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An Analysis of Federal LandBank Borrowers

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Most farmers in the U.S. use some type of debt financing. However, little is known about individual farmers during the loan application process and whether these loans turn out to be successful both for the farmer and the lender. These farms all have to report information about their assets and liabilities as well as provide information about their income. In addition, lenders also collect other information relevant to the loan application process. Some of this information includes interest rates and loan balances of previous loans, the amount of off-farm income, the type of farm, and information about the loan under consideration.

The problem facing policy makers, researchers, and Extension specialists is that limited information exists about what characteristics are important to lenders when granting loans. Lenders have the ability to control the terms of the loan including interest rate, length of loan, and the down payment requirements. Lenders also have the power to not grant credit. In practice, however, many borrowers are limited in their ability to supply a down payment and length of loan is more likely a function of the type of purchase. Therefore, the question becomes what characteristics are important in determining what interest rate a borrower is offered. A related question is what borrower factors lead to a successful loan (i.e., a loan that is paid for with timely payments).

Many lenders use some type of credit scoring model to answer the first question of what interest rate to charge a borrower. However, this interest rate can change as borrowers refinance. Also, as the loan progresses, a farmer's finance situation can change and thus the question becomes modified to ask whether a farmer's current financial

situation can be used to predict the loan interest rate. The second question of whether the original interest rate is a good predictor of loan success really requires a panel data set.

If the loan application, approval process, and borrower financial follow-up were better understood, policy makers and others could help direct farmers toward practices that would increase the likelihood of loan approval or improve the loan terms. Given that credit is so important to agriculture, any decrease in loan costs should improve farmer profitability.

This study examines loan information supplied by over 1500 farms for loan application to the Federal Land Bank system to determine if various farm financial characteristics are a predictor of the current loan interest rate. The better question of determining whether the loan interest rate is a predictor of on-time loan payment and completion cannot be answered with this data set due to an incomplete panel and missing information about payment history. However, the data does have some information about the most recent loan updating (i.e., interest rate refinancing and most recent farm financial statements). This information can be used to test whether current farm financial data predicts the current interest rate. Given that many of the loans were assigned an interest rate based on a credit scoring model, one would assume there would be a connection between farm financial data and the current interest rate.

Another possible use of the data is to see if farm profitability is a function of the debt level on the farm. The data is somewhat limited by not having a time series but it does allow for a cross-sectional comparison. The financial numbers and other characteristics supplied by the borrowers are used to construct a model to determine if the

current interest rate can be predicted from farm financial data and if farm profitability can be predicted from debt levels. The analysis is divided into three different farm types.

Background

Total farm debt in the U.S. has increased to over \$200 billion with the farm credit system the largest supplier of real estate credit. The average farm debt-to-asset ratio is around 15% (USDA). The use of debt increased dramatically during the 1980's and was partially responsible for the first farm crisis. This farm crisis led to a lowering of farm debt use but ever since then the use of debt has been steadily increasing. In fact, the total U.S. farm debt has now passed those levels attained during the first farm crisis.

Many studies have examined farm debt from a macro perspective using data from the census or from the USDA . These studies include examining the optimal farm size, how much land is needed to pay for real estate financed purchases and others.

Fewer studies have examined debt from a micro perspective and even fewer have examined individual farm debt at the loan application stage. The research on credit scoring models by Barry and others would fit this category but this research includes little post loan application follow-up that is incorporated into this study.

Data

This study examines over 1500 farm loan applications to the Federal Land Bank Association of South Mississippi. These loans represent a variety of farm types and a variety of locations across Mississippi. The loans themselves differ greatly in size. In addition information is also collected about off-farm employment, the type of farm, detail

information about other loans, the size of the farm, the number of years farming, and information about non-farm assets, and family living expenses. The information about loans includes the maturity, interest rate, remaining principal, and the loan amount. There was enough loan information to analyze cattle, poultry, and timber farms.

This project used an agricultural economics graduate student on a summer internship to collect data about the loans. This student ended up generating 66 categories of loan information. These include:

LN_ACCT_#: individual number assigned to each loan.

BR_CODE_LN: branch where loan was originated.

- 101 – Brookhaven
- 102 – Greenville
- 103 – Greenwood
- 104 – Hattiesburg
- 105 – Newton
- 106 – Poplarville
- 107 – Jackson

ORIG_BAL: original (gross) amount of the loan

AMT_DEDUCTED_FRM_PROCEEDS: amount deducted from original balance for processing fees, etc.

AMT_FOR_IMPROVEMENTS: amount of loan allotted for improvements to land, structures, etc.

AMT_FOR_OTHER_PURP: amount of loan allotted for things other than purchase of real estate, improvements, or refinancing.

AMT_TO_PURCH_RE: amount of loan allotted to purchase real estate

AMT_TO_REFI_COMBANK_LN: amount of loan allotted to refinance a commercial bank loan

AMT_TO_REFI_FCB_LN: amount of loan allotted to refinance a farm credit bank loan.

AMT_TO_REFI_INS_LN: amount of loan allotted to refinance an insurance loan

AMT_TO_REFI_NON_RE_LN: amount allotted to refinance a non-real estate loan

AMT_TO_REFI_OTHER_RE_LN: amount of loan allotted to refinance another real-estate loan.

LN_APPROV_DATE: date loan was initially approved

ORIGN_DATE: date money was actually loaned

MAT'Y_DATE_CURR: most current maturity date of the loan

LN_TERM: term of loan. This can be from 5 to 30 years, and in a few cases, 40 years.

PMT_FREQ: frequency borrower payments on the loan. (i.e. annually, quarterly)

NEXT_PMT_DUE: indicates the date the next payment is due

PMT_AMT: amount of the periodic payment

INT_RATE closing: loan interest rate at time of loan closing

INT_RATE_LN current: current loan interest rate

AGFAST_LN_FLG: "yes" indicates that the loan was an AgFast loan.

CNTY_NAME_LN: county where the property is located

OPER_CNTY_CODE: unique number assigned to each county in the land bank's system.

ACRES_OPER_TOT: total number of acres currently in productive operation

YR_BEG_FRMNG: year the borrower began farming

BNKRPT?: indicates if the borrower has ever declared bankruptcy

CUST_CLS_CODE: indicates if the customer is considered an individual, company, organization, LLC, etc.

SIC_CODE_LN: Sic Code is the number assigned for the primary purpose of the loan.

212-cattle

219-catfish

251-poultry

252-broilers
811- timber
999-other

SIC_CODE_CUST: category number assigned to the customer, usually based on primary source of income. SIC code numbers are the same for loan categories and customer categories.

NONAG_INC_DEP: indicates if the borrower is dependent on income from non-agricultural sources

GROSS_INC_AG_OP: gross income from agricultural operations

ADJ_NET_INC_AG_OPER: adjusted net income from agricultural operations

GROSS_SALARY_&_WAGES: salary and wages of the borrower.

ADJ_NET_INC_NONFARM: borrower's adjusted net income from non-farm sources

ADJ_NET_INC_TOT: total adjusted net income

ANN_LIVING_EXP: estimate of yearly living expense for the borrower and his family

DEBT_SERVICE: amount paid by the borrower to service debts.

INCOME_TAXES: lists the amount of income taxes paid by the borrower in the last year or in recent years

BAL_REM_AMT: amount of the original loan balance that remains to be repaid.

BAL_REM_PCT: percent of the original loan balance that remains to be repaid.

CURR_ASSETS: current assets reported by the customer

INTERMED_ASSETS: intermediate assets reported by the customer

FIXED_ASSETS: fixed assets reported by the customer

ASSETS_TOT: total assets reported by the customer

CURR_LIAB: lists all current liabilities for the borrower. (< 1 year)

INTERMED_LIAB: lists all intermediate liabilities for the borrower. (1-7 years)

LONG_TERM_LIAB: lists all long-term liabilities for the borrower (>7 years)

NET_WORTH_AMT: net worth of the borrower

NET_WORTH_PCT: percent of net worth that is not subject to any debt.

YBS_GROSS_AG_SALES: gross amount of income resulting from agriculture for a young, beginning or small farmer.

YOUNG?, BEGINNING?, SMALL?: young, beginning, and small farmers are sometimes entitled to special provisions when getting a loan

AV_BUILDING: appraised value of any and all buildings included in the loan

AV_DWELLING: appraised value of any and all dwellings included in the loan

AV_EQUIP: appraised value of the borrower's equipment

AV_LAND: appraised value of the bare land included as collateral for the loan

ACRES_TOT: total acreage of the collateral being offered for the loan

HOMESTD: is the property offered as collateral considered a homestead by the borrower?

AV_TOT: total value assessed to buildings, equipment and land associated with the loan

LN_TO_AV: amount loaned divided by assessed value of collateral. Land Bank can loan up to 85% of the value of the collateral.

LN_TO_AV_SUP: current loan to AV ratio. Accounts for repayment to-date.

In addition, other financial information was developed based on this data. Because these farms vary greatly in size, farm financial ratios were calculated based on the available data.

Some of these ratios are slightly modified to account for data issues but the resulting ratios made it easier to do the analysis and resulted in a better test of if financial characteristics can predict loan rates.

Methods

The first step was to develop some histograms of three farm financial ratios by farm type to see if there are any differences among farm types. These three ratios are debt-to-asset ratio, liquidity ratio, and ROE. This initial step only gives some descriptive statistics but it is useful to see how the farms look before doing any deeper analysis.

The second step was to run a regression analysis to see if it was possible to predict the current interest rate based on several financial ratios. The model used here had the current interest rate as the dependent variable and the independent variables were: ROE, the loan value to collateral value, Net Farm Income as a percent of Total Income, The debt service expense as a percent of total income, D/A ratio, Liquidity ratio, and finally Total Acres.

The final step of the analysis was to run a regression to see if it was possible to predict ROE as a function of two debt characteristics. In this model the independent variables were the debt service to total income ratio and the debt-to-asset ratio. The debt service level is similar to the interest expense ratio as it looks at what percentage of total income is devoted to paying for interest (and principal in this case)

Results and Discussion

Figures 1 to 3 show the debt-to-asset ratio for cattle, poultry, and timber farms. As these figures show, cattle and timber farms have similar debt levels. Poultry farms have quite a bit more debt. In all cases, these farms have more debt than the USDA average

debt level. However, these are all active farmers who tend to have higher debt levels. The nature of the poultry contracts where growers are responsible for the facilities helps explain why this debt level is higher. Also, the contract helps lenders see that prices variability are not a factor and are thus more will to lend at higher levels than the other farm types.

Figures 4 to 6 show the ROE for the three farm types. Again, cattle and timber farms are similar. What might be suprising is how profitable some of the poultly farms are. This might explain some of the reasons that lenders are so willing to lend to these farms. However, given the small equity stake of the poultry farms, high ROE values should be obtained by a large portion of the farms.

Figures 7 to 9 show the liquidity ratios of the farm types. Most of the farms seem to have adequate liquidity as over 90% of the farms have a ratio of two or higher.

Table 1 shows the regression results of trying to predict the current interest rate as a function of 7 different financial characteristics. As this table shows, the regression R-squared is very small as none of the factors do a very good job predicting. The regression results for the poultry and timber farms are similar.

Table 2 shows the regression results of trying to predict ROE as a function of the two debt financial characteristics for cattle farms. Again, the R-squared value is very low. The only case where there is an interesting result is for the Poultry farms. Here the R-squared value is 0.311, mostly due to the influence of debt-to-asset influence.

Figure 10 shows a scatterplot of ROE as a function of debt-to-asset ratio

Figure 1. Debt-to-Asset Ratio for Cattle Farms

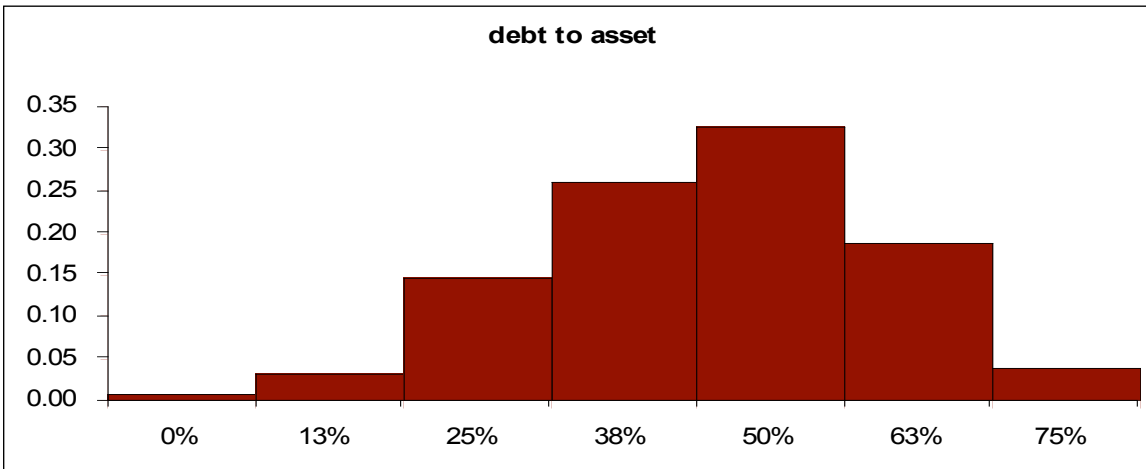


Figure 2. Debt-to-Asset Ratio for Poultry Farms

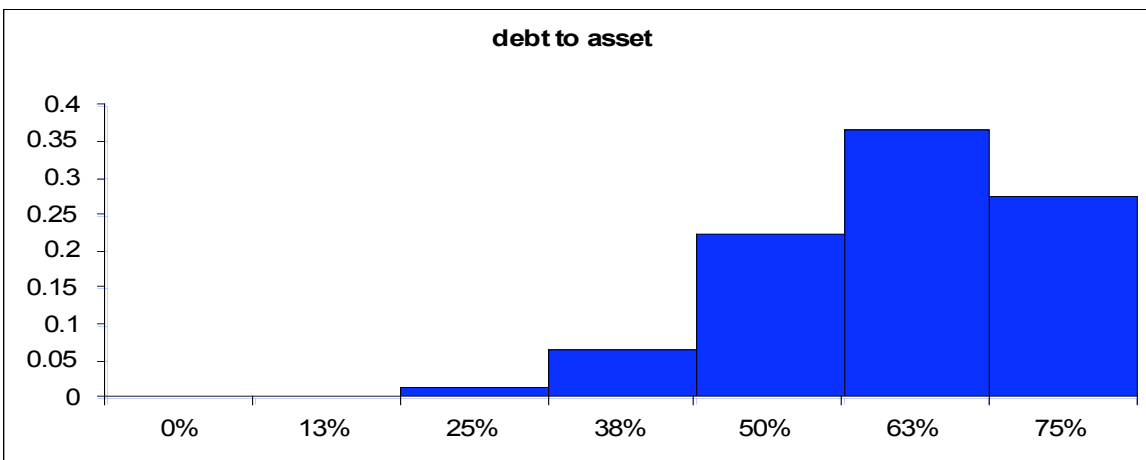


Figure 3. Debt-to-Asset Ratio for Timber Farms

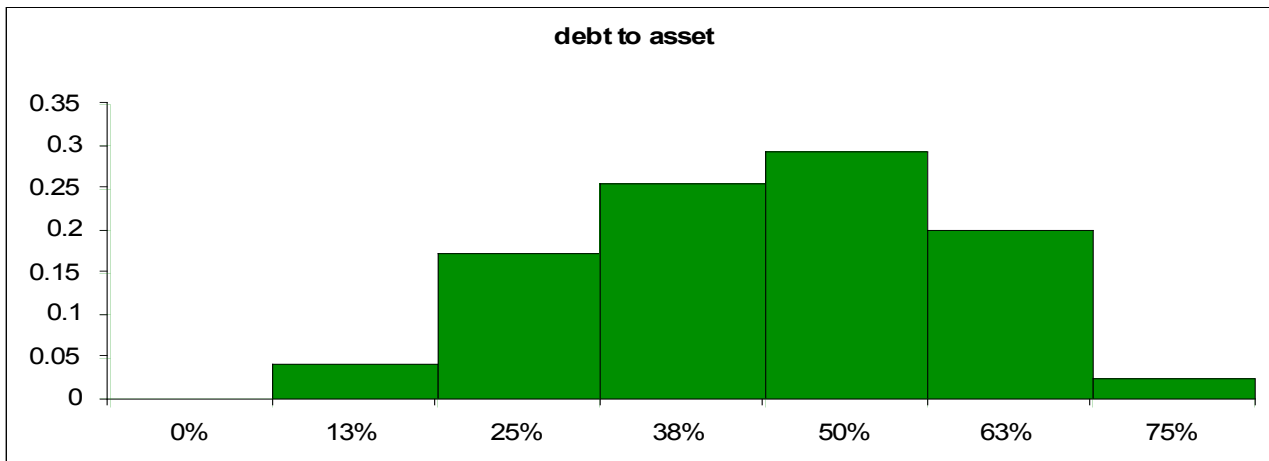


Figure 4. ROE Ratio for Cattle Farms

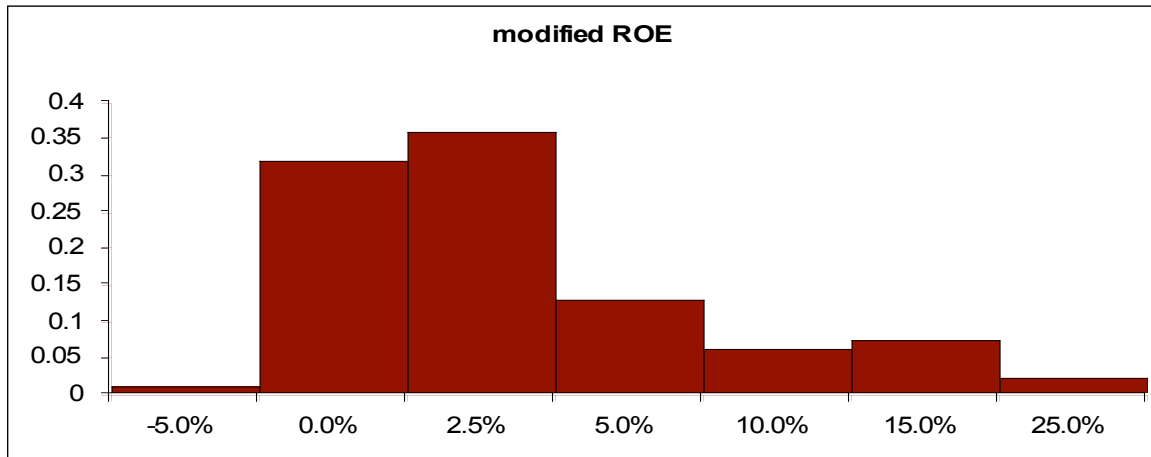


Figure 5. ROE Ratio for Poultry Farms

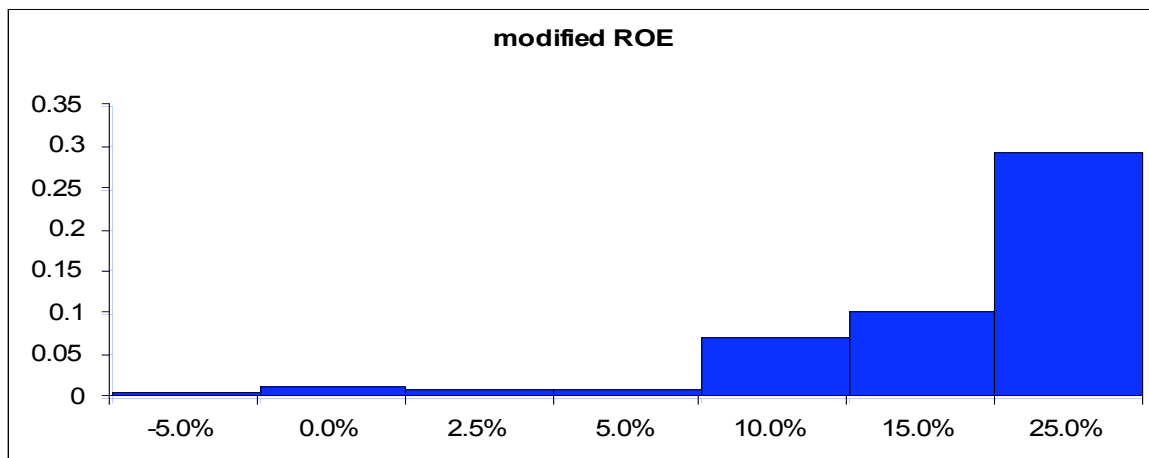


Figure 6. ROE Ratio for Timber Farms

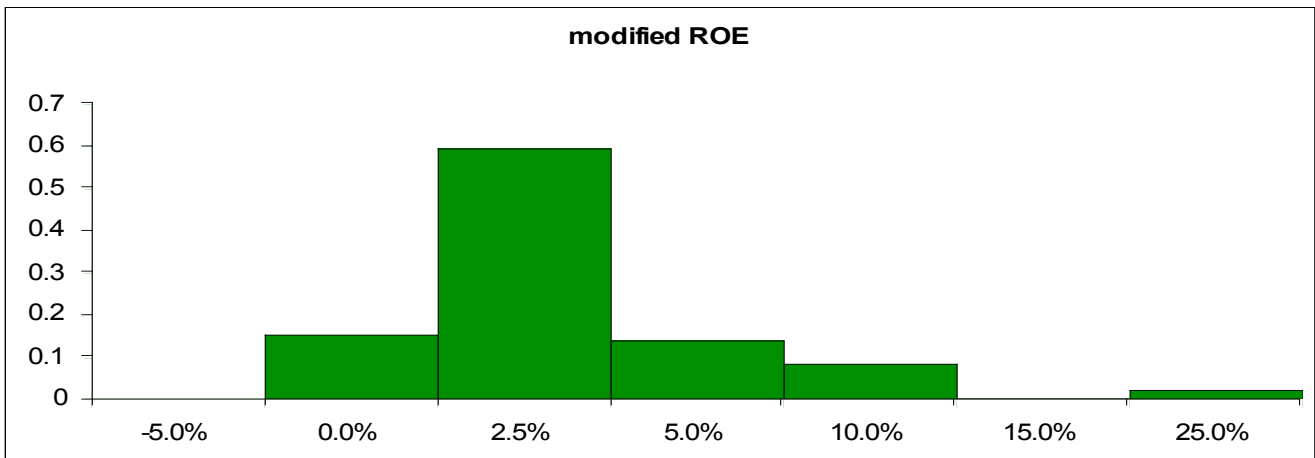


Figure 7. Liquidity Ratio for Cattle Farms

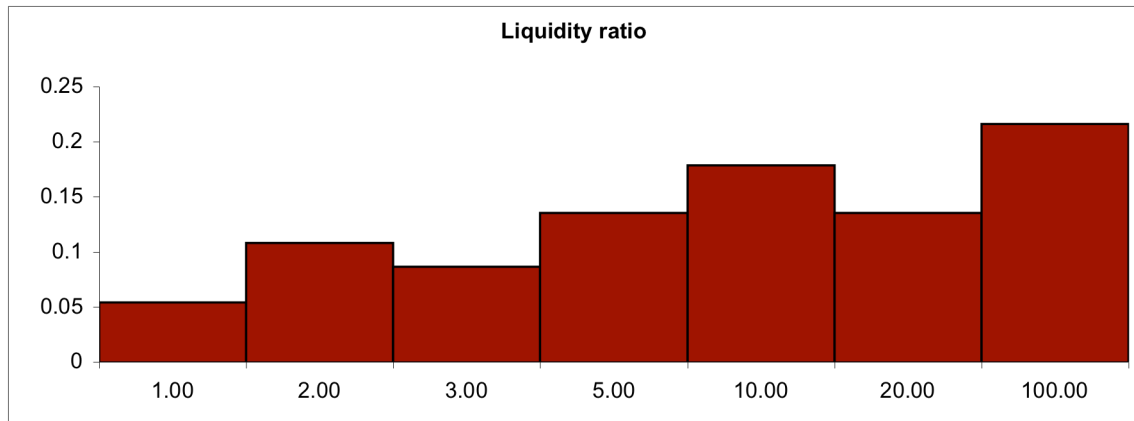


Figure 8. Liquidity Ratio for Poultry Farms

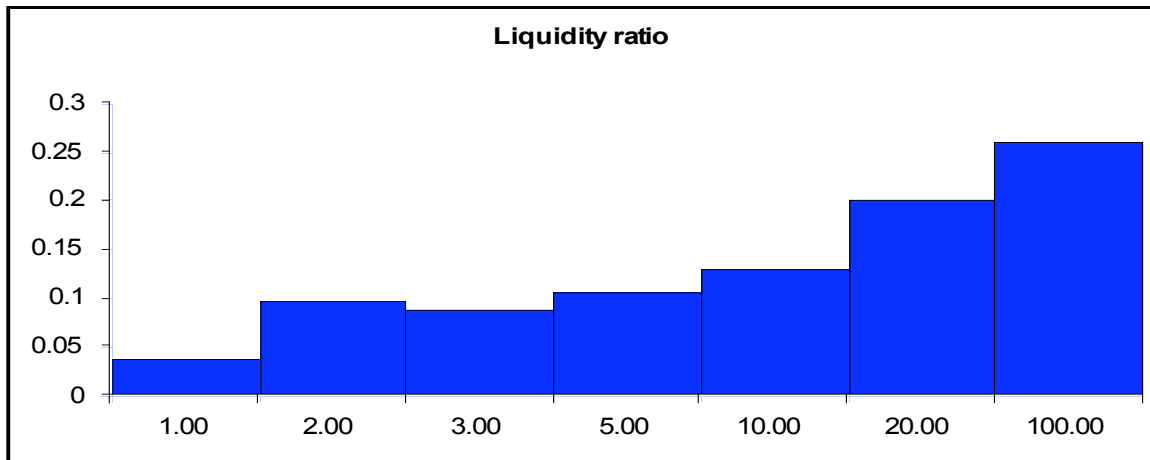


Figure 9. Liquidity Ratio for Timber Farms

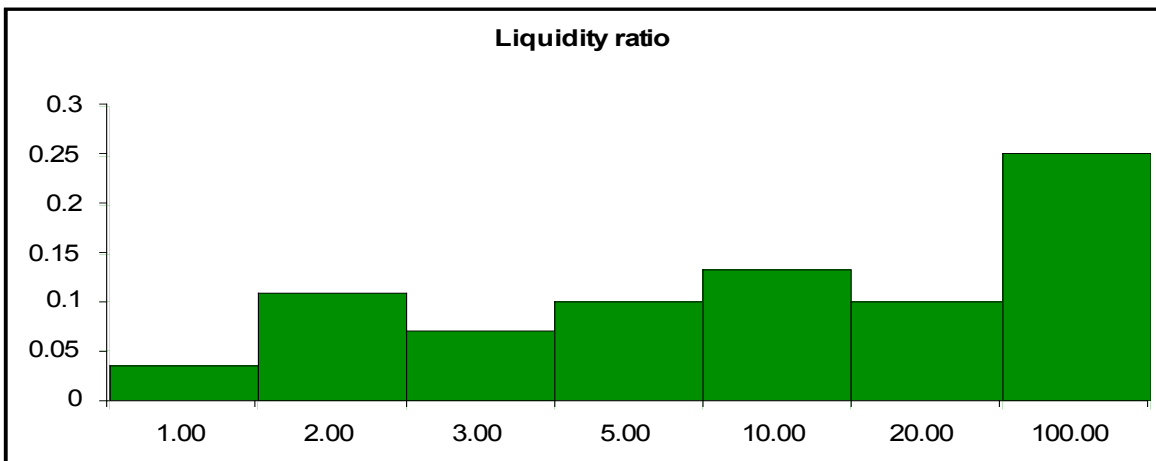


Table 1. Regression Results of Cattle Farms – Predicting Interest Rate

OLS Regression Statistics for IR, 5/26/2006 8:31:26 PM

F-test	0.905	Prob(F)	0.515	Unrestricted Model				
MSE1/2	0.022	CV Regr	40.843	F-test	0.905			
R2	0.053	Durbin-Watson	1.720	R2	0.053			
RBar2	0.000	Rho	0.109	RBar2	0.000			
Akaike Inf	-7.575	Goldfeld-Quandt	1.364	Akaike Inf	-7.575			
Schwarz li	-7.414			Schwarz li	-7.414			
95% Intercept modified ROE Loan to Collateral NFI to TI Debt serv to TI debt to asset Liquidity ratio Tot Ac								
Beta	0.056	0.039	-0.009	-0.014	0.000	0.016	0.000	0.000
S.E.	0.008	0.037	0.010	0.012	0.012	0.017	0.000	0.000
t-test	6.906	1.058	-0.902	-1.160	-0.022	0.969	-1.301	-0.318
Prob(t)	0.000	0.293	0.369	0.248	0.983	0.335	0.196	0.751
Elasticity at Mean		0.021	-0.088	-0.019	-0.002	0.117	-0.015	-0.003
Variance Inflation Fa		2.813	1.486	2.528	1.777	1.549	1.237	1.449
Partial Correlation		0.193	-0.312	-0.238	0.011	0.090	-0.173	-0.027
Semipartial Correlati	0.177166058		-0.295347548	-0.220485	0.009555797	0.083460082	-0.158325716	-0.024416
Restriction								
S.D. Resid	0.021376	MAPE	Scatter Plot of Actual IR vs. modified ROE					

Table 2. Regression Results of Cattle Farms – Predicting ROE

OLS Regression Statistics for modified ROE, 5/26/2006 9:16:02 PM

F-test	3.647	Prob(F)	0.014	Unrestricted Model			
MSE1/2	0.085	CV Regr	291.910	F-test	3.647		
R2	0.040	Durbin-Watson	1.755	R2	0.040		
RBar2	0.029	Rho	0.099	RBar2	0.029		
Akaike Inf	-4.915	Goldfeld-Quandt	1.471	Akaike Information	-4.915		
Schwarz li	-4.879			Schwarz Informati	-4.879		
95% Intercept Debt serv to TI debt to asset							
Beta	0.003		-0.050	0.124			
S.E.	0.021		0.038	0.048			
t-test	0.149		-1.316	2.608			
Prob(t)	0.882		0.190	0.010			
Elasticity at Mean			-0.670	1.642			
Variance Inflation Fa			1.002	1.002			
Partial Correlation			-0.046	0.244			
Semipartial Correlati			-0.045222719	0.245632623			
Restriction							
S.D. Resid	0.084685	MAPE	Scatter Plot of Actual modified ROE vs. Debt serv to TI				

Figure 10. Scatterplot of ROE vs Debt-to-Asset Ratio for Poultry Farms

