. In addition, other studies could ascertain lenders' knowledge of alternative evaluation techniques and their reasons for adoption or rejection. Second, alternative knowledge acquisition techniques need to be tried to test the validity of the personal interview method as applied in this study.

Results of this study have potentially significant implications for the refinement of credit assessment models, expert systems, and industry performance standards. If lenders in other geographic areas rely on similar types of information, credit decision models being developed must place more emphasis on variables and heuristics actually employed by lenders. At present, existing and proposed analytical methods do not appear to meet lender needs. Lender education may also stimulate understanding and adoption of these decision aids.

References

- Barry, P.J., J.A. Hopkin, and C.B. Baker. Financial Management in Agriculture 4th ed., Danville, IL, The Interstate Printers and Publishers, Inc., 1988.
- Bertelsen, D.R. Financial and Production Management Benchmarks From Farm Operator Survey Data Tech. Bull. No. 1747, Econ. Res. Serv., U.S. Dept. of Agr., Washington, D.C., November, 1988.
- Betubiza, E. and D.J. Leatham. A Review of Agricultural Credit Assessment Research and an Annotated Bibliography. Texas Agricultural Experiment Station, B-1688, Texas A&M University, College Station, June, 1990.
- Beyer, R.J. Credit Evaluation: Investigating the Decision Processes of Agricultural Loan Officers Unpublished M.S. thesis, Dept. of Agr. Econ, North Dakota State Univ., Fargo, July, 1990.
- Chhikara, R.K. "The State of the Art in Credit Evaluation." Amer. J. Agr. Econ. 71(1989)1138-44.
- Collins, W. Andrew, "Interviewers' Verbal Idiosyncrasies as a Source of Bias," Public Opinion Quarterly 34:416-422, 1970.
- Davidson, S., C.P. Stickney, and R.L. Weil. Financial Accounting 5th ed., The Dryden Press, 1988.
- Ellinger, P. Personal conversation, unpublished NC-161 credit scoring survey results, Dept. of Agr. Econ., Univ. of Ill., Jan. 21, 1991.
- Forbes, S.O. "Farm Financial Standards: The Focus is on the Future." J. Agr. Lending 3(1989):21-23.
- General Accounting Office. Farm Credit: Actions Needed on Major Management Issues GAO/GGD-87-51, Gov't Printing Office, Washington, D.C., April, 1987.
- General Accounting Office. Farmers Home Administration: Sounder Loans Would Require Revised Loan-making Criteria GAO/RCED-89-9, Gov't Printing Office, Washington, D.C., February, 1989.
- Gustafson, C.R. "Credit Evaluation: Monitoring the Financial Health of Agriculture." Amer. J. Agr. Econ. 71(1989):1145-51.

- Gustafson, C.R., D.M. Saxowsky, and Joan Braaten. "Economic Impact of Laws that Permit Delayed and Partial Repayment of Agricultural Debt." Agr. Fin. Rev. 47(1987):31-42.
- Gustafson, C.R., and P.J. Solemsaas. "Lender Liability: Nature, Extent, and Economic Impact in North Dakota." Agr. Fin. Rev. 49(1989):74-81.
- Gustafson, C.R., J.B. Baltezare, and F.L. Leistriz. "Agricultural Credit Mediation: Borrower and Creditor Perspectives in North Dakota." Agr. Fin. Rev. 51(1991):forthcoming.
- Irwin, G.D. and C.B. Baker. "Effects of Lender Decisions on Farm Financial Planning." Illinois Agricultural Experiment Station Bulletin No. 688, 1962.
- Lee, W.F. and C.B. Baker. "Agricultural Risks and Lender Behavior." Risk Management in Agriculture, edited by P.J. Barry. Ames: Iowa State University Press, 1984.
- Lufburrow, J., P.J. Barry, and B.L. Dixon. "Credit Scoring for Farm Loan Pricing" Agr. Fin. Rev. 44(1984):8-14.
- McGrann, J. and T. Powell. The Texas Agricultural Financial Analysis Expert Systems: Their Development and Capabilities Dept. of Agr. Econ., Texas A&M Univ., College Station, TX, Feb. 1988.
- Miller, L.H. and E.L. LaDue. Credit Assessment Models for Farm Borrowers: A Logit Analysis Working Paper 88-12, Department of Agricultural Economics, Cornell University, Ithaca, NY.
- Newport, S.M. and D.A. Lins. "An Evaluation of Differences Between Cash and Accrual Income For Illinois Farms." N. Cent. J. Agr. Econ. 12(1990):197-206.
- Nilsson, N.J. Principles of Artificial Intelligence. Tioga Publishing Co., Palo Alto, CA, 1980.
- Pederson, G. and C. Donovan. "Credit Rating at Agricultural Banks: Minnesota Survey Results." J. Agr. Lending 3(1990):32-40.
- Phillips, J.J. and Harsh, S.B. An Expert System Application to the Financial Analysis of Lender Case Records Dept. of Agr. Econ., Michigan State Univ., East Lansing, MI, 1988.

Table 1. Ranking of Subjective Credit Factors

Credit Factor	Rank ^a of 11 Credit Factors	
	Average	Range
Honesty	1.6	1-3
Integrity	2.3	1-4
Production Management Ability	3.9	1-7
Financial Management Ability	4.7	1-7
Marketing Ability	6.1	3-8
Goals	6.5	3-9
Education	6.9	3-9
Full-time Farmer	7.3	4-9
Marital Status	7.9	6-11
Age	9.1	6-11
Community Involvement	9.7	7-11

^a 1 = high, 11 = low