Differential Pricing of Agricultural Operating Loans by Commercial Banks

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Differential and variable interest rate pricing strategies are used for agricultural operating loans by the majority of South Dakota commercial banks. However, the prevalence does vary by legal organization. Significant differences were found among differential interest rate pricing structures of independent banks, branch banks, and multibank holding company affiliates.

Interest rate variability has increased significantly since the 1970s for agricultural banks and agricultural borrowers [Melichar]. The causes and consequences of this variability have led to important developments in the pricing structure of agricultural loans. Two of these developments are differential interest rate loan pricing based on borrower risk and variable interest rate pricing of farm operating loans.

In this article, we specifically examine differential and variable interest rate loan pricing policies of various commercial banks in a rural financial market setting. First, the article reviews the loan pricing developments of commercial banks on agricultural operating loans. Second, we develop a conceptual framework of lender differential loan pricing behavior to assist in the subsequent empirical analysis. Third, we describe the survey methodology and procedures used. Fourth, we analyze the pricing policies of the alternative types of banks, giving special emphasis to differential interest rates. Finally, the implications of the results for agricultural lenders and agricultural borrowers are discussed.

New Agricultural Lending Environment

During October 1979, the Federal Reserve System revised monetary policy toward controlling monetary aggregates rather than interest rates in order to reduce inflation [Stigum]. As a result, higher real interest rates and the international trade effects from a higher exchange value of the dollar have contributed to a rise in business risks as well as financial risks faced by agricultural borrowers and agricultural lenders [Gabriel and Baker].

In addition, The International Banking Act of 1978, The Depository Institutions Deregulation and Monetary Control Act of 1980, and the subsequent Depository Institutions Act of 1982 significantly revised the regulatory policy environment for all depository institutions. Among these changes were relaxation of interest rate restrictions on deposits and a more favorable environment for multi-office banking activity [Auerbach].

Changes in Bank Management Strategies

For bank managers, the combination of monetary policy and banking deregula-

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tion increased the uncertainties associated with cost of funds. Agricultural lenders possess a unique set of characteristics that have made adjustments to the new lending environment more difficult for their bank managers and farm borrowers. These characteristics include localized financial markets in economically less diverse rural areas, smaller bank size, and diverse credit evaluation practices for agriculture loans [Barry and Calvert].

As a result of the new lending environment, asset and liability management has become a major determinant of the financial performance of agricultural banks. Loan pricing and profitability analysis have become more important functions in asset and liability management [Barry and Calvert]. Many bank managers have attempted to increase loan profitability and/or reduce their business risk by increasing the linkage between loan pricing policies and cost of funds, cost of loan servicing, and cost of loan defaults.

Differential and variable interest rates are among the agricultural loan pricing strategies increasingly used by banks to improve the linkage between rates of return on loans and the cost of funds [Barry and Calvert]. Differential interest rates are used by banks in attempts to attract or maintain customers with targeted financial positions and/or to price loans so as to equate marginal returns across various loan categories stratified by loan servicing costs and borrower risks. Variable interest rate loans are used by banks to maintain their gross margins or interest rate spreads over time as the cost of funds becomes more variable.

Changes in a bank's loan pricing policy may be aimed toward reducing the bank's business risks, but may also increase the financial risks faced by agricultural borrowers. The increased financial risk of producers, in turn, may alter the loan default risk faced by the banks. This is particularly true if the correlation between farm income and interest rates is expected to be low [LaDue and Leatham]. Therefore, lenders must balance loan profitability with the risk of loan losses [Gabriel and Baker].

Relationship of Legal Structure and Strategies Used

The response of bank managers to the new lending environment has not been uniform across competing agricultural banks with different organizational structures. All states place limits on legal organization and activities allowed in banking. However, states vary in the level of restrictiveness. Illinois, for example, has basically restricted banking organization to individual unit banks, while Iowa has allowed multibank holding companies and limited branch banking [Barry and Pepper]. Arizona is primarily regarded as a branch banking state, while Colorado is primarily regarded as a unit banking/holding company state [Barkley *et al.*].

Previous studies report the relationships among bank structure, agricultural banking operations, and allocation of credit. Barry and Pepper compared loan-to-deposit ratios from an independent unit bank state to ratios from a multibank holding company state. They found that multibank affiliates possessed higher loan-to-deposit ratios. Barkley *et al.* compared loans to deposit ratios from a branch banking state to ratios from a unit bank/holding company state. They found that branch banks had significantly higher proportions of loans than unit banks in nonmetro areas but not in metro areas. As a result, they concluded that banking structure influenced the allocation of credit in nonmetro areas.

In a stratified random sample of U.S. commercial banks, Barry and Calvert found that legal structure was significant in explaining cost of funds and interest margin above cost. They also found that a higher proportion of multibank affiliates and branch banks used variable interest

rates and differential interest rates than did independent unit banks.

However, the literature has not reported the empirical form of the differential pricing structures for the alternative types of agricultural banks. This study is distinguished from previous literature because it provides empirical comparisons of the differential pricing policies used by independent unit banks, branch banks, and multibank affiliates that are competing in a common environment.

A Case Study of Loan Pricing

The objective of this article is to analyze pricing behavior of South Dakota banks as a case study of agricultural loan pricing policies for banks with alternative legal structures. South Dakota is particularly suited for study because it is one of the more flexible states in the legal organization of banking. South Dakota law permits independent unit banks, statewide branch banking, and multibank holding company affiliates (South Dakota Codified Law 51-16; South Dakota Codified Law 51-20). Therefore, we are able to make loan pricing comparisons of these banking structures under a single set of state banking regulations. Previous studies have depended heavily upon comparisons among different states.

In addition, South Dakota is one of the least diversified and most agriculturally dependent states in the nation. A majority of the population in the state is living on farms or in small towns of less than 2,500 population. Only three cities with more than 25,000 population exist in the state. Therefore, comparisons are made on competing institutions in a predominantly nonmetro market environment rather than across heterogeneous market regions, such as Illinois or Iowa. Many western states are similar to South Dakota in agricultural dependency and population sparsity. Therefore, our study may have implications for other western states as well.

A Conceptual Model

In this section, we develop a conceptual model for assisting in the interpretation of the empirical analysis. More comprehensive and detailed models representing lender behavior in determining loan-risk categories and loan-pricing policies are presented elsewhere [Calvert and Barry; Hardy and Moore; Hardy and Weed; LaDue *et al.*]. However, a simplified price discrimination model can provide additional perspective into why differential interest rate pricing schedules slope upward relative to default risk and why rate structures differ among commercial banks with different forms of legal organization.

Differential pricing models assume that the seller can identify and segment the market into distinct submarkets. In a differential loan pricing system, the lender segments the market on the basis of loan-risk classes. For risk classifications to exist in a loan portfolio, the lender must have a method for classifying the loans and evaluating the costs of misclassification errors [Hardy and Weed]. Here, we assume that lenders are able to identify distinct loan-risk classes in terms of demand and cost characteristics.

Demand Characteristics of Risk Classes

Presumably, agricultural borrowers in different risk classes differ in the characteristics of their demand for credit. One advantage of using the price discrimination model is that it allows explicit examination of demand elasticities and the respective implications on differential interest rate pricing. Previous works on formal credit scoring, such as Barth *et al.*, have not explicitly recognized that the credit demand characteristics can vary among loan-risk categories.

Our proposition is that the demand for loan funds is more inelastic for customers in higher loan-risk classes. Higher risk cus-

tomers often lack the ability to shift to other lenders or substitute other sources of credit for those of the present lender. If high risk customers are unable to obtain debt capital at competing lenders, they effectively become less interest rate sensitive in their borrowing activities compared to customers who can obtain credit elsewhere.

Second, if the high risk customers do receive credit from other sources—except for the Farmers Home Administration and state credit programs—they may be confronted with higher interest rates rather than lower interest rates. A new lender may charge higher interest rates than a previous lender due to less familiarity with the customer's management ability, previous loan performance, and personal integrity. Also, this interest rate differential between known and unknown customers may likely increase during periods when the customer is facing unfavorable industry trends.

Finally, high risk customers are not likely to possess a large financial cushion of liquid assets and/or off-farm investments. If interest rates on debt capital become too high relative to the return on off-farm investments, the low risk customers may have flexibility to liquidate assets and pay off loans. The high risk customers do not usually have the same level of flexibility.

As a result, interest rate sensitivity and access to alternative sources of debt and equity capital are considered to be part of the ceteris paribus assumptions of the analysis in this study. Therefore, we assume that each loan-risk class has a distinct demand curve for debt capital. We define the interest rate, r_i charged to a borrower to be equal to $d(L_i)$. An inverse relationship is expected to exist between the interest rate, $d(L_i)$, and the outstanding loan volume, L_i, in the i^{th} loan risk class. Higher interest rates result in fewer feasible investment projects due to inadequate cash flows for meeting the higher cost of capital. Therefore, producers would be expected to lower the amount of debt capital borrowed as interest rates increase.

Cost Functions of Risk Classes

Each loan risk class is presumed to have a distinct cost function. The costs of servicing loans and loan losses are among the most important factors affecting the costs of specific loan-risk classes [Hardy and Moore; LaDue *et al.*]. The costs of servicing loans include customer counseling, clerical, administrative, and bank overhead costs allocated to the loans. The costs of lender-loan losses for a particular risk class may be associated with the frequency of borrower reorganization and liquidation. The size of loan losses and level of recovery are determined by factors such as debt level, current liquidity, loan loss history, collateral security position, and industry trends.

The expected default risk is incorporated into the cost structure of lending [Barth *et al.*]. Therefore, the lender's risk preference is partly reflected in the cost estimation for each risk class. The lender may also specify a bound for which the customer default risk is simply too high [Baltensperger]. For this analysis, we assume that lenders consider only loan-risk classes for which the default risk is not excessive.

For conceptual purposes, assume that the lender has identified the number of economically relevant loan-risk classes to equal n. Each class of loans has a cost function $C(L_i)$. Because loans in each risk class are assumed to have a similar cost structure, we can assume that the cost function is simply a function of the outstanding loan volume of the risk class.

Cost of Funds

Normally, the largest cost to the lender is the cost of funds. The total cost of funds refers to costs that the lender pays to depositors and other capital sources to secure

funds for a specific level of lending activity. For a small rural independent bank that has limited deposits, the cost of funds typically increases as the lender attempts to obtain additional capital to fund a larger loan volume. The cost of funds may not be as sensitive to loan volume changes for branch banks or multibank holding company affiliates.

In our simplified conceptual model, the lender's total cost of funds, $K(L_T)$ is a function of the total outstanding loan volume. The total outstanding loan volume, L_T equals the summation of the dollar value of outstanding loans for all risk classes from $i = 1, \ldots, n$.

Conceptual Model Specification

If the bank is a profit maximizing firm [Hanweck and Kilcollin], the objective function (1) and first-order conditions (2) can be specified in the following manner:

$$\pi = \sum_{i=1}^{n} d(L_i) \cdot L_i - K(L_T) - \sum_{i=1}^{n} C(L_i) \qquad (1)$$

$$\frac{\partial \pi}{\partial L_i} = \left\{\frac{\partial d(L_i)}{\partial L_i} \cdot L_i + d(L_i)\right\} - \frac{\partial K(L_T)}{\partial L_T}\frac{\partial L_T}{\partial L_i} - \frac{\partial C(L_i)}{\partial L_i} = 0 \qquad (2)$$

for $i = 1, \ldots, n$

The marginal revenue for each risk class (3) can be expressed in terms of its demand elasticity, η_i, and interest rate level, $d(L_i)$.

$$d(L_i) \cdot \left(1 - \frac{1}{\eta_i}\right) = \frac{\partial K(L_T)}{\partial L_T}\frac{\partial L_T}{\partial L_i} + \frac{\partial C(L_i)}{\partial L_i} \qquad (3)$$

for $i = 1, \ldots n$

The marginal cost of lending additional funds to any risk class is equal to the additional costs associated with the risk class and the marginal cost of total loan volume.

The interest rate in a specific risk class can be expressed as a function of the interest rate of a different risk class, demand elasticities, and the marginal costs of lending additional funds. The first step is setting the first-order conditions to equal the marginal cost of total loan funds. The first-order conditions for the k^{th} risk class can be divided by the first-order conditions of z^{th} risk class, where k does not equal z. Assume that changes in the loan volume in any risk class will alter the marginal cost of total loan volume in an identical manner. The resulting equation (4) can be obtained for the interest rate of the k^{th} risk class, $d(L_k)$.

$$d(L_k) = d(L_z)\frac{\left(1 - \frac{1}{\eta_z}\right)}{\left(1 - \frac{1}{\eta_k}\right)} + \frac{\frac{\partial C(L_k)}{\partial L_k} - \frac{\partial C(L_z)}{\partial L_z}}{\left(1 - \frac{1}{\eta_k}\right)} \qquad (4)$$

for $k \neq z$

Equation (4) contains a conceptual basis for examining why observed differential interest rate structures might differ among different types of commercial banks.

Conceptual Implications for Empirical Analysis

Observed differential interest rate structures will be impacted by the banker's perceptions of the demand elasticities for the risk classes and the bank's cost structure. Lower risk classes will have lower interest rates for two basic reasons that are evident in equation (4).

First, assume that the k^{th} risk class in equation (4) has a lower default risk level. Since loan classes with lower risk have a more elastic demand, we would expect the demand elasticity for the k^{th} risk class, η_k, to be more elastic than the demand elasticity for the z^{th} risk class, η_z. Therefore, the ratio involving the demand elasticities in equation (4) will be less than one. Since the interest rate of the z^{th} risk class is multiplied by this ratio, the first term of equation (4) implies that the interest rate for

the k^{th} class, $d(L_k)$, is lower than the interest rate for the z^{th} class, $d(L_z)$.

Second, the marginal cost of servicing low-risk loans is lower than high-risk classes, so the second term in equation (4) is negative. If lenders use similar procedures in determining risk classes and have similar evaluations of the demand elasticities, we would expect that interest rates across risk classes would increase at the same rate for independent, branch banks, and multibank holding company affiliates.

Also, the differential interest rate structure can provide insights into whether the cost of funds is similar among different types of banks. If a particular bank has a lower cost of funds, the differential rate structure would be lower than that for competing banks, assuming similarities in loan evaluations and demand elasticities.

Finally, if the different types of banks are using different evaluation procedures or have different assumptions on the demand elasticities for different risk classes or have different costs of funds, indications will appear in the differential interest rate structure. If one group of banks perceives that the costs of higher risk classes are greater than those of the other groups of banks and/or that larger differences in demand elasticities exist for the risk classes, then steeper slopes would occur for that group of banks. If one group of banks has a lower cost of funds and/or a lower cost in servicing loans and loan losses, then the overall interest rate schedule would be lower for that group of banks.

Not All Banks Use Differential Rates

Some lenders do not differentiate their rates based on loan risk classes. These lenders may depend more heavily on non-interest rate terms of the loan contract to ration credit [Baltensperger]. Other possible reasons why a lender might not use differential rates may be the lack of expertise in classifying loans, the lack of adequate cost information, borrower resistance to this lending practice, or philosophical opposition to differential rates. These lenders might be expected to have an interest rate that would be between the lowest and highest rate offered by the banks using differential rates. A lender not using differential rates would have the same interest rate across loan risk classes.

Methodology and Survey Results

The data for this study were provided by a mail survey of the commercial bank population in South Dakota. The survey questionnaires were addressed to the senior agricultural loan officer in each bank. Bank "offices" within the same city limits were excluded (SDCL 51-20). Branch banks (SDCL 51-20) located in different cities were included as were multibank holding company affiliates located in different cities.

The survey was sent to 261 banks on November 1, 1984. Presurvey letters and postsurvey reminder cards were sent to strengthen response rates. Of the total population, 123 senior agricultural loan officers responded to the survey for a survey response rate of 47.1 percent. Although secondary data sources were limited, the respondents appeared to be representative of the population of agricultural banks and legal organization alternatives in the state. Of the total 120 banks responding, 73 (60.8 percent) are independent banks, 20 (16.7 percent) are branch banks, and 27 (22.5 percent) are multibank holding company affiliates.

The survey was designed to elicit interest rate pricing data from the agricultural lenders and to determine credit evaluation criteria, level of financial stress in the agricultural sector, and lender attitudes on extension programs. However, only the pricing policy results are presented here. The banks were specifically asked for loan pricing data on farm operating loans. In

TABLE 1. Prevalence of Selected Loan Pricing Practices and Annual Percentage Rates (APR) Charged for Agricultural Operating Loans by South Dakota Independent Banks, Branch Banks, and Multibank Holding Company Affiliates on November 1, 1984.

	Used Differential Rates			Did Not Use Differential Rates		
Attribute Description	Independent Banks	Branch Banks	Multibank Affiliates	Independent Banks	Branch Banks	Multibank Affiliates
1. Survey Responses	42	17	24	31	3	3
2. Use Variable Rate Operating Loans	23	17	23	12	1	2
3. Proportion of Operating Loans With Variable Rates[a]						
a. Average	80.5%	84.2%	75.9%	69.2%	80.0%	50.0%
b. St. Dev.	27.8%	26.9%	29.6%	34.4%	[b]	[b]
4. Minimum Annual Percentage Rate on Operating Loans						
a. Average	13.99%	13.31%	13.11%	14.33%	15.00%	13.63%
b. St. Dev.	.59	.90	.67	.53	[b]	[b]
c. Range	2.80	3.00	2.00	2.00	[b]	[b]

[a] Average and standard deviation are reported only for those banks reporting that they used variable interest rates for farm operating loans.

[b] Insufficient number of observations for computation of statistic or valid comparison with other identified categories. The information presented for the branch banks and multibank affiliates is presented for reader reference only.

order to accurately define differential pricing on operating loans, banks were specifically asked whether they charge a different interest rate for high-risk customers compared to customers with a preferred credit evaluation.

Prevalence of Differential and Variable Rates

Sixty-nine percent (69.2 percent) of the bank respondents use differential interest rate pricing on their agricultural operating loans (Table 1). Sixty-five percent (65.0 percent) of the bank respondents use variable interest rates pricing on their agricultural operating loans. These attributes are much higher than prevalences of differential rates (47.0 percent) and variable rates (37.6 percent) reported in the 1981 U.S. survey by Barry and Calvert.

The survey results show that branch banks and multibank affiliates are more aggressive in their use of differential and variable interest rates than independent banks. South Dakota branch banks and multibank affiliates are similar in their use of variable differential rates. However, both use these pricing strategies much more than independent banks. These results are similar to those of Barry and Calvert.

Differential rates are used by 85.0 percent of the branch banks, 88.9 percent of the multibank affiliates, and 57.5 percent of the independent banks. Variable interest rates are used by 90.0 percent of the branch banks, 92.6 percent of the multibank affiliates, and 47.9 percent of the independent banks.

Seventy-six percent (75.9 percent) of the banks that use differential pricing also use variable interest rates on some of their farm operating loans. However, the combined use of variable rates and differential rates vary by legal structure. All of the branch banks that use differential pricing and all but one of the multibank affiliates that use differential pricing, also use variable interest rate pricing on some of their farm operating loans. Only 54.8 percent of the independent banks that use differential rates also use variable rate pricing on some of their operating loans.

When variable rates are used, they are not used universally on all of the bank's

farm operating loans. Independent banks, branch banks, and multibank affiliates using both differential and variable rates are not significantly different in the proportion of their operating loans that have variable rates. However, the independent banks not using differential rates show less use of variable rates than do independent banks using both.

The 54.8 percent of the independent banks that use differential and variable rates responded that 80.5 percent of the operating loans have variable interest rates. The 38.7 percent of the independent banks that do not use differential rates but do use variable rates, responded that 69.2 percent of their operating loans have variable interest rates. The results suggest that those bank managers who do not use differential rates are also less apt to widely use variable interest rates.

Minimum APR Available

Further evidence that branch banks and multibank affiliates are more aggressive in their interest rate pricing is shown in the survey data on minimum annual percentage rates (APR). In a question separate from those relating to differential pricing, the survey questionnaire asked the senior agricultural loan officers for the minimum APR on farm operating loans as of November 1, 1984. This question was asked of all banks independently of whether they used differential or variable rates. The results indicate that branch banks and multibank affiliates had significantly lower minimum APRs than independent banks. These results are also consistent with Barry and Calvert.

The significant difference in minimum APRs is due to differences in pricing strategy and/or differences in cost of funds available in the branch banks and multibank affiliates compared to independent banks. Our research provides an additional perspective on this issue in the following analysis of interest rate pricing structure across risk classes.

Differential Rate Structure

For those banks using differential rates, additional questions were asked to elicit operating loan pricing data for the following categories: "Superior Customer Minimum Rate," "Good Customer Rate," "Average Customer Rate," "Weak Customer Rate," and "Inferior Customer Maximum Rate." Also requested was the percentage of farm borrower–customers associated with each of these five categories.

Initially, analysis of variance and a second-order linear model with one independent variable—not reported here—were used to determine the empirical form of interest rates across risk classes for the observations collected in the survey [Draper and Smith]. These analyses indicated a first-order linear relationship between interest rates and risk classes. Therefore, only first-order linear ordinary least squares regression equations are reported in this article.

The dependent variable in the regressions was the APR reported for the specific risk class and the independent variable was the risk class. The coding scheme for the risk classes was (0) for superior, (1) for good, (2) for average, (3) for weak, and (4) for inferior. Each risk class and associated APR represented a distinct observation. Therefore, the number of observations in the regression analysis equals the number of banks using differential interest rates times the number of risk classes.

Two banks reporting the use of differential rates did not report their rate structure and are not included in the regression. Partial pricing structures were reported by six independent banks, two multibank affiliates, and no branch banks. An interpolation was made for the banks reporting only part of their pricing struc-

TABLE 2. Ordinary Least Squares Regression Analysis of the Relationship Between Risk Class and Annual Percentage Rates (APR) Charged by South Dakota Independent Banks, Branch Banks, and Multibank Holding Company Affiliates on November 1, 1984.

OLS Equations[a]	F-Test	Observations	Adjusted R-Squared
1. Independent Banks			
APR = 13.87 + .48 Risk Class (.09) (.04)	170.7	205	.45
2. Branch Banks			
APR = 13.21 + .76 Risk Class (.18) (.05)	249.9	85	.75
3. Multibank Affiliates			
APR = 13.07 + .70 Risk Class (.09) (.04)	388.4	115	.77

[a] Standard errors of the coefficients are presented in parentheses. The equations and coefficients are all significant at the P = .05 level of significance. The coding scheme for the risk classes was (0) for superior, (1) for good, (2) for average, (3) for weak, and (4) for inferior. All three equations were significantly different at the P = .01 level. The significant values at the P = .05 and P = .01 levels are 2.65 and 3.83, respectively. The Chow test F-statistics were as follows: Independent banks and branch banks (9.77); Independent banks and multibank affiliates (20.35); Branch banks and multibank affiliates (5.28).

ture, so that all banks analyzed had five risk classes. A separate analysis using only the reported APRs did not have different conclusions and only minor changes in coefficients from the regressions reported here.

The approach used has limitations that must be explicitly recognized. An implicit assumption is that the methods used to classify loans into risk classes are identical across all banks. However, it is obvious that individual banks may in fact use more or fewer loan categories than those described. A survey pretest was conducted with local lenders to determine the appropriate number of risk classes to use in the survey. The pretest found that five loan classes were typically used. The pretest lenders indicated that the question could be realistically answered even if the lender used as few as three classes or as many as seven classes in actual practice.

A second assumption is that bankers uniformly interpreted the definitions of the five risk categories as explained in the survey. The combination of differential rates along with the customer distribution data requested for each risk class permitted comparisons across banks. This comparison indicated that general interpretations of risk classes were similar across banks. The authors' expectation was for the superior and inferior risk loan classes to be most conceptually similar as interpreted by senior agricultural loan officers across banks. Since the rate structures were identified as being linear, the identification of two points strengthens the results.

Finally for regression purposes, the differences between the risk classes are assumed to be cardinal. This is done even though the nature of the loan classification process and survey instrument may not be perfectly consistent with this assumption. However, we believe that the statistical strength of the relationships identified is supportive of methods used.

Regression Results

The regression comparisons among independent banks, branch banks, and multibank affiliates are shown in Table 2. The multibank affiliates have the lowest predicted APR for the Superior Customer class, as indicated by the intercept term

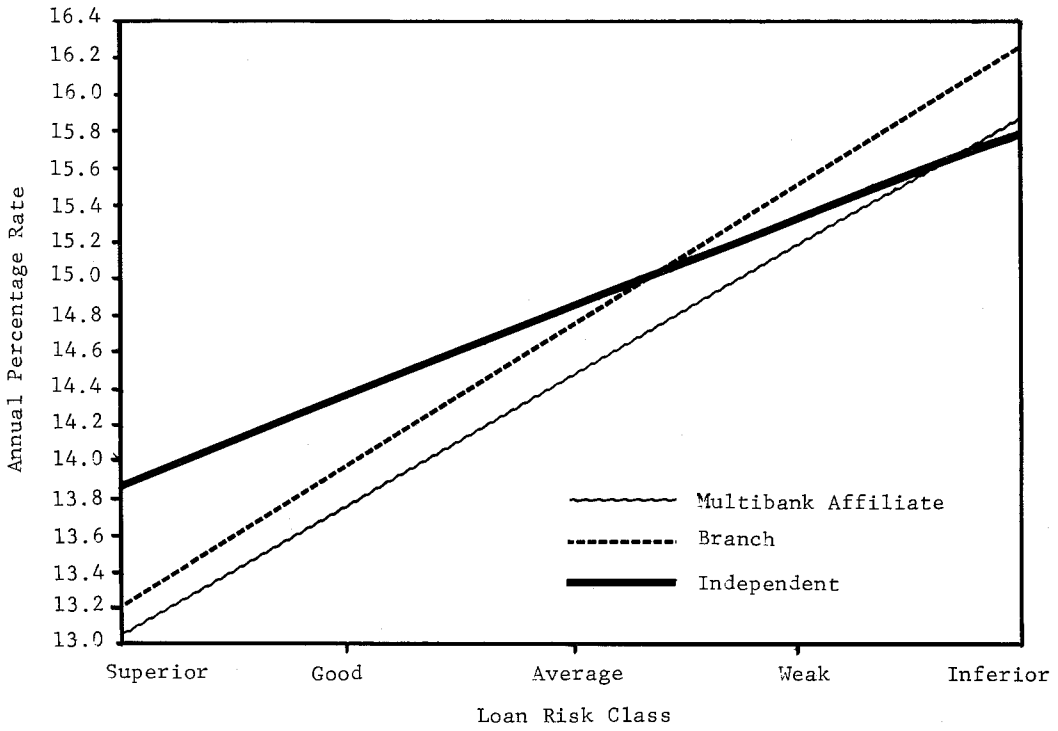

Figure 1. Analysis of Regression Results.

of the regression equations. The predicted APR for branch banks was 14 basis points higher than the multibank affiliates and the predicted APR for independent banks was 80 basis points higher than the multibank affiliates.

The branch banks have the steepest slope across risk classes. The predicted APRs for the branch banks increase 76 basis points for each risk class. This compares to 70 basis points for multibank affiliates and 48 basis points for independent banks. As a result, the branch banks have the highest predicted APR for the inferior class. The inferior customer APR of the multibank affiliates is 38 basis points lower than for branch banks. The inferior customer APR of independent banks is 46 basis points lower than the branch banks.

The results also suggest that branch banks have the most discriminatory rate policy in that the average differences between minimum APR for Superior Customers and maximum APR for Inferior Customers is 304 basis points. The range for multibank affiliates is 280 basis points. The range for independent banks is much lower at 192 basis points. Figure 1 shows the results visually.

The Chow test indicates that independent banks, branch banks, and multibank affiliates do have significantly different ($P = 0.01$) differential rate structures [Kennedy]. Also it would appear from Figure 1 that the multibank affiliates have a lower overall rate structure compared to independent banks or branch banks. This suggests that multibank affiliates are more aggressively pricing their overall level of interest rates than are the other banks.

Implications for Lenders and Borrowers

A broad range of bank pricing strategies existed for farm operating loans in

South Dakota on November 1, 1984. However, systematic patterns did appear to exist in the pricing patterns of banks with different legal organization. The proportion of independent banks using differential rates and/or variable rates was lower than multibank holding company affiliates and branch banks. However, the prevalences for these strategies are much higher than previously reported in a 1981 U.S. survey [Barry and Calvert].

The current differential rate structure generally would appear to encourage superior customers to shift to multibank affiliates and branch banks and, to the degree that they are able to shift, encourage inferior customers to shift away from branch banks. Producer preference for fixed interest rates on farm operating loans may offset this trend because independent banks show a higher proportion of their farm operating loans with fixed rates. The apparent lower overall pricing structure for multibank holding company affiliates also implies that the long-run impact of current pricing policies may contribute to structural change in agricultural lending in South Dakota.

Recent research has analyzed the relationship between variable interest rates and the survivability of the farming operation [LaDue and Zook]. In a complementary fashion, this paper points to an additional dimension of financial risk confronting farm borrowers. Although the interest rate difference between the APRs for the lowest and highest risk class typically ranged from 200 to 300 basis points, observations as high as 600 basis points did exist. Such rate structures have major implications for the marginal cost of agricultural debt capital and the solvency of agricultural producers.

As a result, additional caution is encouraged for producers as they undertake business and financial activities that will alter their credit risk classifications. If a producer does begin to experience a deterioration in financial condition, interest rates are more likely to increase in order to compensate the lender for carrying the additional loan loss risk. Cash flow difficulties may likely increase, if a shift in risk class results in an increase in the borrower's interest rate.

Finally, this article reveals an economic incentive for producers to shop for credit. Although farm borrowers in a high-risk class are limited in their ability to select a new creditor, a significant portion of farmers still have the flexibility to shop for credit. The diversity of lending practices and levels of interest rates implies that producers should search for a creditor that offers a financial package that is most likely to meet their needs. While credit shopping solely based on minimum APRs is not advised, interest rates and risk classification schedules are important attributes to consider when selecting a lender.

References

Auerbach, R. D. *Money, Banking and Financial Markets.* MacMillan Publishing Company, New York, 1985.

Baltensperger, E. "Credit Rationing: Issues and Questions." *Journal of Money, Credit and Banking* 10(1978): 170–83.

Barkley, D. L., C. Mellon, and G. T. Potts. "Effects of Banking Structure on the Allocation of Credit to Nonmetropolitan Communities." *Western Journal of Agricultural Economics* 9(1984): 283–92.

Barry, P. J. and J. D. Calvert. "Loan Pricing and Profitability Analysis by Agricultural Banks." *Agricultural Finance Review* 43(1983): 21–29.

Barry, P. J. and W. H. Pepper. "Effects of Holding Company Affiliation on Loan/Deposit Relationships in Agricultural Banking." *North Central Journal of Agricultural Economics* 7(1985): 65–73.

Barth, J. R., J. J. Cordes, and A. M. Yezer. "An Analysis of Informational Restrictions on the Lending Decisions of Financial Institutions." *Economic Inquiry* 21(1983): 349–60.

Calvert, J. D. and P. J. Barry. "Loan Pricing and Customer Profitability Analysis in Agricultural Banks: Current and Future Policies." Department of Agricultural Economics, University of Illinois–Urbana, June 1982.

Draper, N. R. and H. Smith. *Applied Regression Analysis*. John Wiley and Sons, Inc., New York, 1966.

Gabriel, S. C. and C. B. Baker. "Concepts of Business and Financial Risk." *American Journal of Agricultural Economics* 62(1980): 560–64.

Hanweck, G. and T. E. Kilcollin. "Bank Profitability and Interest Rate Risk." *Journal of Economics and Business* 36(1984): 77–84.

Hardy, W. E., Jr. and M. W. Moore. "The Profitability of Agricultural Customers for Commercial Banks in the Southeast." *Southern Journal of Agricultural Economics* 12(1980): 155–58.

Hardy, W. E., Jr. and J. B. Weed. "Objective Evaluation for Agricultural Lenders." *Southern Journal of Agricultural Economics* 12(1980): 159–64.

Kennedy, P. *A Guide to Econometrics*. MIT Press, Cambridge, 1979.

LaDue, E. L. and D. J. Leatham. "Floating Versus Fixed Rate Loans in Agriculture: Effects on Borrowers, Lenders and the Agricultural Sector." *American Journal of Agricultural Economics* 66(1984): 607–13.

LaDue, E. L., J. L. Moss, and R. S. Smith. "The Profitability of Agricultural Loans by Commercial Banks." *Northeastern Agricultural Economic Council* 7(1978): 1–5.

LaDue, E. L. and G. A. Zook. "Variable Interest Rates and Financial Performance of Dairy Farm Businesses," *Northeastern Journal of Agricultural and Resource Economics* 13(1984): 229–37.

Melichar, E. "A Financial Perspective on Agriculture." *Federal Reserve Bulletin* January 1984.

Stigum, M. *The Money Market*. Dow-Jones Irwin, Homewood, Illinois, 1983.

South Dakota Codified Laws. The Allen Smith Company, Indianapolis, 1982.