Distribution of Farm Operator Debt by Farm Size and Lender

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The Farm Credit System (FCS) is a complex, multi-tiered cooperative charged with providing agricultural credit to U.S. farmers and cooperatives. FCS institutions represent the largest suppliers of real estate financing to U.S. farmers, providing about 35 percent of total U.S. farm real estate debt. FCS institutions are also a large supplier of farm operating credit, providing nearly 14 percent of the total U.S. farm operating credit. As a result of FCS's concentration in agricultural loans, its loan portfolio may be vulnerable to downturns in the agricultural economy. FCS's ability to provide a consistent source of agricultural credit is likely to enhance the prosperity of U.S. agriculture.

Problem

FCS's size in relation to the U.S. farm debt market results in certain interrelationships between the farm finance sector and FCS. Prosperity for U.S. agriculture has historically implied prosperity for FCS. On the other hand, an economic downturn in the agricultural sector can have an adverse impact on the FCS. For example, the results of the 1980's downturn in agriculture were severe financial problems for FCS. This required about $1 billion in federal financial aid to stabilize FCS and insure that farmers continue to have a reliable source of credit.

Federal financial aid and an improved farm economy have caused FCS's financial position to improve in 1988 and 1989 (FCS Annual Report to Investors). Despite the improved financial prospects, some have questioned the logic of maintaining a single sector lender for agriculture. Gajewski (1989a; 1989b) and Harl (1988) pointed out that a single sector agricultural lender may require financial aid each time there is an economic downturn in agriculture. Dodson showed FCS's susceptibility to economic downturns by showing that FCS holds a larger proportion of the vulnerable farm operator debt than any other lender group.[1]

One factor which may partially explain FCS's vulnerability is its concentration in lending to commercial farming operations.[2] Commercial farms have historically received most of their household income from the farm

business.[3]Commercial farming operations may not be able, therefore, to offset farm business losses with nonfarm income. FCS's cooperative structure and regulatory requirements are two factors contributing to their concentration in lending to commercial farms. Since FCS is a farmer-owned cooperative, it is often considered a commercial farm lender. Regulations state that FCS loans are to be made to "bona fide" farmers for use in their farming operations (Agricultural Credit Act of 1987). This paper shows that restrictions on lending to commercial farms can inhibit diversification of FCS's loan portfolios. This can result in greater susceptibility to economic downturns in the farm economy.

Harl (1987, 1988) discussed the problem of nondiversity of FCS's loan portfolio and suggested several methods which FCS may use to increase the level of diversity in loan portfolios. Two of the methods were increasing functional and horizontal diversity. Functional diversity refers to expansion into additional product lines such as insurance or real estate investments. Horizontal diversity refers to expansion of lending activities into non-agricultural sectors. Long range plans developed by FCS in the early 1980s would have moved the system toward greater functional diversity. While the value of functional diversity may be significant, it is unlikely there will be much political support for the government-assisted creation of another large financial conglomerate.

We associate the achievement of horizontal diversity with lending to non-agricultural enterprises. If FCS were to move in this direction, the system may not be distinguishable from commercial banks. It is unlikely that permission for such a broadening of lending authority is likely. However, the emerging structure of agriculture into a bimodal distribution of small part-time farmers and larger full time farmers offers FCS an opportunity to achieve horizontal diversity within the confines of current regulations. This would involve lending to agricultural operators whose fortunes are unrelated to agriculture. This would include smaller part-time farming operations which receive most of their total household income from off farm earnings.

Objectives

This study analyzes cross sectional data on the distribution of farm debt among different farm sizes, lenders, and FCS districts. I undertook this analysis to determine:

1. Are there differences in the distribution of farm operator debt among lenders by farm size?
2. What are the implications of FCS's current loan portfolio distribution among farm sizes for loan portfolio diversification?

3. Is there any opportunity for FCS institutions to increase the diversity of their loan portfolios by increased lending to smaller noncommercial farming operations?

Procedure

USDA's Farm Cost and Returns Survey (FCRS) provides information on the financial structure of agriculture. USDA's Economic Research Service and the National Agricultural Statistics Service conduct this survey each year. This survey provides detailed information on financial and operating characteristics of U.S. farms. The FCRS data details expenses, income, assets, debt, and other items. These are disaggregated by production region, farm size, production specialty, and other characteristics (Morehart et al. 1989).

In this study, I used FCRS data to provide FCS district information on the distribution of farm operator debt between lenders and sales classes. I separated lenders into three distinct groups; FCS, commercial banks, and other lenders. The FCS lender group represented farm operator debt owed to Federal Land Bank Associations and Production Credit Associations. The commercial bank lender group represented farm operator debt owed commercial banks. The other lender group represented farm operator debt owed to insurance companies, the Farmers Home Administration, individuals, merchants and the Small Business Administration.

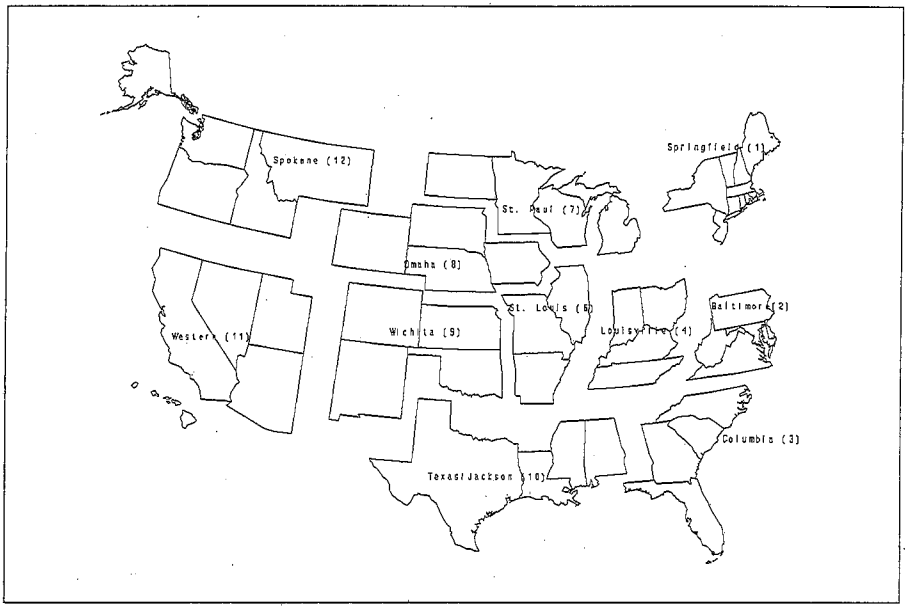
I disaggregated FCRS data by sales class and FCS district. A diagram of the FCS districts is displayed in Figure 1.[4]The sales class large farm represented annual sales above $250,000. An average size farm had annual sales between $250,000 and $40,000. The sales class small farm had annual sales less than $40,000.

I did a correlation analysis to determine if there were any relationships between lender group market shares and business performance statistics.

Distribution of Farm Operator Debt

Tables 1 and 2 show the distribution of farm operator debt for each FCS district between lender group and sales class as of January 1, 1989. Table 1 shows the distribution of total sales class debt among lender group. In the Springfield FCS district, FCS held 37 percent of the large farm debt while commercial banks held 24 percent. Other lenders held 39 percent. Table 1 also shows that FCS was the primary lender to large operations in Springfield, Baltimore, St. Paul, and Sacramento. Commercial banks held the largest portion of large farm debt in the remaining districts. Most of the debt financing of average size farms was by either banks or other lenders in all districts except Sacramento. In eight of the 11 FCS districts, com-

Figure 1.
Farm Credit System Districts, August 1990.



mercial banks financed over 50 percent of the small farm operator debt. Commercial banks financed over 40 percent of the noncommercial farm operator debt in the remaining districts.

Table 2 shows the distribution of lender group debt among sales classes. For example, the composition of the Springfield FCS bank's loan portfolio included 52 percent to large farms, 40 percent to average size commercial farms, and 7 percent to noncommercial farms. Debt owed by large and average size farms composed the largest percentage of FCS's loan portfolio. Except the Texas/Jackson FCS district, FCS maintained a smaller percentage of the small farm operator debt than commercial banks or other lenders.

Debt Distribution and Borrower Financial Performance

Table 3 shows off-farm income as a percent of net cash farm income plus nonfarm income. For most districts, income from off-farm earnings made up less than 50 percent of total household earnings on large and average size farms. Off farm income on small farms was more than 100

Table 1.
Percentage Distribution of Farm Operator Debt for Each Lender Group Between Sales Class: January 1, 1989

FCS District/ Sales class	Lender group			FCS District/ Sales class	Lender group		
	FCS	Banks	Others		FSC	Banks	Others
	..... percent				..... percent		
Springfield				Omaha			
Large	37	24	39	Large	21	49	30
Average	27	30	43	Average	17	41	42
Small	5	76	19	Small	16	50	34
Total	23	44	34	Total	18	45	37
Baltimore				Wichita			
Large	52	30	18	Large	28	46	26
Average	22	41	37	Average	30	35	35
Small	25	49	26	Small	19	52	29
Total	29	41	30	Total	26	43	31
Columbia				Texas/Jackson			
Large	35	38	27	Large	24	48	28
Average	34	32	34	Average	19	42	40
Small	21	45	34	Small	23	43	34
Total	31	37	32	Total	22	44	34
Louisville				Sacramento			
Large	34	36	30	Large	38	29	33
Average	29	31	40	Average	44	14	42
Small	18	57	25	Small	19	57	24
Total	27	41	32	Total	35	32	33
St. Louis				Spokane			
Large	34	33	33	Large	25	39	36
Average	20	45	35	Average	26	28	46
Small	12	56	32	Small	7	58	35
Total	23	44	34	Total	21	40	39
St. Paul				U.S.			
Large	39	28	33	Large	32	37	31
Average	29	30	41	Average	25	35	40
Small	15	56	29	Small	16	54	30
Total	30	33	37	Total	25	40	35

Source: USDA's Farm Cost & Returns Survey, 1988.

percent of total household earnings in all districts but Omaha. Percentages over 100 percent show that nonfarm income is subsidizing negative farm income. Tables 1 and 2 along with the results presented in Table 3 show the concentration of FCS debt among farm sizes which receive a majority of their income from the farm business. This raises questions about the financial performance of farm size groups to which FCS is lending. Specifically, concentration of farm operator debt among commercial farms can result in sensitivity to downturns in the agricultural economy if most income is from the farm business.

Table 2.
Percentage Distribution of Farm Operator Debt for Each Sales Class Between Lender Group, January 1, 1989

FCS District/ Lender group	Sales group			FCS District/ Lender group	Sales group		
	FCS	Banks	Others		FCS	Banks	Others
	..... percent				..... percent		
Springfield				Omaha			
FCS	52	40	8	FCS	40	52	8
Banks	18	23	59	Banks	38	51	11
Other	37	43	20	Other	28	63	9
Total	32	34	34	Total	35	56	9
Baltimore				Wichita			
FCS	37	34	29	FCS	37	43	20
Banks	15	44	41	Banks	37	31	32
Other	13	57	30	Other	30	44	26
Total	20	45	34	Total	35	38	27
Columbia				Texas/Jackson			
FCS	38	43	19	FCS	30	31	39
Banks	34	33	33	Banks	29	34	37
Other	29	42	29	Other	22	41	37
Total	34	39	27	Total	27	36	37
Louisville				Sacramento			
FCS	39	41	20	FCS	58	31	11
Banks	27	29	44	Banks	51	12	37
Other	29	48	23	Other	54	32	14
Total	31	38	31	Total	55	25	20
St. Louis				Spokane			
FCS	48	39	13	FCS	44	46	10
Banks	25	45	30	Banks	35	24	41
Other	32	45	23	Other	32	42	26
Total	33	43	24	Total	36	35	29
St. Paul				U.S.			
FCS	40	54	6	FCS	42	43	15
Banks	27	53	20	Banks	31	37	32
Other	28	63	9	Other	30	50	20
Total	31	57	12	Total	34	43	23

Source: USDA's Farm Cost & Returns Survey, 1988.

Information on the relative financial performance of farm households and businesses can be gained through ratio analysis. Morehart (et al. 1988) used financial ratios to analyze farm financial performance from FCRS data. They used correlation analysis to examine the relationships between FCS market shares and selected financial ratios. Financial ratios were chosen to address the solvency, coverage, efficiency, and profitability of the farm business. In addition, they calculated financial ratios to address coverage and efficiency characteristics of the farm household.[5] I show the ratios calculated in the analysis in Figure 2.

Table 3.
Off Farm Income as Percentage of Net Cash Farm Income Plus Nonfarm Income by FCS District Sales Class[a]

	Farm size		
	Large	Average	Small
	percent		
Springfield	14.65	44.97	122.90
Baltimore	18.29	47.95	110.81
Columbia	7.00	34.16	115.68
Louisville	27.42	72.61	109.44
St. Louis	21.44	48.73	106.10
St. Paul	17.76	43.24	105.40
Omaha	15.60	46.01	97.86
Wichita	18.59	57.19	112.79
Texas/Jackson	21.18	69.49	108.30
Sacramento	12.63	79.38	114.32
Spokane	20.48	53.04	115.77
U.S.	19.01	54.62	109.29

a. Source: Farm Costs and Returns Survey, 1988.
Data represents income received during 1988.

Solvency refers to the portion of the firm financed by lenders or the risk associated with the firm's financial structure. I measured it by the debt-to-asset ratio. Coverage ratios measure the farm business's or household's ability to service debt. This measures the strain on cash flow from the use of credit. I measured coverage by farm business debt service charge, household debt service charge, and times interest earned. I chose farm business debt service charge and times interest earned to estimate the farm businesses' ability to service debt. I chose household debt service charge to estimate the total farm household's ability to service debt.

Efficiency ratios measure the firm's competency in performing business management functions and its economical use of resources. I measured efficiency through the use of debt burden ratios. Debt burden 1 measured the burden placed on net cash farm income to retire outstanding debt. Debt burden 2 measured the burden placed on net cash household income to retire outstanding debt. Profitability ratios measure the earnings generated by the activities of the farm business. I measured them by the return on assets and return on equity.[6]

Correlation Results

I show the results of the correlation analysis between financial performance ratios and FCS district market shares in Table 4. I applied the correlation analysis to disaggregated FCRS data showing the condition of farms on January 1, 1989. The correlation coefficients show FCS's share

Figure 2.
Definition of Financial Ratios Estimated from 1988 and 1989 FCRS data

Ratio	Computation method	Significance
Solvency Ratio:		
Debt/Asset =	Farm business liabilities / Farm business assets	Measures debt pledged against farm assets, indicating overall financial risk.
Coverage Ratios:		
Farm Business Debt Service Charge =	Net cash farm income plus interest payments / Interest plus principal payment	Measures farm businesses' ability to repay both principal and interest.
Times Interest Earned =	Net farm income before interest and taxes / Interest payments	Measures farm businesses' ability to service debt out of net farm income.
Household Debt Service Charge =	net cash household income + interest payment / interest + principal payment	Measures the farm household's abilty to repay both interest and principal.
Efficiency Ratios:		
Debt Burden 1 =	Net cash farm income / Total liabilities	Measures burden placed on net cash farm income to retire outstanding debt.
Debt Burden 2 =	Net cash household income / Total liabilities	Measures burden placed on net household income to retire outstanding debt.
Profitability Ratios:		
Return on assets =	Net Profit + Interest Expense / Total fram business assets	Measures the efficiency with which the farm business uses assets.
Return on equity =	Net Profit / Farm business net worth	Measures the returns to equity capital employed in the Farm business

of farm operator debt was positively correlated with the ratios calculated using only farm business income; farm business debt service charge, times interest earned, debt burden 1, return on assets and return on equity. I found FCS market share to be negatively correlated with the ratios using household income; household debt service charge and debt burden 2. In contrast to FCS, I found commercial bank's share of farm operator debt to be positively related to financial ratios calculated using household income. Also, commercial bank's market shares were significantly negatively correlated with all of the farm business ratios. These results show that FCS's market share was highest among farm size classes with efficient and

Table 4.
Coefficients Between Farm Debt Distribution Statistics and Selected Financial Ratios[a,b,c]

Financial Ratios	Sales Class Market Shares		
	FCS	Banks	Other
	correlation coefficients		
Solvency:			
Debt to asset	0.3110[a]	−0.3783[b]	0.1859
Coverage:			
Household debt Service charge	−0.1388	0.3500[b]	−0.4061[b]
Farm business Debt service charge	0.5391[c]	−0.5357[c]	0.1473
Times interest earned	0.5171[b]	−0.5432[c]	0.1937
Efficiency:			
Debt burden 1	0.5230[b]	−0.4876[b]	0.0901
Debt burden 2	−0.0980	0.3772[a]	−0.4237[b]
Profitability:			
Return on assets	0.2989[a]	−0.2259	−0.0745
Return on equity	0.3656[b]	−0.3113[a]	0.0196

[a]Correlation coefficients (R) / Prob > R under $H_o = R = 0$. The ratios correspond to descriptions in Figure 2.
a $.05 < p \leq .10$
b $.001 < p \leq .05$
c $p \leq .001$.
[b]Analysis based on FCRS data representing the condition of U.S. farms as of January 1, 1989. FCRS data was disaggregated by farm size and FCS district.
[c]Number of observations were 35 for each coefficient calculated.

profitable farm businesses. It was lowest among farm sizes which have the highest household income levels. Commercial bank's market shares, however, were highest among farm sizes which have higher household incomes but poorer farm business performance. Also, a significant positive correlation with the debt to asset ratio implies that FCS market share was associated with more indebted farms.

The correlation coefficients between other lender market shares and selected financial ratios shows a negative relationship with household income and no clear relationship with the farm business ratios. A possible explanation for the result is that the other lender group represented a combination of several different lenders.

Summary & Conclusions

The purpose of this study was to analyze the distribution of farm operator debt using FCRS data. Results showed concentration of farm op-

erator debt held by FCS among average and large farm businesses. The concentration of farm operator debt held by commercial banks was among small farm businesses. Large and average size farm businesses were reliant on farm income for most of their total household income. Conversely, small farm businesses were primarily reliant on off farm income for most of total household income. Correlation analysis showed that when examined from the standpoint of the farm business, FCS's farm operator debt was associated with farm sizes which were efficient, profitable, and had strong debt service capacity. However, when examined from the standpoint of the of the farm household, FCS's farm operator debt was associated with farm sizes which were neither efficient nor had strong debt capacity.

The results imply that opportunities exist for FCS to diversify its portfolio by increased lending to farm operators whose fortunes may not depend on agriculture. This will take the form of lending to smaller farm operations. Small farm operations hold about 23 percent of farm operator debt, while FCS's loan portfolio contained only 15 percent in loans to small farm operations. Increased lending to small farm operations by FCS would have certain disadvantages. Regulators may not consider small farms bona fide farmers. There may be little political support for increased lending authority. On the other hand, increased lending to small farms may lessen the chance of future federal financial aid. Also, small loans may be more expensive to make. Commercial banks are better at subsidizing small loans through service charges, paying balances, and consumer loans. However, some FCS institutions, such as those in the Texas/Jackson district hold large percentages of small farm debt.

Net cash household income is a better indicator of debt capacity, efficiency, and profitability. Historically, lenders have based financial standards on the farm business. However, the results from this study suggest that we should have financial standards on total cash household income with increased emphasis on off farm income and family living expense.

Notes

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1. I define vulnerable farm operator debt as the proportion of debt with debt to asset ratios greater than 0.40 and negative net household income. Net household income is equal to net cash farm income plus off farm income less principal repayment and family living expenses.

2. I define commercial farms as those farms with annual farm sales greater then $40,000.
3. Household income is equal to cash farm income less required debt amortization less family living expense plus off farm income.
4. Figure 1 shows the 10th FCS district as the Texas/Jackson district. The Jackson Federal Land Bank (FLB) was liquidated in 1988 by the Farm Credit Administration. Currently, the area is serviced by the Texas FCS bank. However, the Jackson Federal Intermediate Credit Bank continues to service operating loans in the Jackson district.
5. Two of the components of net household income, family living expense and annual principal repayment, were not obtained directly from the FCRS. They were instead estimated by the USDA-ERS (Morehart et al. 1989).
6. The net farm income used to calculate return on assets and return on equity represents an accounting definition of profit as compared to an economic definition of profit. Economists generally subtract returns to operator and unpaid family labor from the accounting profit to derive an economic definition of profit.

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