**Credit Assessment and Rationing in a Federal Lending Framework**

Rodney L. Brooks, Cesar L. Escalante, James E. Epperson, and Forrest E. Stegelin

Authors' Affiliations: The authors are affiliated with the Department of Agricultural and Applied Economics of the University of Georgia where Rodney L. Brooks is a graduate research assistant, Cesar L. Escalante, James E. Epperson and Forrest E. Stegelin are assistant professor, professor, and associate professor, respectively.

Contact Information: Cesar L. Escalante
315 Conner Hall, University of Georgia, Athens, GA 30602
E-mail address: cescalante@agecon.uga.edu

***Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Denver, Colorado, August 1-4, 2004***

**Credit Assessment and Rationing in a Federal Lending Framework**

Federal involvement in farm credit is guided by the government's mission to assist under-served sectors of the farm economy experiencing difficulty in gaining access to borrowing funds through the regular lending channels. These borrowers include small, beginning farmers considered as high risk borrowers by commercial lenders due to their inadequate business track records and inferior net worth positions. Moreover, the federal credit program is also designed to accommodate borrowers who have been subjected to racial, ethnic or gender prejudice by other lenders.

The implementation of federal lending programs, however, is constrained by the free market principle. The potential disruption of credit market conditions due to the availability of subsidized low-cost federal credit creates the need to regulate the delivery of federal farm loans. Hence, the government, instead of directly competing in the credit market, can only assume the role of "lender of last resort" specifically for farmers who have had experienced denials of their loan request from commercial lenders.

Today, one avenue the federal government uses to provide credit to farmers is through the Farm Service Agency (FSA) operating under the U. S. Department of Agriculture (USDA), which implements direct and guaranteed loan programs as temporary sources of credit for farm businesses. The target of the agency is to accommodate high-risk farm borrowers with direct loans and eventually graduate them to the guaranteed lending program. Once this is achieved, FSA expects these borrowers to successfully satisfy the guaranteed loan provisions and seek credit from conventional agricultural lenders (FmHA-USDA, 1988).

In recent years, however, the USDA has encountered accusations of inequities in the administration of loan programs. For years, Black farmers throughout the country felt that their

credit needs were being ineffectually served by the Farmer's Home Administration, FSA's predecessor (USDA, ERS 1999). The alleged unfairness by FmHA prompted Black farmers across the country to file a class-action discrimination suit known as "Pigford v. Glickman," against FSA in 1997. In response, the Secretary of Agriculture formed the Civil Rights Action Team (CRAT) to investigate the claims. CRAT concluded that discrimination, often extreme, had taken place during the years 1981 to 1996, and CRAT made 92 recommendations to end such practices. These recommendations cover far-reaching areas for change which included holding USDA managers accountable for ensuring the civil rights of all employees and customers, making USDA programs accessible to all customers, creating a diverse workforce and improving the organizational structure of civil rights. The USDA settled the lawsuit on January 5, 1999 by means of a Consent Decree which provided for compensation to Black farmers who could prove discrimination during the aforementioned years.

In the light of these controversies, this study seeks to validate the contention that in recent years the FSA truly has been operating as a "lender of last resort" for farm borrowers considered highly risky by other lenders without discriminating against any particular group of borrowers. An empirical framework is developed using actual FSA borrower data during the period 1999-2002 to analyze the relationship between certain variables used in the conventional loan decision-making process and the amount of loans granted by the FSA. This analytical model will provide indications of the nature of loan evaluation procedures employed by FSA loan officers. Moreover, the incidence of borrower discrimination is also investigated through the inclusion of certain demographical/structural variables suspected to provide basis for biased credit rationing practices of FSA lending officers. The following sections discuss this study's theoretical and empirical frameworks, and present the econometric results and their implications.

## Theoretical Foundation

Increased lending competition, improved borrower information and the lenders' growing concern about loan quality have led to the development of more formal and comprehensive methods of loan evaluation now being used by banks and other farm lenders (Ellinger, Splett and Barry). Although lenders in general do not subscribe to a uniform credit assessment model, the basic framework underlying their differentiated models normally involves the assignment of a credit score to each borrower that is determined as the weighted sum of borrower/business performance measures. The determinants of the credit score and their corresponding weights, however, would vary among lenders.

### *Credit Risk Assessment*

Miller and LaDue, in a study of credit assessment models, examined financial ratios of farm size, liquidity, solvency, profitability, capital efficiency, and operating efficiency as explanatory variables. Using logistic regression techniques, they concluded that borrower quality could be indicated by liquidity, profitability, and operating efficiency. These results were validated in another study conducted by Turvey for Canada's Farm Credit Corporation. Turvey's results indicate that liquidity and leverage were strong determinants of default risk, in addition to profitability and efficiency.

Gallagher emphasized the inverse relationship between leverage and loan success, thus recommending that leverage be considered an important gauge of credit risk. Reduced interest rates are offered to borrowers with lower debt-to-asset (solvency) ratios. The amount of the loan is invariably affected by the interest rate.

Certain lenders develop more than one version of their credit scoring models to apply to categories of their borrowing clients. Modified financial benchmarks and criteria are used

depending on the structural characteristics of farm operations such as size, tenure, and farm-business type. Turvey and Brown, for instance, verified that farm type and location could be important categories in credit scoring models. Kohl emphasized the idea of developing different versions of the credit scoring model to cater to different farm business sizes. His proposed credit scoring model for large farm borrowers considers such financial measures as repayment ability, liquidity, collateral, solvency, profitability, and financial efficiency while smaller farm businesses are evaluated merely on the basis of repayment ability, previous track record, leverage, and collateral coverage. Splett et al. developed two versions of a credit scoring model from a statistical analysis of inputs from a farm lender workshop held in the early 1990s. Their proposed credit-scoring models consider different sets of financial variables and weights to separately cater to term-loan and operating credit applications.

Even with established guidelines, the final decision to grant or deny a loan can be somewhat subjective (Miller and LaDue). The loan officer often uses heuristics, "rules of thumb" or principles acquired through experience to aid in evaluating the potential borrower's application (Gustafson, Beyer, and Saxowsky). The use of subjective judgment in credit evaluation could result in inconsistent credit decisions among loan officers with varied levels of experience. Moreover, a loan officer's attitude toward risk of default could also exert undue influence on his/her ability to evaluate the variables used in the loan decision (Stover, Teas, and Gardener). Failure to be objective with regards to risk may result in an improper decision to grant or deny the loan.

*Credit Rationing Issues*

Asymmetric incentives and information between lenders and borrowers create the need for lenders to devise pricing and non-pricing mechanisms to cope with credit risk associated with

each loan transaction. Empirical evidence shows the predominant use of non-pricing strategies by lenders, which include among others, collateral pledging, reporting requirements, performance standards, constraints on added borrowing, default penalties, insurance requirements, foreclosure conditions and risk of non-renewal of loans (Barry, et al.).

In contrast, not all lenders implement pricing strategies. Approximately 70% adopt differential loan pricing where the level of interest rates depend on, among other factors, loan size, maturity, deposit relationships, and lending competition (Barry, et al.). Within this category of lenders, about 59% implement a risk-adjusted pricing scheme, where credit classifications primarily determine loan pricing terms.

The use of differential/risk-adjusted loan pricing strategies supports Bester's notion of credit rationing, a disequilibrium condition in the credit market when loan demand exceeds available credit supply at the commercial borrowing rate established by lenders. Stiglitz and Weiss argue that there is no equilibrium interest rate in the credit market when the lender could not monitor the borrower's ex-post actions. Bester, however, contends that the credit rationing problem can be resolved when loan covenants jointly specify pricing and non-pricing provisions which would motivate borrowers to signal their risk positions, thus, resulting in a separating equilibrium in the credit market where multiple loan prices prevail.

*The Non-Conventional FSA Lending Framework*

As a non-commercial lender, the FSA is not expected to impose the same stringent criteria in assessing credit risk used by private suppliers of credit. Its lending decisions should be guided instead by eligibility guidelines clearly defined for each of its credit programs, in addition to some criteria prescribed by the agency for determining "creditworthiness." For instance, its

direct lending programs emphasize an important requirement that eligibility for federal credit entails proofs of previous denial of loan application by at least three other lenders.

The FSA, however, warns potential borrowers that compliance with specific eligibility guidelines, even in the case of socially disadvantaged (SDA) borrowers, would not guarantee loan approval (FSA-USDA, 2003). The loan applicants would need to prove their creditworthiness in order to obtain approval of their loan requests, although the FSA's screening guidelines appear to be more considerate of "special borrower circumstances" that normally would not be set aside under the commercial lenders' stricter credit risk assessment frameworks.

The FSA has modified its definition of "creditworthiness" through the years. The Department of Agriculture Reorganization Act of 1994 repealed the statutory provisions in which creditworthiness was determined from the loan applicant's

a) Character, industry, and ability to carry out the proposed operation; and
b) Honesty in endeavoring to carry out obligations associated with the loan (FSA-USDA, 1996, May 1997, September 1997).

Subsequent agency circular notices introduced the following modifications in the assessment of creditworthiness by the agency's lending officers:

a. Determination of realistic repayment plans based on prudent lending principles and from current and historical information available (FSA-USDA, September 1997, 1998)
b. Nonpayment of debts or delinquent payments due to circumstances within an applicant's control as an indication of unacceptable credit history, with special exemption/consideration made for temporary circumstances such as job loss, loss of

benefits or other income, and increase of living expenses due to illness, injury, or death (FSA-USDA, 1996, May 1997, September 1997 ) ;

c. Falsification of information, intentional omission of important loan information, and evidence of lack of reasonable effort to comply with conditions and terms of proposed loan as grounds for loan denial (FSA-USDA, 1996, September 1997, 1999, 2000, 2001); and
d. Nonexistence of credit history could not constitute unacceptable credit history (FSA-USDA, 1996).

The credit rationing paradigm ordinarily used by private lenders also has very limited application to the FSA lending framework. Each FSA lending program has a stipulated borrowing cost that is invariably applied to all loan accounts, thus, eliminating interest rate as a risk management and credit rationing device. Other provisions of the loan covenant such as loan maturity, foreclosure conditions, and prepayment/default penalties are standard among all borrowing accounts. Loan amount remains to be the only potential rationing tool available to an FSA lending officer, especially given the perspective that each FSA program has only a finite funding allocation for a specific period of time.

**Empirical Design**

An analytical framework is developed to verify the validity of a representative credit evaluation construct used by private lenders when applied to the FSA lending programs. The central hypothesis of this study is that the adoption of lending evaluation guidelines resembling the commercial lenders' credit risk assessment techniques would contradict the FSA's expected role as a "lender of last resort." Moreover, this empirical analysis also determines whether FSA

rations credit based on structural and/or demographic considerations, in addition to the size of loan requests made by its borrowing clients.

*FSA Borrower Data*

The borrower data used in this study were obtained from the FSA Georgia State office. The dataset consists of 191 actual loan disbursements made by agency from 1999 to 2002. Of these loan accounts, 94 borrowers are accommodated under the FSA's guaranteed lending programs while 97 received direct loans from the agency. These loans were randomly selected by the FSA for verification that governmental procedures used in making loans were followed. Information extracted from the loan portfolios include borrower declarations from income statements, balance sheets, off-farm income, and expense statements, in addition to information of the ethnic background and gender of the primary borrowers. Portfolio information taken by loan officers was verified through tax returns, lien searches, and credit checks.

*Econometric Framework*

Ordinary least squares regression procedures were used to discern FSA's credit assessment and rationing practices.[1] The general form of the estimating equation is:

$$Log(LS_i) = \beta_0 + \sum_{k=1}^{K} \beta_k X_{ki} + \sum_{n=1}^{N} \gamma_n Z_{ni} + \varepsilon_i$$

where $Log(LS_i)$ is the natural log of the loan size[2]; $X_{ki}$ and $\beta_k$ are the usual credit scoring variables and their coefficient estimates, respectively; $Z_{ni}$ and $\gamma_n$ are the credit rationing-related demographic/structural dummy variables and their coefficient estimates, respectively; and $\varepsilon_i$ is the model's error term. A total of five models are analyzed in this study, i.e. the entire farm borrower dataset and four subsets of data categorized according to the type of FSA credit exposure (direct versus guaranteed lending) and the size of the borrower's farm business (small

versus large farms according to the USDA's definition of these categories based on annual gross revenues).

The first group of explanatory variables ($X_{ki}$) includes proxy financial measures representing the recurring components of credit scoring models analyzed in the literature (Miller and LaDue; Turvey; Splett, et al.; Kohl). These variables include:

i) debt-to-asset ratio (SOLV) representing solvency conditions;

ii) return on equity (ROE) as a measure of profitability;

iii) operating expense ratio (OPRAT), calculated as the ratio of operating expenses to gross revenues, as a measure of financial efficiency;

iv) the ratio of current assets to current liabilities (CURAT) to capture the firm's liquidity position; and

v) the level of net cash margin after operating and debt servicing requirements have been paid (MARGIN) as a proxy for repayment capacity.

An additional financial variable, NONFI, calculated as the level of annual non-farm income of the farm business, is also included to account for the contributions of the non-farm component of the business.

The other set of regressors ($Z_{ni}$) consists of the following dummy variables created to verify the incidence of biased credit rationing favoring certain categories of farm borrowers:

i) SIZE, which takes on a value of 1 for small farms with revenues below $250,000 and 0 otherwise;

ii) NONWH, with a value of 1 for non-white borrowers and 0 otherwise, to capture racial bias;

iii) FEM, with a value of 1 for a female primary borrower and 0 otherwise, to discern any gender bias; and

iv) DRT, which takes on a value of 1 for loans accommodated under the direct lending programs and 0 otherwise.

Additional dummy variables were also included in the model to account for differences in certain farming areas in the state. Actually, the data in this analysis were obtained from eight FSA loan districts. For purposes of this study, contiguous loan districts were combined based on climate and homogeneity of farm production profiles of certain regions. Hence, Districts 2 and 5 were combined to form the CENTRAL region; Districts 3 and 4 were merged as the EAST region; Districts 7 and 8 now represent the SOUTH region; and District 1 was retained as the NORTH region. One strategic exception was made. District 6, though located in South Georgia, was set apart from the SOUTH region and designated SOUTH (D6) because of substantial differences. SOUTH (D6) had a relatively high number of nonwhite borrowers – 25% relative to 6% for the SOUTH region. Loan size on average was much higher in SOUTH (D6) – about 64% higher than for the SOUTH region. Further, gross farm income was almost 35% higher in SOUTH (D6) than in SOUTH on average. In this analysis, the excluded category among the regional dummy variables is the NORTH region.

**Descriptive Analysis**

Table 1 presents the mean values of selected financial measures for the entire dataset and for subsets of borrower observations according to lending program and farm business size. The summary indicates that guaranteed farm loans are generally larger in asset and gross revenue terms. Moreover, most financial ratios associated with these borrowers are more favorable than those of farms that received direct loans from the agency. This is a logical trend considering that

guaranteed borrowers have been previously screened and evaluated by commercial lenders before being referred for FSA guarantee. Among other reasons, the guarantee requirement in these borrowers' loan covenants with their commercial lenders could result from the borrowers' deficiency in at least one financial criterion. In this study's sample observations, the guaranteed farms' relatively weaker profitability position could have, among other factors, negatively affected credit risk ratings and, thus, created the need for FSA guarantee.

Large farm businesses and FSA's guaranteed borrowing clients also are able to avail of larger loan amounts compared to small and directly financed borrowers. Moreover, the results across all data groups indicate that FSA borrowers tend to run financially inefficient business operations with an average operating efficiency of 80% and are highly leveraged as the average FSA borrower sources about 86% of his/her asset financing from borrowed funds.

**Econometric Analysis**

Table 2 presents the ordinary least square estimates and standard errors for the five model versions.[3] The most compelling result is the lack of explanatory power of the credit-scoring related variables in determining changes in the dependent variable. The general model (entire dataset) produced the only incidence of a significant financial variable (current ratio). Notably, the same variable is almost significant in the guaranteed loan model with a p value of 0.109. This somehow confirms (although not strongly) the contention that guaranteed loan applications have been subjected previously to conventional credit assessment techniques by the commercial lenders that recommend them for FSA guarantee. The overall insignificance of financial measures, however, in FSA's loan decisions provides support to the claim that the FSA is indeed the "lender of last resort".

The results for the dummy variables in the general model suggest that the amount of FSA loan could significantly vary according to farm program, borrower size, gender and geographical location. Specifically, larger farm businesses, female borrowers and guaranteed loan applications are able to obtain larger FSA loans than the other farms in their respective categories. The results do not indicate any racial bias given the non-significance of the dummy variable for non-white borrowers. Evidence on gender bias, however, is established in this analysis. The positive coefficient of the dummy variable for female borrowers reflects FSA's overzealous targeting of women borrowers as part of its program to assist socially disadvantaged sectors of the farm industry. Some FSA lending officers also admit that female loan recipients could presumably have been operating the farm businesses with their spouses, but had allegedly better credit scores. Thus, the farm business had a greater chance of obtaining a loan with the female business partner as the primary borrower.

Borrowers from the North region of the state also tend to obtain larger loans from the FSA relative to those from the East, Southern and Central regions. This could be attributed to the larger capital requirements of livestock producers in the North region compared to peanut, cotton and grain farms in the other areas.

Results for the direct versus guaranteed loan analysis indicate that larger farms have larger loans, regardless of lending program type. Interestingly, white borrowers are able to obtain larger directly-funded loans from the FSA than their non-white counterparts. However, a closer scrutiny of their farm operations reveals that non-white farmers operate smaller farms and maintain lower net worth positions. Thus, non-white borrowing clients tend to have smaller loan requests than white farmers.

Other differences in the two lending programs involve loan size by region. The NORTH region typically involved large loans due to the large number of capital-intensive poultry enterprises. But for the Direct-loan program, loans appeared to be significantly higher in the SOUTH (D6) and CENTRAL regions. Causes for this anomaly were an unusual number of beginning farmers and several clients who had suffered major financial setbacks due to weather anomalies.

The analysis of separate models for small and large borrowers produced results consistent with those obtained for the previous models. Both small and large borrowers are able to avail of larger guaranteed loans given the negative coefficient of the Direct Program dummy in both models. Livestock farms belonging to the small business category in the North region tend to account for larger loan amounts availed from the FSA relative to the grain, peanut and cotton farmers in the East and South regions. Among larger farms, however, the poultry farms in the South-D6 region are able to borrow larger amounts than the livestock farmers in the North. The same trend is observed among farmers in the East region.

**Summary and Conclusions**

This study provides evidence reaffirming FSA's primary role as the lender of last resort in recent years for farmers in Georgia who have experienced hardships. The agency seemingly does not scrutinize the financial backgrounds of borrowers as one would expect from commercial lenders. Thus, the financial background of a borrower does not appear to have a significant effect on the size of loans granted by the FSA, regardless of whether the loan is directly funded or guaranteed by the FSA.

A major thrust of the FSA involves graduating borrowers from the Direct-loan program to the Guaranteed-loan program. The FSA seems to be successful in this task as evidenced by

the financial ratios of the borrowers in the Guaranteed versus Direct programs. With improved financial positions, borrowers should be able to transition to availing credit from commercial lenders without the need for FSA assistance.

The results also reveal a logical trend for smaller operations to require smaller amounts of capital while larger operations require larger amounts of capital to operate. However, in reality, the situation may not be so straightforward given the time period, 1999-2002, covered in the analysis. During this time the farm sector experienced severe adverse economic conditions. It was not a time for business expansion but rather a time of preservation for small and large operations alike.

The incidence of racial and gender bias found in this analysis seem to be rationally justifiable. Caution, however, must be observed in interpreting the econometric results considering the small proportion of these farm observations (13 non-white and 10 female borrowers) relative to the sample size. As such, the statistical results could not provide more solid evidence that a pattern of discrimination indeed exists, but neither is it ruled out.

Nonetheless, in this analysis, non-white farmers on average had smaller operations than their white counterparts and thus required smaller loans. Given the subjectivity involved in the loan-granting process, isolated instances of discrimination may occur. McKelly states that most federal programs become operational at the county level and so do discriminatory practices. The decision to grant or deny a loan is made at the county level which opens the door for bias. Loan officers tend to be familiar with potential borrowers as they usually live in the same general area. For whatever reason, loan officers may make subjective loan decisions notwithstanding the procedures that FSA has in place for proper screening.

Moreover, the fact that the USDA has acknowledged that discrimination has occurred in the past challenges the ability of nonwhites to trust the FSA. The inability to trust loan officers may prompt nonwhite borrowers to request smaller loans than would otherwise be the case in hopes that the amount seems insignificant to the loan officer thereby improving the odds of loan approval.

Females, also considered SDAs by the FSA, surprisingly received significantly higher loans in one category – large farms in the Guaranteed-loan program. Reportedly, such operations involved husband and wife teams largely in the NORTH region involving capital intensive poultry enterprises. Apparently, the female member of such teams had the better credit score. A conclusion that the FSA was over targeting females or SDAs, however, cannot be drawn given the circumstances.

Overall, the FSA appears to be carrying out its mission. Some of the operations serviced by the FSA are in poor financial condition but apparently have a reasonable chance of succeeding. Borrowers are not subjected to a litmus test where financial ratios must exceed certain thresholds. As long as the operation displays sufficient cash flow and repayment ability, the FSA is inclined to service the loan.

This study, however, is limited in coverage to FSA borrowers in Georgia, which has distinct demographic attributes. Also, data were not available on potential borrowers who were denied loans by the FSA. Without this information, it cannot be said with certainty whether the FSA relies heavily on the financial background of borrowers for credit risk assessment in the same scale as commercial lenders do. Moreover, there was no information available on the amount of the loan requested by the farmers who eventually received FSA financial assistance.

The amount of the loan requested would allow one to determine whether the accusations made by some non-white farmers that they receive less funds than requested is unfounded or not.

Nonetheless, this research provides a good starting point for a more systematic, verification of FSA's lending practices by incorporating credit assessment and rationing principles in a more appropriate econometric design. This analytical framework could only be enhanced by the availability of other essential information pertaining not only to those that successfully availed of FSA's financial assistance, but also to those that were denied or are still awaiting for federal support that will give their businesses the much needed boost to prosper.

**Notes:**

1. A cross-sectional regression approach is used in this analysis considering that the loan observations in each of the 4 year-period are unique and non-recurring in other years.

2. Several versions of the model have been tested, including the log and linear versions of a normalized dependent variable (size of loan request-total asset ratio). The natural log transformation of loan size as dependent variable, however, is the only version that does not produce heteroscedastic error terms and multicollinearity among regressors, which were both detected in the other model versions.

3. The models for the subsets of observations categorized according to farm lending program and borrower size were tested for structural differences between pairs of datasets. A Chow test-based type of approach is applied by constructing an F ratio using the residual sums of squares obtained from the separate regression runs on the entire dataset and the smaller subsets of data. The F statistic results for the direct versus guaranteed loans and the small versus large farm borrower categories were 7.09 and 3.27, which were significant at least at the 5% confidence level. These results indicate that separate analyses of observations under these categories are warranted.

**References**


Barry, P.J. "Needed Changes in the Farmers Home Administration Lending Programs." *American Journal of Agricultural Economics* 67(1985):341-44.

Bester, H. "Screening Versus Rationing in Credit Markets with Imperfect Information." *American Economic Review* 75(1985):850-55.

Ellinger, P.N., N.S. Splett, and P.J.Barry. *Credit Evaluation Procedures at Agricultural Banks.* Working Paper, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign. August 1991.

Gallagher, R.L. "Distinguishing Characteristics of Unsuccessful versus Successful Agribusiness Loans." *Agricultural Finance Review* 61(2001):19-35.

Gustafson, C.R., R.J. Beyer, and D.M. Saxowsky. "Credit Evaluation: Investigating the Decision Processes of Agricultural Loan Officers." *Agricultural Finance Review* 51(1991):55-63.

Kohl, D.M. "Credit and Marketing Evaluation." 20th Annual Southeastern Agricultural Lenders School. Clemson University, Clemson, SC. April 28-May 2, 2003.

McKelly, B.A. "Why Can't Jacob Read? Why Can't Black Farmer's Farm?" PhD Dissertation, University of Georgia, 2003.

Miller, L., P.N. Ellinger, P.J. Barry, and K. Lajili. "Price and Non-Price Management of Agricultural Credit Risk." *Agricultural Finance Review* 53(1993):28-41.

Miller, L.H. and E.L. LaDue. "Credit Assessment Models for Farm Borrowers: A Logit Analysis." *Agricultural Finance Review* 49(1989):22-36.

Splett, N.S., P.J. Barry, B.L. Dixon and P.N. Ellinger. "A Joint Experience and Statistical Approach to Credit Scoring." *Agricultural Finance Review* 54(1994):39-54.

Stiglitz, J.E. and A. Weiss. "Credit Rationing in Markets with Imperfect Information." *American Economic Review* 71(1981):393-411.

Turvey, C.G. "Credit Scoring for Agricultural Loans: A Review with Applications." *Agricultural Finance Review* 51(1991):43-54.

Turvey, C.G., and R. Brown. "Credit Scoring for a Federal Lending Institution: The Case of Canada's Farm Credit Corporation." *Agricultural Finance Review* 50(1990):47-57.

USDA, Farmers Home Administration (FmHA). *A Brief History of the Farmers Home Administration*. Washington, D. C.: U. S. Government Printing Office, February 1988.

USDA, Consolidated Farm Service Agency. *Creditworthiness Determinations*. FmHA AN No. 3199, September 1995.

USDA, Farm Service Agency. *Creditworthiness Determinations*. Notice FC-117, May 1997.

USDA, Farm Service Agency. *Creditworthiness Determinations*. Notice FC-142, September 1997.

USDA, Farm Service Agency. *Creditworthiness Determinations*. Notice FC-203, August 1998.

USDA, Farm Service Agency. *Creditworthiness Determinations*. Notice FLP-74, August 1999.

USDA, Farm Service Agency. *Creditworthiness Determinations*. Notice FLP-143, July 2000.

USDA, Farm Service Agency. *Creditworthiness Determinations*. Notice FLP-190, March 2001.

USDA, Farm Service Agency. *Facts on Assistance to Minority Producers*. Available online: http://www.fsa.usda.gov/pas/publications/facts/html/minority03.htm, November 2003.

Table 1. Mean Values of Selected Financial Measures, Sample FSA Loan Dataset, 1999-2002

| Financial Variables ($) | Entire Sample | Direct Loans | Guaranteed Loans | Small Borrowers | Large Borrowers |
|---|---|---|---|---|---|
| Total Assets | 532,522 | 296,339 | 776,243 | 330,456 | 774,073 |
| Total Liabilities | 349,741 | 222,561 | 480.980 | 194,727 | 535,046 |
| Gross Farm Income | 308,548 | 229,175 | 390,454 | 129,772 | 522,256 |
| Net Farm Income | 70,013 | 48,644 | 92,062 | 35,073 | 111,780 |
| Operating Expenses | 239,391 | 180,499 | 300,163 | 96,272 | 410,476 |
| Repayment Margin | 50,266 | 15,589 | 86,050 | 25,620 | 79,729 |
| Current Ratio | 2.8444 | 1.2476 | 4.4922 | 4.1590 | 1.2729 |
| Solvency Ratio | 0.8621 | 0.7286 | 0.6171 | 0.8111 | 0.7362 |
| Operating Expense Ratio | 0.8005 | 0.8246 | 0.7756 | 0.8175 | 0.7801 |
| Return on Equity | 0.0508 | 0.1433 | -0.0447 | -0.1644 | 0.3080 |
| Loan Size | 170,989 | 83,794 | 260,967 | 129,228 | 220,910 |
| No. of Observations | 191 | 97 | 94 | 104 | 87 |

Table 2. Ordinary least squares regression results, Sample FSA Loan Dataset, 1999-2002

| Variables | Entire Sample | By Lending Program Type | | By Farm Business Size | |
|---|---|---|---|---|---|
| | | Direct Loans | Guaranteed Loans | Small Farms | Large Farms |
| *Coefficient Estimates and Standard Errors (in parentheses)* | | | | | |
| Intercept | 12.41390[a] | 11.31302[a] | 12.82967[a] | 11.75069[a] | 12.65325[a] |
| | (0.24439) | (0.32870) | (0.38861) | (0.31533) | (0.55706) |
| A. Credit Scoring-Related Variables | | | | | |
| Non-Farm Income | -2.11e-06 | 1.05e-06 | -1.73e-06 | 1.20e-06 | -4.18e-06 |
| | (2.56e-06) | (4.59e-06) | (2.86e-06) | (0.00001) | (2.83e-06) |
| Return on Equity | 0.01763 | 0.00409 | 0.00019 | 0.00317 | 0.02240 |
| | (0.01492) | (0.01790) | (0.02528) | (0.02031) | (0.02263) |
| Repayment Margin | 5.84e-07 | 0.00001 | 2.55e-07 | 2.85e-07 | 5.99e-07 |
| | (5.56e-07) | (4.76e-06) | (5.16e-07) | (1.80e-06) | (5.17e-07) |
| Operating Expense Ratio | 0.18042 | 0.00646 | 0.24418 | 0.24874 | -0.67352 |
| | (0.14236) | (0.22079) | (0.17056) | (0.16064) | (0.66084) |
| Solvency Ratio | 0.20851 | 0.05405 | 0.27938 | 0.25610 | -0.32128 |
| | (0.13347) | (0.15630) | (0.24923) | (0.16959) | (0.24431) |
| Current Ratio | 0.00743[c] | -0.02558 | 0.00675 | 0.00775 | -0.04337 |
| | (0.00434) | (0.02779) | (0.00417) | (0.00485) | (0.03054) |
| B. Credit Rationing-Related and FSA Regional Dummy Variables | | | | | |
| Size | -0.63488[a] | -0.83109[a] | -0.75656[a] | | |
| | (0.13341) | (0.19444) | (0.20221) | | |
| Female | 0.67611[b] | 0.59416 | 0.69792[c] | 0.53081 | 0.91190[b] |
| | (0.32059) | (0.49480) | (0.39934) | (0.51414) | (0.37192) |
| Non-White | -0.37735 | -0.80662[a] | -0.00868 | -0.33830 | -0.47038 |
| | (0.23243) | (0.29761) | (0.37112) | (0.35550) | (0.35926) |
| Direct Loans | -0.92324[a] | | | -0.98681[a] | -0.64046[a] |
| | (0.12924) | | | (0.20949) | (0.17931) |
| East Region | -0.50567[a] | -0.11623 | -0.90340[a] | -0.99162[a] | 0.49437[c] |
| | (0.18958) | (0.24141) | (0.29619) | (0.30229) | (0.28681) |
| South Region | -0.45974[a] | 0.20743 | -1.00467[a] | -0.49917[c] | 0.35579 |
| | (0.18395) | (0.25046) | (0.26579) | (0.26122) | (0.30185) |
| Central Region | -0.34279[c] | 0.67495[b] | -1.10521[a] | -0.31334 | 0.32072 |
| | (0.18774) | (0.27028) | (0.26781) | (0.25270) | (0.35510) |
| South-D6 Region | -0.04970 | 0.65611[c] | -0.70473[c] | -0.08315 | 0.79686[b] |
| | (0.26154) | (0.37495) | (0.37198) | (0.52650) | (0.34628) |
| Model's F Statistic | 11.02[a] | 3.62[a] | 4.16[a] | 5.57[a] | 4.16[a] |
| $R^2$ | 0.4671 | 0.3617 | 0.4032 | 0.4458 | 0.4258 |

Note: Superscripts *a, b* and *c* denote significance at the 1%, 5% and 10% confidence levels, respectively.