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Analysis of the Terms of Bank Lending and Risk Management;Three Essays on Small Business Loans

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ANALYSIS OF THE TERMS OF BANK LENDING AND RISK MEASUREMENT: THREE ESSAYS ON SMALL BUSINESS LOANS

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DEDICATION

This dissertation is dedicated to the two women in my life who have loved and supported me throughout the process, my mother, Muriel and my daughter, Jessica. The preparation of this work took time away from both of them. Neither ever complained and remained steadfast in their support and encouragement. Fortunately, I will never know what may have happened without their support, but it is difficult to imagine the same outcome.

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ABSTRACT

This is a three-part dissertation, which provides a multi-faceted examination of loans and lending to small businesses in the US, which are a key source of economic and job growth. From a broad perspective, this work shows the interplay among various terms of lending, marked differences in lender behavior based on size and type, and a significant role of multiple loans/lenders in explaining loan delinquencies. Essay 1 examines the role of loan guarantees in lines of credit grated to small businesses. The presence of a loan guarantee is associated with lower interest rates and smaller lines of credit. There is some evidence that loan guarantees and collateral are substitutes. Firms with longer banking relationships and fewer banking relationships are less likely to have loan guarantees applied. Since there is some evidence of simultaneity in the data, appropriate econometric procedures are used to obtain consistent parameter estimates. Essay 2 examines differences in terms of lending among two sizes of banks and farm lenders for small loans. Large farm lenders do use more collateral than large bank lenders, but small banks use more collateral than small farm lenders. There is evidence that small banks use more collateral than large banks. All farm lenders appear to use similar levels of collateral, whereas small banks use more collateral than large banks. The determinants of collateral differ based on lender characteristics. For all sizes of farm lenders, the shorter

the term of the loan, the more likely the use of non-real estate collateral, and vice versa. Essay 3 examines the determinants of farm loan delinquencies, and in particular, the influence of multiple loans and multiple lenders on delinquency. The number of lenders used by a borrower, the number of loans, and the product of the two are all positively related to loan delinquency. These factors are at least as significant as standard financial ratios in explaining loan delinquency. The most consistent finding regarding farm borrower delinquency is that borrowers who have been denied credit in the past five years are more likely to have a delinquent loan. It is also found that borrowers using more lenders appear to be able to bargain for lower interest rates.

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CHAPTER I

INTRODUCTION

1.1. *Introduction*

Small business in the United States account for approximately 50% of the economic activity and also contributed approximately 50% of the job growth. In order for these organizations to operate and grow, capital in the form of bank loans is essential. Because of the economic importance of small business, agencies, such as the United States Small Business Administration (SBA) have been created to support this avenue of economic development. For the same reason, research that develops an understanding of the lending process to small businesses can assist borrowers and lenders in working together to support business growth.

In this study, several aspects of lending to small business are examined. Businesses are categorized as small if they have fewer than 500 employees. In the first essay (Are Loan Guarantees Priced for Small Business Lines of Credit?), the role of loan guarantees in small business loans is examined. Small businesses of all types of are included in the study. While loan guarantees are available from the SBA, the loan guarantees examined here are generally not from an agency, but rather are provided by individuals or other

business entities.

A specific type of businesses, which is often a small business, is the farm. In the third essay (Credit Scoring Models as Predictors of Farm Loan Delinquency), determinants of delinquency of loans to farms are examined. Neither borrowers nor lenders benefit from delinquent roles so and understanding of the factors that contribute to loan delinquency should assist both in avoiding these circumstances.

The second essay (Non-Price Terms of Lending for Small Business and Farm Loans) examines the interplay among the terms of lending and also the external credit environment. Four types of lenders are examined: large and small farm lenders and large and small banks. Small commercial loans (<$100,000) are examined within each of the categories of lenders. Contemporaneous relationships among terms of lending are examined as well as those with time lags. This study is a bridge between the first and third essays as it provides an understanding of how difference types and sizes of lenders manage the same type of loans.

1.2. *Background on Commercial Lending*

Compared to mortgage and consumer lending, commercial loans tend to be substantially larger and more complex contracts. This greater complexity arises due to the unique cash flows and credit requirements of the borrower. Firms of difference sizes operating in different industries have unique financing requirements. For example, some have greater need for short term working capital while others have greater intermediate and long term financing needs. Revolving lines of credit are designed to be a flexible credit arrangement to be used when the borrower is not certain of the amount and timing

of their credit requirements. A prearranged line of credit (LOC) assures the borrower that at least a minimum of amount of credit will be available over a given period of time on predetermined terms as long as certain loan covenants are met. These predetermined terms include the level and nature of the borrowing rate (fixed or floating), compensating balance requirements, plus origination and commitment fees.

The bank normally has a target or required rate of return which is designed to: 1) cover the marginal cost of funding the loan, 2) cover the costs associated with making, administering, and monitoring the loan, 3) generate an appropriate return on equity, and 4) and include both maturity and credit risk premiums as appropriate. How the bank achieves it target rate is often open to negotiation with the borrower. For example, the bank may prefer to make a non-revolving term loan with a variable interest rate, and a substantial compensating balance requirement. On the other hand, the borrower may prefer a more flexible revolving line of credit with a fixed interest rate, low commitment fees, and little or no compensating balance requirements. All of the terms are theoretically open to negotiation between the bank and the borrower. In general, the bank is satisfied if it achieves its target rate of return. For example, in Table 1-I, assume that a bank has an average return on its loan portfolio of approximately 7.30%. In Table 1-I, three alternative combinations of contract rate, commitment fees, and compensating balances can be used to generate the required return of 7.30%. To illustrate, assume a borrower is considering taking out a one-year $1,000,000 LOC. The following three sets of lending terms all achieve the same estimated yield (7.30%). In the case of lending terms #1 vs. lending terms #3, the borrower with loan # 1 wants a substantially lower explicit borrowing rate (4.25% vs. 5.75%) but is willing to pay a larger commitment fee

and maintain a larger compensating balance requirement to achieve this goal.

TABLE 1-I. – Effective Interest Rate Comparisons

Loan Terms	Loan # 1	Loan #2	Loan #3
Amount:	$1,000,000	$1,000,000	$1,000,000
Term:	1-Year LOC	1-Year LOC	1-Year LOC
Contract rate:	**4.25%**	**5.00%**	**5.75%**
Risk Premium	1.00%	1.00%	1.00%
Adjusted rate:	5.32%	6.08%	$6.84
Commitment fee on:			
Total LOC:	**.80%**	**0.40%**	**0.00%**
Unused portion of LOC	**.60%**	**0.40%**	**0.20%**
Compensating Balance on:			
Total Commitment:	**5.0 %**	**4.0%**	**3.0%**
Borrowings (Draw-downs)	**4.0%:**	**3.00%.**	**2.%**
Estimated average usage:	75%	75%	75%
Reserve requirement	10%	10%	10%
Estimated Yield	7.30%	7.30%	7.30%

Securitization is the process of making a large number of loans, packaging these loans and issuing securities against this bundle or pool of loans. The cash flows from the pool of loans are allocated to different investor classes (tranches) which have unique expected cash flows. The securitization process involves a number of different players. The originator initially funds and possibly services the loans. The pool of loans is then sold to a trust. The trustee manages the process and arranges for credit enhancement as needed, an underwriter assists in the sale of mortgage back securities, and the rating agency supply a rating for the securities. Banks can either originate the loan themselves or buy it from another lender (i.e. a mortgage broker). Asset-backed securities created through this process are then sold to a broad range of investors with unique risk and return

requirements. The securitization process has revolutionize bank lending in that it allows banks to lend a much greater volume of the loans without incurring the substantial costs associated with holding the loans on the balance sheet for long periods of time. In addition, it provide the bank a flexible interest rate risk gap management tool where it can sell certain types of loans when it wants to adjust the duration of its assets to more closely match the duration of its liabilities. When loan are sold the originating bank often retains the servicing rights which augments the banks non-interest income.

In addition to removing risk from the balance sheet, another important goal is to reduce the cost of lending following a lend-and-hold vs. a lend-and-sell strategy. Many of the costs of the lend-and-hold strategy are hidden. For example, the costs of lending obviously includes the marginal cost of funding the loans, 4.5%, but also the required reserve ratio (10%), the bank's capital to asset ratio (8.0%), the cost of deposit insurance, 0.083%, the bank's income tax rate (30%), the cost of originating and servicing the loan per dollar of assets funded (1.5%), and the expected loan loss rate (0.5%). In this example, the total cost of holding the loan on the balance sheet is substantially higher (8.4%) than the marginal coast of raising the funds (4.5%)[1]. Thus, the final cost of lending and loan ownership is almost 60% higher in relative terms than the explicit rate associated with funding the loan (8.4% vs. 4.5%).

While securitization provides many advantages there are some limitations or

[1] At least this true before the current sub-prime mortgage meltdown where investors seem to care little about the credit risk of the underlying assets which backed the securities they purchased.

[2] At least this true before the current sub-prime mortgage meltdown where investors seem to care little about the credit risk of the underlying assets which backed the securities they purchased.

drawbacks. For example, the lender is constrained to some degree in setting the terms and conditions for the loans it intends to sell. The market likes and rewards loan pools which are relatively homogenous, since this homogeneity makes the cash flows from the pool more predictable and hence easier to value. Furthermore, the market generally prefers to purchase pools of loans which have low default risk which also makes the cash flows more predictable and reduces the cost of purchasing a third default guarantee[2]. Thus, there may be a tendency to sell the higher quality loans and retain the lower quality loans in the bank's portfolio.

1.3. *Summary of Findings*

1.3.1. *Essay 1: Are Loan Guarantees Priced for Small Business Lines of Credit?*

This study attempts to explain the role of loan guarantees when used in small business lines of credit. More specifically, it examines the interplay among loan guarantees, collateral, interest rate, and relative size of the line of credit. Consistent with the concept of the interplay among the terms of lending, other research, and this study, has found the terms of lending to be determined simultaneously. Therefore, two stage estimation procedures are used. For the empirical analysis, the 2003 Survey of Small Business Finances (available from the Federal Reserve Board) is used.

This study finds that loan guarantees are not explained by the presence of collateral, the interest rate, or the size of a line of credit. However, the presence of a loan guarantee is associated with lower interest rates and smaller lines of credit. There is some evidence that loan guarantees and collateral are substitutes. Smaller firms and those with limited

liability legal forms are more likely to have loan guarantees applied to lines of credit. Firms with longer relationships with the lender and firms with a smaller number of banking relationships are less likely to have loan guarantees. Other firm characteristics such as leverage, liquidity, and fixed asset intensity also explain the presence of loan guarantees. These results may indicate that loan guarantees are more a characteristic of lending policy rather than a non-price term of lending based on specific borrowers or loan characteristics.

Two additional variables are included in this study, which that have not been used in the prior, cited research. The strength of the banking relationship is often measured by the length of the relationship. This study uses that measure also and adds the number of bank relationships that each firm has with. Firms with more banking relationships may have weaker relationships, but may be able to negotiate better lending terms. Firms with more banking relationships are more likely to have loan guarantees and pay higher interest rates, but findings consistent with the notion that weaker banking relationships may lead to the more frequent use of loan guarantees and higher interest rates.

Because of the expected interplay among loan guarantees, collateral, interest rate, and loan size during loan negotiations, a variable added is the ratio of the dollar value of credit granted scaled by the requested amount. Higher values of this ratio are associated with a higher likelihood of a loan guarantee but a lower likelihood of a collateral requirement. The ratio does not explain the interest rate or the relative size of the loan.

1.3.2. *Essay 2: Non-Price Terms of Lending for Small Business and Farm Loans*

Collateral is a common feature of bank loans that can reduce both the probability-of-

default (PD) and the loss- given-default (LGD) to the lender and attempt to control asymmetric information between lender and borrower. The empirical evidence regarding the role of collateral is mixed. Given the previous mixed empirical findings, the following questions will be addressed in this study: (1) What are the differences in the terms of lending between small business commercial loans and similar (non-real estate) loans to farmers, and how do these differences vary over time?; (2) In particular, how are loan risk, collateral, and interest rates related for these two different types of farm and non-farm borrower?; and (3) How are these lending term relationships affected by the size of the lender? Three data sources are used in this study, all of which are available from the US Federal Reserve Board. They are (1) E.2 Survey of Terms of Business Lending; (2) E.15 Agricultural Finance Databook; (3) Senior Loan Officer Opinion Survey on Bank Lending Practices. The time frame is 1999Q4 until 2009Q1, which is the longest period for which all common variables of interest are available.

Large farm lenders do use more collateral than large commercial banks, but small commercial banks use collateral more frequently than small farm lenders. Hence, the relationship varies by the type and size of the lender.

For non-real estate loans, farm lenders can require either real estate or other assets (non-real estate) to be pledged as collateral. It is founds that the shorter the term of the loan the more likely the use of non-real estate collateral. It also appears that as maturities lengthen real estate is more often used as collateral among farm lenders. Given the indefinite life of real estate, this finding is suggests that farm lenders match the length of loans with the longevity of the assets used for collateral.

A variable which captures the general credit conditions among lenders is used in this

research. It can be argued that it may be exogenous because it reflects general macroeconomic conditions, or it may be endogenous and largely reflect the composition of a lender's loan portfolio. Most results here suggest those standards are exogenous. However, the cases where other variables explain standards (contemporaneously or with a time lag) are also of interest. Loan risk is negative and significant in explaining collateral for large banks, but is not significant in any other of the OLS equations. One and two lags of loan risk are positive and significant in the credit standards VAR (vector auto regression) equation for large farm lenders. Risk Granger causes changes in lending standards for small commercial banks. All of these results suggest that changes in lending standards are made in response to changes in the risk of the loan portfolio, as would be expected of lenders. In these situations, credit standards appear to be endogenous. The fact that credit standards is not significant in any of the OLS results, but is often significant in the VAR analysis and Granger causality tests, suggests that there are time lags in the lender's response to changes in credit standards. Outstanding loan commitments may also play an important role since these loan terms are negotiated before the loan is made. One lag of credit standards is significant in the VAR model in the loan commitment equation for small commercial banks. Maturity has contemporaneous explanatory power in the use of collateral in both sizes of farm lenders, and in either case, as maturity increases less non-real estate collateral is used. On the other hand, for small banks longer maturities are associated with the use of more collateral.

In summary, while this research does not completely explain the use of collateral, is does support the notion that it is a complex relationship that varies with the type of lender

and the size of the lender and strongly supports the endogenous modeling approach employed in Essay 1.

1.3.3. *Essay 3: Credit Scoring Models as Predictors of Farm Loan Delinquency*

Four questions are addressed in this research: (1) Do the financial ratios used by Moody's for small private firms and those recommendation by FFSC (Farm Financial Standards Council) explain loan delinquencies?; (2) Are borrowers who have had difficulty getting credit in the past more likely to be delinquent on their current loan(s)?; (3) Are delinquent borrowers more likely to have a larger number of outstanding loans and deal with a greater number of lenders than non-delinquent borrowers?; and (4) Can borrowers using multiple lenders negotiate more favorable lending terms such as lower effective interest rates and longer maturity loans? The data used is the 2006 and 2007 ARMS (Agricultural Resource Management Survey) data provided by the United States Department of Agriculture through its Economic Research Section.

The financial ratios used fall mainly into the five categories of liquidity, solvency, repayment capacity, efficiency, and profitability. Typically, at least one ratio in each of the first three categories is significant. Measures of efficiency are generally not significant. Where there are multiple ratios in each category in a single model, multi-colinearity is present to a significant degree so parsimonious models were used that consist of only once ratio per category. In general, it appears that a select set of FFSC ratios are more suited for farms than the Moody's ratios for small business, at least for the purpose of explaining loan delinquency.

The number of loans and lenders does have explanatory power for loan delinquencies

and loan interest rates. For 2007 only, the likelihood of delinquency increases as the number of lenders increases. The number of loans is not significant. However, using 2006 data, the number of loans and the interaction of loans and lenders are both significant, while the number of lenders is not. Pooled results using 2006 and 2007 data match the 2006 results. Clearly, as the number of loans and lenders increases, the likelihood of delinquency increases, irrespective of the level of debt. However, it is not entirely clear whether the number of loans or lenders is most influential. The product of the two variables is consistently significant.

Credit denial in the past five years is the most consistent explanation of current loan delinquencies. A priori, it was not clear whether this variable would have a positive or negative sign. One explanation is that borrowers that have had difficulty getting credit in the past are more likely to continue to struggle financially, so the sign should be positive. However, it is also possible that borrowers that have had prior credit difficulties may reform their behavior in order to get credit in the future. Based on this study, prior credit denial explains loan delinquencies and strongly suggests that prior credit denial is an important determinant of loan delinquency. Based on these results, credit difficulties are persistent.

The number of lenders plays a role in determining the interest rate on loans. Farms using more lenders have a significantly lower average interest rate. This is true in the 2006, 2007, and pooled analyses. This finding supports the idea that borrowers are able to use competition among lenders to negotiate lower interest rates. The number of loans and the loan/lender interaction variable are never significant when the weighted average interest rate is the dependent variable.

Using the 2007 survey data, both the number of lenders and the number of loans are positively associated with the average term of the debt. All three variables are significant at the 5%, but only the number of lenders is positive and significant at the 1% level. Prior credit denial is not a factor in the weighted average term of the loan. The size of the farm (in total assets) is also not significant. Measures of efficiency affect the term of the loan and higher levels of efficiency are associated with shorter term debt. Limited liability organizations have shorter term debt. Farms with higher liabilities, relative to assets, have longer term debt, perhaps because of higher level of liabilities. The liquidity position of the farm does not explain the term of its debt.

Overall, either set of financial ratios is helpful in explaining farm borrower delinquencies, but many of the factors are not always significant. When multiple measures in each category are used, multi-colinearity can confound the results, so simple models are most effective. The five categories of liquidity, solvency, repayment capacity, efficiency, and profitability seem appropriate. There are 11 financial measures that are significant at least once. At least one measure in each of the five major categories is significant at least once. Difficulty with getting credit seems to be persistent as the most consistent explanation for loan delinquency is prior credit denial.

CHAPTER II

ESSAY 1: ARE LOAN GUARANTEES PRICED FOR SMALL BUSINESS LINES OF CREDIT?

2.1. *Introduction*

Numerous authors have investigated the importance of banking relationships in lending to small businesses. A major issue is the relative difficulty in obtaining meaningful information and accurately assessing the credit worthiness of such borrowers. For this reason, many authors have examined the influence of this relationship on various

aspects of line of credits made. For example, Petersen and Rajan (1994) find that small firm borrowing is concentrated, indicating a benefit to a banking relationship. They conclude that there is value to the banking relationship, more for the availability of credit than for a lower cost of debt. Brick, Kane, and Palia (BKP2003) study the interrelationship between interest rate, fees, and collateral in small business loans. All three of these factors, in principle, can be negotiated simultaneously with the bank to address the risks inherent in the loan, and evidence of jointness is found.

Not included in the BKP2003 study is the influence of loan guarantees on the terms of the line of credits. Loan guarantees can introduce a moral hazard at the bank because in the presence of a guarantee, the bank could relax lending standards knowing that it is not fully exposed to the risk of default because of the guarantee. Loan guarantees can also be used as a policy tool to avoid credit rationing that may naturally occur, as discussed by Stiglitz and Weiss (1981). In the United States, the US Small Business Administration (SBA) was created to assist small businesses and represents one source of loan guarantees for small businesses.

Small businesses in the US are responsible for approximately half the economic activity and more than 50% of the job growth. The SBA has been making loan guarantees for small businesses since 1953, consistent with the importance of small businesses to the US economy. It has operated since 1953 by providing direct loans and guaranteed loans to small businesses. During the decade of the 1990's, the SBA helped 435,000 small businesses obtain $94.6 billion in loans. Currently, more than $10 billion in loan guarantees are made annually by the SBA.

The focus of this research is on the effect loan guarantees have on the interest rates

charged and the size of lines of credit. Two questions will be addressed. First, what are the factors associated with the use of loan guarantees? Secondly, to what extent does the presence of a loan guarantee affect the interest rate charged and the size of the line of credit? Along with these variables, this study will also include the effects of collateral and compensating balances on the terms of line of credits.

It is possible that the existence of a line of credit guarantee would lower the bank's evaluation of the risk of the line of credit, since its loss given default would be lower in the presence of a guarantee. Similarly, this is the same argument for the use of collateral, so in this case, loan guarantees and collateral may operate as substitutes, as suggested by some authors. Conversely, it is also possible that a lender may incur higher administrative expenses associated with lending when a guarantee is present, thereby raising the interest rate.

This study finds that loan guarantees are not explained by the presence of collateral, the interest rate, or the size of a line of credit. However, the presence of a loan guarantee is associated with lower interest rates and smaller lines of credit. There is some evidence that loan guarantees and collateral are substitutes. Smaller firms and those with limited liability legal forms are more likely to have loan guarantees applied to lines of credit. Firms with longer relationships with the lender and firms with a smaller number of banking relationships are less likely to have loan guarantees. Other firm characteristics such as leverage, liquidity, and fixed asset intensity also explain the presence of loan guarantees.

With regard to the initial interest rate, this study finds that loan guarantees, larger firms, higher fees, shorter lender relationships, and fewer banking relationships are all

associated with lower initial interest rates. The use of collateral and the presence of a compensating balance are not significant in setting the interest rate. Fixed rate loans have a higher interest rate than variables rate loans, consistent with the higher risk to the lender in the event prevailing rates increase during the term of the loan agreement.

Based on earlier research, it would also be expected that larger loans would be explained by the presence of a loan guarantee. However, in this study the presence of a loan guarantee is associated with smaller lines of credit. The presence of collateral and compensating balances do not significantly explain the size of the line of credit. Loan size is also explained by the size of the firm, with larger firms obtaining smaller loans (relative to the asset base of the firm), which perhaps is simply a size effect, that is larger firms require proportionately smaller lines of credit. The length of the banking relationship is associated with smaller lines of credit.

Collateral is more likely on large loans, and is less likely in the presence of a loan guarantee or on higher interest rate loans. Firms with more fixed assets are less likely to have a requirement for collateral. Consistent with Chakraborty and Hu (2006), who find that longer relationships allow banks to reduce collateral requirements for lines of credit, firms with longer lender relationships are less likely to have a collateral requirement. This is inconsistent with the findings of Brick and Palia (2007) who find no significance to the length of the relationship. However, all of the significant relationship effects, whether on collateral, loan guarantees, interest rate, or loan size are all economically small.

Two additional variables are included in this study, which that have not been used in the prior, cited research. The strength of the banking relationship is often measured by

the length of the relationship. This study uses that measure also and adds the number of bank relationships that each firm has with. Firms with more banking relationships may have weaker relationships, but may be able to negotiate better lending terms. Firms with more banking relationships are more likely to have loan guarantees and pay higher interest rates, but findings consistent with the notion that weaker banking relationships may lead to the more frequent use of loan guarantees and higher interest rates.

Because of the expected interplay among loan guarantees, collateral, interest rate, and loan size during loan negotiations, a variable added is the ratio of the dollar value of credit granted scaled by the requested amount. Higher values of this ratio are associated with a higher likelihood of a loan guarantee but a lower likelihood of a collateral requirement. The ratio does not explain the interest rate or the relative size of the loan.

The findings described above are based on empirical analysis using the 2003 Survey of Small Business Finances using a set of simultaneous equations, similar to the method used by Brick and Palia (2007).

2.2. *Literature Review*

Stiglitz and Weiss (1981) discuss the conditions under which credit rationing may occur in markets under equilibrium conditions. The authors suggest that interest rates alone may not be sufficient to screen applicants and distinguish good and bad borrowers. They postulate that expected bank returns may reach a maximum at some interest rate and decline at higher rates because of expected higher rates of default. A similar argument is made for collateral requirements. They conclude that credit rationing may be expected for banks, especially under conditions of imperfect and limited information, a

typical aspect of lending to small businesses. Using interest rates alone to screen applicants also may introduce an adverse selection problem in that only the riskiest borrowers may agree to such high interest rates.

Because of the recognized importance of small businesses to overall national economic development and recognizing the possible credit rationing behavior, many nations have introduced loan guarantee programs for small business to counter the expected credit rationing behavior of banks.

A number of authors examine the effects of loan guarantee programs. Camino and Cardone (1999) suggest that policy-makers view loan guarantees as substitutes for collateral. The guarantees are then made to induce lenders to lend, absent normal levels of collateral. Their study summarizes a number of European loan guarantee programs and provides a framework for further study, but does not reach specific conclusions about the costs or effectiveness of such loan guarantee programs.

Riding and Haines (2001) survey previous attempts to evaluate the effectiveness of loan guarantee programs and note widely differing rates of default among national programs. They go on to examine the Canadian experience with its loan guarantee program and find it to be quite cost effective. They find higher default rates among newer firms and varying rates of default by industry. They also find that lenders are quite sensitive to the size, or percentage, of the loan that is guaranteed, so small changes in the level of the guarantee would be expected to alter default rates.

Cowling and Mitchell (2003) study the loan guarantee program in the UK. They find that default rates are positively related to interest rates, consistent with the Stiglitz and Weiss (1981) expectation. However, the default rates do not vary with the government

premium. They also find that default rates are affected by other variables, including the size of the loan, its purpose, the legal form of the borrower, the age of the firm, the term of the loan, and the location of the business.

Glennon and Nigro examine SBA 7(a) loan guarantees in the US. They first compare the default rate of small business loans to other traded debt securities and conclude that the default rate falls between Ba/BB and B rated corporate bonds, as rated by Moody's and S&P. These are below investment grade, but are of similar default risk as a large number of corporate loans held by banks. They find that newer firms have a higher rate of default than older firms and larger firms have a higher default rate than smaller firms. Higher guarantee percentages were associated with higher default rates. They also found that lenders did not price loans based on risk during the sample period (1983 – 1998).

Doh and Ryu (2004) study loan guarantees among Korean chaebol. Within the chaebol, there is better information and between the borrower and lender (asymmetric information) and they suggest that the issuance of a loan guarantee by one member on behalf of another is a positive signal regarding the borrower to an outside lender. They further summarize research by Lee and Lee (1998) which indicates that corporate loan guarantees lead to higher debt to equity ratios and suggest firms within chaebols over-borrow because of the availability of these affiliate guarantees. In addition, they suggest that guarantors extract a fee for providing the guarantee, which can be viewed as a form of transfer pricing. They further note that this practice provides perverse incentives to the participants.

Chakraborty and Hu (2006) study collateral for lines of credit and non-lines of credit. They find that the length of the banking relationship is negatively related to the amount

of collateral required and suggest this result stems from the special knowledge lender have of informationally opaque small firms, an understanding developed ruing a long banking relationship.

The above reviews a number of studies that examine default rates and the governmental cost and effectiveness of loan guarantee programs. The focus of this study is on the interest rate and loan size decisions in the presence of a loan guarantee.

Brick and Palia (2007) examine the interdependence of interest rates, collateral, and fees using the 1993 Survey of Small Business Finances for small business lending in the US. They found evidence that these variables are jointly determined (endogenous) and, therefore, use a two-stage least squares (2SLS) procedure to analyze the data. They found a positive correlation among all three. Further, the duration of the banking relationship was not found to be significant, as would be expected for relationship-based lending for small, informationally opaque borrowers. A major contribution of this work is the finding that there does appear to be jointness in the way these loan parameters are set, so single equation, rather than simultaneous, studies may produce inaccurate or misleading results. A factor not considered in the Brick and Palia (2007) study nor the Chakraborty and Hu (2006) study was the effect of a loan guarantee, which is the focus of this study.

2.3. *Methodology*

There are three endogenous hypothesis variables in this study, representing the presence of a loan guarantee, initial interest rate, and the size of the line of credit. Control variables are included to capture effects that have been previously observed in

other research. The include such effects as relation length, firm characteristics including leverage, cash, and the proportion of fixed assets, the legal form of the firm, the number of exiting lines of credit, the number of lenders dealt with, whether the owner is an active manager, and the industry affiliation based on two-digit SIC codes.

Four basic equations will be used to explore this topic. Their general form is shown below.

(1) $LOCG = \alpha_{11} + \beta_{11}RATE + \beta_{12}LSIZEP + \beta_{13}COLLAT + \beta_{1n}CV + \varepsilon_1$

(2) $RATE = \alpha_{21} + \beta_{21}LOCG + \beta_{22}LSIZEP + \beta_{23}COLLAT + \beta_{2n}CV + \varepsilon_2$

(3) $LSIZEP = \alpha_{31} + \beta_{31}RATE + \beta_{32}LOCG + \beta_{33}COLLAT + \beta_{3n}CV + \varepsilon_3$

(4) $COLLAT = \alpha_{31} + \beta_{31}RATE + \beta_{32}LOCG + \beta_{33}LSIZEP + \beta_{3n}CV + \varepsilon_3$

Where:
LOCG is binary and indicates the presence of a loan guarantee
RATE is the initial line of credit interest rate
LSIZEP is the size of the line of credit as a proportion of firm assets
COLLAT is binary and indicates the presence of a collateral requirement
CV is the vector of control variables (see Table 1-I for descriptions)

The three equations will first be applied to the 2003 survey. Note that the LOCG variable is dichotomous, so that equation (1) is estimated using a logistic procedure. Ordinary least squares will be used for the other two equations. Different authors have treated one of more of these same data sets differently. Chakraborty and Hu (2006) assume the variable are exogenous and use typical estimation procedures. Brick and Palia (2007) argue that the terms of credit lines are set jointly, and therefore, the estimation technique must assume a system of simultaneous equations. In this study, the existence of simultaneity will be tested before proceeding with a similar, 2SLS approach as was performed by Brick and Palia (2007).

Because of the use of the logistic regression for equation (1), the existence of simultaneity will be tested using a Hausman test in which RATE and LSIZEP individually on all exogenous variables. The residuals from these two equations are then included, one at a time, as dependent variables in regressions where the dependent variables are each of the other two hypothesis variables. If the coefficient of the residual is significant at the 5% level, then the null hypothesis that the variables are exogenous is rejected and a simultaneous method of estimation will be used for further analysis. A two-stage procedure will be used for analyzing equations with simultaneity.

For the simultaneous equation method, each of the three hypothesis variables will be regressed on all exogenous variables, including all control variables. Then, the predicted values from these first stage regressions will be used as independent variables, replacing the respective original variable in the right hand side of equations 1–3. Variables not found to be consistently significant in the initial regressions are omitted from the second stage analysis. SAS SYSLIN procedure will be used where the two continuous variables are the dependent variable. An instrumental variable for the binary LOCG will be developed using a Logit procedure and will be added to the model for the other two.

When the binary LOCG variable is the dependent variable, the predicted values for RATE and LSIZEP will be taken from reduced form equations and added to the right hand side of the second stage logistic procedure.

Loan guarantees can be viewed as reducing the loss given default for the lender, so to the extent that the interest rate reflects anticipated losses, then loans with credit guarantees should have lower interest rates. Since some authors suggest collateral provides a similar function, then collateral also should reduce the interest rate. It can be

argued that loan guarantees from other corporate entities or government agencies may add administrative costs and possibly raise the interest rate. However, the premise here is that loan guarantees will reduce the interest rate on lines of credit, all other factors being equal. Therefore, the first hypothesis is as follows:

H1: The interest rate charged on lines of credit will be lower in the presence of a loan guarantee. Similarly, the presence of collateral will also lower the interest rate.

Secondly, it is expected that the presence of a loan guarantee offers the possibility of a larger line of credit, for similar reasons. The bank could be expected to recover in the event of default. One factor not included in this data set is whether loan guarantees cover 100% or some smaller amount of the total line of credit. However, on the basis that the presence of a loan guarantee protects the lender in the event of default and consistent with the over-borrowing behavior within Korean chaebols when loan guarantees are readily available, the second hypothesis is as follows:

H2: The size of a line of credit is larger in the presence of a loan guarantee. Likewise, collateral is expected to have the same effect.

2.4. *Data*

The data source is the 2003 Surveys of Small Business Finances (SSBF), available from the US Federal Reserve Board. A total of 4,240 firms and 1972 variables are included in the 2003 survey. There is a wide range of data available, ranging from dichotomous variables to numeric values. For this study, a subset of the data was used which includes only firms that whose most recent loan was a line of credit. Mach and Wolken (2006) report that 34.3% of firms in the 2003 survey have lines of credit. This is the highest proportion, by loan type, of any financial service included in the surveys,

which is the reason for this selection.

A listing of the definitions of variables used in this study is provided in Table 2-I. Variables with unreasonable or impossible values (e.g. a negative cash balance) were treated as missing and not used for analysis. In addition, there are also a number of missing observations for some of the variables. Missing variables were not estimated, and those observations were eliminated from the analysis.

Table 2-II provides descriptive statistics for the variables used. There are approximately 1460 observations available for most of the variables in this subset containing all recent lines of credit. Approximately 63.7% of all lines of credit have loan guarantees. The average initial interest rate is 5.548%. The mean term is just under 31 months. The average size of the line of credit scaled by total assets is 66.1%. The firms average over 17 years of age. They deal with 3.87 lenders each. Almost 80% of the firms have a limited liability legal form (subchapter S, C, or are LLC's). Collateral was required in 51% of the loans, while compensating balances were required on less than 9% of the lines of credit. Eighty-three percent of the firms have the owner as manager. Binary variables were used to capture the industry sector based on 2-digit SIC codes. Of the industries represented, 1% were in the mining industry, 8.2% in construction, 15.8% in manufacturing, 4.1% in transportation, 8.6% in wholesale, 16.4% in retail, 42.5% in insurance, and 3.4% in services, which was used as the base (no binary variable for services to avoid perfect multi-colinearity). None of the firms had previously filed for bankruptcy and none had been delinquent on loans. The preponderance of the lines of credit established was initiated in 2003, with a few exceptions.

Small businesses are defined by the US government as those having fewer than 500

employees. In this study, the average business has approximately 52 employees, has assets of approximately $6.2 million. of cases.

A correlation matrix for the variables is provided in Table 2-III. The majority of the correlation coefficients are below 20%. The presence of loan guarantees (LOCG) is positively correlated with the binary LIMLIAB. FEES and RATE are positively correlated at 28%. Firm age (FAGE) and firm size are positively correlated at 33%. The number of financial institutions dealt with is positively correlated with firm size (34%). Firms tend to develop longer relationships (RELATE) as the firm itself is older (FAGE). These two variables are positively correlated (30%). The number of employees (EMPLOY) is positively correlated with firm size (FSIZE) with a correlation coefficient of 59%. The presence of an owner/manager is negatively correlated with firm size (-31%).

2.5. *Empirical Results*

There are three exogenous, dependent variables of interest in this study, the presence of a loan guarantee (LOCG), the size of the loan as a proportion of total assets (LSIZEP), and the initial interest rate (RATE). Results for each stage of the regressions are reported for each stage in the analysis.

Table 2-IV provides the results of a logistic regression with LOCG as the dependent variable. All variables are included here, including RATE and LSIZEP. In addition to the primary control variables identified in Table 2-I, a number of additional exogenous variables are included in this regression and are used as instrumental variables in the first stage, reduced form equations. This is done in an attempt to improve the quality of the

instruments. RATE is negative and significant, suggesting loan guarantees are priced with lower interest rates. Larger loans are associated with loan guarantees. Collateral, as with interest rates has a negative coefficient but is only significant at the 7% level. Firms dealing with more institutions are more likely to have loan guarantees. Firms with a limited liability legal form are more likely to have a loan guarantee. Firms with a higher ratio of liabilities scaled by assets are more likely to have a loan guarantee. Firms with more fixed assets (PPE) are less likely to have a loan guarantee.

The first stage of the RATE equation is provided in Table 2-V. Because this is a reduced form equation, LOCG and LSIZEP are not included. FSIZE is negative and significant, indicating larger firms are associated with lower interest rates. Leverage is negative and significant, but LIABOVERASSETS is positive and significant. COLLAT is negative and significant. RELATE is positive and significant, suggesting lenders may exploit the lending relationship and charge higher interest rates. Another measure of the relationship is NINST, the number of institutions dealt with. Here also, firms with more banking relationships have higher line of credit interest rates as this variable is positive and significant at the 1% level. COMPBAL is not significant, suggesting compensating balances are not used to adjust interest rates.

Table 2-VI provides the results of the reduced form equation for LSIZEP. FSIZE is negative and significant. Fees are positive and significant. FAGE is negative and significant, suggesting older firms have relatively smaller lines of credit. RELATE is negative and significant, suggesting that longer relationships are associated with smaller lines of credit. NINST is also negative and significant. OWNMGR is positive and significant, suggesting larger lines of credit where an owner/manager is present.

COLLAT is positive and significant, suggesting the presence of collateral is associated with relatively larger lines of credit.

Table 2-VII provides the results of the second stage logistic regression where LOCG is the dependent variables. The instruments for RATE and LSIZEP are designated by the suffix "_i". Both of the two instruments are not significant. This suggests that loan guarantees for lines of credit are not priced, nor do they affect the size of the line of credit. COLLAT is also not significant. FSIZE is negative and significant, indicating larger firms are less likely to have loan guarantees. LEVERAGE is positive and significant, indicating firms with higher leverage are more likely to have loan guarantees. CASH is also negative and significant, indicating firms with more cash are less likely to have loan guarantees. FAGE and NINST are both positive and significant indicating that older firms and those with more institutional relationships are more likely to have loan guarantees. Speculatively, this could be an indicating of a weaker relationship (because there are more institutional relationships) are an indication that older firms are more willing to offer a loan guarantee. RELATE is negative and significant, suggesting that a longer banking relationship may be rewarded by a lower likelihood of a loan guarantees. This is consistent with the Boot and Thakor (1994) expectation that experience with a lender benefits the borrower and can influence the terms of a second or later loan. LIMLIAB is positive and significant. This result may be an indication that lenders are not always satisfied with the security for lines of credit and seek personal loan guarantees from the owner(s). Without a guarantee, the lender would be limited to the security pledged or at most the assets of the borrower. FIXED is negative and significant, indicating fixed rate loans are less likely to have loan guarantees. As in Table 2-IV, firms

with higher relative fixed assets (PPE) are less likely to have loan guarantees. As with all second stage results, the seven binary industry sector variables are included in the estimation but not reported.

Table 2-VII also reports adjusted p values. The adjustment is made because the error term in the second stage is actually the sum of the reduced form equation error and that from the second stage. The adjustment is a function of the ratio of the square root of the sum of the squared errors. In this case, the adjustment is approximately 5% and does not materially change the significance of any of the variables discussed. For further discussion, see Maddala (1977).

Table 2-VIII provides the results of the second stage analysis where RATE is the dependent variable. The instrument LOCG_I is developed from a reduced form estimation equivalent to that presented in Table 2-IV with the exception that RATE and LSIZEP are excluded. LOCG_I is negative and significant, indicating lower interest rates are established when guarantees are applied. FSIZE is negative and significant, indicating larger firms obtain lower rates. LEVERAGE is not significant. FEES are positive and significant, indicating a complementary role for fees and interest rates. TERM, as expected, is negative and significant. RELATE is positive and significant. NINST is also positive and significant. This result is consistent with the reduced form equation results of Table 2-V, but present somewhat of a puzzle. Longer relationships are associated with higher interest rates, contrary to the expected benefits of a longer relationship, but yet having more relationships also leads to higher interest rates. LIMLIAB is not significant, perhaps a consequence of the correlation between LOCG and LIMLIAB. As expected, FIXED is positive and significant. OWNMGR is positive

and significant.

Table 2-IX presented the results of the second stage estimation where LSIZEP is the dependent variable. LOCG_I is negative and significant, indicating loan guarantees are associated with relatively smaller lines of credit. Perhaps this is an indication that without the guarantee, the loan would not have been made so the compromise is a smaller line of credit. RATE is negative and significant, indicating higher rate loans are smaller. FSIZE is negative and significant, indicating larger firms have smaller lines of credit. LEVERAGE is positive and significant, so more leveraged firms borrow for longer periods of time. FEES is positive and significant, indicating larger loans fees for longer loans. RELATE is negative and significant. NINST is positive, but only significant at the 10% level. This suggest that longer banking relationships are associated with smaller lines of credit, but possibly more lender relationships can enable larger lines of credit. LIMLIAB is positive and significant, indicating limited liability legal forms have larger lines of credit.

The results provided in Tables 2-III through 2-VI are based on the assumption that all variables are exogenous. Other authors using another of the surveys (1993) differ on the validity of this assumption. Brick & Palia (2007) explore these relationships using a two stage procedure because of a concern for simultaneity in the data, whereas Chakraborty and Hu (2006) do not. Table 2-X presents the results of an assessment of the presence of simultaneity among the potential endogenous hypothesis variables in this study. Using the concept of the Hausman test, the residuals from two OLS regression of loan size and loan rate are included as independent variables when a potential endogenous variable is regressed on all other variables. The null hypothesis is that the variables are exogenous,

and is tested by the significance of the coefficient of the error term. In this case because of the present of the binary variable representing a loan guarantee a logistic regression is used to test the hypothesis. In any case, if the parameter estimate on the residual is significant, then the null hypothesis that the variables are exogenous is rejected and an econometric approach recognizing this should be employed. The results in Table 2-X are mixed. While these results indicate that RATE and LSIZEP are not simultaneously determined, but there is evidence of simultaneity with LOCG. On that basis, the second stage results in Tables 2-VII through 2-IX are estimated. This is conservative in that without simultaneity, the results of a two-stage process should not change the outcome.

Tables 2-XI through 2-XIV add two additional variables, one estimated as endogenous (COLLAT) and one estimated as exogenous (GRANTPCT). It is COLLAT. In Table 2-XI, the dependent variable is LOCG. Dependent variables include three instruments for collateral, rate, and size. These results are very similar to those in Table 2-VII, except with the addition of COLLAT_I. The significance of the variables does not change. COLLAT_I is positive, but not significant, suggesting the requirement for collateral does not significantly change the probability for a loan guarantee. COLLAT was not significant in Table 2-VII either. GRANTPCT is positive and significant. A possible explanation for this is during loan negotiations, lenders are willing to increase the size of the loan, relative to the amount request, if a borrower will provide a guarantee.

In Table 2-XII, COLLAT is regressed on three instruments and the other independent variables. Here, the presence of a loan guarantees lowers the probability of collateral being required as LOCG_I is negative and significant. RATE_I is positive and significant, suggesting collateral is priced and offering security may lower the interest

rate. LSIZEP_I is positive and significant, suggesting collateral is more likely with larger loans. FAGE is positive and significant, but only at the 6% level. RELATE is negative and significant, suggesting the longer the relationship, the less likely collateral will be required. NINST is not significant at conventional levels so it does not appear that the number of institutions affects the likelihood of a collateral requirement. PPE is negative and significant, indicating that firms with more fixed assets are less likely to have a collateral requirement. GRANTPCT is negative and significant. This suggests that as the amount granted is increased relative to the amount requested, the likelihood of collateral being required is reduced. This finding seems contrary to expectations, but it is consistent with the correlation (-13%) between GRANTPCT and COLLAT, which is significant at the 1% level. Since LOCG_I and COLLAT are negatively related, collateral and loan guarantees are being exchanged to increase the size of the line of credit.

In Table 2-XIII, RATE is regressed on three instruments and the other variables. As in Table 2-VIII, LOCG_I is negative and significant. Neither COLLAT_I nor LSIZEP is significant. The level of significance of the other variables does not change. GRANTPCT is not significant, so the amount of the line of credit granted relative to that requested does not play a role in setting the interest rate.

In Table 2-XIV, LSIZEP is regressed on three instruments and the other variables. COLLAT_I is not significant, which differs from Table 2-IX where COLLAT was positive and significant. The general level of significance of the other variables does not change. GRANTPCT is not significant, as was the case where RATE is the dependent variable.

Hypothesis H1 indicates that loan guarantees lower the interest rate charged. The results in Table 2-VIII (RATE as dependent variable) indicate that the presence of a loan guarantee is associated with a lower rate of interest, so this hypothesis cannot be rejected. However, when LOCG is the dependent variable, RATE is not significant. The follow-on statement in H1 states that collateral lowers the interest rate is supported somewhat. The presence of collateral does not significantly affect the interest rate where RATE is the dependent variable (Table 2-XIII). However, higher interest rates are associated with the use of collateral when collateral is the dependent variable (Table 2-XII).

Hypothesis H2, which states that lines of credit will be larger in the presence of a loan guarantee, can be rejected. LOCG_I is negative and significant where LSIZEP is the dependent variable (Table 2-XIV). In this case, loan guarantees appear to be associated with smaller loans, contrary to the hypothesis. Perhaps the explanation is that if the lender requires a loan guarantee, it is an indication of lower credit quality and in those cases, a lender may only be willing to offer a smaller line of credit. Loan guarantees are associated with higher leverage (see Table 2-VII, where LEVERAGE is positive and significant), consistent with this explanation. Additional support is provided in Table 2-IV, where the coefficient is negative and significant on AO_DB_CREDRK, which is a 1 to 6 point D&B credit score where a higher rating is less risky. A further argument in favor of this is the fact that GRANTPCT is positive and significant where LOCG is the dependent variable. Loan guarantees then appear to be implanted as a means to raise the amount of credit granted relative to the request. This is also consistent with the use of loan guarantees by the US SBA. Borrowers are only eligible for SBA loan guarantees if a lender will not grant the loan. In such cases, the loan guarantee is the final factor that

permits the lender to make the loan. This result may be an indication of a similar, routine practice.

Hypothesis H2 also states that lines of credit will be larger when collateral is required. The presence of collateral does not explain the size of the loan when LSIZEP is the dependent variable (Table 2-XIV). However, larger loans increase the probability that collateral will be required when COLLAT is the dependent variable (Table 2-XII).

Consistent with Chakraborty and Hu (2006), the length of the banking relationship is significant is all the second stage results. A longer relationship is associated with a lower probability of a loan guarantee, a lower probability of a collateral requirement, but is associated with higher interest rates and smaller lines of credit. However, all the estimates suggest the practical effect is small as the coefficients are all small. The finding here that the length of the relationship is significant is inconsistent with Brick and Palia (2007) who find no significance to the relationship length.

Based on the results provided, loan guarantees appear to be used more frequently for limited liability firms perhaps as a way to obtain greater assurance of repayment from the personal wealth of the owner. This speculation cannot be confirmed because the nature of the guarantee is not known. Loan guarantees are also used more frequently with more leveraged firms and those with lower credit ratings, consistent with the notion that guarantees are a means to assure repayment. Longer banking relationships are associated with less frequent use of guarantees. The interest rate and size of the line of credit offer no significant explanation for the presence of a loan guarantee. The use of collateral also does not explain the use of loan guarantees.

The interest rate charged is lower in the presence of a loan guarantee, but not

significantly affected by the use of collateral or compensating balances.

Loan guarantees are associated with smaller loans, possibly an indication of poor credit quality. It appears that lower credit quality is addressed though the use of loan guarantees and limited the size of lines of credit granted. In this case, loan size and guarantees appear to be complementary.

2.6. *Conclusion*

In this research, loan guarantees are found to have a negative effect on the size of loans and also a negative effect on the interest rate of the loans. There is some evidence that loan guarantees and collateral are substitutes as the presence of a loan guarantee lowers the likelihood of a collateral requirement. Measures of liquidity and leverage affect the use of loan guarantees, while they do not significantly affect the use of collateral. The presence of more fixed assets lowers the likelihood of both loan guarantees and collateral. Both loan guarantees and collateral are explained, in part, by the ratio of the amount of credit granted to that applied for. However, the signs are different, so loan guarantees are more probable as the loan amount increases but collateral is less likely. This, perhaps, is a reflection that the two are substitutes. The variable GRANTPCT may be suggesting that there is more bargaining with collateral requirements and loan guarantees than interest rates or the final size of the line of credit. This explanation is suggested and not conclusive. A more detail explanation for this behavior is beyond the scope of this research and will be left for the future.

As with Brick and Palia (2007), there is some evidence of simultaneity among the terms of lines of credits which, absent the use of an appropriate econometric procedure,

may provide inconsistent results. Both the Brick and Palia (2007) and Chakraborty and Hu (2006) research used only the 1993 Survey of Small Business Finances. This study, instead, uses the 2003 survey. Examining the differences among the surveys would be a worthwhile endeavor for future research.

Brick and Palia (2007) and much other prior research examines the effects of lending relationships on the terms of lending. Different authors have found no effect or some significance to the relationship. In this research, the length of the relationship is used as a measure of its effect, similar to that used by Brick and Palia (2007). This research goes further and adds a variable which is the number of lending relationships a firm has. The presence of more banking relationships seems to suggest a weaker relationship. If both measure an aspect of the effect of the lending relationship, their signs should be opposite. A longer relationship is presumed to be a stronger relationship, but more lending relationships suggest a weaker relationship. For loan guarantees a stronger relationship is associated with a lower probability of a loan guarantee, and both variables are significant. For collateral, only the length of the relationship is significant, but it indicates that a longer relationship is associated with a lower probability of collateral. In the case of the interest rate, the two variables have the same sign, so their effects are in opposition. For the size of the loan, a stronger relationship is associated with smaller loans, contrary to what might be expected. As with the prior research, relationship effects are complex, but this study does add to the understanding.

2.7. *References*

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TABLE 2-I. – Variable Definitions

Dependent Variables

LOCG	binary variable indicating a guarantee (1 = present)
RATE	nominal initial interest rate charged for line of credit
LSIZEP	dollar value of the line of credit divided by total assets
COLLAT	binary variable indicating collateral (1 = required)

Instrumental Variables

LOCG_I	Instrument for LOCG
RATE_I	Instrument for RATE
LSIZEP_I	Instrument for LSIZEP
COLLAT_I	Instrument for COLLAT

Control Variables

RATEOVRINDEX	initial interest rate premium over index used
FEES	Fees imposed as % of loan
FSIZE	natural log of firm's assets
EMPLOY	number of full-time employees in survey year
LEVERAGE	ratio of debt to total assets
CASH	ratio of cash to total assets
PPE	ratio of net depreciable assets divided by total assets
INC	net income divided by sales
OPINC	operating profit divided by sales
NUMLOC	number of lines of credit for the firm
TERM	term of the line of credit in months
FAGE	age of the firm in years
FIXED	binary variable indicating fixed interest rate (1 = fixed)
DISTANCE	distance in miles between firm and lender
RELATE	length of the firm's relationship with lender in years
LIMLIAB	binary variable indicating limited liability legal form
OWNMGR	binary variable indicating presence of owner/manager

NINST	number of financial institutions used by the firm
GRANTPCT	ratio of amount granted divided by amount requested
Industry	7 dummy variables for two digit SIC code groups (8 total)

TABLE 2-II. – Summary Statistics for the 2003 Survey

Variable	N	Mean	Standard Deviation	Sum	Minimum	Maximum
LOCG	1460	0.637	0.481	930.000	0.000	1.000
RATE	1460	5.548	2.405	8100.000	0.000	20.900
LSIZEP	1450	0.661	1.404	958.946	0.001	12.265
FSIZE	1450	13.445	2.205	19495.000	7.601	19.066
COLLAT	1460	0.507	0.500	740.000	0.000	1.000
LEVERAGE	1450	0.685	1.236	992.800	0.000	14.608
FEES	1460	0.007	0.019	10.927	0.000	0.200
CASH	1405	0.139	0.211	195.579	0.000	1.000
INC	1450	0.038	1.731	55.177	-28.978	1.673
TERM	1262	30.989	46.083	39108.000	0.000	432.000
FAGE	1460	17.171	13.168	25069.000	1.000	99.000
NINST	1460	3.873	2.023	5655.000	1.000	13.000
GRANTPCT	1460	1.125	1.016	1642.000	0.075	12.500
RELATE	1460	76.346	98.031	111465.000	0.000	600.000
LIMLIAB	1460	0.798	0.402	1165.000	0.000	1.000
FIXED	1460	0.273	0.445	398.000	0.000	1.000
DISTANCE	1460	14.064	76.486	20533.000	0.000	1110.000
COMPBAL	1460	0.089	0.285	130.000	0.000	1.000
EMPLOY	1460	51.772	77.664	75587.000	1.000	486.000
RATEOVRINDEX	1459	1.203	1.622	1754.000	-1.500	12.000
PPE	1450	0.324	0.288	469.766	0.000	1.000
OWNMGR	1415	0.830	0.375	1175.000	0.000	1.000
NUMLOC	1460	0.182	0.843	265.000	0.000	7.000
MINE	1460	0.010	0.101	15.000	0.000	1.000
CONST	1460	0.082	0.275	120.000	0.000	1.000
MANUF	1460	0.158	0.364	230.000	0.000	1.000
TRANS	1460	0.041	0.199	60.000	0.000	1.000
WHOLE	1460	0.086	0.280	125.000	0.000	1.000
RETAIL	1460	0.164	0.371	240.000	0.000	1.000
INSURE	1460	0.425	0.494	620.000	0.000	1.000

Table 2-III. – Correlation Matrix

	LOCG	RATE	LSIZEP	COLLAT	FSIZE	LEVERAGE	FEES	CASH	INC	TERM	FAGE	NINST	RELATE	LIMLIAB	FIXED	DISTANCE	COMPBAL	EMPLOY	RATEOVRINDEX	PPE	OWNMGR	
LOCG	1																					
	1460																					
RATE	-0.116	1																				
	<.0001																					
	1460	1460																				
LSIZEP	-0.05876	0.06981	1																			
	0.0253	0.0078																				
	1450	1450	1450																			
COLLAT	0.05308	-0.23715	0.05037	1																		
	0.0426	0.0001	0.0552																			
	1460	1460	1450	1460																		
FSIZE	-0.00501	-0.39512	-0.43536	0.25688	1																	
	0.8488	<.0001	<.0001	<.0002																		
	1450	1450	1450	1450	1450																	
LEVERAGE	0.04815	0.06614	0.43006	0.01949	-0.34529	1																
	0.0668	0.0118	<.0001	0.4584	<.0001																	
	1450	1450	1450	1450	1450	1450																
FEES	-0.00436	0.27759	0.08024	-0.02864	-0.21745	0.01851	1															
	0.8677	<.0001	0.0022	0.274	<.0001	0.4813																
	1460	1460	1450	1450	1450	1450	1460															
CASH	-0.02622	0.17088	0.23061	-0.12515	-0.39851	0.3048	0.13769	1														
	0.326	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001															
	1405	1405	1405	1405	1405	1405	1405	1405														
INC	0.07314	0.02315	-0.07032	-0.05384	0.10944	0.03706	-0.00624	0.0443	1													
	0.0053	0.3784	0.0076	0.0404	<.0001	0.1598	0.8124	0.0981														
	1450	1450	1440	1440	1440	1440	1450	1395	1450													
TERM	0.00673	0.03755	0.01224	0.06342	-0.16123	-0.01417	0.06777	0.09384	-0.12563	1												
	0.8112	0.1825	0.6652	0.0242	<.0001	0.6164	0.016	0.001	<.0001													
	1262	1262	1252	1262	1252	1252	1262	1217	1252	1262												
FAGE	0.04982	-0.15696	-0.17389	0.14027	0.33207	-0.1195	-0.08072	-0.20071	0.07828	-0.00539	1											
	0.057	<.0001	<.0001	<.0001	<.0001	<.0001	0.002	<.0001	0.0029	0.8482												
	1460	1460	1450	1460	1450	1450	1460	1405	1450	1262	1460											
NINST	0.11821	-0.06727	-0.16988	0.09061	0.34333	-0.0591	-0.12238	-0.10226	0.05773	-0.01711	0.10774	1										
	<.0001	0.0101	<.0001	0.0005	<.0001	0.0244	<.0001	0.0001	0.0279	0.5437	<.0001	0.1538										
	1460	1460	1450	1460	1450	1450	1460	1405	1450	1262	1460	1460										
RELATE	-0.02132	-0.00525	-0.10226	-0.0472	0.11533	-0.03881	0.00884	-0.11884	0.04162	0.01075	0.30477	-0.03735	1									
	0.4157	0.8413	<.0001	0.0714	<.0001	0.1396	0.7356	<.0001	0.1131	0.7029	<.0001	0.1538	0.7362									
	1460	1460	1450	1460	1450	1450	1460	1405	1450	1262	1460	1460	1460									
LIMLIAB	0.20543	-0.18798	-0.00001	0.1519	0.29435	0.00135	-0.09854	-0.07321	0.06725	-0.14879	-0.05037	0.20464	0.00883	1								
	<.0001	<.0001	0.9996	<.0001	<.0001	0.9591	0.0002	0.006	0.0104	<.0001	0.0543	<.0001	0.7362									
	1460	1460	1450	1460	1450	1450	1460	1405	1450	1262	1460	1460	1460	1460								
FIXED	-0.13281	0.32622	0.09512	-0.08222	-0.24321	0.06256	0.14147	0.08395	-0.09104	0.10523	-0.01448	-0.17004	0.07382	-0.1861	1							
	<.0001	<.0001	0.0003	0.0017	<.0001	0.0172	<.0001	0.0016	0.0005	0.0002	0.5805	<.0001	0.0048	<.0001								
	1460	1460	1450	1460	1450	1450	1460	1405	1450	1262	1460	1460	1460	1460	1460							
DISTANCE	-0.03357	0.00545	-0.02782	0.08233	0.10856	-0.01411	-0.0298	-0.05673	0.03059	-0.00965	0.01385	0.07632	-0.06381	0.03047	-0.02545	1						
	0.1998	0.8351	0.2897	0.0016	<.0001	0.5912	0.2552	0.0335	0.2444	0.7319	0.5971	0.0035	0.0147	0.2446	0.3311							
	1460	1460	1450	1460	1450	1450	1460	1405	1450	1262	1460	1460	1460	1460	1460	1460						
COMPBAL	0.02597	0.00213	0.00901	0.05344	-0.03857	0.05719	0.13942	-0.01238	-0.19826	0.06994	-0.04242	0.03148	0.02329	0.00759	-0.01857	-0.04014	1					
	0.3215	0.9352	0.7319	0.0412	0.1421	0.0294	<.0001	0.6428	<.0001	0.0129	0.1052	0.2293	0.3739	0.772	0.4783	0.1252						
	1460	1460	1450	1460	1450	1450	1460	1405	1450	1262	1460	1460	1460	1460	1460	1460	1460					
EMPLOY	-0.05839	-0.2843	-0.13109	0.2202	0.59177	-0.07883	-0.10047	-0.16009	0.02309	-0.09269	0.19182	0.2962	0.00796	0.24833	-0.18503	0.07412	-0.04911	1				
	0.0257	<.0001	<.0001	<.0001	<.0001	0.0027	0.0001	<.0001	0.3797	0.001	<.0001	<.0001	0.7613	<.0001	<.0001	0.0046	0.0607					
	1460	1460	1450	1460	1450	1450	1460	1405	1450	1262	1460	1460	1460	1460	1460	1460	1460	1460				
RATEOVRINDEX	0.08422	0.02355	-0.04373	-0.07497	-0.01654	-0.03985	-0.01529	0.02962	0.03476	-0.00033	-0.11933	0.08442	-0.10551	0.14418	-0.4543	0.19908	0.04144	0.07893	1			
	0.0013	0.3686	0.0961	0.0042	0.5293	0.1294	0.5595	0.2674	0.186	0.9907	<.0001	0.0012	<.0001	<.0001	<.0001	<.0001	0.1136	0.0026				
	1459	1459	1449	1459	1449	1449	1459	1404	1449	1262	1459	1459	1459	1459	1459	1459	1459	1459	1459			
PPE	-0.08723	0.11316	0.11674	-0.06655	-0.0935	0.09467	0.01104	-0.26428	-0.12392	0.0774	-0.08118	0.01531	-0.00593	-0.18554	0.04862	-0.04321	0.05992	-0.09429	-0.05144	1		
	0.0009	<.0001	<.0001	0.0113	0.0004	0.0003	0.6743	<.0001	<.0001	0.0061	0.002	0.5601	0.8216	<.0001	0.0642	0.1001	0.0225	0.0003	0.0502			
	1450	1450	1450	1450	1450	1450	1450	1405	1440	1252	1450	1450	1450	1450	1450	1450	1450	1450	1449	1450		
OWNMGR	-0.01893	0.15677	0.11572	-0.12703	-0.31421	0.10378	0.06554	0.15786	-0.02219	0.02434	-0.20714	-0.05228	-0.01233	-0.13923	0.06673	-0.1121	0.06998	-0.17492	0.0449	0.05864	1	
	0.4767	<.0001	<.0001	<.0001	<.0001	<.0001	0.0137	<.0001	0.4058	0.3943	<.0001	0.0493	0.643	<.0001	0.012	<.0001	0.0085	<.0001	0.0915	0.028		
	1415	1415	1405	1415	1405	1405	1415	1360	1405	1227	1415	1415	1415	1415	1415	1415	1415	1415	1414	1405	1415	
NUMLOC	-0.07403	-0.0249	-0.06082	-0.06391	0.11958	-0.04984	-0.04688	0.00172	0.01427	-0.00432	0.03518	0.24457	-0.06711	-0.06367	-0.04059	-0.02069	-0.02453	0.21053	0.01412	-0.09395	-0.03729	1
	0.0047	0.3418	0.0205	0.0146	<.0001	0.0578	0.0734	0.9487	0.5872	0.878	0.1791	<.0001	0.0103	0.015	0.1211	0.4294	0.3489	<.0001	0.5901	0.0003	0.1609	
	1460	1460	1450	1460	1450	1450	1460	1405	1450	1262	1460	1460	1460	1460	1460	1460	1460	1460	1459	1450	1415	1460

TABLE 2-IV. – Logistic Regression

Dependent variable is LOCG (present = 1), N=999
Likelihood Ratio (Chi-squared) = 319.599 (p <.0001)

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	556	266.2	4.3612	0.0368
RATE	1	-0.1251	0.0528	5.6086	0.0179
LSIZEP	1	0.4579	0.142	10.3991	0.0013
FSIZE	1	0.2461	0.0956	6.6257	0.0101
COLLAT	1	-0.3494	0.1904	3.3684	0.0665
FEES	1	6.1701	7.365	0.7018	0.4022
CASH	1	-0.8657	0.6619	1.7107	0.1909
INC	1	1.0961	0.4386	6.2448	0.0125
TERM	1	0.0028	0.00253	1.2289	0.2676
FAGE	1	0.0351	0.00959	13.4213	0.0002
NINST	1	0.2198	0.0504	18.9993	<.0001
RELATE	1	-0.00232	0.00105	4.8736	0.0273
LIMLIAB	1	1.1072	0.2714	16.6493	<.0001
FIXED	1	-0.6158	0.2838	4.7082	0.03
DISTANCE	1	0.0147	0.00481	9.3303	0.0023
COMPBAL	1	0.888	0.416	4.5573	0.0328
RATEOVRINDEX	1	0.0229	0.0758	0.0912	0.7626
PPE	1	-1.1214	0.444	6.3781	0.0116
OWNMGR	1	-0.1876	0.25	0.5629	0.4531
NUMLOC	1	-0.174	0.118	2.1761	0.1402
MINE	1	-0.6846	0.8501	0.6486	0.4206
CONST	1	0.6858	0.5782	1.4071	0.2355
MANUF	1	-0.3361	0.5552	0.3664	0.545
TRANS	1	0.0158	0.7061	0.0005	0.9821
WHOLE	1	-1.2726	0.5629	5.1118	0.0238
RETAIL	1	0.7197	0.5741	1.5715	0.21
INSURE	1	0.2457	0.5476	0.2013	0.6537
Assets	1	-4.74E-08	1.20E-08	15.7006	<.0001
EMPLOY	1	-0.00729	0.00151	23.3104	<.0001
trading	1	-0.2889	0.5459	0.28	0.5967
liaboverassets	1	1.8347	0.4352	17.772	<.0001
LEVERAGE	1	-1.112	0.4619	5.7971	0.0161
roa	1	-0.1576	0.0722	4.7642	0.0291
Quick	1	0.00672	0.00965	0.4853	0.486
C_AGE_1	1	-0.0256	0.0105	5.9296	0.0149
C_SHARE_1	1	0.00152	0.00383	0.1584	0.6907
ownerjudge	1	1.1217	0.5393	4.3271	0.0375
delinq	1	-0.7552	0.3626	4.3379	0.0373
U8	1	-2.62E-08	1.81E-08	2.1002	0.1473
A0_DB_CREDRK	1	-0.1991	0.0718	7.6785	0.0056
ownbankrupt	1	15.4319	516.5	0.0009	0.9762
firmjudge	1	-1.9075	0.506	14.2091	0.0002
A0_HHI0	1	0.0666	0.1543	0.1862	0.6661
A10_1	1	0.1402	0.0466	9.0582	0.0026
AUDITED	1	-0.8222	0.3021	7.4089	0.0065
year	1	-0.2787	0.1328	4.4001	0.0359

Concordant (%)	82.5	Somer's D	0.651
Discordant (%)	17.4	Gamma	0.652
Ties (%)	0.1	Tau - a	0.296
Pairs	226850	c	0.825

TABLE 2-V. – OLS Regression

Dependent variable is RATE (Stage 1)

N=999 Adjusted R-squared=.4376

Variable			Standard	t Value	
	1	1409.08629		9.15	<.0001
FSIZE		-0.16007		-3.04	0.0024
COLLAT		-0.27455	0.11476	-2.39	0.0169
	1	-0.32806	0.13583	-2.42	0.0159
FEES	1	21.09981	3.8952		<.0001
CASH	1	0.43275	0.39145	1.11	
INC	1	-0.46028	0.2496		0.0655
TERM		-0.00495	0.00145	-3.41	0.0007
FAGE		-0.00125	0.00515	-0.24	0.8088
RELATE	1	0.00221	0.00061244	3.61	0.0003
LIMLIAB	1	-0.57056		-3.29	0.0011
FIXED	1	2.01952	0.15803	12.78	<.0001
	1	-0.00244		-1.9	
COMPBAL		0.23815	0.2309		0.3026
EMPLOY	1	-0.00071482	0.00085025	-0.84	0.4007
RATEOVRINDEX	1	0.37397	0.04426	8.45	<.0001
	1	0.35285	0.24918	1.42	0.1571
OWNMGR	1	0.26591	0.15583		
	1	-0.0611	0.08037	-0.76	0.4473
MINE	1	1.03387	0.6168	1.68	
CONST	1	-0.13577	0.36784	-0.37	
	1	1.04843	0.35206	2.98	0.003
TRANS	1	1.05417	0.42026	2.51	0.0123
WHOLE	1	0.70948	0.3645	1.95	0.0519
RETAIL	1	-0.12194	0.35877	-0.34	0.734
INSURE	1	0.84036	0.35368	2.38	0.0177
Assets	1	-1.21E-08	3.61E-09	-3.36	0.0008
trading	1	1.01982	0.35929	2.84	0.0046
liaboverassets		0.29745	0.13373	2.22	0.0264
roa		-0.00427	0.01862		
	1	0.0003875	0.00029792		0.1937
C_AGE_1	1		0.00643	-2.38	0.0174
	1		0.00238	1.71	0.0884
ownerjudge	1	-1.53404	0.31356	-4.89	<.0001
delinq	1	0.70689		3.19	
U8	1	6.34E-09	7.90E-09	0.8	0.4225
A0_DB_CREDRK	1	0.15583	0.04281	3.64	0.0003
		-0.2062	0.46997	-0.44	0.6609
firmjudge	1	0.79185	0.3124	2.53	0.0114
	1	-0.38172	0.09431	-4.05	<.0001
NINST	1	0.07444	0.02948	2.52	0.0117
A10_1	1	0.0631	0.02496	2.53	0.0116
AUDITED	1	-0.45096	0.17782	-2.54	0.0114
year	1	-0.70005	0.07686	-9.11	<.0001

TABLE 2-VI. – OLS Regression

Dependent variable is LSIZEP (stage 1)
N = 999 Adjusted R-squared = .7114

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-252.48034	59.50642	-4.24	<.0001
FSIZE	1	-0.08553	0.02034	-4.2	<.0001
COLLAT	1	0.32738	0.04434	7.38	<.0001
LEVERAGE	1	0.00624	0.05248	0.12	0.9054
FEES	1	3.37984	1.505	2.25	0.0249
CASH	1	0.54338	0.15124	3.59	0.0003
INC	1	-0.78276	0.09644	-8.12	<.0001
TERM	1	-0.00039662	0.00056106	-0.71	0.4798
FAGE	1	-0.00543	0.00199	-2.73	0.0064
RELATE	1	-0.00098276	0.00023663	-4.15	<.0001
LIMLIAB	1	0.07471	0.06709	1.11	0.2657
FIXED	1	-0.05499	0.06106	-0.9	0.368
DISTANCE	1	0.00030635	0.00049573	0.62	0.5367
COMPBAL	1	0.15574	0.08921	1.75	0.0812
EMPLOY	1	0.0003946	0.00032851	1.2	0.23
RATEOVRINDEX	1	-0.02215	0.0171	-1.3	0.1955
PPE	1	0.01953	0.09628	0.2	0.8393
OWNMGR	1	0.16455	0.06021	2.73	0.0064
NUMLOC	1	0.01642	0.03105	0.53	0.5971
MINE	1	0.30472	0.23831	1.28	0.2013
CONST	1	-0.30424	0.14212	-2.14	0.0326
MANUF	1	-0.4217	0.13603	-3.1	0.002
TRANS	1	-0.28305	0.16238	-1.74	0.0816
WHOLE	1	-0.2571	0.14083	-1.83	0.0682
RETAIL	1	-0.49565	0.13862	-3.58	0.0004
INSURE	1	-0.21053	0.13665	-1.54	0.1237
Assets	1	1.43E-09	1.40E-09	1.03	0.3055
trading	1	-0.22341	0.13882	-1.61	0.1079
liaboverassets	1	0.07595	0.05167	1.47	0.1419
roa	1	0.20394	0.0072	28.34	<.0001
Quick	1	-0.00019616	0.00011511	-1.7	0.0887
C_AGE_1	1	0.01192	0.00248	4.8	<.0001
C_SHARE_1	1	0.00028565	0.00091779	0.31	0.7557
ownerjudge	1	0.50629	0.12115	4.18	<.0001
delinq	1	-0.64274	0.08568	-7.5	<.0001
U8	1	3.41E-09	3.05E-09	1.12	0.2642
A0_DB_CREDRK	1	0.04059	0.01654	2.45	0.0143
ownbankrupt	1	0.74516	0.18158	4.1	<.0001
firmjudge	1	0.96451	0.1207	7.99	<.0001
A0_HHI0	1	0.03614	0.03644	0.99	0.3215
NINST	1	-0.05133	0.01139	-4.51	<.0001
A10_1	1	0.02324	0.00964	2.41	0.0162
AUDITED	1	0.05363	0.06871	0.78	0.4352
year	1	0.12643	0.0297	4.26	<.0001

TABLE 2-VII. – Logistic Regression (Stage 2)

Dependent variable is LOCG (present = 1)
N = 999
Likelihood Ratio (Chi-squared) = 193.4505 (p <.0001)

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Adjusted p
Intercept	1	1.7856	1.3478	1.7551	0.1852	0.162
RATE_i	1	0.0175	0.121	0.0208	0.8852	0.879
LSIZE_i	1	-0.1573	0.1177	1.7859	0.1814	0.159
FSIZE	1	-0.1914	0.0683	7.8567	0.0051	0.003
COLLAT	1	-0.1086	0.1692	0.4119	0.521	0.498
LEVERAGE	1	0.4885	0.1597	9.3556	0.0022	0.001
FEES	1	4.3147	6.3613	0.4601	0.4976	0.474
CASH	1	-1.2443	0.5655	4.8414	0.0278	0.020
INC	1	0.5191	0.3401	2.3302	0.1269	0.107
TERM	1	0.00282	0.00208	1.839	0.1751	0.153
FAGE	1	0.0224	0.00666	11.3272	0.0008	0.000
NINST	1	0.2029	0.046	19.4565	<.0001	0.000
RELATE	1	-0.00278	0.000867	10.2486	0.0014	0.001
LIMLIAB	1	1.3251	0.2513	27.8043	<.0001	0.000
FIXED	1	-1.1516	0.2874	16.0567	<.0001	0.000
DISTANCE	1	0.0123	0.00447	7.5795	0.0059	0.004
COMPBAL	1	0.5979	0.3482	2.949	0.0859	0.070
EMPLOY	1	-0.00447	0.00122	13.3865	0.0003	0.000
RATEOVRINDEX	1	-0.0665	0.0742	0.8044	0.3698	0.344
PPE	1	-1.1923	0.3628	10.8022	0.001	0.001
OWNMGR	1	-0.0769	0.2039	0.1421	0.7062	0.691
NUMLOC	1	-0.1428	0.1025	1.9414	0.1635	0.142

Concordant (%)	76.1	Somer's D	0.523
Discordant (%)	23.7	Gamma	0.524
Ties (%)	0.2	Tau - a	0.238
Pairs	226850	c	0.762

TABLE 2-VIII. – OLS Regression (Stage 2)

Dependent variable is RATE
N=999
Adjusted R-squared = .3989

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	1365.855	154.466	8.84	<.0001
LOCG_I	1	-0.94375	0.352867	-2.67	0.0076
LSIZEP_I	1	-0.10158	0.075725	-1.34	0.1801
FSIZE	1	-0.2489	0.047177	-5.28	<.0001
COLLAT	1	-0.1976	0.117378	-1.68	0.0926
LEVERAGE	1	-0.00462	0.056189	-0.08	0.9345
FEES	1	26.65432	3.618188	7.37	<.0001
CASH	1	-0.2058	0.394521	-0.52	0.602
INC	1	-0.38543	0.233926	-1.65	0.0997
TERM	1	-0.0037	0.001477	-2.51	0.0123
FAGE	1	-0.00479	0.004391	-1.09	0.2756
RELATE	1	0.001566	0.000641	2.44	0.0148
LIMLIAB	1	-0.23338	0.202021	-1.16	0.2483
FIXED	1	1.446405	0.167861	8.62	<.0001
DISTANCE	1	-0.00155	0.00134	-1.16	0.246
COMPBAL	1	0.324661	0.232871	1.39	0.1636
EMPLOY	1	-0.00212	0.000869	-2.44	0.0148
RATEOVRINDEX	1	0.314604	0.044411	7.08	<.0001
PPE	1	0.181853	0.247838	0.73	0.4633
OWNMGR	1	0.275939	0.14445	1.91	0.0564
NUMLOC	1	-0.04566	0.074136	-0.62	0.5381
NINST	1	0.141287	0.032131	4.4	<.0001

TABLE 2-IX. – OLS Regression (Stage 2)

Dependent variable is LSIZEP
N = 999
Adjusted R-squared = .3243

Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	4.962929	0.542892	9.14	<.0001
LOCG_I	1	-0.84096	0.205911	-4.08	<.0001
RATE_I	1	-0.19599	0.047259	-4.15	<.0001
FSIZE	1	-0.28519	0.026576	-10.73	<.0001
COLLAT	1	0.173804	0.07	2.48	0.0132
LEVERAGE	1	0.291817	0.030777	9.48	<.0001
FEES	1	11.41985	2.549563	4.48	<.0001
CASH	1	-0.18441	0.233831	-0.79	0.4305
INC	1	0.26572	0.140366	1.89	0.0586
TERM	1	-0.00143	0.00089	-1.61	0.1081
FAGE	1	0.001412	0.002634	0.54	0.5919
RELATE	1	-0.00084	0.000381	-2.2	0.0281
LIMLIAB	1	0.556778	0.120009	4.64	<.0001
FIXED	1	-0.15582	0.124577	-1.25	0.2113
DISTANCE	1	0.000943	0.000797	1.18	0.237
COMPBAL	1	0.013996	0.13933	0.1	0.92
EMPLOY	1	0.001204	0.00052	2.31	0.0209
RATEOVRINDEX	1	-0.03368	0.030305	-1.11	0.2667
PPE	1	0.157069	0.148414	1.06	0.2902
OWNMGR	1	-0.02648	0.085728	-0.31	0.7575
NUMLOC	1	0.014198	0.043846	0.32	0.7462
NINST	1	0.038768	0.019131	2.03	0.043

TABLE 2-X. – Hausman Test for Exogenous Variables

HAUSMAN TEST FOR EXOGENOUS VARIABLES

Dependent Variable	Residuals from OLS Rate regression p value	Residuals from OLS Loan Size regression p value
RATE	-	0.2533
LSIZEP	0.2521	-
LOCG	0.0784 *	0.0067 ***

significance denoted by ***, **, * for the 1%, 5%, and 10% level, respectively

TABLE 2-XI. – Logistic Regression (Stage 2)

Dependent variable is LOCG (present = 1)
N = 999
Likelihood Ratio (Chi-squared) = 199.0581 (p <.0001)

Parameter	Expected Sign	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Adjusted p	
Intercept		1.6359	1.37	1.4259	0.2324	0.212	
COLLAT_I	-	0.4571	0.6199	0.5437	0.4609	0.441	
RATE_I	-	0.055	0.1198	0.2105	0.6464	0.631	
LSIZEP_I	+	-0.1234	0.1214	1.0329	0.3095	0.288	
FSIZE		-0.2225	0.0711	9.8006	0.0017	0.001	***
LEVERAGE		0.4797	0.1603	8.9604	0.0028	0.002	***
FEES		4.9409	6.3538	0.6047	0.4368	0.416	
CASH		-1.2096	0.5701	4.5023	0.0338	0.026	**
INC		0.219	0.4015	0.2976	0.5854	0.568	
TERM		0.00284	0.00225	1.5923	0.207	0.187	
FAGE		0.02	0.00681	8.6389	0.0033	0.002	***
NINST		0.1867	0.046	16.4583	<.0001	0.000	***
GRANTPCT		0.2242	0.0938	5.715	0.0168	0.012	**
RELATE		-0.00249	0.000956	6.7683	0.0093	0.006	***
LIMLIAB		1.3934	0.2531	30.3097	<.0001	0.000	***
FIXED		-1.2332	0.2882	18.3157	<.0001	0.000	***
DISTANCE		0.0108	0.00466	5.4297	0.0198	0.015	**
COMPBAL	+	0.5721	0.357	2.5684	0.109	0.094	*
EMPLOY		-0.00435	0.00122	12.6546	0.0004	0.000	***
RATEOVRINDEX		-0.0614	0.0786	0.6107	0.4345	0.414	
PPE		-1.1364	0.4057	7.8464	0.0051	0.003	***
OWNMGR		-0.0503	0.2083	0.0583	0.8092	0.801	
NUMLOC		-0.1079	0.1059	1.0377	0.3084	0.287	

Concordant (%)	76.5	Somer's D	0.532
Discordant (%)	23.3	Gamma	0.533
Ties (%)	0.2	Tau - a	0.242
Pairs	226850	c	0.766

significance denoted by ***, **, * for the 1%, 5%, and 10% level, respectively

TABLE 2-XII. – Logistic Regression (Stage 2)

Dependent variable is COLLAT (present = 1)
N = 999
Likelihood Ratio (Chi-squared) = 286.869 (p <.0001)

Parameter	Expected Sign	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq	Adjusted p	
Intercept		-0.00351	1.4226	0	0.998	0.998	
LOCG_I	-	-0.9495	0.5219	3.31	0.0689	0.071	*
RATE_I	-	-0.4833	0.1157	17.4471	<.0001	0.000	***
LSIZEP_I	+	0.4053	0.1255	10.4369	0.0012	0.001	***
FSIZE		0.1949	0.0759	6.5982	0.0102	0.011	**
LEVERAGE		0.0214	0.0854	0.0627	0.8023	0.804	
FEES		7.5784	6.309	1.4429	0.2297	0.234	
CASH		-0.4446	0.544	0.668	0.4138	0.418	
INC		1.2889	0.3766	11.7138	0.0006	0.001	***
TERM		0.00701	0.00244	8.2351	0.0041	0.004	***
FAGE		0.0132	0.0068	3.7865	0.0517	0.054	*
NINST		0.0634	0.0461	1.8858	0.1697	0.173	
GRANTPCT		-0.352	0.1206	8.5135	0.0035	0.004	***
RELATE		-0.0029	0.000926	9.7953	0.0017	0.002	***
LIMLIAB		-0.1686	0.2937	0.3296	0.5659	0.569	
FIXED		0.3721	0.2963	1.5766	0.2093	0.213	
DISTANCE		0.025	0.00644	15.0206	0.0001	0.000	***
COMPBAL	+	1.1205	0.3645	9.4479	0.0021	0.002	***
EMPLOY		-0.00334	0.00148	5.0944	0.024	0.025	**
RATEOVRINDEX		-0.0308	0.0733	0.1767	0.6742	0.677	
PPE		-1.332	0.377	12.4829	0.0004	0.000	***
OWNMGR		-0.224	0.2145	1.0899	0.2965	0.301	
NUMLOC		-0.1978	0.1091	3.2834	0.07	0.072	*

Concordant (%)	79.5	Somer's D	0.591
Discordant (%)	20.4	Gamma	0.591
Ties (%)	0.1	Tau - a	0.292
Pairs	246078	c	0.795

significance denoted by ***, **, * for the 1%, 5%, and 10% level, respectively

TABLE 2-XIII. – OLS Regression (Stage 2)

Dependent variable is RATE
N=999
Adjusted R-squared = .3965

Variable	Expected Sign	Parameter Estimate	Standard Error	t Value	Pr > |t|	
Intercept		1410.404	159.9105	8.82	<.0001	***
COLLAT_I	-	0.337321	0.419803	0.8	0.4219	
LOCG_I	-	-0.87179	0.354412	-2.46	0.0141	**
LSIZEP_I	?	-0.06317	0.077256	-0.82	0.4138	
FSIZE		-0.26347	0.051399	-5.13	<.0001	***
LEVERAGE		-0.03115	0.057438	-0.54	0.5877	
FEES		27.14055	3.673374	7.39	<.0001	***
CASH		-0.14923	0.395215	-0.38	0.7058	
INC		-0.57723	0.269188	-2.14	0.0323	**
TERM		-0.00439	0.00156	-2.81	0.005	***
FAGE		-0.00629	0.004431	-1.42	0.1558	
RELATE		0.002012	0.000695	2.89	0.0039	***
LIMLIAB		-0.2556	0.205702	-1.24	0.2143	
FIXED		1.501037	0.172206	8.72	<.0001	***
DISTANCE		-0.00219	0.001406	-1.56	0.1196	
COMPBAL	?	0.261787	0.237327	1.1	0.2703	
EMPLOY		-0.00222	0.00088	-2.52	0.0119	**
RATEOVRINDEX		0.340663	0.048513	7.02	<.0001	***
PPE		0.321277	0.268936	1.19	0.2325	
OWNMGR		0.318567	0.148363	2.15	0.032	**
NUMLOC		-0.01677	0.076618	-0.22	0.8268	
NINST		0.138426	0.032074	4.32	<.0001	***
GRANTPCT		0.051839	0.064012	0.81	0.4182	

significance denoted by ***, **, * for the 1%, 5%, and 10% level, respectively

TABLE 2-XIV. – OLS Regression (Stage 2)

Dependent variable is LSIZEP
N=999
Adjusted R-squared = .3201

Variable	Expected Sign	Parameter Estimate	Standard Error	t Value	Variable Pr > |t|	
Intercept		4.9651	0.54324	9.14	<.0001	***
COLLAT_I	+	-0.34085	0.23872	-1.43	0.1537	
LOCG_I	+	-0.81473	0.205854	-3.96	<.0001	***
RATE_I	?	-0.1815	0.047225	-3.84	0.0001	***
FSIZE		-0.27026	0.02916	-9.27	<.0001	***
LEVERAGE		0.304582	0.030877	9.86	<.0001	***
FEES		10.54297	2.570075	4.1	<.0001	***
CASH		-0.23177	0.233219	-0.99	0.3206	
INC		0.384306	0.157705	2.44	0.015	**
TERM		-0.00054	0.000928	-0.58	0.5631	
FAGE		0.002097	0.00264	0.79	0.4272	
RELATE		-0.00118	0.000401	-2.94	0.0033	***
LIMLIAB		0.575649	0.122094	4.71	<.0001	***
FIXED		-0.22951	0.126073	-1.82	0.069	*
DISTANCE		0.001586	0.000823	1.93	0.0542	
COMPBAL	?	0.083414	0.140926	0.59	0.5541	
EMPLOY		0.001391	0.00052	2.67	0.0077	***
RATEOVRINDEX		-0.06369	0.031666	-2.01	0.0446	**
PPE		-0.02375	0.161072	-0.15	0.8828	
OWNMGR		-0.07046	0.08679	-0.81	0.4171	
NUMLOC		-0.00905	0.045275	-0.2	0.8416	
NINST		0.033616	0.018933	1.78	0.0761	*
GRANTPCT		0.035809	0.037653	0.95	0.3418	

significance denoted by ***, **, * for the 1%, 5%, and 10% level, respectively

CHAPTER III

ESSAY 2: NON-PRICE TERMS OF LENDING FOR SMALL BUSINESS AND FARM LOANS

3.1. *Introduction and Prior Research*

Banks set lending terms in a negotiation with borrowers in an effort to earn a target rate of return and manage the probability of default (PD) and loss given default (LGD). Varying interest rates and non-price terms, such as collateral, can reduce the LGD. However, Stiglitz and Weiss (1981) show that raising interest rates and increasing collateral requirements above a maximum amount can actually reduce the expected return to the bank. This occurs because of adverse selection, in which case only the riskiest borrowers will accept the higher interest rates. Because of this behavior, lenders would have more risk than the higher interest rates compensate for, explaining the lower returns to the lender as interest rates increase. Given this situation, it is rational for banks to ration credit (refuse to lend to certain borrowers), rather than attempt to price it with higher interest rates. This explains why total lending volume may decline in response to tightened lending standards.

Many other authors have examined the use of collateral as a non-price means to

resolve the asymmetric information between borrower and lender. The borrower knows better than the lender the true risk of the business, and in the case of small businesses, information asymmetry is higher because of the absence of public disclosure of financial data, as is the case with publicly traded companies. Boot and Thakor (1994) examine the use of collateral and conclude that collateral is more likely to be used on a first loan related to a short or non-existent prior banking relationship. The need for collateral can then be reduced or eliminated on subsequent loans to the same borrower following a successful initial loan contract

Small borrowers tend to be more informationally opaque than large, publicly traded firms. There is a large body of research that examines bank relationship lending by banks. In this case, the banks place some reliance upon the prior relationship with a borrower and the knowledge gained from that relationship, such as cash flows observed in checking accounts. There are a group of studies that focus on the effects of the lender-borrower relationship on interest rates and the use of collateral. Machauer and Weber (1998) find that German borrowers offer more collateral to their "housebank", the bank with whom they have a primary banking relationship. In this case, it appears the banks may exploit the relationship or are using their private knowledge of the small firm to set the terms of lending. This seems to suggest that a closer banking relationships lead to greater use of collateral, perhaps because the inside knowledge of the lender enable them to identify collateral which might be available to pledge. Contrary to this finding, Elsas and Krahnen (1999) find an inverse relationship between the use of collateral and the strength of the banking relationship. Brick and Palia (2007) examine the use of collateral, loan interest rates, and the length of lending relationships. Here, the length of the

banking relationship is used as a measure of the strength of the relationship. They review prior research noting mixed findings on the inter-relationships among interest rate, collateral, and the length of the banking relationship. Berger and Udell (1990) find a positive relationship between the use of collateral and interest rates, whereas in a later study, Berger and Udell (1990) find a no relationship.

Chakraborty and Hu (2006) examine the use of collateral in small business loans. They examine multiple types of loans, including lines of credit and others types, such as fixed term loans. They find a negative relationship between the length of the bank-borrower relationship and the use of collateral for lines of credit. The relationship length is not significant for other types of loans. One key difference between the research of Brick and Palia (2007) versus Chakraborty and Hu (2006) is whether the terms of lending are endogenous or exogenous. Brick and Palia (2007) argue that they are endogenous and use a two-stage procedure in their econometric analysis. This same method is employed in Essay 1 for the same reason. Both Essay 1 and Brick and Palia (2007) find evidence that key loan terms are in fact determined jointly, or simultaneously, and therefore those variables are not predetermined but rather are endogenous. The following table summarizes the research discussed above. Overall, there is mixed evidence with regard to the relationship between length of the bank lending relationship and the use of collateral. There is also mixed empirical evidence regarding the interplay between the use of collateral and other lending terms.

Summary of Prior Literature on Use of Collateral

Authors	Year	Dependent Variable	Independent variable	Findings
Boot & Thakor	1994	Theoretical model		collateral and interest rate affected by relationship; interest rate drops and so does the need for collateral following a successful loan
Berger & Udell	1995	Rate Premium	Collateral (ns) Relationship (-)	collateral not significant lower rate with longer banking relationship
		Collateral (logit)	Relationship (-) Total Asssets (+)	collateral less likely with longer banking relationship collateral more likely with larger firm total assets
Machauer & Weber	1998	Rate Premium	Noncollateral (-)	uncollateralized percentage of credit line negatively related to rate premium (i.e. amount of collateral increases with rate premium)
Chakraborty & Hu	2006	Collateral (logit)	Relationship (-) Total Assets (+)	collateral less likely with longer banking relationship lines of credit only collateral more likely with larger firm total assets
Brick & Palia	2007	Rate Premium	Collateral (+)	significant if collateral is personal (e.g. co-signed) tested only lines of credit [endogenous]

Farm Lending - Both loans to the small non-farm (commercial) business sector and loans to the small farm sector represent different forms of small business lending. Given the substantial differences in the risk these firms face and the types of assets such firms possess, it is possible that lenders to these two sectors may view collateral in significantly different ways. This may especially be true since farm businesses are characterized by large fixed assets in the form of land and equipment and are subject to a high degree of output price volatility.

Another important difference in loans to small businesses and loan to farms is that according to Walraven and Barry (2004), over 60% of farm loans are made by small commercial banks. In contrast, approximately 43% of small non-farm commercial loans (<$100,000) are made by small commercial banks based on the November, 2008 Federal Reserve's Terms of Business Lending survey. Thus, not only are the two borrowing sectors, farm and non-farm, unique their primary lenders are quite different as well.

Walraven and Barry (2004), using data from the Survey of Terms of Bank Lending to Farmers and from call reports, examine the relationship between the effective interest rate charged and various price and non-price terms of lending. They find that secured loans

(using collateral) have a higher effective interest rate as do loans secured by farm real estate. In this case, collateral appears to be a complement to interest rates, rather than being a substitute.

Lown and Morgan (2006) examine the effects of changes in loans standards on the quantity of loans made. They argue that the loan standards variable (taken from the Loan Officer Opinion Survey) is an approximate index for a vector of non-price lending terms. They show, using a VAR model, that the volume of C&I loans (commercial and industrial) is negatively affected by an increase in lending standards.

3.2. *Research Hypotheses*

As discussed above, collateral is a common feature of bank loans that can reduce both the probability-of-default (PD) and the loss- given-default (LGD) to the lender and attempt to control asymmetric information between lender and borrower. The empirical evidence regarding the role of collateral is mixed. Given the previous mixed empirical findings, the following questions will be addressed in this study:

1. What are the differences in the terms of lending between small business commercial loans and similar (non-real estate) loans to farmers, and how do these differences vary over time?
2. In particular, how are loan risk, collateral, and interest rates related for these two different types of farm and non-farm borrower?
3. How are these lending term relationships affected by the size of the lender?

Testable Hypotheses

Farms typically are fixed-asset intensive because both land and equipment is required. As a result, it is anticipated that lenders will seek to use the more readily available and

easy to identify collateral for non-real estate loans to farmers. There is evidence from Chakraborty and Hu (2006) that more collateral is required as the size of the borrower (total assets) increases. Furthermore, small banks typically lend to local and regional small borrowers, which may be concentrated by industry type. This would tend to concentrate credit risk in smaller banks where it is more difficult to diversify their loan portfolio. For example, smaller rural banks located in agricultural areas are like to have a loan portfolio heavily concentrated in farm loans to local borrowers. Therefore, the following three hypotheses are tested:

H1: Collateral will be more prevalent in farm lending than in small non-farm commercial loans

H2: Small banks require more collateral than larger lenders due to their more concentrated higher risk loan portfolios.

H3: The importance of collateral will change over time as lenders modify their underwriting (credit) standards to reflect changes in external economic conditions and their internal risk management strategies.

3.3. *Data*

The Federal Reserve Board conducts two quarterly surveys of the terms of lending, one for business (C&I) lending, and one for lending to farmers. More formally, the business lending survey is named E.2 Survey of Terms of Business Lending (STBL), and the other is named E.15 Agricultural Finance Databook (AFD). Both surveys are quarterly and since 1999Q4 have provided the same information with regard to summary loan data. The AFD has more variables and more detailed information than is provided in the STBL, and in some cases has more years of data. It is subdivided into three sections; A) Amount and Characteristics of Farm Loans Made by Commercial Banks; B)

Selected Statistics from the Quarterly Reports of Condition of Commercial Banks; and C) Reserve Bank Surveys of Farm Credit Conditions and Farm Land Values.

For this study, six variables common to both surveys will be used. These are collateral (percentage of loans secured by collateral), interest rate (effective interest rate charged), risk (1 to 5 loan categories where 5 is the most risky), volume (dollar volume of loans made), maturity (average maturity weighted by loan amount), and commitment (percentage made under commitment). Both farm and non-farm surveys are subdivided into small and large bank (lenders) categories, so comparisons of the effects of bank size can be made by comparing the results of the same model for the two different size categories. Likewise, comparisons between farm lending and C&I lending can be made using identical models with the different data sets. Loans up to $99,000 are included in this study. One additional variable from the Senior Loan Officer Opinion Survey is used. It is the net percentage of domestic bank respondents that are tightening standards. (That is, the percent of banks that have tightening their credit standards less the percentage of banks that have loosened their lending standards).

There are two standards time series, one for small borrowers and one for large. While the size of the typical borrower is not known, since this study examines loans smaller than $100K, it is presumed that the standards series for small borrowers would be most appropriate. Regardless, as shown by Morgan and Lown (2006) the two series are highly correlated. For these time series, the two series have a Pearson correlation coefficient of .968, which is significant at the 1% level. For this study, the small borrower lending standards series will be used.

Although the time series is relatively short (38 quarters), this data does offer the

opportunity for examining effects of changes of lending terms on subsequent borrower behavior. All of the time series were tested for the presence of unit roots using the augmented Dickey Fuller procedure. For the variables where the null hypothesis of a unit root cannot be rejected (5% level of significance), they are included in the model in first difference form. When this is the case, either the first or second letter of the variable name is a "D", indicating it is a differenced variable. Furthermore, if the first letter in a variable name is "F", this indicates that the variable applies to a farm lender. If the last letter is an "L", the variable applies to a large lender.

In Table 3-III, descriptive statistics of the AFD and STBL for the entire time series are provided for the common variables. The data is provided for large farm banks, small farm banks, and for small and large banks. The variables are defined as follows:

1) FOTCOLLAT – Non-real estate collateral as a percent of total loans.

2) DSTANDARDS – percentage of lenders increasing lending standards on a net basis.

3) FDEXRATE – The weighted average effective interest rate of loans in excess of comparable maturity treasury rate.

4) FRISK – weighted average loan risk rating on a scale from 1 to5, with 5 being the highest risk. The risk ratings are assigned by the lender.

5) FDVOLUME – The volume or size of the lenders total loan portfolio in billions of dollars.

6) FMATURE – The weighted average maturity of the loan portfolio in months

7) FCOMMIT – The percentage of loans made under a prior loan commitment arrangement.

The correlation matrices are provided in Table 3-IV. Many of the correlations are not significant. All of the correlation matrices contain two lags of the variable DSTANDARDS. This is done since lags of this variable are significant in some cases in the panel regressions. Further, Granger causality associated with this variable is also shown to be present, the results of which are presented later.

Even though many of the correlation coefficients are not significant, some general observations can be made. For farm lenders, the use of non-real estate collateral is negatively correlated with maturity. This suggests that has farm loan maturities increase, the use of real estate collateral increases since the use of real estate collateral and non-real estate collateral are negatively correlated. Also for farm lenders, the use of non-real estate collateral is negatively correlated with two lags of the lending standards variable, so as lending standards tighten, collateral is used less.

Risk is negatively correlated with lending standards, and lags thereof, for large banks. Risk is weakly and negatively correlated with standards tightening for small banks mildly (11% level of significant). Furthermore, risk is not significantly correlated with changes in lending standards at farm lenders.

To begin to assess the differences between types of loans and the effects of lender size and type, t-tests of the differences in means were performed. The results are provided in Table 3-V. Panel A compares small and large farm lenders. If the t-statistic has a positive sign, then the mean value of the variable for the small lenders is greater than that for the large lender. Panel A indicates that farm lenders use non-real estate collateral in a similar manner. Small farm lenders charge higher nominal rates (79.3 bps higher), make lower risk loans for longer periods of time, and report lower total loan volume. Small

farm lenders issue a lower proportion of loans under commitment (35% lower).

Panel B compares small and large non-farm commercial lenders. All six variables are significantly different for large and small banks (5% level). Small commercial banks require more collateral, charge higher interest rates, issue lower risk loans, lend less total volume of loans, offer longer maturity, and issue a smaller proportion of loans under commitment.

Panel C and D analyze how lending terms differ between large commercial banks and large farm lenders (Panel C) and between small commercial banks and small farm lenders (Panel D). As indicated in Panel C, both types of lenders require similar levels of non-real estate collateral and charge similar nominal interest rates. Commercial banks accept more risk on lower loan volume with higher maturities and a higher proportion of loans made under commitment. As reported in Panel D, small farm lenders and small non-farm banks charge roughly similar nominal interest rates, with small farm lenders charging somewhat higher rates (55.4 bps), which is significant at the 10% level. On the other hand, small commercial banks require more collateral, accept more risk, lend a lower volume, accept longer maturities, and issue a larger proportion of loans under commitment.

In summary, bank size effects are as follows: small banks charge higher nominal interest rates, make less risky loans, lend less total volume, lend with longer maturities, and conduct less lending under commitment. These findings apply regardless of whether the lender is a farm lender or a bank. The effects of lender type (banks versus farm lenders) are summarized as follows, regardless of size: Commercial banks accept higher risk, lend less total volume, offer longer maturities, and lend proportionately more under

commitment.

A. Role of Collateral - One difference between the variables in the two surveys is the presence of two collateral variables in the AFD data. The value of the non-real estate collateral ("other" collateral) variable (OTCOLLAT) is the percentage of loans that have non-real estate collateral. Even though the loans examined in this study are non-real estate loans, a portion of the collateral actually used to support non-real estate lending is based on real estate. Given the nature of farms, it is not surprising that collateral of this type may be used for non-real estate loans. A preliminary evaluation of these two forms of collateral reveals that they are negatively correlated. This suggests subsequent analysis must use a single collateral variable due to a high degree of multi-colinearity It also suggests that total collateral variable which is the sum of real estate collateral (RECOLLAT) and non-real estate collateral (OTCOLLAT) may mask differing relationships. The correlation between the two variables is -0.87.

Machauer and Weber (1998) discuss the presence of "money illusion," which is the tendency for interest rate risk premiums, measured over some risk free rate, to be lower when nominal interest rates are high and higher when nominal rates are low. To borrowers this procedure appears to stabilize their borrowing rates over the interest rate cycle. There is evidence of this rate smoothing phenomenon over the sample period as the correlation between the fed funds rate and the borrowers risk premium (EXRATE) is -0.74.

3.4. *Alternative Models*

A. OLS Model - The first model to be estimated will be of the following

contemporaneous form as follows:

$$COLLATERAL_t = \alpha + \beta_1 STANDARDS_t + \beta_2 EXRATE_t + \beta_3 MATURE + \beta_4 RISK_t + \beta_5 VOLUME_t + \beta_6 COMMIT + \varepsilon_t \quad (1)$$

This equation will be estimated for four categories of lenders: large and small commercial banks and large and small farm lenders. The presence of possible non-stationarity in the data will be examined and corrected as necessary. Furthermore, Newey-West robust coefficients will be used to address the presence of autocorrelation or heteroskedasticity. Depending upon empirical findings, it may be appropriate to include a lag of the STANDARDS variable rather than its contemporaneous value.

B. Vector Auto-Regression (VAR) - In order to capture dynamic time-varying inter-relationships effects among the variables a vector auto-regressive (VAR) model will be estimated similar to the model used by Lown and Morgan (2004). As discussed previously, certain prior studies consider terms of lending to be exogenous, whereas other research considers the terms of lending to be endogenous or jointly determined (See Essay 1 in this dissertation). The VAR procedure is quite flexible since it assumes that all the variables in the model are potentially interrelated or endogenous.

The VAR model will include the same variables as shown in equation (1) except that the right hand side will include lags of both the dependent variable and selected independent variables. Thus, the VAR model is a series of equations, all of the form specified in equation (2), where the number of equations is equal to the number of variables. To illustrate, the general form of the VAR model will be as follows:

$$COLLATERAL_t = \beta_0 + \Sigma\beta_{1i} STANDARDS_{t-i} + \Sigma\beta_{2i} EXRATE_{t-i} + \Sigma\beta_{3i} MATURE_{t-i} + \Sigma\beta_{4i} RISK_{t-i} + \Sigma\beta_{5i} VOLUME_{t-i} + \Sigma\beta_{6i} COMMIT_{t-i} + \Sigma\beta_{7i} COLLATERAL_{t-i} + \varepsilon_t \quad (2)$$

where Σ indicates the inclusion of lags of the variables from time t-1 to time n.

The number of lags (n) to be used is an empirical matter and will be based on the lowest values for the AIC and SIC summary statistics. The number of lags of the variables will be limited because of the relatively short length of the time series. Given the limited number of degrees of freedom, the VAR model will be estimated using only those independent variables found to be statistically significant in equation (1).

The credit standards variable may or may not be exogeneous. Loan and Morgan (2006) suggest that it represents a proxy for all non-price terms of lending. In their research, they find a negative relationship between credit standards and aggregate loan volume and assume credit standards to be exogenous. However, it may be that lenders, in order to properly manage their loan portfolio, may adjust underwriting standards for internal purposes, and not simply in response to external economic factors or monetary policy changes.

C. Granger Causality - Given the expectation that tightening of lending standards will influence both priced and non-price terms of lending, Granger causality tests will be conducted to determine which variable(s) appear to precede or "cause" the other variables to change. While the appropriate number of lags is an empirical matter, prior research suggests that no more than 4 lags should be necessary.

3.5. *Results*

A. OLS Results - Equation (1) was first estimated using OLS for the four categories of lenders. These results are provided in Table 3-VI, Panels A-D. Six variables are used in each model. The credit standards variable used in each model is specified in first

difference form (DSTANDARDS), hence a positive value for the variable would indicate that credit standards are being tightened at an increasing rate. Several other independent variables, loan commitment (COMMMITL), interest rate risk premium (DEXRATEL), and loan volume (VOLUME) are also specified in first difference form as needed to correct for non-stationarity.

The dependent variable in this section is specified in levels, not in first difference form. The model for Large Farm Lenders (Panel A) showed strong first-order auto-correlation, while the Durbin-Watson statistic for the other models was marginal at the 5% level. Thus, all four models include a first-order autoregressive term, AR(1), which proved to be highly significant in all models. In addition, all models were tested for the presence of heteroskedasticity, using both the White and Bruesch-Pagan-Godfrey tests. The results, reported in the Appendix, indicate that heteroskedasticity is not present in any of the models.

*In Panel A, the results for Large Farm Lenders are provided. FMATURITY is significant at the 10% level and carries a negative sign. This result is consistent with the previously mentioned correlation where maturity is negatively correlated with use of non-real estate collateral. FCOMMITL is positive and significant at the 5% level. The credit standards variable is not significant.

The equation estimated in Panel B for small farm loans is significant at the 1% level, but once again the standards variable is not significant. As with large lenders, loan maturity (FMATURE) is negative and statistically significant. Risk is not significant. Maturity is negative and significant, as is the case for large farm lenders. Loan volume is positive and significant, while the coefficient on loan commitment (FCOMMIT) is

negative and significant at the 5% level. The interest rate variables, FRISK and FEXRATE, are not statistically significant.

The OLS results for large commercial banks are provided Panel C. The overall regression is significant at the 1% level and loan risk (RISKL) is the only significant variable in the model and carries a negative coefficient. This sign may appear inconsistent with expectations as it would be expected that banks would require collateral on riskier loans to mitigate the risk. However, as support for this sign, the correlation matrix (Table 3-IV, Panel C) indicates the sign is negative and significant at the 1% level. An alternate explanation for the negative sign is that the loan portfolio is riskier because fewer loans require collateral. This could occur when the competitive environment forces banks to reduce their collateral demands in order to secure the loan.

In Panel D, the results for small commercial banks are provided. Loan volume is significant and negatively related to collateral usage. This negative relationship between loan volume contrasts to the positive but small coefficient reported in Panel B. This may be due to abundant levels of both real estate and non-real estate collateral available from farms borrowers. Loan commitment (DCOMMIT) is also significant at the 10% and negatively related to collateral usage.

Table 3-I provides a summary of the OLS results. In the regression for large farm lenders, maturity and commitment are significant at conventional levels. Maturity is also negative and significant for small farm lenders. Commitment is significant, but negatively related to collateral, contrary to the findings for large farm lenders. For small farm lenders, the first difference of volume is used in the analysis so the proportion of collateral used increases as volume increases. Risk is the only significant variable for

large banks. For small banks, higher volume is associated with a lower proportion of collateral in loans, suggesting looser terms of lending in periods of higher volume. For both types of small lenders, the proportion of loans made under commitment is negatively associated with the proportion of collateral required, suggesting borrowers may benefit from the prior commitment regarding collateral requirements when compared to current lending standards. For small farm lenders, loan maturity is negative and significant, consistent with the finding that non-real estate collateral is negatively related to loan term. The most consistent finding is that commitment is significant in three of the four lender type estimations. In general, each lender category appears to have unique, contemporaneous explanatory variables for the proportion of loans requiring collateral.

TABLE 3-I. – OLS Summary Results

Dependent Variable = COLLATERAL

	sign (+/-)	**Variable**	**Significance**
A. Large Farm Lenders:			
	-	MATURE	*
	+	COMMIT	**
B. Small Farm Lenders:			
	+	VOLUME	*
	-	MATURE	***
	-	COMMIT	**
C. Large Commercial Banks:			
	-	RISK	**
D. Small Commercial Banks:			
	-	VOLUME	**
	-	DCOMMIT	*

*,**,*** denotes significance at 10%, 5%, 1%, respectively

B. VAR Results - VAR models of the form described in equation (2) were estimated for each of the four lender categories and the results are provided in Table 3-II, Panels A-D. Because of the limited number of observations, all the VAR models include the collateral and standards variables, and at least two more variables having the lowest p value in their respective OLS regression. Furthermore, all variables with significance levels below 0.10 are included in the respective VAR model.

The VAR results for large farm lenders are provided in Panel A. In equation (1) DSTANDARDS are explained by one lag of FDOTCOLLATL and one and two lags of FDRISKL. Thus, as collateral is increased lending standards are subsequently loosened, and as loan risk increases credit standards are subsequently tightened. In equation (2) none of lagged variables appear to impact FDOTCOLLATL in a significant way. The strongest explanatory variable identified in equation (3) for FMATUREL is its own value lagged two quarters. One lag of DSTANDARDS is also significant, suggesting that maturities increase in response to tightening standards. In equation (4) the variable FMATUREL lagged one quarter has a positive impact on changes in loan risk (FDRISKL). This suggests that as maturity increases, loan risk subsequently increases.

The results for small farm loans reported in Panel B in equation (1) for DSTANDARDS indicate that none of the explanatory variables are significant. In equation (2), FOTCOLLAT is explained by one lag of DSTANDARDS (negative sign) and two lags of FCOMMIT, which is positive and statistically significant. In equation (3) FDVOLUME is explained by a one quarter lag in its own value which carries a negative coefficient. Thus, an increase in loan volume is followed by a subsequent decrease in volume. In equation (4), FMATURE is explained by one lag of DSTANDARDS and one

lag of FOTCOLLAT, both with positive coefficients. This suggests that as standards tighten and collateral is required more, loan maturities increase. In equation (5), FCOMMIT is explained by both one and two lags of FDVOLUME, where the signs of both coefficients are both positive. This indicates that as volume increases, the proportion of loans made under commitment increases in subsequent quarters.

The results for large commercial banks are provided in Panel C. None of the lags of the variables are significant in explaining the DSTANDARDS in equation (1). One lag of VOLUMEL is positive and significant in explaining OTCOLLAT in equation (2). As previously noted, VOLUMEL was not significant at conventional levels in the contemporaneously OLS model (Table 3-VI, Panel C.), but one lag is significant here, suggesting that loan volume increases lead to increased use of collateral in the following quarter. In equation (3), loan RISK is positively related to its own value lagged one period and the same is true for loan volume in equation (4).

The VAR results for small commercial banks are provided in Panel D. In equation (1) the value of the risk premium lagged two quarters is weakly related to changes in loan standards two quarters later. In equation (2) the one quarter lagged value of OTCOLLAT is positively related to OTCOLLAT. In equation (3) one lag of OTCOLLAT is negative and significant in explaining VOLUME. This result is similar to the findings for small farm lenders where one lag of FOTCOLLAT is positive and significant in the FDVOLUME equation. None of the lagged variables are significant in explaining risk premiums (DEXRATE) as indicated in equation (4), indicating once again that contemporaneous relationships may be more important. However, one lag of DSTANDARDS is significant in the DCOMMIT model, equation (5), suggesting that as

lending standards tighten more loans are made under commitment. Perhaps this occurs because borrowers take advantage of the pre-existing loan commitment to obtain new loans after standards are tightened. Finally, as seen in equation (5) the percent of loan commitments is negatively related to its lagged value.

The VAR results are summarized in Table 3-II. The VAR results present a complex picture of the interaction of the variables over time. In four equations, a lag of standards is significant in the model. However, only once is STANDARDS explained by a lag of another variable. This result could be interpreted as evidence that standards functions more as an exogenous shock as opposed to a internally determined lending policy. This is consistent with the Lown and Morgan (2006) view that this variable is a composite of non-priced terms of lending. As shown in Table 3-II, there is not a consistent pattern of lagged influences, either by lender size or type. Each seems to have its own, unique lagged relationships.

TABLE 3-II. – VAR Results Summary

Lender	2 Lags	1 Lag	No Lag	Dependent Variable
A. Large Farm Lenders:				
	Maturity (-)	Standards (+)	Const (+)	MATURE
	Risk (+)	Risk (+) Collat (-)		STANDARDS
		Maturity (+)	Const (-)	RISK
B. Small Farm Lenders:				
	Commit(+)	Standards(-)	Const(+)	OTCOLLAT
		Collat (+) Standards(+)		MATURE
C. Large Commercial Banks:				
		Volume (+)	Const (+)	OTCOLLAT
D. Small Commercial Banks:				
		Standards(+)		COMMIT

C. Granger Causality - Given the complex lag relationships between the variables as evidenced by the VAR analysis, Granger causality is explored. Table 3-VIII - Panels A-D provides the Granger results for each of the four loan samples. Lags of 5 or more quarters were not found to be significance. In many cases, two lags were sufficient to demonstrate a relationship. For all analyses in this section, 4 quarterly lags are used.

While analyses were conducted among all pairs of variables in the model, only the results indicating Granger causality at the 10% level or better are reported in Table 3-VIII.

Panel A provides the results for large farm lenders. A number of significant relationships are shown. The use of collateral is Granger caused by maturity, loan commitments, and standards. Loan maturity is Granger caused by both risk and volume. Loan risk is Granger caused by the interest rate risk premium. Credit standards is Granger caused by loan commitments.

Panel B provides the results for small farm lenders. The use of collateral is Granger caused by standards and loan commitments and is somewhat similar to the case for large farm lenders, except that maturity is not significant. Maturity is Granger caused by the interest rate premium, loan commitments, and volume. The interest rate premium is Granger caused by standards and loan commitments. Risk and Volume are Granger caused by maturity. Loan commitments are Granger caused by loan volume.

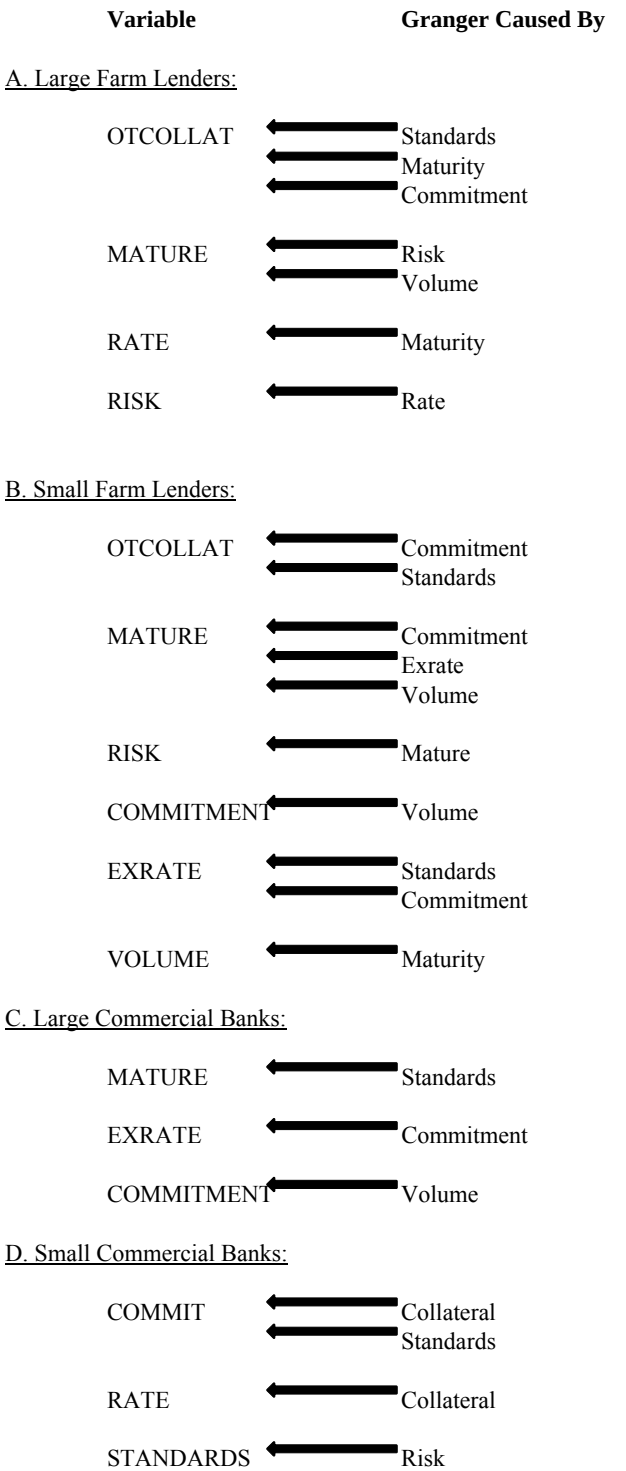
Granger causality appears to be weaker and less prevalent among commercial banks compared to farm lenders. For example for large commercial banks (Panel C), there are a much smaller number of significant relationships. Lending standards Granger causes maturity, while loan commitments Granger cause changes in the interest rate premium, and loan volume Granger causes changes in loan commitments. Finally, Panel D provides the results for small commercial banks. Loan commitments are Granger caused by collateral and credit standards. Collateral Granger causes interest rate premiums and risk Granger causes Standards. For small commercial banks, most of the relationships found are only weakly significant at only the 10% level.

Figure 3-1 provides a summary of the Granger causality results. Many more variables

are shown to Granger cause other terms of lending for both sizes of farm lenders. Collateral is Granger caused by standards and commitments for all farms lenders. Loan maturity is Granger caused by loan volume. Risk is Granger caused by maturity for both as well. As shown in Table 3-V (differences in means), the means of all variables used differ as a function of size for farm lenders, except collateral, where the difference is not significant. But, many aspects of Granger causality are similar among farm lenders.

Unlike farm lenders, the picture of Granger causality is quite different for banks. For each pair of variables where Granger causality is significant, the pairs differ between large and small banks. The only common causal factor is standards where for large banks it Granger causes maturity and for small banks it Granger causes commitment. Each bank type appears to have its own unique relationship with regard to Granger causality.

FIGURE 3.1. – Summary of Granger Causality Results



3.6. *Conclusion*

This study examines the use of non-real estate collateral for small loans (<$100,000)

in four types of lenders: large and small farm lenders and large and small banks. The purpose of the research is to determine how terms of lending differ as a function of lender type and lender size. Four different types of analyses were performed: 1) T-tests for differences in mean values over the 38 quarters of data, 2) panel regressions using OLS, 3) vector auto-regressions (VAR), and 4) Granger causality tests. Hypothesis H1 proposes that collateral is used more frequently among farm loans than commercial loans, and was developed primarily based on the view that collateral is typically more plentiful in farms than other small businesses. Based on univariate t-tests, large farm lenders do use more collateral than large commercial banks, but small commercial banks use collateral more frequently than small farm lenders. Hence, the relationship varies by type of lender.

Hypothesis H2 proposes that small commercial banks use collateral more frequently than large commercial banks. This hypothesis was developed on the basis that small banks would be more risk averse than their larger counterparts and would more frequently impose collateral requirements to reduce their risk. Bi-variate t-tests partially support this hypothesis. All farm lenders appear to use similar levels of collateral, whereas small banks use more collateral more frequently than large banks. Multivariate analyses show that the determinants of collateral differ based on lender characteristics.

For non-real estate loans, farm lenders can require either real estate or other assets (non-real estate) to be pledged as collateral. For all sizes of farm lenders, loan maturity is negative and significant in explaining the use of non-real estate collateral. Thus, the shorter the term of the loan, the more likely the use of non-real estate collateral. Because of the negative correlation between non-real estate ("other") collateral and real estate

collateral, it appears that as maturities lengthen real estate is more often used as collateral. Given the indefinite life of real estate, this finding is suggests that farm lenders match the length of loans with the longevity of the assets used for collateral.

Loan commitment has a somewhat consistent effect on the use of collateral among farm lenders. For small farm lenders, loan commitments explains the use of collateral in the OLS regression and in the VAR results, two lags of commitment are also significant in explaining collateral usage. Commitment is shown to Granger cause the use of non-real estate collateral for both large and small farm lenders. These findings support the view that changes in the proportion of loans made under commitments affects the use of collateral. One possible explanation is that as standards tighten, borrowers may be more inclined to exercise a prior loan commitment rather than requesting a new loan with their current bank or seeking a loan with a new lender. It may also be that under these circumstances, current collateral requirements have become tougher, so it is preferable to the borrower to exercise the prior commitment. In the small farm lender OLS analysis, the coefficient for commitment is negative and significant, which is consistent with this explanation.

The use of non-real estate collateral in small lenders, regardless of type, is influenced by contemporaneous changes in lending volume and commitment. The sign on commitment is always negative, indicating that as the proportion of loans made under commit increase, the proportion of loans requiring collateral decreases. However, the sign on volume is positive for small farm lenders but negative for small commercial banks, indicating a lender type difference in behavior.

In terms of Hypothesis H3, changes in loan credit standards over time play a role in

many of the relationships observed. On a contemporaneous basis, changes in credit standards were not found to be significant in any of the OLS panel regressions. In the VAR analysis, one-quarter lags of credit standards is significant in explaining: 1) maturity in the case of large farm lenders, 2) collateral and maturity for small farm lenders, and 3) loans commitments in small commercial banks. Furthermore, changes in lending standards Granger cause collateral in both size of farm lenders, but does not affect the use of collateral among commercial banks. Changes in lending standards Granger causes maturity in large banks and loan commitment in small banks. In total, changes in lending standards Granger causes five terms of lending variables.

Prior research where the same standards variable is used suggests it is a composite of non-priced terms of lending and is related to economic or monetary policy factors. As such, it is viewed as an exogenous shock. The results in this research tend to support the concept of standards being exogenous, since it is a significant explanatory variable in four models, but is explained by other variable only in one. The Granger causality results also show that in only one case is standards Granger caused by another variable. However, standards Granger causes five other variables and appears at least once in each lender category.

Despite the evidence that standards may be exogenous, the cases where other variables explain standards (contemporaneously or with a time lag) are also of interest. Loan risk is negative and significant in explaining collateral for large banks, but is not significant in any other of the OLS equations. One and two lags of loan risk are positive and significant in the credit standards VAR equation for large farm lenders (Table 3-VII, Panel A, equation (1)). Risk also Granger causes changes in lending standards for small

commercial banks. All of these results suggest that changes in lending standards are made in response to changes in the risk of the loan portfolio, as would be expected of lenders. In these situations, credit standards appear to be endogenous. The fact that credit standards is not significant in any of the OLS results, but is often significant in the VAR analysis and Granger causality tests, suggests that there are time lags in the lender's response to changes in credit standards. Outstanding loan commitments may also play an important role since the loan terms are negotiated before the loan is made. One lag of credit standards is significant in the VAR model in the loan commitment equation for small commercial banks. Maturity has contemporaneous explanatory power in the use of collateral in both sizes of farm lenders, and in either case, as maturity increases less non-real estate collateral is used. On the other hand, for small banks longer maturities are associated with the use of more collateral.

These results illustrate that the use of collateral as an important term of lending is quite complex and varies by the type and size of the lender. Prior research reveals inconsistent findings regarding the use of collateral. This research sheds some light on these inconsistencies because the use of collateral varies by lender type and size. As noted in the comparison of farm versus non-farm lending, different types of collateral appear to be used differently, with real estate collateral being more used more frequently as loan maturities lengthen. In summary, while this research does not completely explain the use of collateral, is does support the notion that it is a complex relationship that varies with the type of lender and the size of the lender and strongly supports the endogenous modeling approach employed in Essay 1.

3.7. *References*

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TABLE 3-III. – Descriptive Statistics
Panel A. Large Farm Lenders

	FDOTCOLLATL	DSTANDARDS	FDEXRATEL	FMATUREL	FDRISKL	FDVOLUMEL	FCOMMITL
Mean	0.172	1.819	0.014	12.415	-0.002	4299.351	84.843
Median	0.244	1.900	0.051	11.767	-0.008	0.000	85.153
Maximum	5.190	21.400	0.554	16.206	0.212	116191.000	92.957
Minimum	-5.341	-27.300	-0.841	9.141	-0.188	-105635.000	73.083
Std. Dev.	2.415	10.569	0.326	1.935	0.091	55936.610	4.023
Observations	37	37	37	37	37	37	37

Panel B. Small Farm Lenders

	FOTCOLLAT	DSTANDARDS	FDEXRATE	FMATURE	FRISK	FVOLUME	FCOMMIT
Mean	83.752	1.819	0.052	18.283	2.410	201647.200	49.734
Median	84.229	1.900	0.058	18.039	2.410	193814.000	50.827
Maximum	90.949	21.400	1.353	25.054	2.535	315965.000	56.678
Minimum	72.414	-27.300	-1.138	11.572	2.234	117463.000	33.412
Std. Dev.	3.706	10.569	0.515	3.020	0.076	48277.800	5.433
Observations	37	37	37	37	37	37	37

Panel C. Large Banks

	OTCOLLATL	DSTANDARDS	EXRATEL	MATUREL	RISKL	VOLUMEL	DCOMMITL
Mean	83.803	1.819	3.281	47.270	3.489	1506.892	0.089
Median	84.100	1.900	3.340	46.000	3.500	1486.000	0.000
Maximum	87.900	21.400	4.480	95.000	3.700	1846.000	2.100
Minimum	78.700	-27.300	2.340	34.000	3.200	1209.000	-3.100
Std. Dev.	2.575	10.569	0.523	10.469	0.113	173.209	1.035
Observations	37	37	37	37	37	37	37

Panel D. Small Banks

	OTCOLLAT	DSTANDARDS	DEXRATE	MATURE	RISK	VOLUME	DCOMMIT
Mean	86.254	1.819	0.022	294.541	3.138	1275.135	0.441
Median	86.100	1.900	-0.020	293.000	3.100	1273.000	0.100
Maximum	90.800	21.400	0.640	409.000	3.300	1682.000	6.400
Minimum	81.100	-27.300	-0.760	203.000	3.000	915.000	-5.700
Std. Dev.	2.909	10.569	0.330	47.004	0.072	141.155	3.381
Observations	37	37	37	37	37	37	37

FOTCOLLAT – Non-real estate collateral, % of loans. The first letter "F" indicates a farm lender, for all variables
DSTANDARDS – percentage of lenders increasing lending standards. The prefix "D" indicates the first difference of the series, used because the level data has a unit root
FDEXRATE – Interest rate of loans in excess of an appropriate treasury rate. The "D" second letter indicates the first difference of the series
FRISK – The reported loan risk (1 to 5 scale with one being the lowest risk)
FDVOLUME – The volume of loans, in millions of dollars
FMATURE – The maturity of the loans, in months
FCOMMIT – The percentage of loans made under a prior commitment
GENERAL – The first letter "F" indicates a Farm lender. If the last letter is an "L", it is a large lender. A "D" as either the first or second letter indicates the first difference of the series, which is being used because the level data has a unit root.

TABLE 3-IV. – Correlation Matrices

Panel A. Large Farm Lenders

	FDOTCOLLATL	DSTANDARDS	FDEXRATEL	FMATUREL	FDRISKL	FDVOLUMEL	FCOMMITL
FDOTCOLLATL	1.000						

DSTANDARDS	-0.037	1.000					
	0.832	-----					
FDEXRATEL	0.000	-0.051	1.000				
	0.999	0.773	-----				
FMATUREL	-0.357	-0.157	-0.013	1.000			
	0.035	0.368	0.942	-----			
FDRISKL	0.192	-0.288	-0.451	0.019	1.000		
	0.269	0.094	0.007	0.915	-----		
FDVOLUMEL	-0.004	-0.356	-0.098	0.376	0.178	1.000	
	0.981	0.036	0.575	0.026	0.307	-----	
FCOMMITL	0.238	-0.208	-0.107	-0.459	0.157	-0.014	1.000
	0.168	0.230	0.542	0.006	0.369	0.936	-----

Panel B. Small Farm Lenders

	FOTCOLLAT	DSTANDARDS	FDEXRATE	FRISK	FDVOLUME	FMATURE	FCOMMIT
FOTCOLLAT	1.000						

DSTANDARDS	0.079	1.000					
	0.653	-----					
FDEXRATE	0.193	0.156	1.000				
	0.268	0.372	-----				
FRISK	-0.001	-0.204	0.048	1.000			
	0.997	0.241	0.784	-----			
FDVOLUME	0.175	0.103	-0.034	-0.109	1.000		
	0.315	0.554	0.848	0.534	-----		
FMATURE	-0.494	0.015	-0.043	-0.067	0.215	1.000	
	0.003	0.932	0.805	0.702	0.214	-----	
FCOMMIT	-0.273	-0.276	-0.168	-0.063	-0.314	-0.188	1.000
	0.113	0.109	0.334	0.719	0.067	0.279	-----

Legend: Pearson Correlation coefficient / p value

Panel C. Large Banks

	OTCOLLATL	DSTANDARDS	EXRATEL	MATUREL	RISKL	VOLUMEL	DCOMMITL
OTCOLLATL	1.000						

DSTANDARDS	0.229	1.000					
	0.174	-----					
EXRATEL	0.062	0.242	1.000				
	0.718	0.150	-----				
MATUREL	-0.029	0.070	0.118	1.000			
	0.865	0.679	0.488	-----			
RISKL	-0.539	-0.320	-0.414	-0.042	1.000		
	0.001	0.053	0.011	0.804	-----		
VOLUMEL	0.331	0.063	-0.417	-0.042	-0.220	1.000	
	0.046	0.712	0.010	0.803	0.190	-----	
DCOMMITL	0.040	-0.127	0.128	-0.097	-0.073	-0.146	1.000
	0.815	0.454	0.451	0.567	0.669	0.389	-----

Panel D. Small Banks

	OTCOLLAT	DSTANDARDS	DEXRATE	MATURE	RISK	VOLUME	DCOMMIT
OTCOLLAT	1.000						

)STANDARDS	0.091	1.000					
	0.591	-----					
DEXRATE	-0.191	0.167	1.000				
	0.258	0.323	-----				
MATURE	0.146	0.182	0.014	1.000			
	0.390	0.281	0.936	-----			
RISK	-0.186	-0.293	-0.178	-0.023	1.000		
	0.270	0.078	0.293	0.894	-----		
VOLUME	-0.474	-0.016	0.001	0.153	0.155	1.000	
	0.003	0.925	0.997	0.366	0.359	-----	
DCOMMIT	-0.233	-0.215	-0.124	-0.267	0.090	-0.016	1.000
	0.165	0.202	0.464	0.110	0.595	0.923	-----

Legend: Pearson Correlation coefficient / p value

TABLE 3-V. – Tests of Differences in Means

Panel A. Farm Lenders (small - large)

VARIABLE	Difference in means	t statistic	p value	
FOTCOLLAT	-1.095	-1.247	0.217	
RATE	0.793	2.270	0.026	*
RISK	-0.749	-35.186	0.000	**
VOLUME	-73,067	-6.475	0.000	**
MATURE	5.902	10.253	0.000	**
COMMIT	-35.339	-31.917	0.000	**

Panel B. Banks (small - large)

VARIABLE	Difference in means	t statistic	p value	
OTCOLLAT	2.447	3.866	0.000	**
RATE	1.014	2.493	0.015	*
RISK	-0.358	-16.064	0.000	**
VOLUME	-219.790	-5.973	0.000	**
MATURE	246.711	31.922	0.000	**
COMMIT	-14.545	-18.161	0.000	**

Panel C. Large Lenders (bank - farm)

VARIABLE	Difference in means	t statistic	p value	
OTCOLLAT	-0.888	-1.154	0.252	
RATE	-0.775	-1.805	0.075	*
RISK	0.332	13.253	0.000	**
VOLUME	-275,243	-34.528	0.000	**
MATURE	34.865	20.456	0.000	**
COMMIT	5.252	7.282	0.000	**

Panel D. Small Lenders (bank - farm)

VARIABLE	Difference in means	t statistic	p value	
OTCOLLAT	2.654	3.485	0.001	**
RATE	-0.554	-1.712	0.091	*
RISK	0.723	40.307	0.000	**
VOLUME	-202,396	-25.340	0.000	**
MATURE	275.674	36.464	0.000	**
COMMIT	26.047	22.442	0.000	**

***, **, * denotes significance at the 1%, 5%, and 10% level, respectively

TABLE 3-VI (A). – OLS Results - Large Farm Lenders

Dependent Variable: FOTCOLLATL
Method: Least Squares
Date: 10/02/09 Time: 09:32
Sample (adjusted): 2000Q2 2009Q1
Included observations: 36 after adjustments
Convergence achieved after 8 iterations

	Coefficient	Std. Error	t-Statistic	Prob.
C	68.51552	10.51249	6.517535	0.0000
DSTANDARDS	-0.014441	0.029902	-0.482947	0.6329
FDEXRATEL	0.929741	0.968974	0.959511	0.3455
FMATUREL	-0.279961	0.151666	-1.845907	0.0755
FDRISKL	-0.795862	3.384479	-0.235150	0.8158
FDVOLUME	5.01E-06	4.59E-06	1.092687	0.2838
FCOMMITL	0.269504	0.109156	2.468971	0.0199
AR(1)	0.898823	0.074738	12.02628	0.0000

R-squared	0.786096	Mean dependent var	85.06165
Adjusted R-squared	0.732620	S.D. dependent var	3.865390
S.E. of regression	1.998748	Akaike info criterion	4.416049
Sum squared resid	111.8598	Schwarz criterion	4.767942
Log likelihood	-71.48888	Hannan-Quinn criter.	4.538869
F-statistic	14.69996	Durbin-Watson stat	1.827665
Prob(F-statistic)	0.000000		

Inverted AR Roots	.90

TABLE 3-VI (B). – OLS Results - Small Farm Lenders

Dependent Variable: FOTCOLLAT
Method: Least Squares
Date: 10/01/09 Time: 11:02
Sample (adjusted): 2000Q2 2009Q1
Included observations: 36 after adjustments
Convergence achieved after 7 iterations

	Coefficient	Std. Error	t-Statistic	Prob.
C	116.4900	18.32044	6.358475	0.0000
DSTANDARDS	-0.000274	0.051344	-0.005336	0.9958
FDEXRATE	0.669704	0.918775	0.728910	0.4721
FRISK	-2.088728	6.856947	-0.304615	0.7629
FDVOLUME	1.66E-05	8.52E-06	1.951693	0.0610
FMATURE	-0.845834	0.172966	-4.890160	0.0000
FCOMMIT	-0.247296	0.101240	-2.442678	0.0211
AR(1)	0.353307	0.187369	1.885625	0.0698

R-squared	0.499484	Mean dependent var	83.70063
Adjusted R-squared	0.374355	S.D. dependent var	3.745603
S.E. of regression	2.962686	Akaike info criterion	5.203200
Sum squared resid	245.7703	Schwarz criterion	5.555093
Log likelihood	-85.65760	Hannan-Quinn criter.	5.326020
F-statistic	3.991756	Durbin-Watson stat	1.984707
Prob(F-statistic)	0.003818		

Inverted AR Roots	.35

TABLE 3-VI (C). – OLS Results - Large Banks

Dependent Variable: OTCOLLATL
Method: Least Squares
Date: 10/01/09 Time: 11:04
Sample (adjusted): 2000Q2 2009Q1
Included observations: 36 after adjustments
Convergence achieved after 15 iterations

	Coefficient	Std. Error	t-Statistic	Prob.
C	117.6571	15.64218	7.521781	0.0000
STANDARDS	-0.018602	0.023208	-0.801527	0.4296
DEXRATEL	-0.006893	0.991094	-0.006955	0.9945
RISKL	-10.31678	3.932943	-2.623171	0.0139
MATUREL	0.022736	0.031261	0.727286	0.4731
VOLUMEL	0.000729	0.002375	0.306899	0.7612
DCOMMITL	0.354029	0.278361	1.271832	0.2139
AR(1)	0.523187	0.154238	3.392075	0.0021

R-squared	0.553195	Mean dependent var	83.70278
Adjusted R-squared	0.441494	S.D. dependent var	2.537545
S.E. of regression	1.896390	Akaike info criterion	4.310911
Sum squared resid	100.6962	Schwarz criterion	4.662804
Log likelihood	-69.59640	Hannan-Quinn criter.	4.433731
F-statistic	4.952459	Durbin-Watson stat	1.934383
Prob(F-statistic)	0.000973		

Inverted AR Roots	.52

TABLE 3-VI (D). – OLS Results - Small Banks

Dependent Variable: OTCOLLAT
Method: Least Squares
Date: 10/01/09 Time: 11:08
Sample (adjusted): 2000Q2 2009Q1
Included observations: 36 after adjustments
Convergence achieved after 10 iterations

	Coefficient	Std. Error	t-Statistic	Prob.
C	87.94629	20.14291	4.366117	0.0002
DSTANDARDS	0.027235	0.035581	0.765443	0.4504
DEXRATE	-0.451871	0.990259	-0.456316	0.6517
RISK	1.552733	6.431910	0.241411	0.8110
VOLUME	-0.006334	0.002907	-2.178869	0.0379
MATURE	0.005240	0.008881	0.589993	0.5599
DCOMMIT	-0.171814	0.091772	-1.872179	0.0717
AR(1)	0.616081	0.152213	4.047498	0.0004

R-squared	0.547080	Mean dependent var	86.30000
Adjusted R-squared	0.433850	S.D. dependent var	2.936373
S.E. of regression	2.209413	Akaike info criterion	4.616461
Sum squared resid	136.6821	Schwarz criterion	4.968354
Log likelihood	-75.09629	Hannan-Quinn criter.	4.739281
F-statistic	4.831586	Durbin-Watson stat	2.285127
Prob(F-statistic)	0.001149		

Inverted AR Roots .62

TABLE 3-VII (A). – VAR Results - Large Farm Lenders

Sample (adjusted): 2000Q3 2009Q1
Included observations: 35 after adjustments
Standard errors in ( ) & ***,**,* indicating significance

	(1) DSTANDARDS	(2) FDOTCOLLATL	(3) FMATUREL	(4) FDRISKL
DSTANDARDS(-1)	-0.004	-0.031	0.056	0.001
	(0.19)	(0.04)	(0.03)	(0.00)
			*	
DSTANDARDS(-2)	0.136	-0.031	0.012	-0.001
	(0.17)	(0.04)	(0.03)	(0.00)
FDOTCOLLATL(-1)	-2.212	-0.101	0.208	0.006
	(0.81)	(0.19)	(0.14)	(0.01)
	**			
FDOTCOLLATL(-2)	-1.007	-0.267	0.147	0.004
	(0.83)	(0.19)	(0.15)	(0.01)
FMATUREL(-1)	-0.005	0.115	0.137	0.023
	(1.02)	(0.24)	(0.18)	(0.01)
				**
FMATUREL(-2)	0.246	0.401	-0.384	0
	(1.12)	(0.26)	(0.20)	(0.01)
			*	
FDRISKL(-1)	45.962	0.072	-4.765	-0.37
	(23.71)	(5.51)	(4.12)	(0.21)
	*			*
FDRISKL(-2)	47.283	-1.999	-6.54	-0.194
	(23.53)	(5.47)	(4.09)	(0.21)
	*			
C	-0.949	-5.953	15.259	-0.289
	-16.422	-3.814	-2.853	-0.143
			***	*
R-squared	0.344	0.299	0.419	0.348
Adj. R-squared	0.142	0.083	0.24	0.147
Sum sq. resids	2543.374	137.183	76.785	0.192
S.E. equation	9.891	2.297	1.719	0.086
F-statistic	1.705	1.385	2.345	1.732
Log likelihood	-124.666	-73.567	-63.412	41.39
Akaike AIC	7.638	4.718	4.138	-1.851
Schwarz SC	8.038	5.118	4.538	-1.451
Mean dependent	1.366	0.26	12.414	-0.002
S.D. dependent	10.68	2.399	1.972	0.093

TABLE 3-VII (B). – VAR Results - Small Farm Lenders

Sample (adjusted): 2000Q3 2009Q1
Included observations: 35 after adjustments
Standard errors in ( ) & ***,**,* indicating significance

	(1) DSTANDARDS	(2) FOTCOLLAT	(3) FDVOLUME	(4) FMATURE	(5) FCOMMIT
DSTANDARDS(-1)	0.024	-0.12	750.638	0.104	0.081
	(0.20)	(0.06)	(630.55)	(0.05)	(0.08)
		*		**	
DSTANDARDS(-2)	0.099	-0.056	388.348	0.064	-0.09
	(0.20)	(0.06)	(652.69)	(0.05)	(0.09)
FOTCOLLAT(-1)	-0.8	-0.008	3157.739	0.423	0.132
	(0.72)	(0.22)	(2,298.33)	(0.19)	(0.30)
				**	
FOTCOLLAT(-2)	0.745	0.04	-260.501	-0.042	-0.037
	(0.77)	(0.24)	(2,449.49)	(0.20)	(0.32)
FDVOLUME(-1)	0	0	-0.468	0	0
	-	-	(0.17)	-	-
			**		*
FDVOLUME(-2)	0	0	-0.048	0	0
	-	-	(0.16)	-	-
					***
FMATURE(-1)	-0.436	0.006	-1657.534	0.17	0.362
	(1.01)	(0.31)	(3,215.21)	(0.26)	(0.42)
FMATURE(-2)	1.537	0.332	-5110.188	-0.161	-0.295
	(0.95)	(0.29)	(3,030.55)	(0.24)	(0.40)
FCOMMIT(-1)	-0.314	-0.199	-1464.61	0.154	0.279
	-0.448	-0.138	-1432.24	-0.115	-0.188
FCOMMIT(-2)	0.349	0.28	1732.255	-0.075	-0.05
	(0.46)	(0.14)	(1,470.23)	(0.12)	(0.19)
		*			
C	-16.486	70.985	-137665.3	-17.888	29.547
	(94.18)	(29.08)	(300,958.00)	(24.23)	(39.41)
		**			
R-squared	0.216	0.409	0.588	0.382	0.422
Adj. R-squared	-0.11	0.162	0.416	0.125	0.182
Sum sq. resids	3039.737	289.74	3.10E+10	201.199	532.274
S.E. equation	11.254	3.475	35964.58	2.895	4.709
F-statistic	0.662	1.658	3.425	1.486	1.755
Log likelihood	-127.786	-86.651	-410.22	-80.269	-97.295
Akaike AIC	7.931	5.58	24.07	5.215	6.188
Schwarz SC	8.419	6.069	24.559	5.704	6.677
Mean dependent	1.366	83.67	-1269.314	18.345	49.824
S.D. dependent	10.68	3.796	47075.89	3.095	5.206

TABLE 3-VII (C). – VAR Results - Large Banks

Sample (adjusted): 2000Q3 2009Q1
Included observations: 35 after adjustments
Standard errors in ( ) & ***,**,* indicating significance

	(1) DSTANDARDS	(2) OTCOLLATL	(3) RISKL	(4) VOLUMEL
DSTANDARDS(-1)	-0.067	0.041	-0.002	-0.165
	(0.20)	(0.04)	(0.00)	(2.83)
DSTANDARDS(-2)	-0.088	-0.03	-0.002	-0.801
	(0.20)	(0.04)	(0.00)	(2.92)
OTCOLLATL(-1)	-0.275	0.303	0.011	3.031
	(1.19)	(0.21)	(0.01)	(17.21)
OTCOLLATL(-2)	0.925	0.003	-0.002	2.281
	(1.09)	(0.19)	(0.01)	(15.71)
RISKL(-1)	-26.144	-5.68	0.453	69.988
	(25.79)	(4.59)	(0.21) **	(373.29)
RISKL(-2)	-0.669	0.466	0.213	108.04
	(26.17)	(4.66)	(0.21)	(378.72)
VOLUMEL(-1)	0.008	0.004	0 -	0.405
	(0.01)	(0.00) *		(0.20) **
VOLUMEL(-2)	0.002	0.001	0 -	0.213
	(0.01)	(0.00)		(0.19)
C	26.224	68.47	0.514	-492.049
	(156.47)	(27.87) **	(1.28)	(2,264.52)
R-squared	0.155	0.524	0.52	0.312
Adj. R-squared	-0.105	0.377	0.372	0.1
Sum sq. resids	3278.288	103.983	0.219	686681.4
S.E. equation	11.229	2	0.092	162.514
F-statistic	0.595	3.577	3.518	1.474
Log likelihood	-129.108	-68.718	39.158	-222.638
Akaike AIC	7.892	4.441	-1.723	13.236
Schwarz SC	8.292	4.841	-1.323	13.636
Mean dependent	1.366	83.629	3.489	1510.429
S.D. dependent	10.68	2.535	0.116	171.346

TABLE 3-VII (D). – VAR Results - Small Banks

Sample (adjusted): 2000Q3 2009Q1
Included observations: 35 after adjustments
Standard errors in ( ) & ***,**,* indicating significance

	(1) DSTANDARDS	(2) OTCOLLAT	(3) VOLUME	(4) DEXRATE	(5) DCOMMIT
DSTANDARDS(-1)	0.142	-0.008	0.635	-0.002	0.086
	(0.20)	(0.05)	(2.09)	(0.01)	(0.05) *

TABLE 3-VIII. - Granger Causality Tests

Panel A. Large Farm Lenders

Null Hypothesis:		F-statistic	Probability	
DSTANDARDS does not Granger Cause FDOTCOLLATL	33	2.212	0.098	*
FMATUREL does not Granger Cause FDOTCOLLATL	33	4.016	0.012	**
FCOMMITL does not Granger Cause FDOTCOLLATL	33	3.414	0.024	**
FDRISKL does not Granger Cause FMATUREL	33	2.900	0.043	**
FDVOLUMEL does not Granger Cause FMATUREL	33	2.472	0.072	*
FCOMMITL does not Granger Cause DSTANDARDS	33	2.975	0.040	**
FMATUREL does not Granger Cause FDEXRATEL	33	2.833	0.047	**
FDEXRATEL does not Granger Cause FDRISKL	33	3.571	0.020	**

Panel B. Small Farm Lenders

Null Hypothesis:		F-statistic	Probability	
FDEXRATE does not Granger Cause FMATURE	33	3.1480	0.0325	**
FDVOLUME does not Granger Cause FMATURE	33	2.2428	0.0944	*
FCOMMIT does not Granger Cause FMATURE	34	2.9013	0.0422	**
DSTANDARDS does not Granger Cause FOTCOLLAT	33	4.0612	0.0118	**
FCOMMIT does not Granger Cause FOTCOLLAT	34	3.2831	0.0271	**
DSTANDARDS does not Granger Cause FDEXRATE	33	2.6632	0.0571	*
FCOMMIT does not Granger Cause FDEXRATE	33	2.7288	0.0529	*
FMATURE does not Granger Cause FRISK	34	2.3214	0.0846	*
FMATURE does not Granger Cause FDVOLUME	33	2.8407	0.0464	**
FDVOLUME does not Granger Cause FCOMMIT	33	3.0765	0.0353	**

Panel C. Large Banks

Null Hypothesis:		F-statistic	Probability	
DSTANDARDS does not Granger Cause MATUREL	33	2.941	0.041	**
DCOMMITL does not Granger Cause DEXRATEL	33	2.784	0.050	**
VOLUMEL does not Granger Cause DCOMMITL	33	2.865	0.045	**

Panel D. Small Banks

Null Hypothesis:		F-statistic	Probability	
OTCOLLAT does not Granger Cause DCOMMIT	33	2.360	0.082	*
DSTANDARDS does not Granger Cause DCOMMIT	33	2.419	0.076	*
OTCOLLAT does not Granger Cause DEXRATE	33	2.403	0.078	*
RISK does not Granger Cause DSTANDARDS	33	3.069	0.036	**

3.8. *Appendix*

Tests for Heteroskedasticity in OLS estimations (Table 3-IV)

Panel A

Heteroskedasticity Test: White

F-statistic	2.104209	Prob. F(27,8)	0.1372
Obs*R-squared	31.55649	Prob. Chi-Square(27)	0.2489
Scaled explained SS	7.377179	Prob. Chi-Square(27)	0.9999

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.425088	Prob. F(6,29)	0.8562
Obs*R-squared	2.910224	Prob. Chi-Square(6)	0.8200
Scaled explained SS	0.680343	Prob. Chi-Square(6)	0.9949

Panel B

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.785376	Prob. F(6,29)	0.1372
Obs*R-squared	9.710887	Prob. Chi-Square(6)	0.1374
Scaled explained SS	10.79912	Prob. Chi-Square(6)	0.0948

Heteroskedasticity Test: White

F-statistic	0.690679	Prob. F(27,8)	0.7775
Obs*R-squared	25.19256	Prob. Chi-Square(27)	0.5637
Scaled explained SS	28.01573	Prob. Chi-Square(27)	0.4102

Panel C

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.569453	Prob. F(6,29)	0.7512
Obs*R-squared	3.794393	Prob. Chi-Square(6)	0.7045
Scaled explained SS	2.217427	Prob. Chi-Square(6)	0.8987

Heteroskedasticity Test: White

F-statistic	0.505426	Prob. F(27,8)	0.9115
Obs*R-squared	22.69531	Prob. Chi-Square(27)	0.7013
Scaled explained SS	13.26304	Prob. Chi-Square(27)	0.9875

Panel D

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.825779	Prob. F(6,29)	0.5595
Obs*R-squared	5.253130	Prob. Chi-Square(6)	0.5118
Scaled explained SS	3.464257	Prob. Chi-Square(6)	0.7487

Heteroskedasticity Test: White

F-statistic	0.927748	Prob. F(27,8)	0.5927
Obs*R-squared	27.28572	Prob. Chi-Square(27)	0.4485
Scaled explained SS	17.99399	Prob. Chi-Square(27)	0.9037

CHAPTER IV

ESSAY 3: CREDIT SCORING MODELS AS PREDICTORS OF FARM LOAN DELINQUENCY

4.1. *Introduction and Literature Review*

Numerous authors have examined credit scoring models for bank lending to agricultural firms. Zech and Pederson (2003) have found that debt-to-asset ratio is a strong predictor of the borrower's ability to repay the loan. They further found that asset turnover and family living expenses are good predictors of farm performance. Durguner and Katchova (2007) find that prior year working capital to gross farm return, debt-to-asset ratio, and return on farm assets are the most pertinent factors explaining creditworthiness. In earlier work, Splett, Barry, Dixon, and Ellinger (1994) use a 5 factor credit scoring model. The five factors are Liquidity (current ratio) Solvency (Equity-Asset ratio), Profitability (farm ROE), Repayment Capacity (capital debt-repayment margin), and Financial Efficiency (Net income from operations ratio). A weight is applied to each factor to arrive at an overall credit score.

Many authors also comment about the need for credit scoring models specific to the type of farm and possibly even for a particular region. However, Escalante, Barry, Park and Demir note that credit risk migration behavior is more influenced by macroeconomic

factors and that farm-level factors, including various financial ratios.

The Farm Financial Standards Council (FFSC), a cooperative of agricultural producers, lenders, and other interested parties has developed a standardized set of 16 financial ratios for use in reporting and analysis of farms. They are grouped in five categories of Liquidity, Solvency, Profitability, Repayment Capacity, and Efficiency. These groups are consistent with those described in Splett, et al. (1994).

Moody's Investor Services, provides credit rating for both firms and the individual securities they issues. In addition to their public firm credit ratings, Moody's has developed a credit scoring model for private companies. Most farms are small, privately owned businesses and would fall under the general category of business for whom Moody's private sector credit model would apply. A detailed description of the model is provided by Falkenstein (2000), although pertinent details of the specific variable transformations employed are not discussed. Ten financial ratios are selected based on their univariate relationship between the likelihood of default and each of the nine predictor variables. Moody further transforms each variable to achieve better explanatory power in the model. The ten financial ratios used in their model are well defined and in many ways consistent with those in the FFSC group. The ratios included in their model are similar, but not identical to those recommended by the FFSC. A comparison of the ratios used by the two organizations is provided in the table below. As noted, both have measures of liquidity, solvency/capital structure, profitability, and repayment capacity. Moody's model includes two other categories of trading accounts and growth, but does not include distinct efficiency measures.

Much of the prior research is conducted with farm level data but very often with data

from a single geographic region. An exception to this is provided by Walraven & Barry (2004) who use loan level data from the national Survey of Terms of Bank Lending to Farms conducted by the Federal Reserve Board. This detailed data is typically not publicly available; hence only aggregate information will be used in the current study. The focus of their research is to examine the factors which determine the interest rate applied to farms loans. In addition, to macro factor which impact all interest rates, several loan risk rating categories were included to identify whether farm loan rates are set on a risk-adjusted basis. Included among the explanatory variables are five risk rating categories. They show that the risk rating levels, along with other non-price loan characteristics, and certain bank characteristics affect interest rates. They found loan delinquency rates for commercial banks during the 1997 to 2002 time period to be 5.7%, well above the typical delinquency rates for agricultural lenders. In the same time period, non-real estate loans to agricultural firms had a combined delinquent and non-performing total of between 2% and 4%. The rate for the past 5 years has been typically under 2%.

There is also a substantial body of research addressing transition rates from one risk class to another. This line of research also uses credit rating categories to examine how the rating of a borrower or loan may change in risk over time. A credit score is assigned based upon the data taken from the loan application. If the credit score is sufficiently large the loan is granted. Presumably loan risk will affect both the priced and non-price terms of the loans. Lenders may then use a credit migration matrix to estimate capital requirements over time. As reported in Walraven & Barry (2004), approximately 20% of lenders did not credit score their farm loans, while an additional 25% did not show any variation in their assigned risk categories. The purpose of this research is to determine

which financial performance variables are associated with farms that become delinquent on their loans. A delinquent borrower is identified in the survey when the borrower self-reports paying less than the amount required by their lender(s) during the year. Credit scoring ratios from FFSC and Moody's will be used in the analysis.

This is research unique in its examination of loan delinquency (rather than default) and in the use of a large, national survey of farm businesses as a data source. Further, in addition to the use of financial ratios as explanatory variables, the primary hypothesis variables are those that capture the number of loans held by a farm and the number of different lenders granting those loans. This research will also examine whether prior credit denial in the past 5 years explain current loan delinquency.

In this research, many of the financial ratios are significant in one or more estimations where a measure of farm delinquency is the dependent variable. However, few are typically significant in any one regression model estimation. The five categories of Liquidity, Solvency, Repayment Capacity, Efficiency, and Profitability seem appropriate for credit determination. If a parsimonious model consisting of one measure from each of the five categories is used, most of the variables are typically significant. No single ratio or financial measure is consistently significant.

The number of lenders used by a borrower, the number of loans obtained by borrowers, and the product of the two all appear to have explanatory power in explaining loan delinquency. As the number of loans and the number of lenders increase, the likelihood of having a delinquent loan increases. These factors seem to be at least as significant as the financial ratios in explaining loan delinquency.

Perhaps the most consistent finding regarding farm borrower default is that borrowers

who have been denied credit sometime in the past five years are more likely to have a delinquent loan. In the 2007 survey, the primary data used for this analysis, no borrowers were denied credit in 2007, so the reported credit denials are from previous years. The binary variable which captures whether a borrower has been denied credit in the past five years is consistently positive and significant, more so than any other independent variable estimated.

The role of multiple loans and lenders is different with regard to interest rates. Borrowers using more lenders have lower average interest rates. Those with more loans pay higher rates. Borrowers denied credit in the past also pay higher interest rates.

Using multiple lenders also appears to have an influence on the average term of loans, with those borrowers using more lenders having longer terms. Average term also appears to be explained by the farm type, with livestock farms having longer terms. The only equations estimated where prior credit denial is not a significant factor is where the loan term is the dependent variable. Therefore, prior credit denial does not appear to influence the term of loans.

Performing similar analyses using the 2006 survey indicates that factors explaining default do change somewhat year to year. While the same five major categories of financial ratios are still applicable, which ratios are significant varies somewhat year to year. The same is true for the number of lenders and the number of loans. Pooled regressions combining both 2006 and 2007 data is also performed. Pooled results are consistent with the individual years and provide similar results.

4.2. *Research Questions*

The data, described in the next section, provides considerable detailed information about farms and their financial condition. Included in the data are variables that indicate the amount of debt outstanding at year end, the number of loans outstanding, the number of lenders used for those loans, and whether any are delinquent. There is also information about whether a borrower has been denied credit in the past five years, or whether a borrower has no new loans because credit is denied in the current year. Based on this information, it is possible to segregate farms into two broad categories as mentioned below:

1. Current Borrowers:
    a. Current on all loans
    b. Delinquent on at least one loan
    c. Have had trouble obtaining credit in the past
2. Non-Borrowers:
    a. Don't currently require credit; have sufficient funds
    b. Currently unable to obtain credit
    c. Current terms of credit are unacceptable due to high transactions cost and/or collateral related risk.
    d. Have had trouble obtaining credit in the past

Based on these categories of borrowers and non-borrowers, the followings research questions are addressed.

1. How are farm borrowers different than non-borrowers? That is, what operating characteristics determine when a farm requires external bank financing?

2. When a farm requires external funds, what factors determine the number of loans

outstanding and the number of unique banks a borrower uses to obtain credit. Furthermore, what influence does the number of lenders a borrower has have on the borrowing relationship?

3. How are delinquent borrowers different from non-delinquent borrowers? In particular, is the number of loans outstanding from various lenders a significant factor in explaining the differences?

Testable Hypotheses:

Weak liquidity, low profitability, and high leverage are likely indicators of financial distress for farms. Furthermore, it is possible that financial difficulties which contributed to the denial of credit in the past may be an indication of continued financial distress or financial mismanagement. However, it can also be argued that borrowers who have been denied credit have an incentive to reform their financial management practices to enable them to borrow in the future. Furthermore, the existence of multiple outstanding loans is potentially another contributor toward default. This is analogous to individual borrowers with numerous credit cards issued by multiple lenders who become overextended. On the other hand, farm borrowers using multiple lenders can possibly negotiate more favorable terms and can be more readily assured of obtaining credit during periods of banking distress. On the negative side it is also possible that using multiple lenders may diminish the value of the borrower's primary banking relationship. These propositions will be tested as follows:

H1: The standard set of financial ratios proposed by both Moody's and FFSC to measure a borrower's creditworthiness should be effective in predicting farm loan delinquencies.

H2: Borrowers who have had difficulty getting credit in the past are more likely to be delinquent on their current loan(s).

H3: Delinquent borrowers are more likely to have a larger number of outstanding loans and deal with a greater number of lenders than non-delinquent borrowers.

H4: Borrowers using multiple lenders should be able to negotiate more favorable lending terms such as lower effective interest rates, longer maturity loans, lower collateral requirements, and have access to a larger and more stable flow of credit.

4.3. *Data*

The data used for this study is the ARMS (Agricultural Resource Management Survey) data, developed by the United States Department of Agriculture (USDA) and provided through the Economic Research Service (ERS). This is a large annual survey of farms which includes data on farming practices as well as other operational and financial information. The most recent surveys conducted in 2006 and 2008 include more information about farm debt and borrowing practices. The 2005 survey contains similar information, but there are so few delinquent borrowers that model results from that year are not reported. The information included in the survey changes over time, sometimes significantly. For example, the identification of delinquent loans is not available before 2005, so this limits the number of years available for the study of questions related to issues of borrower delinquency.

This study will primarily focus on the 2007 survey data since certain key information is only available in the 2007 survey. At the same time, data from 2006 and a pooled model containing observations from both years will be used to demonstrate the robustness of the findings. The 2007 survey contains data on 18,709 farms, while 21,734

farms were surveyed in 2006. (The 2005 survey included 22,843 farms). The ARMS dataset contains the raw survey results and other variables derived from the raw data, such as total assets, total debt, etc. For this analysis, the raw data and the summary variables were used to create variables for this analysis. None of the raw variables were used directly in the regression analyses.

Several types of variables were developed for this analysis. Various financial metrics suggested by Moody's and FFSC to predict creditworthiness were computed. Then, other variables were created to test specific research hypotheses. Several control variables were also created which address such factors as farm type, legal form of the organization, age and education of the primary operator, and eight dummy variables representing the nine geographic survey regions. A description of these variables is presented in Table 4-I. The ERS develops weights for the survey variables. This is done based on the production value of the farms in an attempt to make the survey results as representative as possible. For example, a much greater percentage of large farms are surveyed than for smaller farms, so the weights applied to small farms are generally larger than those for large farms. Table 4-II provides the un-weighted descriptive statistics for the variables used. Table 4-III provides the weighted statistics of the same variables. The effect of the survey weights is apparent when the total assets are examined. Un-weighted, the mean of total assets are almost $2.6 million, whereas weighted, the mean is $0.845 million (note that the total asset value is divided by 1,000,000 for reporting convenience). Furthermore, the delinquent variable (DELINQYN) is an indicator variable and equals one if any loans outstanding at year end are delinquent. There are 121 farms with delinquent loans in 2007. However, this variable using weights suggests there are 7,004 farms with

delinquent loans in the country. More importantly, it is not clear that this variable will scale based on farm production value, as it is anticipated that farm specific factors unrelated to size will determine loan delinquency. By dollar amount, there is over $71 million (DELINQAMT) in delinquent loans. These represented 0.5% of loans outstanding at year end, by dollar value.

For this study it is not clear that using weighed data is entirely appropriate but weighting procedures will be used in some of the analyses and reported in Appendix A. Most of the analyses will be conducted using un-weighted variables as the determinants of loan delinquency are expected to independent of aggregate farm sector output. At the same time, a size variable (total assets) will be used to control for farm size effects.

Examining other un-weighted variables in Table 4-II, there are a total of 7,708 loans made to farms (LOANSTOT#) and there are a total of 4,580 lenders identified in the survey (LEANDERNO). However, these are not strictly additive, as the number of unique lenders involved is unknown. The explanation for this is that this variable counts the number of different lenders *per farm*, but the variable is not formulated in a manner to count different lenders making loans to all farms in the survey. By definition, the number of loans cannot be smaller than the number of lenders.

The weighted average interest rate is 6.699% (RATEWTAVG, weighted by dollar value). The weighted average term of the loans is 127.4 months (TERMWTAVG). Most of the farms are not limited liability organizations but are typically partnerships or sole proprietorships. A total of 2,704 farms are limited liability corporations (C or S corporations). This represents 12.9% of the farms surveyed. The majority of the farms are categorized as crop farms since 41.6% of the farms are livestock farms (FTYPE;

1=livestock).

The farms are relatively liquid with current ratios averaging almost 60, and quick ratios of over 34. However, it does not appear that the current assets include large cash reserves as cash/assets has a mean value of 3%. Using the weighted data, current and quick ratios are even higher, suggesting small farms are relatively more liquid. Cash divided by assets is 1.3% using weighted data, so the smaller farms have relatively less cash.

The debt to asset ratio in the un-weighted summary is 20.2%, whereas for the weighted survey, it is 7.6%, suggesting small farms have relatively less debt. Debt divided by equity is 14.6% un-weighted and 12.7% weighted, again supporting the view that smaller farms have relatively less debt. The variable denied5yr is a binary variable equal to 1 if a farm has been denied credit during the past 5 years. The total number of farms surveyed that had been denied credit is 183, larger than the number of currently delinquent borrowers. Using survey weights, the mean of this variable is 0.6%, indicating that credit denial is more common in larger farms.

To gain further understanding of borrower and non-borrower characteristics, Table 4-IV is provided. Mean values for the variables are provided for borrowers and non-borrowers. The number of non-borrowers greatly exceeds the number of borrowers as there are approximately 4 non-borrowers for every borrower. Table 4-IV also provides t-tests of the differences between the variables for borrowers and non-borrowers. Borrowers are larger in total assets, have more cash (scaled by assets), turn their inventories more slowly, grow net income more rapidly, have higher levels of working capital (also a size effect), have lower operating margins but higher net income, have

higher capital replacement margins (also affected by size), have higher levels of interest expense and lower levels of net farm income. Note that whether a farm is a borrower or not is based on whether debt was used to fund operations in the survey year. Among control variables capturing personal characteristics, borrowers are younger and have a higher proportion of college education. Livestock farms and farms organized as limited liability organizations have a higher proportion of borrowers versus non-borrowers.

Table 4-V provides correlation matrices for the variables. Panel A contains Moody's ratios and the hypothesis and control variables. Panel B contains only the FFSC ratios. Many of the Moody's ratios have low correlation coefficients with one another and they tend to be below 5%, with two exceptions. ROA is correlated with liabilities over assets (65.6%) and net income over assets (97%). The binary variable DELINQYN is not highly correlated with any of the ratio variables, and none of the correlations are significant. However, the signs of the correlations coefficient are generally as expected: liabilities over assets is positive, and all others are negative. The correlation between DELINQYN and LENDERNO is 17% and significant, and is 9.5% and significant with the number of loans (LOANSTOT#). The correlation with farms reporting a prior credit denial (DENIED5YR) is 12% and significant.

There are three hypothesis variables that capture loan/lender characteristics. They are the number of different lenders per farm (LENDERNO), the total number of loans per farm (LOANSTOT#), and LOANS*LENDERS which is the product of the previous two variables. LENDERNO and LOANSTOT# are significantly correlated with a coefficient of 67%. Because they are correlated to this degree, estimations will be performed with these two variables, individually. The variable LOANS*LENDERS was to eliminating

the need to include two correlated hypothesis variables in a single estimation.

The weighted average interest rate (RATEWTAVG) has a negative and significant correlation with the number of lenders, but the correlation with the number of loans (LOANSTOT#) is positive, but not significant.

Correlations among the FFSC ratios are provided in panel B of Table 4-IV. Many of the correlations among the ratios are low or not significant, with some exceptions. Some of the significant correlations are size related. For example, working capital, net income, and the capital replacement margin are not ratios and are therefore affected by the size of the farm. The correlations among these three are all significant. Other correlations are significant, such as those among operating margin, operating expense, and depreciation expense. Some correlation is expected between these ratios as they are inter-related by definition. The issue of multi-colinearity will be examined in more detail in the results section. The FFSC ratios in most cases have multiple ratios in each general category (e.g. liquidity, solvency). Therefore, many of the FFSC variables are expected to be, and are, correlated.

4.4. *Model*

The purpose this study is to determine the factors that are associated with borrower delinquency, including which financial variables best explain this. The variables to be used are those suggested for use by FFSC and those in the Moody's credit scoring model for private firms. The ARMS database includes a variable for each loan indicating whether the borrower paid the amount due, paid more than the amount due, or paid less than the amount due during the year. This variable can either become a binary variable

DELINQYN (1=delinquent, 0 = current) or be created as a continuous variable such as the percent of the total dollar amount of loans outstanding which are delinquent per borrower (i.e., $ of loans delinquent/ $ total loans). The two forms of the delinquency variable will then be used as the dependent variable in either a logistic or multiple regression model, where the appropriate hypothesis and control variables are included as explanatory variables.

There are a total of 121 farms with delinquent loans in the 2007 survey. This represents 0.65% of the total farms in the survey and 1.83% of the loans outstanding. The rate of delinquency is consistent with that reported in the Federal Reserve Board's Agricultural Finance Databook. Additional summary statistics from the 2007 ARMS survey regarding the sample of delinquent and non-delinquent borrowers is provided in the table below. All the reported ratios are lower for the delinquent farms, consistent with hypothesis H1. The only unexpected result is that delinquent borrowers have a lower expense ratio.

The farms that have debt and are current on their loans represent 21.6% of all farms in the survey. Approximately 78% of all farms in the survey had no debt at the end of the year. Those farms are not included in the table below.

2007 ARMS Survey

Ratio	Debt Current	Delinquent	Difference
Current	2.3	1.53	0.77
Debt/Asset	17.73%	15.83%	1.90
ROA	2.64%	1.87%	0.77
ROE	1.61%	0.84%	0.77
Operating Profit (ROS)	12.19%	11.03%	1.16
Debt Coverage	2.66	2.55	0.11
Asset Turnover	0.22	0.17	0.05
Operating Expense	82.78%	77.84%	4.94
Number of Obs.	2,603	103	
% of Farms	39.4%	1.56%	

The following model (equation 1) will be estimated using a binary variable (DELINQYN) as the dependent variable. In this case, a logistics procedure will be used. In addition, a continuous, but censored variable (DELINQPCT) will used as a dependent variable in a model of the same general form. In this case, a Tobit procedure will be used. The variable is censored because a large portion of the observations have a value of zero.

$$DELINQ = \alpha + \beta_n RATIO_n + \gamma_m HYPOTHESIS_m + \delta_p CONTROL_p + \varepsilon \quad (1)$$

Where, RATIO is a vector of 'n' financial ratios, HYPOTHESIS is a vector of 'm' hypothesis variables and CONTROL is a vector of 'p' control variables for farm type, location, and farmer characteristics such as age and experience.

Individual cross sectional regressions are conducted for each of the two survey years used, and will also be estimated using a pooled data set. Given the multiple borrower categories discussed above, it potentially is possible to perform this analysis with a multinomial logistic procedure. In this case, the dependent variable would have three categories: good borrowers, delinquent borrowers, and denied borrowers. However, in

the 2007 survey, no borrowers reported being unable to borrow when desired, so the multinomial logistic procedure is not feasible.

For each dependent variable, two regression models will be required for each year: one using the FFSC recommended ratios and the other using Moody's. A comparison of the two models results will serve as a robustness check on the development of credit scoring model for farms. Because there are multiple loan/lender variables that are correlated, several versions of each equation will be estimated to reduce the effects of multi-colinearity.

To test hypothesis H3, two additional models will be analyzed. These are as follows:

$$RATEWTAVG = \alpha + \beta_n RATIO_n + \gamma_m HYPOTHESIS_m + \delta_p CONTROL_p + \varepsilon \quad (2)$$

Where RATEWTAVG is the weighted average of the interest rate on the loans;

RATIO is a vector of financial ratios and metrics; HYPOTHESIS is a vector of hypothesis variables, which are primarily the number of lenders and the number of loans; and CONTROL is a vector of control variables.

$$TERMWTAVG = \alpha + \beta_n RATIO_n + \gamma_m HYPOTHESIS_m + \delta_p CONTROL_p + \varepsilon \quad (3)$$

where TERMWTAVG is the weighted average of the interest rate on the loans; RATIO is a vector of financial ratios and metrics; HYPOTHESIS is a vector of hypothesis variables, which are primarily the number of lenders and the number of loans; and CONTROL is a vector of control variables.

For the estimation of both equations (2) and (3), only borrowers (as opposed to non-borrowers) will be included in the observations used. Only the 2007 has the loan terms data sufficient to compute TERMWTAVG. Therefore, estimations using the 2006 data and pooled regressions will not include equation (3).

4.5. *Empirical Results*

A. Logistic Regression with DELINQYN as the Dependent Variable - Equation (1) is

first estimated as a logistic regression. In Table 4-VI (A), the Moody's ratios along with other control and hypothesis variables are included. Table 4-VI (B) provides the results of the same model, but using the FFSC ratios. Both use the variables in the un-weighted form. In Table 4-VI (A), using the Moody's ratios, two measures of liquidity (quick ratio and cash/assets) are negative and significant at the 5% level. No other Moody's variables are significant at this level. The number of lenders is positive and significant, suggesting that more lenders are associated with loan delinquency, while the number of loans is not significant. The interaction of loans and lenders is positive and significant at the 10% level. Borrowers who were denied credit during the past 5 years are more likely to have delinquent loans because the binary variable DENIED5YR (credit denied in the past 5 years) is positive and significant at the 1% level. The variable FTYPE (farm type) is negative and significant at the 5% level, indicating that livestock operations are less likely to be delinquent on loans. The weighted average of the term of debt (TERMWTAVG) is negative and significant at the 10% level.

In Table 4-VI (B), equation (1) is estimated using the FFSC variables. The number of lenders (LENDERNO) is positive and significant, while the number of loans (LOANSTOT#) is not significant. The interaction of the two (LOANS*LENDERS) is positive and significant at the 10% level. One measure of solvency, the debt to asset ratio, (DEBTASSET) is positive and significant at the 1% level. A measure of profitability, ROE is positive and significant at the 10% level. The measure of repayment capacity or the term debt coverage ratio, (TERMDEBTCOV) is also positive and significant. Three measures of operating efficiency, asset turnover (ASSETTURNOVER), operating expense ratio (OPEXPRATIO), and the interest

expense ratio (INTEXPRATIO) are also significant. The regression coefficient on ASSETTURNOVER is positive and significant, while the operating expense ratio (OPEXPRATIO) is negative and significant. The coefficient on the interest expense ratio (INTEXPRATIO) is also negative and significant at the 10% level. In addition, borrowers who have been denied credit in the past 5 years (DENIED5YR) are more likely to have a delinquent loan.

B. Parsimonious Models - Because some of the ratio variables are correlated (especially among the FFSC ratios) a parsimonious model with fewer independent variables is developed. One variable from each of five broad financial performance categories (liquidity, solvency, repayment capacity, efficiency, and profitability) is selected. The selection is based upon which variable has the highest level of statistical significance from either of the two equations reported in Tables 4-VI (A) and 4-VI (B). The results of this parsimonious model are provided in Table 4-VII (A). Three of the ratios are significant at the 1% level while (ROE) is significant at the 5% level. The liquidity measure (QUICKRATIO) is not significant, nor is the inventory turns (INVTURNS) variable. The solvency ratio, debt to assets (DEBTASSET) is positive and significant. Surprisingly, the profitability measure, ROE is positive and significant. However, the mean of this ratio among borrowers is negative but positive for non-borrowers, which may be the explanation for the sign. The measure of repayment capacity (term debt coverage ratio, TERMDEBTCOV) is positive and significant. The efficiency measure, asset turnover ratio, (ASSETTURNOVER) is negative and significant. As in Tables 4-VI (A) and 4-VI (B), the loan term (TERMWTAVG) is negative and significant and the firm type (FTYPE) is negative and significant. The

number of lenders (LENDERNO) is positive and significant, while the number of loans (LOANSTOT#) is not. The number of lenders (LENDERNO) is positive and significant at the 1% level even when all three loan/lender variables are included in the same model (Model 4).

In Table 4-VII (B) the results of a Tobit regression are provided using the same variables of the parsimonious model estimated in Table 4-VII (A). The dependent variable is DELINQPCT, the proportion of loans (by dollar amount) that are delinquent. As such, it might be expected that somewhat different results are obtained as compared to the logistic regressions. This dependent variable is censored as it has the value of zero in most cases, hence the use of the Tobit procedure. Here, the number of loans and the loan/lender interaction are both negative and significant at the 10% level. This sign is different than in the previous logistic models and perhaps is merely an effect of the amount of debt and the influence on the value of the dependent variable. A borrower with a small number of loans could only deal with a small number of lenders and the relative proportion of each loan of the total debt would be larger. The negative sign can perhaps be explained when borrowers with a small number of loans also have a delinquent loan. In this case, a smaller total number of loans would be associated with a higher percentage of delinquent loans.

As reported in Table 4-VII (A), borrowers who have been denied credit in the past (DENIED5YR) have a higher proportion of loan delinquencies. A higher proportion of delinquencies is also associated with higher level of debt as the debt to asset ratio (DEBTASSET) is positive and significant, but at the 10% level. ROE is positive and significant at the 1% level, as it is in the previous parsimonious model (Table 4-VII (A)).

The sign of loan term (TERMWTAVG) is actually negative, but when rounded to 3 decimal points, the sign is lost in the rounding. Farm type (FTYPE) is negative and significant at the 1% level. All variables that are significant in the Tobit estimation (Table 4-VII (B)) have the same sign as those in the parsimonious logistic regress (Table 4-VII (A)), with the exception of the loans/lender variables discussed above.

C. Impact of Multiple Loans on Interest Rates - To address hypothesis H3, which states that borrowers with multiple lenders will obtain lower interest rates and longer loan terms, two different regression models are used. One uses RATEWTAVG (weighted average of the loan interest rate) as the dependent variable, and the other uses TERMWTAVG (weighted average of the term of the loan, in months) as the dependent variable.

Tables 4-VIII (A) and 4-VIII (B) report the results of two OLS analyses where RATEWTAVG (weighted average of interest rate) is the dependent variable. Moody's ratios are used in Table 4-VIII (A), and the FFSC ratios are used in Table 4-VIII (B). In Table 4-VIII (A), (Moody's ratios) the number of lenders is negative and significant at the 1% level, while the number of loans (LOANSTOT#) and the loan/lender (LOANS*LENDERS) interaction are not significant. This is consistent with the ability of borrowers to use competitive forces to negotiate lower interest rates. Borrowers that have been denied credit pay approximate 45 basis points higher interest rates. Larger borrowers as measured by total assets pay lower interest rates. Inventory turnover (INVTURNS) is positive and significant, indicating that borrowers which demonstrate greater efficiency in managing their inventory surprisingly pay higher interest rates. Perhaps this high turnover ratio is simply an indication of lower relative levels of

inventory which provide less security for loans. Ceteris paribus, firms with higher inventory turnover will have lower levels of inventory. Borrowers that are currently delinquent pay similar interest rates since DELINQYN (1 = delinquent) is not significant. FIXEDPCT (proportion of fixed rate debt) is negative and significant, suggesting that as the proportion of fixed rate debt increases, the interest rate is lower. Since mortgage debt may likely be fixed rate, the ratio of fixed rate debt to total debt may increase as the ratio of mortgage debt to total debt increases.

Also reported in this table are variance inflation factors (VIF) for Model 4. The Moody's variables are not highly correlated so there is little variance inflation among those variables. However, LENDERNO (number of lenders), LOANSTOT# (number of loans) and their interaction (LOANS*LENDERS) are highly correlated and when included together, show evidence of substantial variance inflation (VIF = 2.4 to 8.7). This suggests that it is most appropriate to use these variables individually in a regression model.

Table 4-VIII (B) provides the same model as in Table 4-VIII (A) using the FFSC variables. The number of lenders (LENDERNO) is once again negative and statistically significant and DENIED5YR (credit denial in past 5 years) is positive and significant. The number of loans (LOANSTOT#) and the loan/lender interaction (LOANS*LENDERS) are both insignificant. The interest expense ratio (INTEXPRATIO) is the only FFSC variable that is significant with a positive coefficient. The coefficient on FIXEDPCT is negative and significant. The owner education variable, COLLEGE (1=attended college), is negative and significant at the 10% level. The coefficient on total assets (TOTASSETS) is negative and significant.

Once again VIF values are reported for Model 4. Not only is there considerable variance inflation when all three loan/lender variables are included together, but, as discussed above, a number of the FFSC ratios when included together result in substantial multi-colinearity. This is the reason for estimating the parsimonious models which includes only one variable to represent each performance category. For these reasons no models with all three loan/lender variables included will be estimated.

D. Effect of Multiple Lenders on Interest Rates - In Tables 4-IX (A) and 4-IX (B), OLS regressions where TERMWTAVG (weighted average loan term) is regressed on hypothesis and control variables are reported. Table 4-VIII (A) provides the results of an OLS estimate using the Moody's ratios and other hypothesis and control variables. LENDERNO (number of lenders) is positive and significant, again suggesting that borrowers that use more lenders are able to get longer term loans and perhaps are using their bargaining power to do so. The term of outstanding debt is not significantly influenced by prior delinquencies since DENIED5YR is not significant. LIABOVRASSETS (liabilities divided by assets) is positive and significant, suggesting that as total debt increases, its term increases. CASHOVRASSETS (cash divided by assets) is negative and significant, suggesting that borrowers with more cash have shorter term debt. DEBTSVCCOV (debt service coverage ratio) is negative and significant. Borrowers that are currently delinquent (DELINQYN,1 = delinquent) have shorter debt by approximately 21 months. FIXEDPCT (proportion of debt that is fixed rate) is positive and significant, which perhaps shows the influence of mortgage debt, as discussed above. LIMLIAB (limited liability legal form) is negative and significant indicating that this corporate form has shorter term debt. FTYPE (farm type, 1 =

livestock) is positive and significant, indicating livestock farms have shorter term debt.

Table 4-IX (B) provides the results of the same model as Table 4-IX (A), except the FFSC variables replace the Moody's variables. All three loan/lender variables are positive and significant at the 5% level. ROA (return on assets) and NETINC (pre-tax income) are negative and significant. TERMDEBTCOV (term debt coverage ratio) is negative and significant. Three measures of efficiency (ASSETTURNOVER [asset turnover], OPEXPRATIO [operating expense ratio], DEPREXPRATIO [depreciation expense ratio]) are all negative and significant. INTEXPRATIO (interest expense ratio) is positive and significant. As in Table 4-IX (A), FIXEDPCT (proportion of fixed rate debt) and FTYPE (farm type) are positive and significant and LIMLIAB (limited liability corporate form) is negative and significant.

E. 2006 Survey Results - To this point, all reported results are based on the 2007 survey. In 2007, there were 121 farm entities that had delinquent loans. In the 2006 survey, there are 179 delinquent borrowers. Earlier surveys do not contain all the same information regarding loan delinquencies so the same analyses reported above cannot be estimated using data from the earlier years. However, the content of the 2006 survey is similar to that of the 2007 survey, so similar models can be estimated using the 2006 survey. Most of the same models that were estimated using the 2007 survey were repeated using the 2006 survey data. Rather than report all of the models analyzed, just the parsimonious models using the 2006 survey are provided. The loan term data in the 2006 survey is not available, so the TERMWTAVG (weighted average of debt term) variable is not present in the 2006 and in any pooled estimations. TERMWTAVG also cannot be used as a dependent variable.

Table 4-X (A) provides the results of a logistic regression (dependent variable is DELINQYN, 1 = delinquent) using the 2006 survey. It is a parsimonious model selected in the same manner as the 2007 survey (one variable from each of five categories of financial ratios), so the included variables are similar, but not identical, to those used in the 2007 parsimonious model. As in 2007, one variable from each major category is used. In Table 4-X (A), the number of lenders (LENDERNO) is not significant, but the number of loans (LOANSTOT#) and the loan/lender interaction term (LOANS*LENDERS) are both positive and significant at the 5% level. Borrowers previously denied credit (DENIED5YR) are more likely to be delinquent. Variables measuring liquidity, solvency, and profitability are significant and have the expected signs. TERMDEBTCOV (term debt coverage ratio) is positive and significant at the 10% level. No other financial ratios are significant. LIMLIAB (limited liability legal form) is positive and significant at the 1% level, indicating limited liability organizations are more likely to be delinquent.

Table 4-X (B) provides a parsimonious, OLS model where RATEWTAVG (weighted average interest rate) is the dependent variable. Here, as in the 2007 results, the number of lenders (LENDERNO) is negative and significant at the 5% level. Borrowers previous denied credit (DENIED5YR) pay higher interest rates. The measure of liquidity (CURRENT [current ratio]) is negative and significant at the 10% level. LIABOVRASSETS (liabilities divided by assets) and ROA (return on assets) are both significant at the 1% level. FIXEDPCT (proportion of fixed rate debt) is negative, as observed using 2007 data, and significant at the 1% level. LIMLIAB (limited liability legal form) is negative and significant at the 10% level.

F. 2006/2007 Pooled Survey Results - In order to use a larger data set, estimations using pooled data from 2006 and 2007 are performed. As in the 2006 analyses, only the parsimonious models are reported. Table 4-XI (A) provides the results of a logistic, parsimonious model where DELINQYN (1= delinquent) is the dependent variable. The parsimonious model is developed in the same manner as those in 2006 and 2007. A binary variable (YEAR07) which equals one if the year is 2007 is included to capture the effects of different years. An interaction term (eitherYEAR07 x LENDERNO, LOANSTOT#, or LOANS*LENDERS) is also included. The interaction term in any model is the one that uses the corresponding loan/lender term used in the model. The number of loans (LOANSTOT#) and the loan/lender interaction variable (LOANS*LENDERS) are both significant at the 5% level. The results from the two survey years differ here (LENDERNO (number of lenders is significant in the 2007 survey and LOANSTOT# [number of loans] is significant in the 2006 survey). Based on these results, borrowers that use more lenders and/or have more loans are more likely to be delinquent, even while controlling for the level of debt (solvency). Borrowers denied credit (DENIED5YR) are more likely to be delinquent, and this variable is positive and significant at the 1% level. Measures of liquidity (QUICKRATIO), solvency (DEBTASSET), profitability (ROA) and repayment capacity (TERMDEBTCOV) are all significant at the 5% level. Farms with a limited liability legal form (LIMLIAB) are also more likely to be delinquent. Livestock farms (FTYPE = 1) are less likely to be delinquent. Neither the binary year variable (YEAR07) nor its interaction with the loan/lender variable is significant.

Table 4-XI (B) provides the results of an OLS estimation (dependent variable =

RATEWTAVG [weighted average interest rate]) and the same parsimonious model. Here, as in the 2006 and 2007 surveys, LENDERNO (number of lenders) is negative and significant, but only at the 10% level. Borrowers previously denied credit (DENIED5YR) pay higher average interest rates, and this variable is significant at the 1% level. Measures of liquidity (QUICKRATIO), solvency (DEBTASSET), and profitability (ROA) are all significant at the 1% level. As in the individual year estimations, FIXEDPCT (proportion of fixed rate debt) is negative and significant. The year binary variable (YEAR07) is negative and significant in Models 2 and 3, indicating lower average interest rates in 2007 versus 2006. The expected sign of this variable is negative. Interest rates in 2006 and 2007 were quite similar. Using weekly data for 10 year treasury bills, the rates in 2007 on average were higher than those in 2006. However, when interest rates during the first two to three months of the two years are compared, the interest rates in 2007 are lower by 10 to 26 basis points. As production loans to farms may often be made early in a calendar year, a negative sign for YEAR07 is not unexpected.

G. Summary of Regression Results - A summary of all regression results where the dependent variable is DELINQYN (delinquent = 1) is provided in Table 4-XII (A). Measures of solvency, repayment capacity, and profitability are consistently significant. Other categories of financial variables are less consistently significant. Every group of models has at least one version of the loan/lender variable (LENDERNO, LOANSTOT#, LOANS*LENDERS) that is significant. One of these variables is always significant.

Table 4-XII (B) provides a summary of the OLS regressions where RATEWTAVG (weighted average interest rate) is regressed on the hypothesis, ratio, and control

variables. In these regressions, at least one of the financial ratio categories is significant, and the signs are consistent across models. LENDERNO (number of lenders) is consistently negative and significant. The number of loans (LOANSTOT#) is never significant, nor is the loan/lender (LOANS*LENDERS) interaction variable. These results provide support for the hypothesis that borrows who use multiple lenders obtain lower interest rates, perhaps using the competition among lenders to obtain more favorable interest rates.

H. Analysis Using Survey Weights - As noted earlier, survey weights are available in the data set. The results provided to this point do not use the survey weights because they are established based on production value and there is no evidence that this factor has explanatory power. However, three, parsimonious regressions using survey weights, are provided in Appendix A. As in the un-weighted regressions, the number of lenders and number of loan variables are positive and significant in explaining loan delinquency. A prior denial of credit is also positive and significant. The financial ratios are generally not significant.

4.6. *Conclusions*

The focus of this research is on the factors associated with farm loan delinquency, the use of two sets of financial ratios as determinants of those delinquencies, the effect of multiple lenders and multiple loans on delinquencies and other terms of lending.

Splett, Barry, Dixon, and Ellinger (1994) find that a simple, five-ratio model is adequate for credit scoring of farm borrowers. Their model includes one measure each of liquidity, solvency, repayment capacity, efficiency, and profitability. The results of this

study find that one or more measures in each of their five categories is associated with loan delinquencies. Measures of liquidity, solvency, repayment capacity, and profitability are typically significant. Measures of efficiency are generally not significant. The number of inventory turns is never significant. In general, it appears that a select set of FFSC ratios are more suited for farms than the Moody's ratios for small business, at least for explaining loan delinquency.

The number of loans and lenders does have explanatory power for loan delinquencies and loan interest rates. In 2007, as the number of lenders increases, the likelihood of delinquency increases. The number of loans is not significant. The interaction variable (LOANS*LENDERS) is positive and significant at the 10% level. However, using the 2006 data, the number of loans and the interaction variable are both significant at the 5% level, while the number of lenders is not. Pooled results using 2006 and 2007 data match the 2006 results. Clearly, as the number of loans and lenders increases, the likelihood of delinquency increases, irrespective of the level of debt. However, it is not entirely clear whether the number of loans or lenders is most influential. The product of the two is significant, at least at the 10% level. Because of the correlation between these variables, regressions models that include more than one of the variables are not useful.

Credit denial in the past five years is the most consistent explanation of current loan delinquencies. A priori, it was not clear whether this variable would have a positive or negative sign. One explanation is that borrowers that have had difficulty getting credit in the past are more likely to continue to struggle financially, so the sign should be positive. However, it is also possible that borrowers that have had prior credit difficulties may reform their behavior in order to get credit in the future. Based on this study, prior credit

denial explains loan delinquencies and strongly suggests that prior credit denial is an important determinant of loan delinquency. In this case, the analyses indicate that credit difficulties are persistent.

The number of lenders plays a role in the interest rate. Farms using more lenders have a significantly lower average interest rate. This is true in the 2006, 2007, and pooled analyses. This finding supports the idea that borrowers are able to use competition among lenders to negotiate lower interest rates. The number of loans and the loan/lender interaction variable are never significant when the weighted average interest rate is the dependent variable.

Using the 2007 survey data, both the number of lenders and the number of loans are positively associated with the average term of the debt. All three variables are significant at the 5%, but only the number of lenders is positive and significant at the 1% level. Prior credit denial is not a factor in the weighted average term of the loan. The size of the farm (in total assets) is also not significant. Measures of efficiency affect the term of the loan and higher levels of efficiency are associated with shorter term debt. Limited liability organizations have shorter term debt. Farms with higher liabilities, relative to assets, have longer term debt, perhaps because of higher level of liabilities. The liquidity position of the farm does not explain the term of its debt.

Overall, either set of financial ratios is helpful in explaining farm borrower delinquencies, but many of the factors are not always significant. When multiple measures in each category are used, multi-colinearity can confound the results, so simple models are most effective. The five categories of liquidity, solvency, repayment capacity, efficiency, and profitability seem appropriate. There are 11 financial measures

that are significant at least once. At least one measure in each of the five major categories is significant at least once. Difficulty with getting credit seems to be persistent as the most consistent explanation for loan delinquency is prior credit denial.

4.7. *References*

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TABLE 4-I. – Variable Definitions

Moody's Ratios

TOTASSETS	Total assets
QUICKRATIO	Quick ratio
LIABOVRASSETS	Liabilities divided by total assets
CASHOVRASSETS	Cash divided by total assets
NIOVRASSETS	Net Income divided by total assets
DEBTSVCCOV	Debt Service coverage ratio
INVTURNS	Inventory Turns
NIGROWTH	Net Income growth (1 year)
ROA	Net Income divided by total assets

FFSC Ratios

CURRENT	Current assets divided by current liabilities
WORKCAP	Current assets less current liabilities
DEBTASSET	Total debt divided by total assets
EQUITYASSET	Book equity divided by total assets
DEBTEQUITY	Total debt divided by book equity
ROA	Net Income divided by total assets
ROE	Net Income divided by book equity
OPMARGIN	Operating income divided by sales
NETINC	Before tax income
TERMDEBTCOV	Annual after-tax cash flow divided by annual debt and least payment obligations
CAPREPLACE	Dollar amount, cash flow after all debt and least payments
ASSETTURNOVER	Gross revenue divided by total assets
OPEXPRATIO	Operating expenses less depreciation/amortization divided by revenue
DEPREXPRATIO	Depreciation/amortization divided by revenue
INTEXPRATIO	Total interest expense divided by revenue
NETFARMINCRATIO	Net farm income divided by revenue

Hypothesis Variables

DELINQYN	Binary - 1 if any loan is delinquent, otherwise 0
DELTOT	Total number of delinquent loans
DELINQAMT	Dollar amount of delinquent loans
DELINQPCT	Delinqamt divided by total debt
LENDERNO	Number of different lenders used
LOANNBR	Number of loans detailed (4 or 5 max, depending on survey year)
LOANSTOT#	Total number of loans
FIXEDPCT	Weighted average (by dollar amount) of fixed rate loans
BORROWER10	Binary - 1 if farm has debt, 0 otherwise
BORROWER123	Discrete: 1 for good borrower; 2 for delinquent borrower; 3 if denied in year
NONBORROWER	Binary - 1 if farm is a non-borrower, 0 otherwise
RATEWTAVG	Weighted average (by dollar amount) of interest rate
TERMWTAVG	Weighted average (by dollar amount) of term of debt (in months)
DENIED5YR	Binary - 1 if farm has been denied credit in past 5 years, otherwise 0

Control Variables

AGE	Age of principal in farm, in years
COLLEGE	Binary - 1 if principal in farm has attended college
LIMLIAB	Binary - 1 if farm is a limited liability legal form (e.g. S or C corp.)
FTYPE	Binary - Farm type, 1=livestock, 0 = agricultural
REGIONx	8 binary variables for 9 regions

TABLE 4-II. – Descriptive Statistics (un-weighted) for 2007

Variable	N	Mean	Std Dev	Sum
totassets	1870	2.58	6.29	48389
quickratio	1857	34.183	764.041	634877
liabovrassets	1869	0.20	8.05	377
cashovrassets	1869	0.03	0.11	55
NIovrassets	1869	0.17	6.86	325
DebtSvcCov	1177	32.813	1,183.000	386237
Invturns	1870	0.62	7.84	11714

TABLE 4-III. – Descriptive Statistics (weighted) for 2007

Variable	N	Mean	Std Error of Mean
totassets	18709	0.852	0.014
quickratio	18573	46.634	6.969
liabovrassets	18697	0.076	0.004
cashovrassets	18697	0.013	0.001
NIovrassets	18697	0.020	0.004
DebtSvcCov	11771	14.013	2.459
Invturns	18706	0.793	0.109
NIgrowth	5132	1.161	0.439
ROA	18697	-0.065	0.007
delinqyn	18709	0.003	0.001

TABLE 4-IV. – Comparison of Borrowers and Non-borrowers

	Non-borrower Mean	Borrower Mean	difference	t value	p	
totassets	2.245	3.776	-1.531	-11.94	0.0001	***
quickratio	34.725	32.297	2.428	0.11	0.915	
liabovrassets	0.193	0.232	-0.039	-0.52	0.6020	
cashovrassets	0.028	0.037	-0.009	-4.22	0.0001	***
Niovrassets	0.188	0.125	0.063	0.94	0.3479	
DebtSvcCov	38.844	20.991	17.853	1.06	0.2901	
Invturns	0.666	0.487	0.180	2.40	0.0163	**
Nigrowth	2.471	8.074	-5.604	-3.17	0.0015	***
Current	63.479	45.964	17.515	0.74	0.4568	
workcap	0.195	0.415	-0.220	-7.42	0.0001	***
debtasset	0.193	0.233	-0.040	-0.52	0.6020	
equityasset	0.807	0.767	0.040	0.52	0.6020	
debtequity	0.157	0.108	0.049	0.31	0.7567	
ROA	0.104	0.091	0.013	0.21	0.8320	
ROE	0.037	-1.977	2.013	1.04	0.2978	
Opmargin	-1.576	-0.165	-1.411	-3.22	0.0013	**
NetInc	0.132	0.280	-0.148	-6.85	0.0001	***
Termdebtcov	20.008	19.613	0.395	0.70	0.4849	
capreplace	0.164	0.265	-0.101	-4.46	0.0001	***
Assetturnover	0.879	0.615	0.264	1.00	0.3191	
Opexpratio	1.398	0.866	0.533	2.34	0.0192	**
Deprexpratio	0.089	0.114	-0.025	-1.47	0.1426	
intexpratio	0.071	0.106	-0.035	-2.66	0.0079	***
Netfarmincratio	-1.647	-0.271	-1.376	-3.13	0.0017	***
age	56.666	52.428	4.238	20.82	0.0001	***
college	0.530	0.570	-0.040	-4.56	0.0001	***
limliab	0.115	0.176	-0.061	-9.35	0.0001	***
ftype	0.392	0.499	-0.107	-12.29	0.0001	***
N (typical)	14,540	4,169				

*, **, *** indicates significance at 10%, 5% and 1% levels, respectively

TABLE 4-V. – Correlation Matrix

Panel A. Moody's Ratios

	totassets	quickratio	liabovrassets	cashovrassets	NIovrassets	DebtSvcCov	Invturns	NIgrowth	ROA	delinqyn	delinqpct	lenderno	loans*lenders	loantot#	fixedpct	borrower10	ratewtavg	termwtavg	denied5yr	age	college	limliab	ftype
totassets	1.000																						
quickratio	-0.003	1.000																					
liabovrassets	-0.004	-0.001	1.000																				
cashovrassets	0.023 ***	-0.018 **	-0.001	1.000																			
NIovrassets	-0.005	0.000	0.574 ***	-0.001	1.000																		
DebtSvcCov	0.005	0.022 **	-0.001	-0.007	0.006	1.000																	
Invturns	-0.004	0.030 ***	-0.001	0.043 ***	-0.001	0.008	1.000																
NIgrowth	0.030 **	-0.001	0.005	0.018	0.018	0.015	0.014	1.000															
ROA	-0.002	0.000	0.656 ***	0.000	0.967 ***	0.005	-0.001	0.016	1.000														
delinqyn	0.003	-0.003	0.001	-0.003	-0.002	-0.002	-0.002	-0.015	-0.001	1.000													
delinqpct	-0.001	-0.003	0.001	-0.006	-0.002	-0.002	-0.002	-0.010	-0.002	0.727 ***	1.000												
lenderno	0.071 ***	-0.017 **	0.003	0.041 ***	-0.006	-0.008	-0.006	0.038 ***	-0.003	0.174 ***	0.121 ***	1.000											
loans*lenders	0.067 ***	-0.148	0.084 ***	0.071 ***	-0.001	-0.025	-0.004	0.040 ***	0.006	0.089 ***	0.013	0.021 *	1.000										
loantot#	0.082 ***	-0.019	0.104 ***	0.073 ***	-0.002	-0.033 **	-0.014	0.050 ***	0.007	0.095 ***	0.042 ***	0.670 ***	0.901 ***	1.000									
fixedpct	-0.100 ***	-0.003	-0.044 ***	-0.047 ***	0.002	-0.034 **	-0.043 ***	-0.020	-0.001	-0.030 *	-0.034 **	0.059 ***	0.028	0.027	1.000 .								
borrower10	0.101 ***	-0.001	0.002	0.034 ***	-0.004	-0.007	-0.010	0.032 **	-0.001	0.151 ***	0.125 ***	0.775 ***	0.343 ***	0.453 ***	. .	1.000							
ratewtavg	-0.081 ***	-0.029 *	0.051 ***	0.000	-0.002	-0.047 **	0.013	0.033 *	0.001	0.031 *	0.005	-0.060 ***	-0.008	0.013	-0.080 ***	. .	1.000						
termwtavg	-0.035 **	-0.026	0.082 ***	-0.076 ***	-0.092 ***	-0.058 ***	-0.044 ***	-0.010	-0.067 ***	-0.044 ***	-0.044 ***	0.067 ***	0.042 **	0.048 ***	0.125 ***	. .	-0.027	1.000					
denied5yr	0.013 *	-0.004	0.002	0.016 **	-0.002	-0.003	-0.003	0.021	-0.002	0.121 ***	0.093 ***	0.197 ***	0.111 ***	0.123 ***	-0.019	0.186 ***	0.042 **	0.010	1.000				
age	-0.001	0.010	0.004	-0.075 ***	0.001	0.002	-0.011	-0.006	0.003	-0.025 ***	-0.019 ***	-0.132 ***	-0.133 ***	-0.166 ***	-0.038 **	-0.145 ***	-0.018	-0.027	-0.045 ***	1.000			
college	0.050 ***	-0.002	-0.005	0.026 ***	0.007	0.008	-0.006	0.016	0.006	-0.004	-0.001	0.036 ***	0.048 ***	0.052 ***	-0.068 ***	0.033 ***	-0.018	-0.038 **	0.001	-0.126 ***	1.000		
limliab	0.159 ***	0.015 **	0.020 ***	0.071 ***	0.018 ***	0.006	-0.003	0.018	0.027 ***	0.013 *	0.004	0.052 ***	0.037 ***	0.052 ***	-0.056 ***	0.075 ***	-0.001	-0.089 ***	0.009 0.226	-0.038 ***	0.109 ***	1.000	
ftype	-0.025 ***	-0.008	-0.008	-0.106 ***	-0.015 **	-0.010	0.016 **	-0.020	-0.014 *	0.001	-0.007	0.090 ***	0.001	0.026 **	0.046 ***	0.091 ***	0.008	0.088 ***	0.015 **	-0.009	-0.096 ***	-0.069 ***	1.000

***, **, * denotes significance at the 1%, 5% and 10% levels, respectively

TABLE 4-V. – Correlation Matrix

Panel B. FFSC Ratios

	Current	workcap	debtasset	equityasset	debtequity	ROA	ROE	OpMargin	NetInc	Termdebtcov	capreplace	Assetturnover	Opexpratio	Deprexpratio	intexpratio	Netfarmincratio	delinqyn	delinqpct	lenderno	loantot#	loans*lenders
Current	1.000																				
workcap	0.048 ***	1.000																			
debtasset	-0.002	-0.006	1.000																		
equityasset	0.002	0.006	-1.000 ***	1.000																	
debtequity	-0.001	-0.001	-0.001	0.001	1.000																
ROA	0.000	0.001	0.656 ***	-0.656 ***	-0.002	1.000															
ROE	0.001	0.002	-0.003	0.003	0.009	-0.055 ***	1.000														
OpMargin	0.001	0.006	0.001	-0.001	0.000	0.002	0.000	1.000													
NetInc	0.006	0.223 ***	0.000	0.000	-0.005	0.030 ***	-0.003	0.009	1.000												
Termdebtcov	0.008	0.018 *	-0.001	0.001	-0.001	0.004	0.010	0.012	0.040 ***	1.000											
capreplace	0.009	0.269 ***	-0.004	0.004	-0.005	0.029 ***	-0.003	0.009	0.921 ***	0.046 ***	1.000										
Assetturnover	-0.001	-0.003	0.895 ***	-0.895 ***	-0.002	0.847 ***	-0.009	0.001	0.010	0.001	0.009	1.000									
Opexpratio	-0.001	-0.005	0.000	0.000	0.000	-0.001	0.000	-0.959 ***	-0.010	-0.009	-0.010	-0.001	1.000								
Deprexpratio	-0.002	-0.005	0.000	0.000	0.001	-0.002	0.000	-0.187 ***	-0.011	-0.005	-0.008	-0.001	0.163 ***	1.000							
intexpratio	-0.004	-0.011	0.001	-0.001	0.000	-0.002	0.000	-0.099 ***	-0.012	-0.005	-0.013 *	-0.001	0.130 ***	0.453 ***	1.000						
Netfarmincratio	0.001	0.007	0.001	-0.001	0.000	0.002	0.000	1.000 ***	0.009	0.010	0.009	0.001	-0.959 ***	-0.187 ***	-0.099 ***	1.000					
delinqyn	-0.005	-0.005	0.001	-0.001	-0.010	-0.001	0.002	0.002	-0.006	0.018 *	-0.011	-0.001	-0.001	0.000	0.002	0.002	1.000				
delinqpct	-0.004	-0.004	0.001	-0.001	-0.010	-0.002	0.002	0.001	-0.006	0.001	-0.010	-0.001	-0.001	0.001	0.003	0.001	0.727 ***	1.000			
lenderno	-0.025 ***	0.043 ***	0.003	-0.003	0.000	-0.003	0.003	0.010	0.035 ***	-0.012	0.003	-0.006	-0.008	0.006	0.010	0.010	0.174 ***	0.121 ***	1.000		
loantot#	-0.030	0.043 ***	0.003	-0.104 ***	0.026 **	0.007	0.007	0.021 *	0.000	-0.031 **	-0.039 ***	-0.014	-0.013	0.009	0.033 ***	0.020	0.095 ***	0.042 ***	0.669 ***	1.000	
loans*lenders	-0.030 ** *	0.023	0.104 ***	-0.104 *** **	0.255	0.007	0.007 *	0.021	0.000 **	-0.031 ***	-0.039	-0.014	-0.013	0.009 ***	0.034	0.020	0.094 *** ***	0.042	0.670 ***	0.901 ***	1.000

***, **, * denotes significance at the 1%, 5% and 10% levels, respectively

TABLE 4-VI (A). – Logistic Regression (2007)

Dependent variable = delinqyn (1=delinquent)
Moody's Ratios, Un-weighted

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.	**Model 4** Estimate (Std Error) sig.		Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.	**Model 4** Estimate (Std Error) sig.
Intercept		-3.015 (0.921) ***	-2.554 (0.887) ***	-2.567 (0.886) ***	-2.936 (0.956) ***	totassets	-	-0.035 (0.035)	-0.038 (0.036)	-0.041 (0.037)	-0.036 (0.036)
lenderno	+	0.372 (0.157) **			0.313 (0.225)	ratewtavg	+	0.024 (0.074)	0.014 (0.074)	0.015 (0.074)	0.023 (0.074)
loantot#	+		0.046 (0.041)		0.027 (0.127)	termstavg	?	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.002 (0.001) *
loans*lenders	+			0.025 (0.014) *	0.017 (0.052)	fixedpct	?	-0.339 (0.269)	-0.295 (0.265)	-0.298 (0.266)	-0.335 (0.269)
quickratio	-	-0.112 (0.055) **	-0.116 (0.055) **	-0.115 (0.055) **	-0.112 (0.055) **	age	-	-0.003 (0.01)	-0.004 (0.01)	-0.003 (0.01)	-0.003 (0.01)
liabovrassets	+	-0.108 (0.444)	-0.129 (0.445)	-0.135 (0.446)	-0.110 (0.449)	limliab	?	0.291 (0.303)	0.279 (0.303)	0.292 (0.303)	0.295 (0.304)
cashovrassets	-	-2.083 (0.969) **	-2.124 (0.952) **	-2.136 (0.955) **	-2.091 (0.969) **	college	-	-0.303 (0.235)	-0.280 (0.235)	-0.281 (0.235)	-0.304 (0.235)
DebtSvcCov	-	-0.003 (0.004)	-0.003 (0.004)	-0.003 (0.004)	-0.003 (0.004)	ftype	?	-0.562 (0.248) **	-0.591 (0.247) **	-0.581 (0.248) **	-0.561 (0.249) **
Invturns	-	-0.081 (0.254)	-0.034 (0.227)	-0.038 (0.231)	-0.078 (0.253)	8 region dummies included but not reported					
Nigrowth	-	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	R square Re-scaled R squa		0.021 0.087	0.020 0.081	0.020 0.084	0.021 0.088
ROA	-	-0.092 (0.293)	-0.064 (0.297)	-0.065 (0.297)	-0.089 (0.294)	Likelihood Ratio p		57.183 0.000	53.059 0.000	54.455 0.001	57.311 0.001
denied5yr	+	1.189 (0.337) ***	1.124 (0.336) ***	1.234 (0.335) ***	1.193 (0.338) ***	Concordant Discordant		70.7 26.9	70.8 26.8	71 26.6	70.8 26.9

TABLE 4-VI (B). – Logistic Regression (2007)

Dependent variable = delinqyn (1=delinquent)
FFSC Ratios, Un-weighted

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.	**Model 4** Estimate (Std Error) sig.
Intercept		-3.697 (0.829) ***	-3.339 (0.811) ***	-3.347 (0.811) ***	-3.685 (0.855) ***
Lenderno	+	0.334 (0.133) ***			0.319 (0.199) *
loantot#	+		0.038 (0.037)		-0.002 (0.105)
loans*lenders	+			0.022 (0.013) *	0.003 (0.046)
denied5yr	+	1.178 (0.28) ***	1.219 (0.279) ***	1.213 (0.279) ***	1.178 (0.281) ***
Current	-	-0.024 (0.018)	-0.025 (0.018)	-0.024 (0.018)	-0.024 (0.017)
Workcap	-	-0.144 (0.179)	-0.142 (0.176)	-0.148 (0.179)	-0.144 (0.179)
debtasset	+	0.955 (0.367) ***	0.953 (0.365) ***	0.955 (0.366) ***	0.954 (0.369) ***
debtequity	+	0.003 (0.016)	0.003 (0.015)	0.003 (0.015)	0.003 (0.016)
ROA	-	-0.061 (0.466)	-0.026 (0.47)	-0.032 (0.469)	-0.062 (0.468)
ROE	-	0.044 (0.026) *	0.043 (0.025) *	0.043 (0.258) *	0.044 (0.026) *
OpMargin	+	0.542 (0.339)	0.554 (0.334) *	0.549 (0.334) *	0.541 (0.339)
NetInc	+	-0.199 (0.303)	-0.184 (0.301)	-0.194 (0.309)	-0.199 (0.304)
TermDebtCov	-	0.0005 (0.0001) ***	0.0004 (0.0001) ***	0.0005 (0.0001) ***	0.0005 (0.0001) ***
Capreplace	-	0.204 (0.269)	0.204 (0.269)	0.221 (0.274)	0.206 (0.271)
Assetturnover	-	-0.963 (0.316) ***	-0.963 (0.314) ***	-0.965 (0.315) ***	-0.963 (0.316) ***
Opexpratio	-	0.864 (0.407) **	0.879 (0.4) **	0.874 (0.401) **	0.863 (0.407) **
Deprexpratio	-	-0.594 (0.911)	-0.538 (0.898)	-0.556 (0.901)	-0.597 (0.914)
Intexpratio	-	-1.095 (0.619) *	-1.129 (0.607) *	-1.123 (0.608) *	-1.094 (0.619) *

	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.	**Model 4** Estimate (Std Error) sig.
ratewtavg	?	0.058 (0.061)	0.054 (0.061)	0.055 (0.061)	0.058 (0.061)
termwtavg	?	-0.003 (0.001) **	-0.003 (0.001) **	-0.003 (0.001) **	-0.003 (0.001) **
fixedpct	?	-0.313 (0.225)	-0.271 (0.222)	-0.276 (0.222)	-0.319 (0.225)
age	-	-0.003 (0.008)	-0.002 (0.008)	-0.002 (0.008)	-0.003 (0.008)
limliab	?	0.130 (0.264)	0.112 (0.264)	0.124 (0.264)	0.131 (0.265)
college	-	-0.373 (0.199) *	-0.361 (0.199) *	-0.361 (0.199) *	-0.373 (0.199) *
ftype	?	-0.443 (0.209) **	-0.480 (0.208) **	-0.469 (0.208) **	-0.443 (0.209) **
8 region dummies included but not reported					
R square		0.029	0.028	0.028	0.029
Re-scaled R square		0.109	0.104	0.106	0.109
Likelihood Ratio		98.475	93.490	94.918	98.487
p		0.001	0.001	0.001	0.001
Concordant		71.3	71.1	71.2	71.3
Discordant		26.8	26.9	26.7	26.7

TABLE 4-VII (A). – Logistic Regression (2007)

Dependent variable = delinqyn (1=delinquent)
Parsimonious Model, Un-weighted

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.	**Model 4** Estimate (Std Error) sig.
Intercept		-3.090	-2.729	-2.732	-3.106
		(0.756)	(0.74)	(0.737)	(0.785)
		***	***	***	***
Lenderno	+	0.365			0.359
		(0.132)			(0.196)
		***			**
loantot#	+		0.045		0.013
			(0.035)		(0.102)
loans*lenders	+			0.023	-0.002
				(0.012)	(0.045)
				*	
denied5yr	+	1.142	1.180	1.177	1.140
		(0.277)	(0.277)	(0.277)	(0.278)
		***	***	***	***
Quickratio	-	-0.044	-0.047	-0.046	-0.044
		(0.032)	(0.032)	(0.032)	(0.032)
debtasset	+	0.861	0.849	0.848	0.854
		(0.329)	(0.328)	(0.328)	(0.332)
		***	***	***	***
ROE	-	0.039	0.038	0.039	0.039
		(0.016)	(0.016)	(0.016)	(0.016)
		**	**	**	**
TermDebtCov	-	0.0004	0.0004	0.0004	0.0004
		(0.0001)	(0.0001)	(0.0001)	(0.0001)
		***	***	***	***
Assetturnover	-	-0.797	-0.771	-0.772	-0.796
		(0.274)	(0.269)	(0.27)	(0.274)
		***	***	***	***
Invturns	-	-0.227	-0.179	-0.184	-0.225
		(0.202)	(0.195)	(0.197)	(0.202)

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.	**Model 4** Estimate (Std Error) sig.
ratewtavg	-	0.042	0.037	0.038	0.042
		(0.059)	(0.059)	(0.059)	(0.059)
termwtavg	?	-0.003	-0.003	-0.003	-0.003
		(0.001)	(0.001)	(0.001)	(0.001)
		***	***	***	***
fixedpct	?	-0.363	-0.312	-0.316	-0.363
		(0.224)	(0.221)	(0.221)	(0.224)
age	-	-0.001	-0.001	-0.001	-0.001
		(0.008)	(0.008)	(0.008)	(0.008)
limliab	+	0.219	0.205	0.213	0.218
		(0.256)	(0.255)	(0.256)	(0.256)
college	-	-0.352	-0.337	-0.337	-0.353
		(0.198)	(0.197)	(0.197)	(0.198)
		*	*	*	*
ftype	?	-0.525	-0.566	-0.554	-0.527
		(0.208)	(0.207)	(0.208)	(0.209)
		***	***	***	***
totassets	?	-0.040	-0.041	-0.043	-0.041
		(0.027)	(0.0275)	(0.0278)	(0.0275)
8 region dummies included but not reported					
R square		0.027	0.025	0.025	0.027
Re-scaled R square		0.099	0.093	0.095	0.099
Likelihood Ratio		89.039	83.339	84.844	89.084
p		0.001	0.001	0.001	0.001
Concordant		69.7	69.6	69.9	69.9
Discordant		28.1	28.2	27.9	28.0

TABLE 4-VII (B). – Tobit Regression (2007)

Dependent variable = delinqpct
Parsimonious Model, Un-weighted

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.
Intercept		0.055 (0.025) **	0.055 (0.245) **	0.053 (0.024) **
Lenderno	+	-0.005 (0.005)		
loantot#	+		-0.003 (0.001) *	
loans*lenders	+			-0.001 (0.0006) *
denied5yr	+	0.054 (0.015) ***	0.055 (0.015) ***	0.055 (0.015) ***
Quickratio	-	0.000 (0.0003)	0.000 (0.0004)	0.000 (0.0004)
debtasset	+	0.025 (0.014) *	0.027 (0.014) *	0.026 (0.014) *
ROE	-	0.002 (0.0007) ***	0.002 (0.0007) ***	0.002 (0.0007) ***
TermDebtCov	-	0.0000 (0.000001)	0.0000 (0.00001)	0.0000 (0.000001)
Assetturnover	-	-0.003 (0.006)	-0.003 (0.006)	-0.003 (0.006)
Invturns	-	-0.005 (0.005)	-0.006 (0.005)	-0.006 (0.005)

	Exp sign	**Model 1** Estimate Std Error p value	**Model 2** Estimate Std Error p value	**Model 3** Estimate Std Error p value
ratewtavg	+	-0.001 (0.002)	-0.001 (0.002)	-0.001 (0.002)
termwtavg	?	0.000 (0.00003) **	0.000 (0.00003) **	0.000 (0.00003) **
fixedpct	?	-0.011 (0.007)	-0.011 (0.008)	-0.011 (0.007)
age	-	0.000 (0.0003)	0.000 (0.0003)	0.000 (0.00003)
limliab	?	-0.008 (0.008)	-0.008 (0.009)	-0.008 (0.009)
college	-	-0.009 (0.007)	-0.009 (0.007)	-0.009 (0.007)
ftype	?	-0.021 (0.007) ***	-0.020 (0.007) ***	-0.021 (0.007) ***
8 region dummies included but not reported				
AIC		-1719.000	-1721.000	-1721.000

TABLE 4-VIII (A). – OLS Regression (2007)
Dependent variable = ratewtavg
Moody's Ratios, Un-weighted

Parameter	Exp sign	**Model 1** Estimate Std Error p value	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.	**Model 4** Estimate (Std Error) sig.	VIF
Intercept		7.300 (0.193) ***	7.022 (0.187) ***	7.061 (0.185) ***	7.337 (0.203) ***	
Lenderno	-	-0.198 (0.046) ***			-0.294 (0.069) ***	2.4
loantot#	-		0.009 (0.014)		0.013 (0.032)	6.0
loans*lenders	-			-0.004 (0.006)	0.015 (0.016)	8.7
denied5yr	+	0.476 (0.139) ***	0.439 (0.139) ***	0.450 (0.139) ***	0.466 (0.139) ***	1.0
totassets	-	-0.032 (0.006) ***	-0.034 (0.007) ***	-0.033 (0.007) ***	-0.035 (0.007) ***	1.2
quickratio	-	-0.004 (0.003)	-0.003 (0.003)	-0.004 (0.003)	-0.004 (0.003)	1.1
liabovrassets	+	0.211 (0.121) *	0.169 (0.122)	0.192 (0.122)	0.172 (0.122)	1.2
cashovrassets	-	-0.179 (0.27)	-0.192 (0.271)	-0.188 (0.271)	-0.184 (0.269)	1.3
DebtSvcCov	+	0.000 (0.0002)	0.000 (0.0002)	0.000 (0.0002)	0.000 (0.0002)	1.1
Invturns	+	0.105 (0.043) **	0.096 (0.044) **	0.097 (0.044) **	0.107 (0.043) **	1.3
Nigrowth	+	0.000 (0.0003)	0.000 (0.0003)	0.000 (0.0003)	0.000 (0.0003) *	1.0
ROA	-	0.161 0.110	0.133 0.111	0.139 0.111	0.160 0.110	1.1

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.	**Model 4** Estimate (Std Error) sig.
delinqyn	+	0.1090 (0.173)	0.0720 (0.173)	0.0790 (0.173)	0.1050 (0.172)
termwtavg	+	0.000 (0.0003)	0.000 (0.00003) **	0.000 (0.001)	0.000 (0.0003)
fixedpct	?	-0.259 (0.071) ***	-0.011 (0.008)	-0.276 (0.071) ***	-0.258 (0.07) ***
age	-	-0.004 (0.002)	0.000 (0.0003)	-0.004 (0.003)	-0.004 (0.003)
limliab	?	0.022 (0.083)	0.008 (0.009)	0.034 (0.083)	0.025 (0.083)
college	-	-0.070 (0.061)	-0.009 (0.007)	-0.079 (0.062)	-0.072 (0.061)
ftype	?	0.074 (0.064)	-0.020 (0.007) ***	0.081 (0.064)	0.071 (0.064) 0.242
8 region dummies included but not reported					
F statistic		5.050	4.310	4.310	4.970
p value		0.001	0.001	0.001	0.001
adjusted R-square		0.036	0.030	0.030	0.038

TABLE 4-VIII (B). – OLS Regression (2007)
Dependent variable = ratewtavg
FFSC Ratios, Un-weighted

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.	**Model 4** Estimate (Std Error) sig.	VIF
Intercept		7.225 (0.183) ***	7.032 (0.176) ***	7.068 (0.175) ***	7.225 (0.192) ***	
Lenderno	-	-0.126 (0.044) ***			-0.189 (0.067) ***	2.5
loantot#	-		0.019 (0.013)		0.033 (0.031)	6.3
loans*lenders	-			0.001 (0.005)	0.004 (0.016)	9.1
denied5yr	+	0.286 (0.129) **	0.252 (0.129) **	0.261 (0.129) **	0.276 (0.129) **	1.0
Current	-	-0.003 (0.002) *	-0.003 (0.002)	-0.003 (0.002)	-0.003 (0.002)	1.1
Workcap	-	0.031 (0.021)	0.031 (0.021)	0.031 (0.021)	0.029 (0.021)	1.6
debtequity	+	0.001 (0.003)	0.001 (0.003)	0.001 (0.003)	0.001 (0.003)	1.1
ROA	-	0.143 (0.118)	0.102 (0.118)	0.117 (0.118)	0.122 (0.118)	1.4
ROE	-	0.004 (0.006)	0.004 (0.006)	0.004 (0.006)	0.003 (0.006)	1.1
OpMargin	-	0.004 (0.038)	-0.003 (0.038)	-0.001 (0.038)	0.001 (0.038)	9.8
NetInc	-	-0.060 (0.044)	-0.059 (0.044)	-0.062 (0.044)	-0.053 (0.044)	3.5
TermDebtCov	-	0.0000 (0.0001)	0.0000 (0.0001)	0.0000 (0.0001)	0.0000 (0.0001)	1.0
Capreplace	-	-0.024 (0.04)	-0.018 (0.04)	-0.018 (0.04)	-0.024 (0.04)	3.1
Assetturnover	+	0.049 (0.056)	0.055 (0.056)	0.052 (0.056)	0.054 (0.056)	1.6
Opexpratio	+	-0.085 (0.054)	-0.101 (0.054) *	-0.095 (0.054) *	-0.094 (0.054) *	11.7
Deprexpratio	-	-0.048 (0.125)	-0.075 (0.126)	-0.067 (0.126)	-0.057 (0.125)	1.8
Intexpratio	+	0.471 (0.156) ***	0.521 (0.156) ***	0.502 (0.156) ***	0.498 (0.156) ***	6.1
termwtavg	+	0.000 (0.0003)	-0.001 (0.0003) *	0.000 (0.0003) *	0.000 (0.0003)	1.2
fixedpct	?	-0.283 (0.067) ***	-0.300 (0.066) ***	-0.296 (0.067) ***	-0.286 (0.067) ***	1.1
age	-	-0.002 (0.003)	-0.002 (0.003)	-0.002 (0.003)	-0.002 (0.003)	1.1
limliab	?	0.019 (0.077)	0.026 (0.077)	0.025 (0.077)	0.017 (0.077)	1.1
college	-	-0.108 (0.058) *	-0.116 (0.058) **	-0.114 (0.058) **	-0.110 (0.058) *	1.1
ftype	?	0.092 (0.059)	0.099 (0.059) *	0.100 (0.0598) *	0.087 (0.059)	1.2
totassets	-	-0.022 (0.006) ***	-0.024 (0.006) ***	-0.023 (0.0056) ***	-0.024 (0.006) ***	1.6
8 region dummies included but not reported						
F statistic		4.200	4.010	3.940	4.200	
p value		0.000	0.000	0.000	0.000	
Adj. R-squared		0.030	0.028	0.028	0.032	

TABLE 4-IX (A). – OLS Regression (2007)
Dependent variable = termwtavg
Moody's Ratios, Un-weighted

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.
Intercept		85.969	98.539	98.816
		(15.253)	(14.667)	(14.629)
		***	***	***
Lenderno	+	9.720		
		(2.971)		
		***		
loantot#	+		1.244	
			(0.873)	
loans*lenders	+			0.552
				(0.361)
denied5yr	?	6.790	7.868	7.769
		(8.93)	(8.941)	(8.941)
totassets	?	0.328	0.289	0.309
		(0.419)	(0.424)	(0.422)
quickratio	-	-0.006	-0.024	-0.023
		(0.2)	(0.201)	(0.201)
liabovrassets	+	43.470	43.366	43.620
		(7.73)	(7.815)	(7.781)
		***	***	***
cashovrassets	-	-51.784	-51.727	-51.777
		(17.289)	(17.318)	(17.317)
		***	***	***
DebtSvcCov	-	-0.027	-0.027	-0.028
		(0.012)	(0.012)	(0.012)
		**	**	**
Invturns	?	0.073	0.529	0.464
		(2.808)	(2.809)	(2.809)
Nigrowth	-	-0.002	-0.002	-0.002
		(0.017)	(0.018)	(0.018)
ROA	-	-11.543	-10.647	-10.659
		(7.07)	(7.075)	(7.074)

	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.
delinqyn	?	-21.6260	-20.3440	-20.6060
		(11.06)	(11.07)	(11.074)
		*	*	*
ratewtavg	+	-1.506	-1.873	-1.821
		(1.243)	(1.24)	(1.24)
fixedpct	?	27.306	28.006	28.014
		(4.52)	(4.519)	(4.518)
		***	***	***
age	?	0.181	0.179	0.179
		(0.173)	(0.173)	(0.173)
limliab	?	-18.682	-19.262	-19.138
		(5.309)	(5.315)	(5.317)
		***	***	***
college	?	-1.194	-0.884	-0.909
		(3.938)	(3.944)	(3.944)
ftype	?	8.845	8.435	8.569
		(4.084)	(4.089)	(4.089)
		**	**	**
8 region dummies included but not reported				
F statistic		7.880	7.510	7.520
p value		0.001	0.001	0.001
Adj. R-squared		0.060	0.057	0.057

TABLE 4-IX (B). – OLS Regression (2007)

Dependent variable = termwtavg

FFSC ratios, Un-weighted

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.		Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.
Intercept		112.430	123.784	124.427	ratewtavg	+	-1.524	-1.785	-1.733
		(12.985)	(12.544)	(12.516)			(1.034)	(1.035)	(1.034)
		***	***	***				*	*
Lenderno	+	10.006			fixedpct	?	22.654	23.332	23.346
		(2.602)					(3.926)	(3.928)	(3.927)
		***					***	***	***
loantot#	+		1.579		age	?	-0.011	-0.007	-0.008
			(0.764)				(0.148)	(0.149)	(0.149)
			**						
loans*lenders	+			0.647	limliab	?	-9.222	-9.746	-9.631
				(0.319)			(4.574)	(4.578)	(4.579)
				**			**	**	**
denied5yr	-	-9.562	-8.471	-8.531	college	?	-2.197	-1.943	-1.984
		(7.668)	(7.674)	(7.676)			(3.455)	(3.459)	(3.461)
Current	-	0.131	0.125	0.123	ftype	?	7.391	6.715	6.922
		(0.109)	(0.11)	(0.1099)			(3.536)	(3.539)	(3.539)
							**	*	**
Workcap	-	-1.238	-1.302	-1.287	totassets	?	0.249	0.220	0.243
		(1.246)	(1.247)	(1.248)			(0.332)	(0.335)	(0.334)
debtequity	+	0.208	0.199	0.204					
		(0.173)	(0.173)	(0.173)	8 region dummies included but not reported				
ROA	-	-16.943	-16.294	-16.066	F statistic		20.760	20.370	20.360
		(6.964)	(6.985)	(6.977)	p value		0.000	0.000	0.000
		**	**	**					
ROE	-	-0.301	-0.310	-0.308	Adj. R-squared		0.161	0.158	0.158
		(0.375)	(0.375)	(0.375)					
OpMargin	-	0.727	0.906	0.929					
		(0.234)	(2.237)	(2.236)					
NetInc	-	-13.756	-13.362	-13.555					
		(2.593)	(2.602)	(2.598)					
		***	***	***					
TermDebtCov	-	-0.014	-0.014	-0.014					
		(0.006)	(0.006)	(0.006)					
		**	**	**					
Capreplace	-	15.442	15.149	15.247					
		(2.366)	(2.369)	(2.37)					
		***	***	***					
Assetturnover	-	-31.009	-31.109	-31.139					
		(3.246)	(3.253)	(3.252)					
		***	***	***					
Opexpratio	-	-19.806	-19.656	-19.574					
		(3.18)	(3.19)	(3.188)					
		***	***	***					
Deprexpratio	-	-37.042	-36.431	-36.359					
		(7.392)	(7.403)	(7.402)					
		***	***	***					
Intexpratio	+	116.998	116.785	116.519					
		(8.997)	(9.031)	(9.022)					
		***	***	***					

TABLE 4-X (A). – Logistic Regression (2006)
Dependent variable = delinqyn (1=delinquent)
Parsimonious, Un-weighted

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.
Intercept		-12.069 (411)	-11.940 (414.6)	-11.924 (413.7)
Lenderno	+	0.131 (0.1082)		
loantot#	+		0.065 (0.0296) **	
loans*lenders	+			0.028 (0.0126) **
denied5yr	+	1.331 (0.215) ***	1.317 (0.2138) ***	1.288 (0.216) ***
Current	-	-0.053 (0.0195) ***	-0.052 (0.0194) ***	-0.052 (0.0194) ***
liabovrassets	+	0.224 (0.1187) *	0.225 (0.1256) *	0.218 (0.1265) *
ROA	-	-0.647 (0.2913) **	-0.667 (0.301) **	-0.651 (0.301) **
TermDebtCov	-	0.0022 (0.00124) *	0.0022 (0.00123) *	0.0022 (0.00124) *
Deprexpratio	-	0.004 (0.0145)	0.003 (0.0145)	0.003 (0.0146)
Invturns	-	0.1537 (0.1066)	0.1545 (0.1067)	0.1578 (0.1065)

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.
ratewtavg	+	0.078 (0.0434) *	0.078 (0.0435) *	0.079 (0.0436) *
termwtavg	?	-0.506 (0.1779) ***	-0.511 (0.1761) ***	-0.506 (0.1758) ***
fixedpct	?	-0.272 (0.1844)	-0.290 (0.185)	-0.290 (0.1852)
age	-	0.005 (0.007)	0.005 (0.0071)	0.005 (0.007)
limliab	?	0.548 (0.192) ***	0.556 (0.191) ***	0.546 (0.1915) ***
college	-	0.080 (0.1711)	0.078 (0.171)	0.075 (0.1713)
ftype	?	-0.156 (0.1695)	-0.157 (0.1698)	-0.165 (0.1698)
totasset	?	0.009 (0.0087)	0.009 (0.0088)	0.009 (0.0088)
8 region dummies included but not reported				
R square		0.038	0.039	0.039
Re-scaled R square		0.117	0.119	0.119
Likelihood Ratio		135.685	138.727	138.976
p		0.001	0.001	0.001
Concordant		72.9	72.7	72.8
Discordant		25.7	25.9	25.7

TABLE 4-X (B). – OLS Regression (2006)
Dependent variable = ratewtavg
Parsimonious, un-weighted

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.	Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.
Intercept		7.099 (0.2457) ***	6.992 (0.241) ***	7.012 (0.24) ***	fixedpct	?	-0.812 (0.0737) ***	-0.817 (0.073) ***	-0.812 (0.0737) ***
Lenderno	-	-0.097 (0.049) **			age	-	-0.002 (0.00282)	-0.001 (0.0028)	-0.001 (0.00282)
loantot#	-		-0.001 (0.0166)		limliab	?	-0.144 (0.0847) *	-0.149 (0.084) *	-0.145 (0.0845) *
loans*lenders	-			-0.009 (0.0069)	college	-	0.076 (0.0655)	0.069 (0.065)	0.073 (0.0655)
denied5yr	+	0.620 (0.132) ***	0.581 (0.131) ***	0.609 (0.132) ***	ftype	?	-0.034 (0.066)	-0.030 (0.066)	-0.031 (0.066)
Current	-	-0.003 (0.00194) *	-0.003 (0.0019) *	-0.003 (0.0019) *	8 region dummies included but not reported				
liabovrassets	+	-0.141 (0.031) ***	-0.142 (0.031) ***	-0.141 (0.031) ***	F statistic		10.640	10.460	10.540
ROA	-	0.193 (0.054) ***	0.194 (0.054) ***	0.193 (0.054) ***	p value		0.001	0.001	0.001
TermDebtCov	-	-0.0007 (0.00049)	-0.0007 (0.00049)	-0.0007 (0.00049)	Adj. R-squared		0.059	0.059	0.059
Deprexpratio	-	-0.003 (0.0043)	-0.003 (0.004)	-0.002 (0.004)					
Invturns	+	-0.0624 (0.0454)	-0.064 (0.045)	-0.0635 (0.045)					

TABLE 4-XI (A). – Logistic Regression (Pooled)
Dependent variable = delinqyn (1=delinquent)
Parsimonious, Un-weighted

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.		Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.
Intercept		-12.592 (430)	-12.454 (434.8)	-12.452 (432.9)	ratewtavg	+	0.064 (0.0357) *	0.062 (0.0358) *	0.063 (0.0359) *
Lenderno	+	0.131 (0.106)			termwtavg	-	-0.002 (0.001) **	-0.002 (0.0009) *	-0.002 (0.0009) *
loantot#	+		0.063 (0.0285) **		fixedpct	?	-0.254 (0.14) *	-0.246 (0.1397) *	-0.249 (0.14) *
loans*lenders	+			0.029 (0.0122) **	age	-	0.003 (0.005)	0.002 (0.005)	0.003 (0.005)
denied5yr	+	1.311 (0.138) ***	1.317 (0.1667) ***	1.294 (0.168) ***	limliab	?	0.334 (0.149) **	0.332 (0.149) **	0.328 (0.1495) **
Quickratio	-	-0.064 (0.022) ***	-0.064 (0.0223) ***	-0.063 (0.022) ***	college	-	-0.145 (0.127)	-0.142 (0.127)	-0.145 (0.127)
debtasset	+	0.156 (0.068) **	0.152 (0.0677) **	0.150 (0.0677) **	ftype	?	-0.309 (0.128) **	-0.326 (0.128) ***	-0.326 (0.128) ***
ROA	-	-0.394 (0.152) ***	-0.385 (0.1484) ***	-0.381 (0.147) ***	Year07	-	-0.301 (0.29)	0.023 (0.194)	0.004 (0.179)
TermDebtCov	-	0.0004 (0.0001) ***	0.0004 (0.00014) ***	0.0004 (0.0001) ***	lender/loans x year	?	0.208 (0.166)	-0.023 (0.0439)	-0.007 (0.017)
Deprexpratio	-	0.002 (0.0136)	0.001 (0.0138)	0.001 (0.0138)	8 region dummies included but not reported				
Invturns	-	-0.0308 (0.092)	-0.0211 (0.089)	-0.02 (0.089)	R square		0.027	0.027	0.027
					Re-scaled R square		0.089	0.089	0.090
totassets	?	0.002 (0.009)	0.001 (0.0092)	0.001 (0.0092)	Likelihood Ratio		184.727	182.332	184.497
					p		0.001	0.001	0.001
					Concordant		69.7	69.4	69.6
					Discordant		28.4	28.6	28.5

TABLE 4-XI (B). – OLS Regression (Pooled)
Dependent variable = ratewtavg
Parsimonious, un-weighted

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.		Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.
Intercept		7.466 (0.141) ***	7.346 (0.13) ***	7.383 (0.128) ***	termwtavg	+	0.000 (0.0003)	0.000 (0.0002)	0.000 (0.0003)
Lenderno	-	-0.076 (0.0453) *			fixedpct	?	-0.542 (0.049) ***	-0.551 (0.049) ***	-0.547 (0.049) ***
loantot#	-		0.002 (0.015)		age	?	-0.003 (0.001)	-0.003 (0.0019)	-0.003 (0.0049)
loans*lenders	-			-0.007 (0.006)	limliab	?	-0.090 (0.057)	-0.093 (0.057) *	-0.089 (0.0569)
denied5yr	+	0.495 (0.093) ***	0.464 (0.093) ***	0.482 (0.093) ***	college	-	-0.014 (0.044)	-0.022 (0.044)	-0.019 (0.044)
Quickratio	-	-0.007 (0.002) ***	-0.007 (0.002) ***	-0.007 (0.002) ***	ftype	?	0.028 (0.045)	0.033 (0.044)	0.033 (0.044)
debtasset	+	-0.114 (0.026) ***	-0.114 (0.026) ***	-0.113 (0.026) ***	Year07	-	-0.135 (0.104)	-0.233 (0.072) ***	-0.226 (0.064) ***
ROA	-	0.142 (0.044) ***	0.141 (0.044) ***	0.140 (0.044) ***	lender/loans x yea	?	-0.054 (0.065)	0.014 (0.02)	0.007 (0.009)
TermDebtCov	-	0.0000 (0.0001)	0.0000 (0.00011)	0.0000 (0.0001)	8 region dummies included but not reported				
Deprexpratio	-	-0.001 (0.004)	-0.002 (0.004)	-0.002 (0.004)	F statistic p value		12.080 0.001	11.710 0.001	11.710 0.001
Invturns	+	-0.024 (0.029)	-0.027 (0.029)	-0.027 (0.029)	Adj. R-squared		0.039	0.038	0.038

TABLE 4-XII (A). – Summary of Findings: Logistic Regressions

	Dependent Variable	Number of Loans/Lenders	LIQUIDITY	SOLVENCY	REPAYMENT CAPACITY	EFFICIENCY	PROFITABILITY
2007							
Table 6(A)	delinqyn	(+) Lenderno	(-) Quickratio (-) Cashovrassets				
Table 6(B)	delinqyn	(+) Lenderno (+) Loans*lenders		(+) Debt/Asset	(+) Term Debt Cov.	(-) Assetturnover (+) Opexpratio (-) Intexpratio	(+) ROE
Table 7(A)	delinqyn	(+) Lenderno (+) Loans*lenders		(+) Debt/Asset	(+) TermDebtCov	(-) Assetturnover	(+) ROE
2006							
Table 10	delinqyn	(+) Loantot# (+) Loans*lenders	(-) Current	(+) Liab/Assets	(+) TermDebtCov		(-) ROA
Pooled							
Table 11(A)	delinqyn	(+) Loantot# (+) Loans*lenders	(-) Quickratio	(+) Debt/Asset	(+) TermDebtCov		(-) ROA

symbol in () indicates the sign of the coefficient when significant at the 10% level, or better

TABLE 4-XII (B). – Summary of Findings: OLS Regressions
Dependent variable = RATEWTAVG

	Dependent Variable	Number of Loans/Lenders	LIQUIDITY	SOLVENCY	REPAYMENT CAPACITY	EFFICIENCY	PROFITABILITY
2007							
Table 8(A)	RATEWTAVG	(-) LENDERNO				(+) INVTURNS	
Table 8(B)	RATEWTAVG	(-) LENDERNO				(+) INTEXPRATIO	
2006							
Table 10(B)	RATEWTAVG	(-) LENDERNO		(-) Liab/Assets			(+) ROA
Pooled							
Table 11(B)	RATEWTAVG	(-) LENDERNO	(-) Quickratio	(-) Debt/Asset			(+) ROA

symbol in () indicates the sign of the coefficient when significant at the 10% level, or better

4.8. *Appendices*

Appendix A

2007 Survey data results using survey weights

The majority of the analysis has been conducted using un-weighted survey data. As noted, survey weights are included in the dataset in order to make better inferences for the country at large. A much higher percentage of large farms are surveyed than small farms, so survey weights are important for this purpose. However, for the study of loan delinquencies, the use of survey weights may not be appropriate. However, in order to address this question, several estimations are provided in this appendix using the survey weights.

In Table 4-XIII (A), results of a parsimonious logistic regression model are provided. All three of the loan/lender variables are significant at the 10% level, and the number of loans (LOANSTOT#) and the loan/lender interaction term (LOANS*LENDERS) are both significant at the 1% level. This result is generally consistent with the other findings that the number of lenders and number of loans have a positive and significant effect on the likelihood of loan delinquency. As found previously, borrowers that had been denied credit during the past 5 years (DENIED5YR) are more likely to have delinquent loans. None of the financial ratios are significant. Borrowers with longer maturity debt are less likely to have delinquent loans, a finding generally consistent with previous results.

In Table 4-XIII (B), the weighted average loan interest rate is regressed on a parsimonious group of ratios and other variables. None of the loan/lender variables are significant. Borrowers previously denied credit (DENIED5YR) pay higher interest rates, although this results is significant only at the 10% level. ROE (return on equity) is negative and significant at the 10% level. The only other significant variables are AGE,

which is positive and significant at the 10% level, and COLLEGE, which is negative and significant at the 1% level. This result suggests that attending college is associated with average loan rates 45 basis points lower.

In Table 4-XIII (C), none of the loan/lender variables are significant, nor is DENIED5YR. The debt-to-asset ratio (DEBTASSET) is positive and significant, indicating that as the total amount of debt increases, so does the term of the debt. Asset turnover (ASSETTURNOVER) is negative and significant. Inventory turnover (INVTURNS) is also negative and significant. As a higher proportion of loans is fixed rate, the average term of the debt increases. This same result was found with un-weighted data and is perhaps explained by borrowers for whom most of the debt is mortgage debt, which may especially be the case for smaller farms. Limited liability organizations have shorter term debt. This finding also is consistent with the un-weighted analyses.

TABLE 4-XIII (A). – Weighted Regression Results - Weighted Logistic Regression (2007)

Dependent variable = delinqyn (1=delinquent)
Parsimonious Model, weighted

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.		Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.
Intercept		140.808 (35.456) ***	144.271 (34.977) ***	142.213 (34.751) ***	ratewtavg	+	-1.482 (2.588)	-1.416 (2.593)	-1.447 (2.592)
Lenderno	+	0.031 (5.938)			fixedpct	?	28.429 (10.951)	28.605 (10.915)	25.582 (10.922)
Loantot#	+		-2.849 (2.304)		age	?	-0.080 (0.399)	-0.075 (0.399)	-0.076 (0.399)
Loans*lenders	+			-0.933 (0.815)	limliab	?	-35.271 (9.044) ***	-34.726 (9.134) ***	-38.004 (9.094) ***
denied5yr	-	-10.416 (19.294)	-9.164 (19.205)	-9.717 (19.274)	college	?	8.627 (9.629)	8.708 (9.614)	8.667 (9.62)
Quickratio	-	0.761 (0.808)	0.741 (0.807)	0.745 (0.809)	ftype	?	-12.537 (10.488)	-12.741 (10.457)	-12.762 (10.468)
debtasset	+	177.614 (21.569)	178.486 (21.761)	178.159 (21.69)	8 region dummies included but not reported				
ROE	-	-0.870 (0.94)	-0.869 (0.946)	-0.860 (0.939)	F statistic p value		11.020 0.001	10.910 0.001	10.980 0.001
TermDebtCov	-	-0.0090 (0.012)	-0.0100 (0.012)	-0.0100 (0.0122)	Adj. R-squared		0.239	0.240	0.239
Assetturnover	-	-121.672 (12.093) ***	-120.518 (12.006) ***	-120.827 (12.037) ***					
Invturns	-	-11.804 (5.13) **	-11.674 (5.033) **	-11.662 (5.038) **					

TABLE 4-XIII (B). – Weighted Regression Results - Weighted OLS Regression (2007)

Dependent variable = Ratewtavg
Parsimonious Model, weighted

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.		Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.
Intercept		5.964 (0.561) ***	5.917 (0.533) ***	5.965 (0.523) ***	termwtavg	-	0.000 (0.0007)	0.000 (0.0007)	0.000 (0.0007)
Lenderno	-	0.026 (0.118)			fixedpct	?	-0.109 (0.251)	-0.112 (0.251)	-0.111 (0.251)
Loantot#	-		0.054 (0.039)		age	-	0.014 (0.008) *	0.014 (0.008) *	0.014 (0.008) *
Loans*lenders	-			0.015 (0.0143)	limliab	?	0.090 (0.1808)	0.080 (0.178)	0.086 (0.1793)
denied5yr	+	0.624 (0.334) *	0.603 (0.3338) *	0.616 (0.3336) *	college	-	-0.450 (0.1607) ***	-0.451 (0.161) ***	-0.451 (0.161) ***
Quickratio	-	0.000 (0.005)	0.000 (0.005)	0.000 (0.005)	ftype	?	0.127 (0.167)	0.130 (0.1675)	0.129 (0.1675)
debtasset	+	0.298 (0.436)	0.280 (0.435)	0.289 (0.436)	8 region dummies included but not reported				
ROE	-	-0.014 (0.008) *	-0.014 (0.008) *	-0.014 (0.008) *	F statistic p value		2.660 0.001	2.660 0.001	2.730 0.001
TermDebtCov	-	-0.0001 (0.0001)	-0.0001 (0.0001)	-0.0001 (0.0001)	Adj. R-squared		0.052	0.052	0.051
Assetturnover	-	0.117 (0.2349)	0.101 (0.236)	0.108 (0.235)					
Invturns	-	0.0798 (0.0555)	0.078 (0.056)	0.0787 (0.0556)					

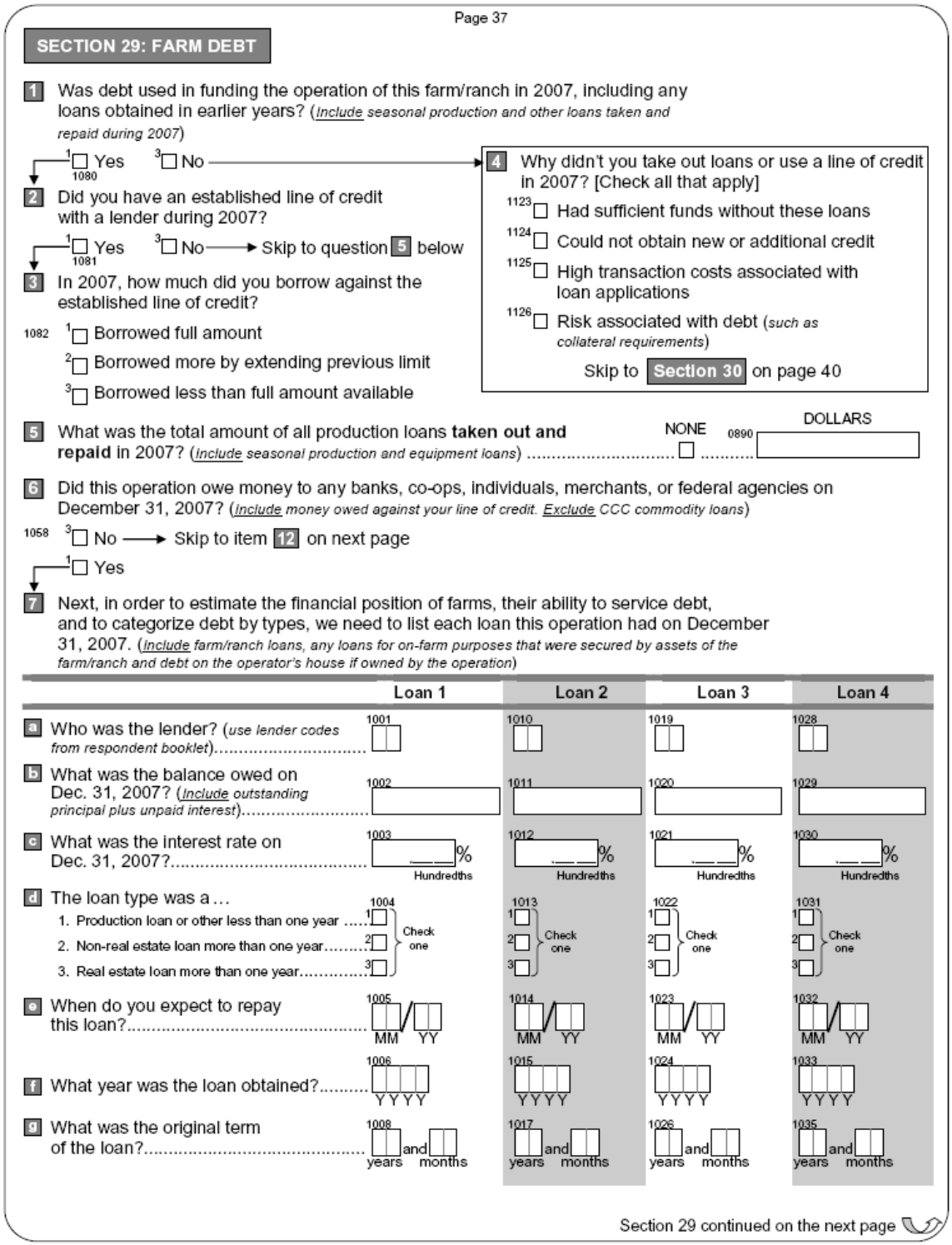
TABLE 4-XIII (C). – Weighted Regression Results - Weighted OLS Regression (2007)

Dependent variable = Termwtavg
Parsimonious Model, Weighted

Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.	Parameter	Exp sign	**Model 1** Estimate (Std Error) sig.	**Model 2** Estimate (Std Error) sig.	**Model 3** Estimate (Std Error) sig.
Intercept		140.808	144.271	142.213	ratewtavg	+	-1.482	-1.416	-1.447
		(35.456)	(34.977)	(34.751)			(2.588)	(2.593)	(2.592)
		***	***	***					
Lenderno	+	0.031			fixedpct	?	28.429	28.605	25.582
		(5.938)					(10.951)	(10.915)	(10.922)
Loantot#	+		-2.849		age	?	-0.080	-0.075	-0.076
			(2.304)				(0.399)	(0.399)	(0.399)
Loans*lenders	+			-0.933	limliab	?	-35.271	-34.726	-38.004
				(0.815)			(9.044)	(9.134)	(9.094)
							***	***	***
denied5yr	-	-10.416	-9.164	-9.717	college	?	8.627	8.708	8.667
		(19.294)	(19.205)	(19.274)			(9.629)	(9.614)	(9.62)
Quickratio	-	0.761	0.741	0.745	ftype	?	-12.537	-12.741	-12.762
		(0.808)	(0.807)	(0.809)			(10.488)	(10.457)	(10.468)
debtasset	+	177.614	178.486	178.159					
		(21.569)	(21.761)	(21.69)	8 region dummies included but not reported				
ROE	-	-0.870	-0.869	-0.860	F statistic		11.020	10.910	10.980
		(0.94)	(0.946)	(0.939)	p value		0.001	0.001	0.001
TermDebtCov	-	-0.0090	-0.0100	-0.0100	Adj. R-squared		0.239	0.240	0.239
		(0.012)	(0.012)	(0.0122)					
Assetturnover	-	-121.672	-120.518	-120.827					
		(12.093)	(12.006)	(12.037)					
		***	***	***					
Invturns	-	-11.804	-11.674	-11.662					
		(5.13)	(5.033)	(5.038)					
		**	**	**					

Appendix B

2007 ARMS Survey - Farm Debt Section



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SECTION 29: FARM DEBT

1 Was debt used in funding the operation of this farm/ranch in 2007, including any loans obtained in earlier years? (*Include seasonal production and other loans taken and repaid during 2007*)

1080 ☐ 1 Yes ☐ 3 No →

4 Why didn't you take out loans or use a line of credit in 2007? [Check all that apply]

1123 ☐ Had sufficient funds without these loans
1124 ☐ Could not obtain new or additional credit
1125 ☐ High transaction costs associated with loan applications
1126 ☐ Risk associated with debt (*such as collateral requirements*)

Skip to **Section 30** on page 40

2 Did you have an established line of credit with a lender during 2007?

1081 ☐ 1 Yes ☐ 3 No → Skip to question **5** below

3 In 2007, how much did you borrow against the established line of credit?

1082 ☐ 1 Borrowed full amount
☐ 2 Borrowed more by extending previous limit
☐ 3 Borrowed less than full amount available

5 What was the total amount of all production loans **taken out and repaid** in 2007? (*Include seasonal production and equipment loans*) ..... NONE ☐ 0890 DOLLARS ☐

6 Did this operation owe money to any banks, co-ops, individuals, merchants, or federal agencies on December 31, 2007? (*Include money owed against your line of credit. Exclude CCC commodity loans*)

1058 ☐ 3 No → Skip to item **12** on next page
☐ 1 Yes

7 Next, in order to estimate the financial position of farms, their ability to service debt, and to categorize debt by types, we need to list each loan this operation had on December 31, 2007. (*Include farm/ranch loans, any loans for on-farm purposes that were secured by assets of the farm/ranch and debt on the operator's house if owned by the operation*)

	Loan 1	Loan 2	Loan 3	Loan 4
a Who was the lender? (*use lender codes from respondent booklet*)	1001	1010	1019	1028
b What was the balance owed on Dec. 31, 2007? (*Include outstanding principal plus unpaid interest*)	1002	1011	1020	1029
c What was the interest rate on Dec. 31, 2007?	1003 ___ % Hundredths	1012 ___ % Hundredths	1021 ___ % Hundredths	1030 ___ % Hundredths
d The loan type was a … 1. Production loan or other less than one year 2. Non-real estate loan more than one year 3. Real estate loan more than one year	1004 ☐ 1 ☐ 2 ☐ 3 Check one	1013 ☐ 1 ☐ 2 ☐ 3 Check one	1022 ☐ 1 ☐ 2 ☐ 3 Check one	1031 ☐ 1 ☐ 2 ☐ 3 Check one
e When do you expect to repay this loan?	1005 MM / YY	1014 MM / YY	1023 MM / YY	1032 MM / YY
f What year was the loan obtained?	1006 YYYY	1015 YYYY	1024 YYYY	1033 YYYY
g What was the original term of the loan?	1008 years and months	1017 years and months	1026 years and months	1035 years and months

Section 29 continued on the next page

Section 29, question 7 continues here

	Loan 1	Loan 2	Loan 3	Loan 4
h What percent was for operating expenses, capital expenditures, or other expenses of the farm operation?	1037 ☐☐☐ %	1039 ☐☐☐ %	1042 ☐☐☐ %	1045 ☐☐☐ %
i The primary purpose of this loan was…	1007	1016	1025	1034
1. Purchase real estate (land and its attachments)	1 ☐	1 ☐	1 ☐	1 ☐
2. Purchase feeder livestock	2 ☐	2 ☐	2 ☐	2 ☐
3. Purchase other livestock	3 ☐	3 ☐	3 ☐	3 ☐
4. Other current operating expenses	4 ☐	4 ☐	4 ☐	4 ☐
5. Farm machinery and equipment	5 ☐	5 ☐	5 ☐	5 ☐
6. Debt consolidation	6 ☐	6 ☐	6 ☐	6 ☐
7. Other	7 ☐	7 ☐	7 ☐	7 ☐
	Check one	Check one	Check one	Check one
j Was this loan…	1038	1040	1043	1076
1. Fixed Rate?	1 ☐	1 ☐	1 ☐	1 ☐
2. Variable or adjustable interest rate loan?	2 ☐	2 ☐	2 ☐	2 ☐
	Check one	Check one	Check one	Check one
k If a variable or adjustable rate, how often is it repriced?	1009	1018	1027	1036
1. Monthly	1 ☐	1 ☐	1 ☐	1 ☐
2. Quarterly	2 ☐	2 ☐	2 ☐	2 ☐
3. Semi-annually	3 ☐	3 ☐	3 ☐	3 ☐
4. Annually	4 ☐	4 ☐	4 ☐	4 ☐
	Check one	Check one	Check one	Check one
l How do payments made on each loan in 2007 compare with scheduled interest and principal?	1059	1041	1044	1077
1. Paid amount due	1 ☐	1 ☐	1 ☐	1 ☐
2. Paid more than required	2 ☐	2 ☐	2 ☐	2 ☐
3. Paid less than required	3 ☐	3 ☐	3 ☐	3 ☐
	Check one	Check one	Check one	Check one

8 Do you have other farm loans in addition to the four recorded on previous page and above?

1078 3 ☐ No → Skip to question **11** below

1 ☐ Yes

9 How many farm loans were there in addition to the **four** recorded for items **7a** through **7l**? ..... 1046 NUMBER ☐☐

10 What was the total amount of debt owed on December 31, 2007 on these additional (*item* **9**) loans? ..... 1047 DOLLARS ☐☐☐☐☐☐☐☐☐

11 How much of the debt owed on December 31, 2007 (*reported above*), was for the operator's dwelling if dwelling was included in farm assets? (*If operator's dwelling is owned by the operation, debt should be included here and above*) ..... NONE ☐ ..... 1057 DOLLARS ☐☐☐☐☐☐☐☐☐

12 Within the past 5 years, have you encountered any of the following with regard to your credit or applications to lenders or creditors?

a Request for credit or loan application was turned down or you were not given as much credit as you applied for? ..... 1120 1 ☐ Yes 3 ☐ No

b Initial request for credit or loan application was turned down but later granted by reapplying to the same institution or elsewhere? ..... 1121 1 ☐ Yes 3 ☐ No

c Thought of applying for credit at a particular place but changed your mind because you thought you might be turned down? ..... 1122 1 ☐ Yes 3 ☐ No 0999 ☐