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Abstract

Agricultural lenders in today's environment face many challenges when evaluating the creditworthiness of farm borrowers. To address these challenges, a survey was conducted with financial institutions in Kansas and Indiana where agricultural lenders were asked for their response to hypothetical agricultural loan requests. Each loan request differed by the borrower's character, financial record keeping, productive standing, Fair Isaac credit bureau score, and credit risk. Lenders provided information about themselves and their financial institutions.

The survey data obtained determine the relative importance of financial and non-financial information when analyzing agricultural loan applications. Tobit models are estimated to identify the borrower and lender characteristics that are important in determining loan approval while OLS models are used to investigate the factors that affect interest rates offered to farm borrowers. The results provide a comparison of agricultural lending between two important agricultural states. The results from this analysis also provide lenders with insight on the factors that influence the decision making process of other agricultural lenders.

Keywords: agricultural loans, credit evaluation, credit bureau score, interest rates

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The challenges agricultural lenders face when evaluating the creditworthiness of farm borrowers have dramatically changed over the last several decades. During the mid 1980s, American agriculture suffered through times similar to those of the Great Depression that again demonstrated the consequences of relying on collateral values supported by inflationary expectations rather than cash flows. As a result, many lenders adopted methods that more accurately measure the financial position of agricultural producers such as credit bureau scores.

Many studies have examined the methods used by lenders without achieving a consensus as to which quantitative and qualitative factors are most important in the agricultural loan decision-making process. In this study, data from a survey administered to financial institutions in Kansas and Indiana are used to study the agricultural lending process. The primary objective is to analyze the factors financial institutions consider when lending to farm borrowers. The specific objectives are to: 1) Determine the relative importance of financial and non-financial information when analyzing agricultural loan applications; and 2) Identify the borrower and lender characteristics important in determining loan approval and interest rates.

Credit Evaluation

According to Gustafson, agricultural lenders use the five C's of credit (capacity, capital, collateral, character, and conditions) when evaluating an agricultural loan application. Gustafson states that lenders judge these attributes using information obtained from previous experience with a borrower in conjunction with financial statements, references, and other documentation. An individual lender or committee decides whether a borrower possesses ample ability to repay for the use of loan funds. While Gustafson acknowledges developments in credit evaluation, he suggests that research focusing on the relationship between management decisions, attributes, and traits that distinguish one farmer's behavior from another could enhance assessment accuracy.

In the early 1990s, Gustafson, Beyer, and Saxowksy administered a survey to ten agricultural loan officers in the Red River Valley of southeastern North Dakota and west-central Minnesota to determine information sources, credit evaluation procedures, and lending heuristics used. In the survey, lenders described their methods of credit evaluation and responded to seven hypothetical credit situations. Gustafson, Beyer, and Saxowksy found that lenders placed significant weight on the borrower's financial information and personal characteristics (honesty, integrity, and production-management ability) when making decisions regarding approval, levels of credit, and need for servicing action.

Ellinger, Splett, and Barry utilized a survey to examine credit evaluation procedures, risk assessment methods, and credit model consistencies among agricultural banks in Illinois and Iowa. They found that following the farm financial crisis of the 1980s, lenders used more formal and comprehensive methods to evaluate the creditworthiness of agricultural borrowers. Their results indicated that nearly 60% of the lenders used a credit-scoring model to assist in loan approval, loan pricing, loan monitoring, and evaluation of loan portfolio risks. However, their results indicated a relatively high level of disparity among the systems in use by lenders.

Substantial research on credit risk assessment in agricultural lending has yielded mixed results about which factors to include in the development and validation of credit scoring models (Barry and Ellinger; Splett et al.). In the late 1980s, Miller and LaDue focused on the development of credit scoring models for dairy farmers by employing measures of farm size, liquidity, solvency, profitability, capital efficiency, and operating efficiency as explanatory variables. Miller and LaDue used 203 dairy loans from an agricultural loan portfolio for a single bank in upstate New York. Using logistic regression, they found that the quality of larger borrowers was predicted by liquidity, profitability, and operating efficiency measures.

Using data from 9,403 loans made by Canada's Farm Credit Corporation, Turvey conducted a similar study by empirically estimating four alternative credit-scoring models. The results indicated that liquidity and leverage were strong determinants of default risk, in addition to profitability and efficiency. However, results from further analysis supported the inclusion of both qualitative and quantitative factors when selecting a method to evaluate the creditworthiness of farm borrowers.

Splett et al. built upon previous studies by employing a joint experience and statistical approach to develop and evaluate credit-scoring models. Experienced lenders from the Sixth Farm Credit District were used to develop models that incorporated lender experience, knowledge, and intuition. Financial ratios from the Farm Financial Standards Task Force were used with other collateral measures to develop experienced term-loan and operating-loan models. The models were estimated using logistic regression to determine the relationship between experience and statistical credit scoring models. The results indicated that the statistical models were moderately successful in replicating lender behavior and classifying actual loans.

Featherstone, Roessler, and Barry analyzed the Seventh Farm Credit District's loan portfolio from 1995 to 2002 using repayment capacity, solvency, and liquidity to determine the accuracy of financial performance ratios in predicting the expected probability of default status. Results from the study showed that the underwriting guidelines in place within the Seventh Farm Credit District were statistically significant in predicting the expected probability of defaults.

Lenders' Responses to Loan Requests

During the late 1960s, Baker introduced the simulated borrowing method as an alternative for evaluating lender responses to various managerial choices in a farm's financial and production organization. He justified this by noting that actual loan data are limiting because they are restricted to only approved loans and fail to include marginal loans that may be rejected. By empirically testing lender responses to hypothetical loans, he concluded that banks and credit associations prefer loans that are: (1) self-liquidating and (2) asset-generating.

Barry and Willmann used the simulated borrowing method to develop the decision elements for a risk-programming model of a representative case farm for the Southern Blacklands of Texas and to survey the credit responses of lenders to contract choices. Barry and Willmann found that lenders' credit response may modify the producer's contracting plans and his or her rate of income growth.

Sonka, Dixon, and Jones (1980) applied similar methods to assess the impact of the firm's financial structure on its external credit limits for 33 agricultural lenders in east central Illinois. Each loan officer was asked to evaluate and respond to five loan situations which varied by financial stress. In each case, the borrower had recently purchased farmland, and was requesting $60,000 to replace a combine and build grain storage facilities. Sonka, Dixon, and Jones found that lender responses fell into two groups, a conservative group and a liberal group, with respect to the average loan amount approved. They also found that these two groupings of lenders responded differently to the borrower's financial position and structure.

Barry, Baker, and Sanint (1981) used two different lender surveys to examine the concepts underlying farmers' credit risks and to determine how credit may influence farmers' debt use. The first survey asked 101 unit banks and Production Credit Associations (PCAs) in south central and eastern Texas to respond to a representative farming situation. From this survey, thirty-four responses included loan limits, interest rates, collateral requirements, and other loan requirements. A second survey, conducted by the Federal Reserve Bank of Chicago, resulted in several hundred responses to farm lending conditions. Barry, Baker, and Sanint found that a farmer's credit position was positively correlated with changes in level of farm income and that this correlation was stronger for capital credit than for operating credit. They also found that variation in fund availability from rural banks contributed to high credit risks.

During the mid 1980s, Pflueger and Barry elicited commercial banks' and PCAs' responses to a farmer's use of crop insurance. The 55 lenders in Illinois analyzed two case loan requests containing a farmer biography, description of the Federal Crop Insurance program, and historic and projected financial statements. Each lender evaluated the case loans in terms of maximum credit limits for operating and capital loans, interest rates, loan maturities, security requirements, and other loan provisions. The results indicated that approximately 60% of lenders responded in a positive manner to a borrower's participation in the Federal Crop Insurance program. The results also

indicated that the magnitude of credit responses differed considerably while interest rates and loan maturities stayed about the same.

In a 1993 study, Dixon, Ahrendsen, and Barry formulated a two-equation model with the goals of identifying and estimating the variables that lead banks to charge different interest rates on agricultural loans. They used data from a 1990 survey of 34 commercial banks in western Arkansas responded to four hypothetical agricultural loan requests. Each request, which differed by the borrower's financial strength, consisted of an intermediate-term loan of $150,000 for the construction of two broiler houses and a short-term loan of $95,000 for the purchase of stocker steers. They found that for both loans, interest rates were positively correlated with the bank's loan to deposit ratio. Results also indicated that banks facing losses may be more aggressive when pricing loans due to the marginal profitability of the loans.

Bard, Barry, and Ellinger (2000) used a case study to evaluate the influence of changes in the banking industry on the cost and availability of agricultural credit. They asked 1,064 commercial banks in Illinois, Iowa, and Indiana to respond to case loans for two of three hypothetical farm borrowers with different demographic characteristics and credit needs. Bard, Barry, and Ellinger analyzed the data from the 114 responding banks and found no overwhelming evidence in support of or against commercial bank consolidation as it affects agricultural lending. Thus, results suggest that other non-measured factors influence the loan terms offered by commercial banks to agricultural borrowers.

The number of studies examining the agricultural lending decision provides strong evidence that lenders consider both financial and non-financial variables when evaluating the creditworthiness of farm borrowers. However, various credit evaluation procedures and methods have been studied without achieving a consensus as to which variable measures should be used when analyzing agricultural loan applications. Furthermore, while there have been many studies, the majority of them do not explicitly consider how lenders use credit bureau scores when lending to farm borrowers. Thus, further research pertaining to the lenders assessments, especially as it relates to the agricultural loan decision-making process is needed.

Theoretical Framework

Traditionally, lenders have applied the five C's of credit when analyzing the creditworthiness of a farm borrower. The first C, which is capacity, refers to a borrower's ability to repay a loan obligation and bear the subsequent financial risk (Gustafson). Lenders generally analyze a borrower's repayment capacity by conducting an analysis of both historical and projected profitability and cash flow of the farm business.

Capital is the second C of credit and refers to the funds available to operate a farm business. To assess capital, lenders review balance sheets from both current and previous years, and calculate financial measures of liquidity and solvency. This allows the lender

to gauge the amount of equity a borrower has invested in the operation and how effectively that investment generates cash flows.

The third C, which is collateral, represents a security agreement that serves as a final source of repayment to the lender if the borrower defaults on the terms of the loan agreement. Since lenders seek to maximize profits, they carefully consider the risk/return relationship of the loan request. As risk increases, lenders will seek larger amounts and/or higher quality collateral.
Conditions are the fourth C of credit and refer to the intended purpose of the loan. Lenders consider factors such as the loan amount, the use of the funds, and the repayment terms. The lender also considers the overall economy, including interest rate levels, inflation rate, and demand for money.

The fifth C, which is character, encompasses personal factors such as honesty, integrity, and reliability. The borrower's risk attitude is an important element of this human factor considered in the loan decision-making process. If a borrower has a negative evaluation on this factor, the loan may be rejected even if the other four factors are very good.

Credit Bureau Reports and Scores

An additional component that is an important part of the decision-making process for loan analysis is credit bureau reports. A credit bureau report is a detailed account of an individual's credit history (FICO). A credit bureau or credit-reporting agency maintains files on millions of borrowers containing information collected from lenders, creditors, insurers, and employers. The three major credit bureaus, Equifax, Experian, and TransUnion, all provide credit bureau reports.

The typical credit bureau report includes four categories of information. The first category contains personal or identifying information including the individual's name, current and previous addresses, telephone number, social security number, date of birth, and current and previous employers. The second category outlines the individual's credit history providing specific details about credit accounts and loans, including late payments, skipped payments, accounts turned over to collection agencies, and repossessions. The third category contains public record information from local, state, and federal courts and information on overdue debt from collection agencies. Public record information includes bankruptcies, foreclosures, suits, wage attachments, liens, and judgments (FICO).

Inquiries are the last category of information in a credit bureau report. This includes a list of everyone who has voluntarily or involuntarily accessed credit bureau reports on the individual within the last two years. Voluntary inquiries are initiated by the individual for obtaining credit; while involuntary inquires, are situations where lenders have accessed and reviewed the credit bureau report for pre-approved credit offers. Although both types are part of a credit bureau report, involuntary inquiries do not appear on the credit bureau report that a lender receives.

Along with a credit bureau report, lenders can also purchase a credit score from each of the credit reporting agencies. The credit in the credit bureau report is calculated using a formula developed by the Fair Isaac Corporation. Although the specific relationship is unpublished, there are five basic factors used in determining a credit score (Figure 1).

Since lenders and other credit grantors may not report account activity to all credit bureaus, an individual's credit score may vary among the three credit bureaus. Credit scores range from 400 to 900 with the average around 700. According to the scoring model, as an individual's score increases, his or her risk of default decreases.

Methods

The first issue in examining the factors financial institutions consider in production agriculture lending is to identify the sources of variation. The factors of interest to this study and each of their levels were defined.

Character (CHAR) – is a qualitative non-financial variable that encompasses personal factors such as honesty, integrity, and reliability. The borrower's character is defined by two levels: honest or dishonest. The borrower is honest if the lender visited with a number of individuals in the agricultural community and they all indicated that the farmer was honest in his business dealings. The borrower is classified as dishonest if three of the individuals in the agricultural community expressed concerns regarding fairness in business transactions with the farmer. CHAR is "1" if the individual is defined as honest and "0" if the individual is classified as dishonest.

Fair Isaac Credit Bureau Score (FICO) – is a quantitative non-financial variable that provides an indication of the borrower's financial integrity. A Fair Isaac credit bureau score of 725 represents a low-risk borrower, while a score of 560 represents a high-risk borrower. FICO is "1" if the farmer has a Fair Isaac credit bureau score of 725 points and "0" if the farmer has a Fair Isaac credit bureau score of 560 points.

Financial Record Keeping (EXCFRK, AVGFRK) – is a qualitative non-financial variable that represents the borrower's ability to maintain complete and accurate up-to-date records. This includes borrowers who keep their own records by using computerized applications, or other innovations for farm accounting and financial management purposes. This also includes borrowers who employ an accountant or record service to provide computerized record keeping, whole farm and enterprise analysis, and tax preparation. A distinction is not made between these two forms of financial recording keeping. In this study, the borrower's financial record keeping ability is defined as excellent, average, or poor. EXCFRK is "1" if the observation corresponds to a scenario where the farmer is an excellent financial record keeper and "0" otherwise. AVGFRK is "1" if the observation corresponds to a scenario where the farmer is an average financial record keeper and "0" otherwise. The default category is a poor record keeper.

Productive Standing (PSUPQ, PSMID) – is a qualitative non-financial variable that refers to the borrower's ability to manage business risk, select appropriate production and marketing activities, and meet realistic price and yield assumptions. Three levels, upper

quartile, middle-half, and lower quartile are used to define the productive standing. Each level provides a measure of how the borrower's operation ranks in comparison to other industry participants. PSUPQ is "1" if the observation corresponds to a scenario where the operation ranks in the upper quartile and "0" otherwise. PSMID is "1" if the observation corresponds to a scenario where the operation ranks in the middle and "0" otherwise. The default category represents a producer in the lower quartile.

Credit Risk (CR) – is a quantitative financial variable that consists of the borrower's financials and ratio analysis. The borrower's financials include three years of selected accounting information from the balance sheet, income statement, and cash flow statement, while the ratio analysis contains financial measures of liquidity, solvency, profitability, repayment capacity, and financial efficiency. In this study, the borrower's credit risk is represented by four levels. CR is "7.61" if the observation corresponds to a scenario where the expected probability of default is 7.61%, "3.68" if the observation corresponds to a scenario where the expected probability of default is 3.68%, "1.48" if the observation corresponds to a scenario where the expected probability of default is 1.48% and "0.74" if the observation corresponds to a scenario where the expected probability of default is 0.74%. Alternatively, CR1, CR2, CR3, and CR4 are equal to "1" if the probability of default is 7.61%, 3.68%, 1.48%, and 0.74%, respectively and "0" otherwise.

The full factorial design, which is the total combination of these factors and their levels, results in 144 (2 x 2 x 3 x 3 x 4) combinations of hypothetical agricultural loan. Each combination represents a farmer scenario coded by assigning one of the most common names that occurred during the 1990 United States Census. As examples, Figure 2 summarizes four of the 144 possible combinations of the loan requests. Lenders analyzed and responded to four systematically selected loan requests by providing the loan amount, interest rate, and terms that they would offer to each borrower. The loan amount and interest rate represent the response variables and are dependent variables used in the analysis. The variable L_i is the proportion of the tractor loan granted and R_i is the interest rate charged by the financial institution if the loan is approved (percent).

Financial Institution Population and Sample

The second step is to define the financial institution population. First, the Federal Deposit Insurance Corporation (FDIC) website indicated that 3,270 commercial banks in the United States had at least $1 million in agricultural loans outstanding as of December 31, 2004. In Kansas, 277 U.S. commercial banks with 978 lending offices, and in Indiana 100 U.S. commercial banks with 1,471 lending were selected. Additionally, each Farm Credit office in Kansas and Indiana is included in the sample. Twenty-seven Farm Credit offices in Kansas and 28 in Indiana are included in the sample.

Methodology and Instrument

The primary objective of this study is to analyze the factors that financial institutions consider when lending to farm borrowers. To obtain the required data, the hypothetical

borrowing approach is used. The basics of this method include conducting a simulated borrowing experiment through a mail survey to elicit lenders' responses to hypothetical agricultural loan requests.

The survey instrument is a combination of hypothetical agricultural loan requests and a survey questionnaire. Each loan request consists of four sections: (1) farmer scenario, (2) borrower's financials, (3) ratio analysis, and (4) the agricultural lending decision. The farmer scenario section provides a biographical sketch of the individual farmer and presents his request for funds to purchase an additional tractor. As Table 1 shows, both Kansas and Indiana have a number of farms that are comparable in size and value of sales. Although Kansas has more livestock enterprises, both states have a large number of agricultural operations that are involved in the production of grain and oilseeds (Table 2). Therefore, lenders in both states presumably encounter similar loan applications from farmers of these types of operations.

The borrower's financial section includes accounting information from the balance sheet, income statement, and cash flow statement for the years ending December 31, 2002 through 2004. The ratio analysis section contains financial measures of liquidity, solvency, profitability, repayment capacity, and financial efficiency. The agricultural lending decision section presents a variety of questions concerning the agricultural loan decision-making process, including the decision the borrower would receive from the lenders financial institution.

The second component of the survey instrument is a one-page survey that consists of two sections: bank characteristics and loan officer characteristics. The bank characteristics section focuses on descriptive factors about the financial institution. Such factors include bank size, portfolio composition, profitability, lending risk, and location. ASSETSIZ is the total asset size of the bank (billions of dollars); CA is the bank's ratio of capital to assets (percent); ALTL is the bank's ratio of agricultural loans to total loans (percent); ROA is the bank's return on assets (percent); LNDE is the bank's ratio of loans to deposits (percent); and NCLTL is the bank's ratio of non-current loans to total loans (percent). The loan officer characteristics section requests information about the responding lender's degree of involvement in agricultural lending, his or her individual lending authority, and their decision making authority. EXP is the number of years of lending experience the loan officer has as an agricultural loan officer (years); PTIME is the percentage of time the loan officer spends on agricultural loans (percent); and MLA is the loan officer's maximum individual lending authority (dollars).

Survey Design

For each of the 144 scenarios, the personal and business information as well as the loan request are the same, with the exception of the farmer's name. Conversely, the farmer attributes vary by the borrower's character, financial record keeping, productive standing, credit risk, and Fair Isaac credit bureau score. The information provided to the lender is

the same in as much as possible to minimize the review time required by the lender while maximizing the information provided[39].

The second step in designing the survey instrument consists of preparing key financial statements that match with the credit risk ratings. Two sources of data, the Kansas Farm Management Association (KFMA) Annual Whole-Farm and Enterprise Summaries and the 2002 Census of Agriculture from Kansas and Indiana were used to create four sets of financial statements. Financial measures of liquidity, solvency, profitability, repayment capacity, and financial efficiency were calculated in accordance with the recommendations of the Farm Financial Standards Council (FFSC). The expected probability of default (credit risk) is calculated for each of the sets of variables using the credit-scoring model defined in Featherstone, Roessler, and Barry (2006). To determine the probability of default, first determine the log odds ratio:

$$Ln\left(\frac{probability\ of\ default}{1 - probability\ of\ default}\right) = -2.3643 - .00135(RC) - .0217(OE) - .00399(WC) \quad \textbf{(1)}$$

where *RC* is the repayment capacity percentage, *OE* is the owner equity percentage, and *WC* is the working capital percentage. Next calculate the expected probability of default:

$$Probability\ of\ Default = \frac{e^{xb}}{1 + e^{xb}} \quad \textbf{(2)}$$

where *xb* is the result of equation (1)'s right hand side. Table 3 reports the expected probability of default for each credit risk variable with respect to year. These four scenarios are consistent with the distribution of credit ratings found by Haverkamp (2003) who found that ninety percent of the observations of credit ratings for Kansas Farms were in this range.

Survey Process

Following a pretest and approval process, a systematic method selected the loan requests and assigned them to the lender (Table 4). The EXCEL RANDBETWEEN function chose a random number between 1 and 144 that corresponded to a hypothetical agricultural loan request. Blocking and replication methods ensured the probability of receiving a specific loan request remains constant across the scenarios given to each lender. In situations where duplicate scenarios occurred, new scenarios were generated and reassigned to the lender. An Excel macro was created to produce a Microsoft Excel database that contained information on 10,016 hypothetical agricultural loan requests. The loan application packages for the sample lenders included a cover letter, four loan requests, one questionnaire, and a business reply envelope. The survey was mailed to 277 commercial banks and 27 Farm Credit offices in Kansas during the week of April 18, 2005. A similar survey was mailed to 100 commercial banks and 28 Farm Credit offices in Indiana during the week of May 13, 2005.

[39] See Jones for a copy of the survey instrument and the accompanying information provided to the lender.

Empirical Models

Loan Amount

In this study, a two-limit Tobit model is estimated because the dependent variable is constrained by the minimum (0) and maximum (1) portion of the loan request that a borrower may receive. The observed dependent variable L_i is determined as follows:

$$L_i = \begin{cases} 0 & if \quad L_i^* = \beta' X_i + \varepsilon_i \leq 0 \\ L_i^* & if \quad 0 < \beta' X_i + \varepsilon_i < 1 \\ 1 & if \quad L_i^* = \beta' X_i + \varepsilon_i \geq 1 \end{cases} \tag{3}$$

where L_i^* is a latent variable, β' is a vector of the slope coefficients for the matrix of X_i parameters, and ε_i is the error term.

In the first two-limit Tobit model estimated for the tractor loan amount granted, the variables (*CR3*) and (*CR4*) are included to represent the credit risk or expected probability of default that corresponds to each loan request. Loan observations where the expected probability of default was 7.61 were not included in this model because the lenders in both Kansas and Indiana denied all of these loan requests. The two-limit Tobit model is specified as follows:

$$\begin{aligned} L_i = {} & \beta_0 + \beta_1 CHAR_i + \beta_2 FICO_i + \beta_3 EXCFRK_i + \beta_4 AVGFRK_i \\ & + \beta_5 PSUPQ_i + \beta_6 PSMID_i + \beta_7 CR3_i + \beta_8 CR4_i + \beta_9 ASSETSIZ_i \\ & + \beta_{10} ROA_i + \beta_{11} NCLTL_i + \beta_{12} EXP_i + \beta_{13} PTIME_i + \varepsilon_\beta \end{aligned} \tag{4}$$

In the second two-limit Tobit model estimated, the variable (*CR*) represents the credit risk or expected probability of default that corresponds to each loan request. Contrary to the first two-limit Tobit model, the analysis includes all observations where sufficient information was provided. The second two-limit Tobit model is specified as follows:

$$\begin{aligned} L_i = {} & \beta_0 + \beta_1 CHAR_i + \beta_2 FICO_i + \beta_3 EXCFRK_i + \beta_4 AVGFRK_i \\ & + \beta_5 PSUPQ_i + \beta_6 PSMID_i + \beta_7 CR_i + \beta_8 ASSETSIZ_i + \beta_9 ROA_i \\ & + \beta_{10} NCLTL_i + \beta_{11} EXP_i + \beta_{12} PTIME_i + \varepsilon_\beta \end{aligned} \tag{5}$$

Both models (equations 4 and 5) are estimated using the PROC QLIM procedure in SAS to determine the characteristics important in determining loan approval.

Interest Rate

The interest rate offered on the approved loan observations is included as the dependent variable in two separate models. The first model, which includes the same independent variables as the first two-limit Tobit model, is specified as follows:

$$R_i = \alpha_0 + \alpha_1 CHAR_i + \alpha_2 FICO_i + \alpha_3 EXCFRK_i + \alpha_4 AVGFRK_i + \alpha_5 PSUPQ_i + \alpha_6 PSMID_i + \alpha_7 CR3_i + \alpha_8 CR4_i + \alpha_9 ASSETSIZ_i + \alpha_{10} ROA_i + \alpha_{11} NCLTL_i + \alpha_{12} EXP_i + \alpha_{13} PTIME_i + \varepsilon_\alpha \quad \textbf{(6)}$$

The second model includes the same independent variables used in the second two-limit Tobit model and is specified as follows:

$$R_i = \alpha_0 + \alpha_1 CHAR_i + \alpha_2 FICO_i + \alpha_3 EXCFRK_i + \alpha_4 AVGFRK_i + \alpha_5 PSUPQ_i + \alpha_6 PSMID_i + \alpha_7 CR_i + \alpha_8 ASSETSIZ_i + \alpha_9 ROA_i + \alpha_{10} NCLTL_i + \alpha_{11} EXP_i + \alpha_{12} PTIME_i + \varepsilon_\alpha \quad \textbf{(7)}$$

Both models (equations 6 and 7) are estimated in SAS using the ordinary least squares procedure to determine the borrower and lender characteristics important in determining interest rates.

Results

Overall Survey Response

One hundred and eighteen useable responses were returned, resulting in a total response rate of 38.82% for the lending offices in Kansas (Table 5). A breakdown indicates that 106 responses were received from commercial banks, and 12 responses from the Farm Credit System. One hundred and seventeen of the participating lenders provided responses to the four loan requests they were assigned while one lender only responded to three of the given loan requests resulting in 471 loan observations for Kansas.

Fifty-two useable responses were returned from commercial banks and nine were received from the Farm Credit System, resulting in 244 observations from Indiana. The final survey response rate was 47.66% for the lenders in Indiana. The total response rate was 41.91% for commercial banks and 38.18% for Farm Credit Services (Table 5). The overall response rate was 41.44% for the lenders in both Kansas and Indiana.

Survey Results

This segment is divided into three sections that correspond to specific components of the survey instrument: (1) loan requests, (2) bank characteristics, and (3) loan officer characteristics.

Loan Requests

Since the results are dependent upon which loan requests lenders responded to, it is important to examine the responses received to assess non-response bias. A summary of the distribution of responses obtained from Kansas and Indiana lenders on the combinations of hypothetical agricultural loan requests is presented in Table 6. The distribution of responses received should correspond to scenarios that represent an expected percent for all levels of that factor. The expected percent for character and Fair Isaac credit bureau score is 50%, while the expected percent for financial record keeping and productive standing is 33.33%. Credit risk is defined by four levels; therefore, the

expected percent for each level is 25%. A subjective analysis of the distribution shows that the responses received is consistent with the expected percents for all factors and their levels.

Table 7 summarizes the distribution of decisions made by the lenders regarding loan approval or denial. Although lenders in both states approved more loans than they denied, lenders in Indiana approved 59.58% of the loans while lenders in Kansas approved 57.75% of the loans. The average loan amount offered by Kansas lenders on both approved and denied loans was $44,994 while the average loan amount offered by Indiana lenders on both approved and denied loans was $43,491 (Table 8). However, the average loan amount offered by Indiana lenders on approved loans was $107,449 while the average loan amount offered by Kansas lenders on approved loans was only $106,458. The average interest rate offered by Indiana lenders was 38 basis points lower, and ranged from 5.60% to 8.75%; the standard deviation was 0.72%. The average interest rate offered by Kansas lenders ranged from 5.75% to 9.75%; the standard deviation was 0.77%. On average, lenders in Kansas were willing to extend the loan for 6.27 years while lenders in Indiana were willing to loan for only 6.15 years. Lenders in both states commented that they traditionally approve machinery and equipment loans for 5 years, but were willing to approve the loan for 6 years since the borrower was requesting a 7-year loan.

The interest rate offered by lenders in Kansas was on average nine basis points higher than their typical interest rate, and ranged from 1.25% lower to 2.00% higher (Table 9). Indiana lenders offered an interest rate that was on average 15 basis points higher than their typical interest rate with a range from -1.00% to 2.00%. Numerous lenders in both Kansas and Indiana commented that the interest rate was a specific percent above the Wall Street Prime or their bank prime rate.

Bank Characteristics

Total assets (*ASSETSIZ*) for the 113 responding banks in Kansas averaged $5.46 billion and ranged from $200,000 to $195 billion; the standard deviation was $28.46 billion (Table 10). A breakdown indicates 47.35% of these banks had total assets less than $100 million. The average total assets for the 53 responding banks in Indiana were $46.85 billion, and ranged from $890,000 to $1,157 billion; the standard deviation was $179.28 billion. A breakdown indicates 14.75% of these banks had total assets of $100.00 million or less.

The mean capital to asset ratio (*CA*) for the 108 responding banks in Kansas was 13.37%, and ranged from 1.06% to 100.00%; the standard deviation was 10.97%. Results show 12.53% of these banks had a ratio of 7.00% or less; 35.67% had a ratio between 7.00% and 10.00%; and 51.80% were greater than 10.00%. The mean ratio for the 44 responding banks in Indiana was 11.95%, and ranged from 1.01% to 50.00%; the standard deviation was 6.53%. Results show 21.31% of these banks had a ratio of 7.00% or less; 27.87% had a ratio between 7.00% and 10.00%; and 50.82% were greater than 10.00%.

The average agricultural loan ratio (*ALTL*) for the 110 responding banks in Kansas was 46.62%, and ranged from 1.60% to 100.00%; the standard deviation was 29.37% A breakdown indicates 33.76% of these banks had a ratio of 25.00% or less; 41.61% had a ratio between 25.00% and 65.00%; and 24.63% were greater than 65.00%. The mean ratio for the 46 responding banks in Indiana was 27.10%, and ranged from 0.40% to 88.60%; the standard deviation was 27.49%. A breakdown indicates 68.85% of the banks had a ratio of 25.00% or less; 16.39% had a ratio between 25.00% and 65.00%; and 14.75% were greater than 65.00%.

The mean return on assets (*ROA*) for the 105 responding banks in Kansas was 1.51%, and ranged from -0.77% to 7.14%; the standard deviation was 1.01%. Results show 35.46% of these banks had an *ROA* of less than 1.00%. The mean *ROA* for the 48 responding banks in Indiana was 1.33%, and ranged from 0.38% to 2.40%; the standard deviation was 0.53%. Results show 39.34% of these banks had an *ROA* of 1.00% or less.

The average loan to deposit ratio (*LNDE*) for the 100 responding banks in Kansas was 71.78%, and ranged from 31.00% to 113.00%; the standard deviation was 18.21%. A breakdown indicates 46.50% of the banks had a ratio of 65% or less; 28.03% had a ratio between 65% and 80%; and 25.48% had a ratio greater than 80%. The average ratio for the 40 responding banks in Indiana was 84.67%, and ranged from 50.00% to 112.00%, the standard deviation was 14.52%. A breakdown indicates 39.34% of the banks had a ratio of 65% or less; 16.39% had a ratio between 65% and 80%; and 44.26% had a ratio greater than 80%.

The average non-current loans to total loans (*NCLTL*) for the 105 responding banks in Kansas was 1.65%, and ranged from 0.00% to 25.00%; the standard deviation was 2.76%. Results show 61.78% of these banks had a ratio of 1.00% or less; 32.27% had a ratio between 1.00% and 4.00%; and 5.94% were greater than 4.00%. The mean ratio for the 40 responding banks in Indiana was 1.49%, and ranged from 0.01% to 11.16%; the standard deviation was 1.89%. Results show 65.57% of these banks had a ratio of 1.00% or less; 29.51% had a ratio between 1.00% and 4.00%; and 4.92% were greater than 4.00%.

Loan Officer Characteristics

The average number of years experience as an agricultural loan officer (*EXP*) for the 116 responding lenders in Kansas was 16.03 years, and ranged from 8 months to 40 years; the standard deviation was 9.10 years (Table 11). The mean *EXP* for the 59 responding lenders in Indiana was 17.54 years, and ranged from 1 year to 37 years; the standard deviation was 9.54 years. The mean percent of time Kansas lenders spend on agricultural loans (*PTIME*) was 59.30%, and ranged from 2% to 100%. A breakdown indicates 19.32% of these lenders spend 25% or less of their time on agricultural loans; 28.03% spend between 25% and 50%; 22.08% spend between 50% and 75%; and 30.57% spend greater than 75% of their time on agricultural loans. The mean *PTIME* for the Indiana lenders was 60.36%, and ranged from 5% to 100%. A breakdown indicates 27.87% of these lenders spend 25% or less of their time on agricultural loans; 19.67% spend

between 25% and 50%; 11.48% spend between 50% and 75%; and 40.98% spend greater than 75% of their time on agricultural loans.

The average maximum lending authority (*MLA*) for the Kansas lenders was $324,912, and ranged from $0 to $2,000,000. Results show that 71.13% had an *MLA* of $250,000 or less; 11.89% had an *MLA* between $250,000 and $500,000; and 16.99% had an *MLA* greater than $500,000. The mean *MLA* for the Indiana lenders was $662,222, and ranged from $0 to $15,000,000. Results show that 68.85% had an *MLA* of $250,000 or less; 19.67% had an *MLA* between $250,000 and $500,000; and 11.48% had an *MLA* greater than $500,000. A closer look shows that 51.59% of the 113 lenders in Kansas responding to this question had a maximum lending authority less than the requested loan amount of $110,000 while 39.34% of the 54 lenders in Indiana had an *MLA* less than $110,000.

In response to decision-making process, 84% of the lenders in Kansas and 89% of lenders in Indiana indicated that they tend to base their decisions on logic and on objective analysis of cause and effect. However, a few of these lenders stated that they also consider "the five C's of credit" when evaluating an agricultural loan. The remaining 16% of the lenders in Kansas and 11% in Indiana indicated that they tend to base their decisions primarily on values and on objective evaluation of person-centered concerns.

Loan Amount Regression Analysis

The regression results from the first two-limit Tobit model (equation 4) in Table 12 correspond to the Kansas, Indiana, and All observations, respectively. The two non-financial variables, which were statistically significant at the 1% level in Kansas and All, are character (*CHAR*) and Fair Isaac credit bureau score (*FICO*). *FICO* was statistically significant at the 1% level in Indiana, but *CHAR* was not statistically significant. Although both variables had a positive impact on the proportion granted in Kansas, Indiana, and All, results suggest that *FICO* has a larger impact on the proportion granted.

The variables that correspond to the borrower's financial record keeping abilities (*EXCFRK* and *AVGFRK*) suggest that as the borrower's abilities increased the proportion of the loan approved increased, which is as expected. However, *EXCFRK* is the only variable that was statistically significant at the 10% level in Indiana and at the 5% level in All, respectively. The two productive standing variables (*PSUPQ* and *PSMID*) were both statistically significant at the 10% level in Kansas, but were not statistically significant in Indiana and All. The results show that the coefficients for *PSMID* is larger than the coefficients for *PSUPQ*, which may imply that productive standing is not an important factor in the agricultural loan decision-making process.

The two financial variables (*CR3* and *CR4*), were both statistically significant at the 1% level in Kansas, Indiana, and All. The results suggest that as the expected probability of default for a loan request decreased, the proportion of the loan approved increased, which is as expected. The results also suggest that lenders may have been willing to approve a larger amount on corresponding scenarios since the coefficients for these variables were greater than one.

The bank characteristics (*ASSETSIZ*, *ROA*, and *NCLTL*) all suggest that they had a negative impact on the proportion granted. However, *ASSETSIZ* was not statistically significant in Kansas, Indiana, and All, while *ROA* and *NCLTL* were statistically significant in Kansas and All. The results imply that years of agricultural loan officer experience (*EXP*) negatively affected the proportion granted in Kansas, Indiana, and All. The results also suggest that the amount of time spent on agricultural loans (*PTIME*) had a positive impact on the proportion granted in Kansas, Indiana, and All. The relationships for both of these loan officer characteristics were statistically significant at the 1% level in Kansas and All while *EXP* was the only loan officer characteristic that was statistically significant in Indiana.

The regression results from the second two-limit Tobit model (equation 5) in Table 13 correspond to the Kansas, Indiana, and All observations, respectively. The variable (*CR*) is used to represent the credit risk or expected probability of default that corresponds to each loan request, the analysis includes all observations where sufficient information was provided. The results presented in this table are consistent with those shown in Table 12. After redefining the credit risk variable, results continue to show that as the expected probability of default for a loan request increased the proportion of the loan granted decreased.

Interest Rate Regression Analysis

The regression results for the first interest rate model (equation 6) in Table 14 correspond to the Kansas, Indiana, and All observations, respectively. Results suggest that both *CHAR* and *FICO* had a negative impact on the interest rate charged by the financial institution. However, with the exception of *CHAR* in All, *FICO* is the only variable of these two non-financial variables that was statistically significant. It was statistically significant at the 5% level in Kansas, 10% level in Indiana, and the 1% level in All.

The borrower's financial record keeping abilities (*EXCFRK* and *AVGFRK*) and productive standing (*PSUPQ* and *PSMID*) display inconsistent results across the estimates of these variables. Although an interpretation of these results yields little meaning, results do show that *EXCFRK* and *AVGFRK* were statistically significant at the 5% level in All.

Results show that the two financial variables (*CR3* and *CR4*), had a negative impact on the interest rate in Kansas, Indiana, and All. This suggests that as the expected probability of default for a loan request decreased the interest charged by the financial institution decreased as well, which is as expected. However, *CR4* was statistically significant at the 1% level in Kansas, Indiana, and All, but *CR3* was not statistically significant.

The bank characteristics (*ASSETSIZ*, *ROA*, and *NCLTL*) showed mixed results in the interest rate model. The results imply that *ASSETSIZ* negatively affected the interest rate in Kansas and All, but had a positive impact on the interest rate in Indiana. *ASSETSIZ*

was only statistically significant at the 5% level in Kansas. *ROA* suggests that it had a negative impact on the interest rate charged by lenders in Kansas, Indiana, and All; however, *ROA* was only statistically significant at the 5% level in Kansas and All. The results also suggest that *NCLTL* had a positive impact on the interest rate in Kansas, Indiana, and All. Nonetheless, *NCLTL* was only statistically significant at the 1% level in Indiana and All.

The loan officer characteristics (*EXP* and *PTIME*) also showed mixed results in the interest rate model. The results imply that *EXP* negatively affected the interest rate in Kansas, Indiana, and All, but was only statistically significant at the 5% level in Kansas and All. The results also suggest that *PTIME* had a positive impact on the interest rate charged by the lenders in Kansas and All, but had a negative impact on interest rate in Indiana. *PTIME* was only statistically significant at the 1% level in Kansas.

The regression results from the second model (equation7) in Table 15 correspond to the Kansas, Indiana, and All observations, respectively. The total number of observations used in the first and second OLS models is the same because the lenders in both Kansas and Indiana denied all loan requests where the expected probability of default was 7.61.

Conclusions

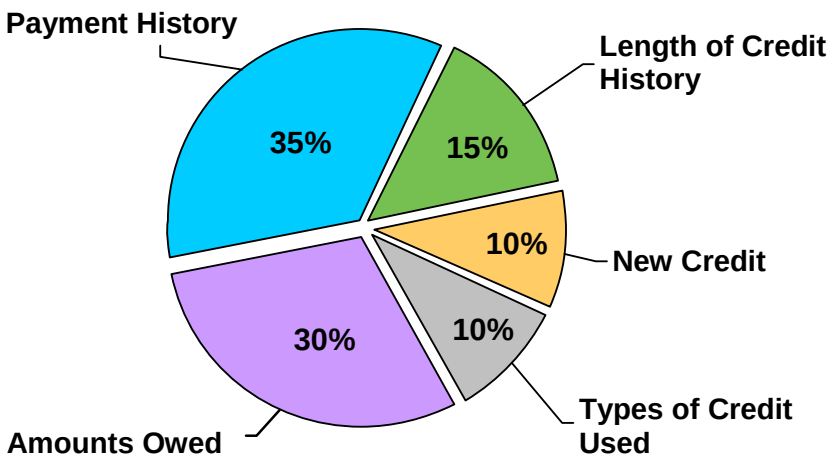
The primary objective of this study was to analyze the factors that financial institutions consider when lending to farm borrowers. To obtain the required data, a survey of financial institutions in both Kansas and Indiana was conducted where agricultural lenders responded to four hypothetical agricultural loan requests. Each loan request differed by the borrower's character, financial record keeping, productive standing, Fair Isaac credit bureau score, and credit risk. Lenders also provided information about themselves and their financial institution.

Two-limit Tobit models determined the borrower and lender characteristics important in determining loan approval. The results suggest that the two non-financial variables, character and Fair Isaac credit bureau score, both significantly influenced the proportion granted in Kansas while Fair Isaac credit bureau score significantly influenced the proportion granted in Indiana. The financial variables representing credit risk, or the expected probability of default, significantly influenced the proportion granted by financial institutions. Return on assets and non-current loans to total loans were the only bank characteristics that significantly influenced the proportion granted in Kansas. The loan officer characteristics, percent of time lenders spent on agricultural loans and number of years experience as an agricultural loan officer significantly influenced the proportion granted in Kansas.

Interest rate models determined the borrower and lender characteristics important in determining interest rates. Results suggest that Fair Isaac credit bureau score had a negative impact and significantly influenced the interest rate charged by financial institutions. The borrower's financial record keeping abilities and productive standing displayed inconsistent results across the estimates of these variables. The credit risk variables had a negative impact on the interest rate charged by financial institutions.

The bank characteristics suggest that total assets and return on assets had a negative impact on the interest rate in Kansas, and were both statistically significant at the 5% level. Results suggest that non-current loans to total loans had a positive impact and statistically influenced the interest rate in Indiana. The results imply that the lender experience as an agricultural loan officer negatively affected the interest rate and was statistically significant at the 5% level in Kansas. The results also suggest that time spent on agricultural lending had a positive impact on the interest rate charged by the lenders in Kansas and was statistically significant at the 1% level.

Figure 1. Categories Used in Determining a Fair Isaac Credit Bureau Score



Source: http://www.myfico.com

Figure 2. Hypothetical Agricultural Loan Requests

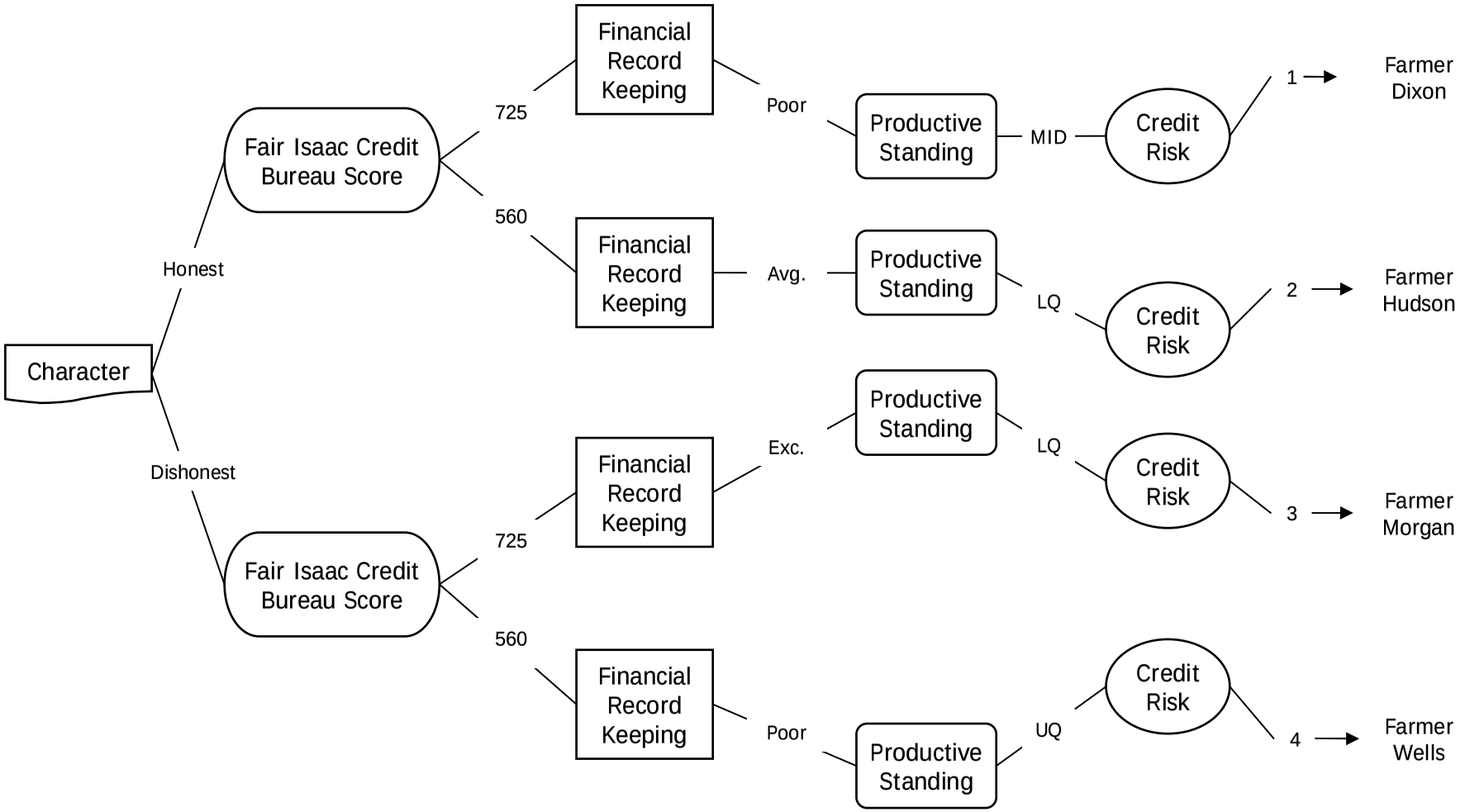


Table 1. 2002 Census of Agriculture State Profiles for Kansas and Indiana

Item	Kansas	Indiana
Farms ..... number	64,414	60,296
Land in farms ..... acres	47,227,944	15,058,670
Average size of farm ..... acres	733	250
Estimated market value of land and buildings		
Average per farm ..... dollars	505,999	637,645
Average per acre ..... dollars	687	2,567
Estimated market value of all machinery and equipment:	5,983,765	4,636,855
Average per farm ..... dollars	95,124	80,240
Farms by size:		
1 to 259 acres	33,149	46,542
260 to 499 acres	8,972	5,443
500 to 999 acres	8,641	4,494
1,000 to 1,999 acres	7,371	2,827
2,000 acres or more	6,281	990
Total cropland ..... farms	56,703	53,725
..... acres	29,542,022	12,909,002
Harvested cropland ..... farms	44,073	44,298
..... acres	18,976,719	11,937,370
Irrigated land ..... farms	5,915	2,212
..... acres	2,678,277	313,130
Market value of agricultural products sold $1,000	8,746,244	4,783,158
Average per farm $1,000	135,782	79,328
Crops sales $1,000	2,418,447	2,992,747
Livestock sales $1,000	6,327,797	1,790,411
Farms by value of sales:		
Less than $49,999	47,113	44,990
$50,000 to $99,999	6,282	4,945
$100,000 to $499,999	9,205	8,505
$500,000 or more	1,814	1,856
Government Payments ..... farms	39,191	26,841
$1,000	328,244	224,701
Total farm production expenses $1,000	4,310,513	8,443,180
Average per farm ..... dollars	71,501	131,126
Net cash farm income of operation $1,000	833,052	841,600
Average per farm ..... dollars	13,818	13,070

Source: National Agricultural Statistics Service

Table 2. Kansas and Indiana Ranked Items within the U.S., 2002

Item	Kansas			Indiana		
	Farms	Quantity[1]	U.S. Rank	Farms	Quantity	U.S. Rank
Livestock and Poultry Inventories:						
Cattle and calves	32,525	6,321,138	2	20,662	862,074	35
Hogs and pigs	1,648	1,520,996	9	4,087	3,478,570	5
Layers 20 weeks old and older	1,961	(D)[2]	(D)[2]	2,152	21,952,110	5
Broilers	374	18,536	42	572	3,823,936	25
Turkeys	231	881,121	21	423	3,848,054	8
Ducks	484	5,295	34	553	1,143,160	1
Pheasants	104	99,322	7	83	8,337	32
Crops Harvested:						
Corn for grain	9,552	2,494,179	10	24,156	5,123,291	5
Corn for silage	2,865	307,303	8	2,875	116,939	17
All Wheat for grain[3]	24,236	8,080,854	1	5,907	299,873	21
Sorghum for grain	15,086	2,863,487	1	94	9,950	16
Soybeans	13,622	2,534,974	11	25,212	5,761,363	4
Forage[4]	29,760	3,086,085	5	22,196	625,898	31

[1] Quantity represents number for livestock and poultry, and acres for selected crops.
[2] NASS withheld information to avoid disclosing data for individual farms.
[3] All wheat for grain equals winter wheat for grain in Indiana and Kansas because both states do not grow durum wheat and other spring wheat for grain.
[4] Land used for all hay and haylage, grass silage, and greenchop.
Source: National Agricultural Statistics Service

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Table 3. Expected Probability of Default for Each Credit Risk Variable

Year	Credit Risk Classes			
	1	2	3	4
2002	6.98	3.69	1.54	0.86
2003	7.18	3.80	1.61	0.88
2004	7.61	3.68	1.48	0.74

Table 4. Systematic Method for Selecting Loan Requests

Lender	Loan 1	Loan 2	Loan 3	Loan 4
1	7	39	49	24
2	107	6	69	136
3	56	53	17	38
4	40	1	27	124
5	106	14	46	109
⋮	⋮	⋮	⋮	⋮
2502	119	1	9	70

Table 5. Summary of Response Rates by Financial Institutions

Lending Offices	Kansas	Indiana	Total
Commercial Banks	38.27%	52.00%	41.91%
Farm Credit Services	44.44%	32.14%	38.18%
Total	38.82%	48.41%	41.44%

Note: The calculations for the response rates are derived using the number of banks instead of the number of lending offices.

Table 6. Distribution of Responses to Hypothetical Agricultural Loan Requests

Factors and Levels	Kansas		Indiana	
	Frequency	Percent	Frequency	Percent
Character:				
Positive	238	50.53	130	53.28
Negative	233	49.47	114	46.72
FICO Score:				
725	232	49.26	129	52.87
560	239	50.74	115	47.13
Financial Record Keeping:				
Excellent	155	32.91	80	32.79
Average	168	35.67	83	34.02
Poor	148	31.42	81	33.20
Productive Standing:				
Upper Quartile	178	37.79	92	37.70
Middle	140	29.72	75	30.74
Lower Quartile	153	32.48	77	31.56
Credit Risk:				
1	131	27.81	53	21.72
2	129	27.39	60	24.59
3	110	23.35	66	27.05
4	101	21.44	65	26.64

Notes: The factors and levels correspond to those discussed in Section 4.2. The cumulative percent for some factors and levels does not equal one hundred percent because the percents shown are rounded to the nearest hundredth.

Table 7. Distribution of Decisions by Lenders Regarding Loan Approval or Denial

Decision	Kansas		Indiana	
	Frequency	Percent	Frequency	Percent
Approve	272	57.75	143	59.58
Deny	199	42.25	97	40.42

Table 8. Summary Statistics of Loan Amount, Interest Rate, and Terms

	Mean	Standard Deviation	Minimum	Maximum	No. of Observations
Kansas:					
Loan Amount – A & D	$44,994	$52,863	$0	$115,000	471
Loan Amount – A	$106,458	$7,163	$68,000	$115,000	197
Interest Rate	7.55%	0.77%	5.75%	9.75%	197
Years	6.27	0.92	4.50	7.00	197
Indiana:					
Loan Amount – A & D	$43,491	$53,160	$0	$110,000	240
Loan Amount – A	$107,449	$8,257	$50,000	$110,000	91
Interest Rate	7.17%	0.72%	5.60%	8.75%	91
Years	6.15	1.06	3.00	7.00	91

Notes: Loan Amount – A & D = the loan amount on both approved and denied loan requests. Loan Amount – A = the loan amount on loan requests that were approved.

Table 9. Summary Statistics of Interest Rate Comparisons

	Mean	Standard Deviation	Minimum	Maximum	No. of Observations
Kansas:					
Typical	0.0887%	0.4397%	-1.25%	2.00%	197
Indiana:					
Typical	0.1475%	0.4509%	-1.00%	2.00%	89

Note: The data presented in this table correspond to the differences between the interest rates offered by the lenders and their typical interest rates.

Table 10. Summary Statistics of Responding Banks

Bank Characteristic	Mean	Standard Deviation	Minimum	Maximum	No. of Banks
Kansas:					
Total Assets	$5.46 B	$28.46 B	$0.0002 B	$195.00 B	113
Capital Asset Ratio	13.37%	10.97%	1.06%	100.00%	108
Agricultural Loan Ratio	46.62%	29.37%	1.60%	100.00%	110
Return on Assets	1.51%	1.01%	-0.77%	7.14%	105
Loan Deposit Ratio	71.78%	18.21%	31.00%	113.00%	100
Non-current Loans to Loans	1.65%	2.76%	0.00%	25.00%	105
Indiana:					
Total Assets	$46.85 B	$179.28 B	$0.0089 B	$1,157.25 B	53
Capital Asset Ratio	11.95%	6.53%	1.01%	50.00%	44
Agricultural Loan Ratio	27.10%	27.49%	0.40%	88.60%	46
Return on Assets	1.33%	0.53%	0.38%	2.40%	48
Loan Deposit Ratio	84.67%	14.52%	50.00%	112.00%	40
Non-current Loans to Loans	1.49%	1.89%	0.01%	11.16%	40

Notes: The number of banks varies across bank characteristics because (1) some of the responding lenders did not answer the specific question, and (2) the number of banks that provided their Loan Deposit Ratio only represents commercial bank lending offices. Farm Credit Services is not a depository institution; therefore, they do not have a loan deposit ratio.

Table 11. Summary Statistics for Responding Lenders

Loan Officer Characteristic	Mean	Standard Deviation	Minimum	Maximum	No. of Lenders
Kansas:					
EXP	16.03	9.10	0.67	40	116
PTIME	59.30%	28.56%	2.00%	100.00%	116
MLA	$324,912	$426,761	$0	$2,000,000	113
Indiana:					
EXP	17.54	9.54	1	37	59
PTIME	60.36%	32.75%	5.00%	100.00%	59
MLA	$662,222	$2,213,955	$0	$15,000,000	54

Notes: The number of lenders varies across loan officer characteristics because some of the responding lenders did not answer the specific question. EXP = agricultural lending experience, PTIME = time spent on agricultural lending, MLA = maximum lending authority.

Table 12. Regression Results from Tobit Model 1 for the Proportion of Loan Granted

Variable	Kansas		Indiana		All	
	Coefficient	P-Value	Coefficient	P-Value	Coefficient	P-Value
Intercept	-1.7064	0.0012***	-3.5242	0.0565*	-2.1659	<.0001***
CHAR	0.8130	0.0003***	0.7808	0.2653	0.7685	0.0007***
FICO	0.9814	<.0001***	3.3167	0.0019***	1.4261	<.0001***
EXCFRK	0.4078	0.1220	1.6065	0.0781*	0.7042	0.0107**
AVGFRK	0.0608	0.8135	0.9776	0.2312	0.3129	0.2351
PSUPQ	0.4376	0.0885*	-1.0768	0.2092	0.2107	0.4159
PSMID	0.4934	0.0693*	-1.1229	0.2056	0.2201	0.4202
CR3	1.3193	<.0001***	3.0858	0.0009***	1.6344	<.0001***
CR4	3.7685	<.0001***	7.8061	0.0004***	4.5208	<.0001***
ASSETSIZ	-0.0034	0.4582	-0.0023	0.4249	-0.0013	0.3740
ROA	-0.2328	0.0419**	-0.6505	0.3912	-0.2919	0.0291**
NCLTL	-0.0896	0.0129**	-0.3757	0.1191	-0.1106	0.0071***
EXP	-1.7064	0.0012***	-3.5242	0.0565*	-2.1659	<.0001***
PTIME	0.8130	0.0003***	0.7808	0.2653	0.7685	0.0007***
Σ	0.9814	<.0001***	3.3167	0.0019***	1.4261	<.0001***
L – Mean	0.5523		0.5304		0.5452	
L – Std. Error	0.4842		0.4939		0.4869	
Obs. Lower Bound	129		67		196	
Obs. Upper Bound	115		65		180	
Total Observations	229		145		444	
Log Likelihood	-233.52		-93.82		-339.51	

Note: Single, double, and triple asterisks (*) denote significance at the 10%, 5%, and 1% levels, respectively.

Table 13. Regression Results from Tobit Model 2 for the Proportion of Loan Granted

Variable	Kansas		Indiana		All	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
Intercept	1.75383	0.0001***	3.817192	0.0262**	2.007441	<.0001***
CHAR	0.81574	0.0003***	0.781842	0.2631	0.766789	0.0008***
FICO	0.96760	<.0001***	3.332429	0.0019***	1.419319	<.0001***
EXCFRK	0.40883	0.1208	1.613375	0.0764*	0.705109	0.0105**
AVGFRK	0.05196	0.8399	0.952115	0.2399	0.310854	0.2378
PSUPQ	0.43811	0.0880*	-1.040909	0.2184	0.206732	0.4236
PSMID	0.49246	0.0696*	-1.14671	0.1954	0.223183	0.4129
CR	-0.94457	<.0001***	-1.99974	0.0003***	-1.140764	<.0001***
ASSETSIZ	-0.00366	0.4219	-0.002395	0.4184	-0.001308	0.3766
ROA	-0.23133	0.0429**	-0.613854	0.4121	-0.292455	0.0286**
NCLTL	-0.09005	0.0124**	-0.373152	0.1178	-0.110866	0.0069***
EXP	-0.01159	0.3033	0.030864	0.3981	-0.004862	0.6693
PTIME	1.75383	0.0001***	3.817192	0.0262**	2.007441	<.0001***
Σ	0.81574	0.0003***	0.781842	0.2631	0.766789	0.0008***
L – Mean	0.4008		0.4179		0.4061	
L – Std. Error	0.4805		0.4890		0.4828	
Obs. Lower Bound	242		106		348	
Obs. Upper Bound	115		65		180	
Total Observations	412		184		596	
Log Likelihood	-233.84		-93.91		-339.76	

Note: Single, double, and triple asterisks (*) denote significance at the 10%, 5%, and 1% levels, respectively.

Table 14. Regression Results from Interest Rate Model 1 for Approved Loan Observations

Variable	Kansas		Indiana		All	
	Coefficient	Prob.	Coefficient	Prob.	Coefficient	Prob.
Intercept	8.5151	<.0001***	8.2775	<.0001***	8.5253	<.0001***
CHAR	-0.1073	0.3530	-0.1652	0.3216	-0.1781	0.0639*
FICO	-0.2459	0.0327**	-0.3655	0.0524*	-0.2975	0.0024***
EXCFRK	-0.1294	0.3467	-0.3558	0.1296	-0.2512	0.0319**
AVGFRK	-0.1857	0.1675	-0.2255	0.3310	-0.2604	0.0247**
PSUPQ	-0.1730	0.1978	0.1123	0.5948	-0.0776	0.4908
PSMID	0.0194	0.8910	0.3276	0.1241	0.1127	0.3418
CR3	-0.1426	0.2191	-0.2092	0.2770	-0.1451	0.1390
CR4	-0.8561	0.0002***	-1.0096	0.0095***	-0.9294	<.0001***
ASSETSIZ	-0.0051	0.0343**	0.0003	0.6132	-0.0004	0.4599
ROA	-0.1778	0.0203**	-0.0878	0.6628	-0.1624	0.0216**
NCLTL	0.0281	0.1434	0.2405	0.0029***	0.0504	0.0071***
EXP	-0.0143	0.0191**	-0.0146	0.1457	-0.0119	0.0202**
PTIME	0.0046	0.0300***	-0.0019	0.4955	0.0027	0.1105
R-squared	0.2448		0.4026		0.2286	
Adj R-squared	0.1811		0.2687		0.1843	
F-Statistic	3.84		3.01		5.15	
RMSE	0.6986		0.6577		0.7104	
Total Observations	168		72		240	

Note: Single, double, and triple asterisks (*) denote significance at the 10%, 5%, and 1% levels, respectively.

Table 15. Regression Results from Interest Rate Model 2 for Approved Loan Observations

Variable	Kansas		Indiana		All	
	Coefficient	**Prob.**	**Coefficient**	**Prob.**	**Coefficient**	**Prob.**
Intercept	7.8054	<.0001***	7.4034	<.0001***	7.7655	<.0001***
CHAR	-0.1285	0.2710	-0.1900	0.2566	-0.1998	0.0410**
FICO	-0.2185	0.0593*	-0.3494	0.0651*	-0.2678	0.0069***
EXCFRK	-0.1390	0.3184	-0.3658	0.1224	-0.2628	0.0276**
AVGFRK	-0.1608	0.2363	-0.2423	0.3004	-0.2514	0.0332**
PSUPQ	-0.1693	0.2135	0.1522	0.4715	-0.0646	0.5732
PSMID	0.0178	0.9014	0.3162	0.1406	0.1020	0.3982
CR	0.2185	0.0002***	0.2659	0.0070***	0.2380	<.0001***
ASSETSIZ	-0.0044	0.0639*	0.0002	0.7135	-0.0005	0.3907
ROA	-0.1922	0.0131**	-0.1095	0.5892	-0.1772	0.0138**
NCLTL	0.0287	0.1394	0.2595	0.0013***	0.0534	0.0051***
EXP	-0.0160	0.0093***	-0.0131	0.1917	-0.0122	0.0197**
PTIME	0.0054	0.0105**	-0.0019	0.5001	0.0031	0.0701*
R-squared	0.2194		0.3812		0.1954	
Adj R-squared	0.1589		0.2553		0.1528	
F-Statistic	3.63		3.03		4.59	
RMSE	0.7080		0.6637		0.7240	
Total Observations	168		72		240	

Note: Single, double, and triple asterisks (*) denote significance at the 10%, 5%, and 1% levels, respectively.

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