The Competitiveness of Farm Credit Markets

in a Deregulated Environment

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Abstract: Despite the proliferation of banking offices occurring since banking deregulation, about one-third of all counties in the US were still considered to have little competition with respect to agricultural credit. Counties considered less competitive were located in regions where farming is less prevalent; Northeast, Mid-Atlantic, Appalachia, and Southeast. There was no evidence that farm interest rates charged by commercial banks were higher regions with less competition. Higher FCS interest rates in counties with less competitive suggested that full-time commercial-size farms may be disadvantaged by a lack of credit market competition.

The views and opinions presented in this paper are those of the authors and not necessarily those of USDA or the Farm Service Agency.

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Major structural changes occurring over the past 30 years have greatly altered the appearance of the US banking industry. Until the 1980's, banking in the US was a decentralized collection of segmented local markets. Interstate banking legislation enacted in the 1980's relaxed entry barriers and consolidated the industry through mergers. These changes were especially evident in rural America. Like the public square or the courthouse, locally owned and operated community banks were once a mainstay of small towns. While locally owned and operated community banks are still present in the small towns of rural America, their presence has given way to large regional and money center banks. Banking deregulation has enabled greater branching and more consolidation of banking institutions. In 1975, there were nearly 19,000 banks and savings and loans with 59,000 nationwide offices. By 2004, the number of institutions had declined to under 10,000, but the number of branch offices exceeded 80,000. The brick and mortar of large bank buildings with a huge lobby and rows of tellers have given way to ATM's and small retail offices located in supermarkets and Walmarts.

The impact of the changing banking industry on agricultural credit can have significant implications for Federal farm credit programs. One of the primary economic justifications for Federal farm credit programs is that a shortage of lenders providing farm loans may result farmers facing uncompetitive credit markets (Executive Office of the President). One intended outcome of Federal credit programs is to lessen disadvantages faced by those facing uncompetitive markets. The proliferation of retail bank offices occurring since deregulation suggests an improved access to credit, and consequently, more competitive credit markets. But, does greater general availability of credit affect farm credit markets? If the expansion in banking services is mostly occurring in urban areas, some agricultural producers may still be facing uncompetitive loan markets, and Federal credit programs may still be justified.

The extent to which farmers may face uncompetitive credit markets is examined in this paper. Local credit markets were categorized according to their apparent competitiveness concerning farm loans. The structural characteristics of farms among markets considered most competitive were contrasted with characteristics of farms in counties considered less competitive. The possible interaction between competitiveness of local credit markets and farm interest rates is examined. It was expected that once those farmers in less competitive credit markets would be more likely to have less favorable loan terms, specifically higher interest rates for a given level of risk. Standard regression techniques were used to examine the presence of such relationships.

Past Studies

The impact of banking deregulation and structural changes on the banking industry has been much debated. On the one hand, consolidation is expected to improve the performance of the banking sector by eliminating inefficiencies and over capacity while the proliferation of banking offices enhances the availability of banking services. Large banking organizations can make farmers and rural communities less vulnerable to disruptions in local economic activity. Yet, smaller banks are much more likely than large banks to shrink their loan portfolio in response to bank capital and aggregate economic conditions (Hancock and Wilcox). On the other hand, deregulation can result in banks orienting their business development toward more affluent groups resulting in less credit available to those with less means.

Concerns about adverse impacts from banking deregulation seem to be greater among farmers and others in rural America. While these concerns may arise from a long-held notion that banking consolidation is a threat to rural regions, past studies have indeed indicated a relationship between banking consolidation and rural credit availability. Past research has demonstrated that the presence of large banks in rural areas may adversely affect the supply of credit to farmers and rural residents (Ellinger and Neff, Featherstone). Plus, studies have demonstrated that small firms, such as family farms,

tend to obtain their credit from smaller bank offices located within the community (Berger and Udell, 1998). And, acquisitions of rural banks by out-of-state organizations tended to reduce lending to small businesses (Keeton). Gilbert and Belongia (1988) found that a bank's lending to farmers as a percent of total loans declined with bank size suggesting that consolidation will tend to restrict the access of farmers to credit. Yet, other studies have indicated that despite banking consolidation, small businesses still have ample access to credit. Berger et.al. found that even when large banks reduced lending to small businesses, smaller banks operating in the same lending territory increased their lending to small businesses. Featherstone found bank acquisitions and mergers to have no impact on the share of loans made for agricultural purposes.

Conceptual Framework

For the purposes of this analysis, interest rates were assumed to reflect five factors: (a) a return to productive capital; (b) and adjustment reflecting a positive rate of time preference; (c) a premium for expected inflation; (d) a risk premium; and (e) non-competitive pricing premium. For loans made by a specific lender group of a given size and term, the first three factors should be identical across all borrowers. Differences in market rates of interest can vary by lender and the time period over which a loan is made. Different groups of lenders do not necessarily compete against each other for the same loans. Government lending agencies such as the Farm Service Agency (FSA) tend not to serve the same clientele as commercial banks or the Farm Credit System (FCS) (Dodson and Koenig, 2003). Likewise, FCS and commercial banks tend to serve somewhat different clienteles (Dodson and Koenig; 2004). In addition different lenders likely have different cost structures and different lending practices which may lead to differences in observed rates (Dixon, Ahrendson, and Barry).

Market interest rates are determined by the interaction of lender's available supply of funds to lend and borrower's demand for loans, both of which are subject to change over time. General macroeconomic conditions such as expectations concerning inflation and the real rate of interest influences the supply of available loan funds. The demand for

loans depends on the current and future economic viability of the borrower's enterprise, which can vary over time. Thus, interest rates received by a borrower depend on the time of loan origination and the term of the loan.

After controlling for loan size and terms, differences in interest rates among borrowers should be represented by differences in borrower's financial risk the competitiveness of local credit markets. A reduced form equation is developed which relates the interest rates on individual loans of a given term made by a specific lender group during a specific time to a set of factors. The specific model is of the form:

$$r_{ij}^{tk} = X_{ij}^{tk} \beta + u_{ij}^{tk} \ ,$$

where r_{ij}^{tk} represents the interest rate charged on loan i by lender j, in period t with a term of k, X_{ij}^{tk} represents the factors expected to influence the interest rate, and u_{ij}^{tk} is an error term representing observable and unobservable factors related to interest rates.

Factors expected to influence interest rates, X_{ij}^{tk}, should be related to differences in the borrower's risk profile and market competitiveness. Goodwin and Mishra found the borrower's risk premium on farm loans to be affected by diversification, wealth, operator race, operator age, farming experience, and loan size. Market competitiveness should be related to the presence of active lenders within a market area.

Variables included in the empirical model which were expected to measure these factors are described in table 1. Most of these variables represent measures of financial risk. Typically, loans to refinance existing indebtedness are considered more risky than loans to make new investments and would be expected to carry higher rates. Greater financial risk and, hence higher interest rates on loans would be expected among farms with higher debt-asset ratios, lower net worth, lower term debt coverage ratios, and lower return on assets. Financial risk and, consequently, interest rates would be expected to be lower among farmers with greater management skills. Operator education and farming experience were chosen as proxies of a farmer's management skill. It was expected that farmers with more years of farming experience and more education would receive lower

rates. Farms with greater diversity of production were expected to have less financial risk, and therefore, likely to receive lower rates. Diversification was measured using the entropy index which is bounded by 0 and 1. An entropy index of 0 indicates complete specialization in one crop while 1 is complete diversification (Jinkins). Farms with greater measures of the entropy index should receive lower rates on farm loans.

The level of competition is incorporated in the analysis by using binary variables for the most and least competitive groups of counties with respect to farm credit markets. If fewer bank branch offices providing farm loans had an adverse impact on competition, one would expect bank farm lending rates to farmers would be higher in regions with fewer bank branches. FCS rates are expected to reflect their costs and market conditions. Hence, their rates should follow the same general trends evident among banks with higher rates expected in less competitive counties and lower rates among more competitive counties.

Ryan and Koenig report that FCS's focuses on serving larger full-time farms as opposed to small and part-time farmers. Such a focus results in lower per-unit cost and, consequently, lower rates. To measure these effects, binary variables for fulltime and noncommercial sized farms are included in the model.

Estimation Approach

The analysis utilizes commercial bank Federal Reserve Bank Call Report data and Federal Deposit Insurance Corporation (FDIC) Summary of Deposit data to estimate the competitiveness of local credit markets. Data on the characteristics of borrowers obtaining new farm loans is provided by USDA's Agricultural Resource Management Study (ARMS). The ARMS is a complex sample surveys comprised of data that originate with sample designs that adjust for non-responses and differing probabilities of selection. Complex samples differ from random surveys in that random surveys assume independence of observations, while complex surveys do not. Standard statistical techniques assume a random sample and result in under-representation of variances when

analyzing data from complex surveys. Therefore, analysis of data from complex surveys should include specific calculation of variance estimates that account for these sample characteristics. For ARMS, a delete-a-group jackknife approach with replication method may be used (Dubman).

Variable name	Variables Description
Full-time	1, if primary occupation = farmer, annual operator labor hours >1,500, > 50% of household income is from the farm business, and annual farm sales > $250,000; 0 otherwise.
Noncommercial farm	1, if annual farm sales < $100,000; 0 otherwise.
Refinance	1, if loan is used to refinance existing indebtedness; 0 otherwise
Noncompetitive credit markets	1, if farm is located in a county considered less competitive with respect to agricultural credit; 0 otherwise.
Competitive credit markets	1, if farm is located in a county considered competitive with respect to agricultural credit; 0 otherwise
Debt-asset ratio	Total year-end debt divided by year-end assets.
Term debt coverage ratio	Term debt coverage ratio.
Return on assets	Return on assets (as percent.)
Operator experience	Number of years of farming experience
College	1, if farm operator has some college education; 0 otherwise
Loan size	Dollar amount of loan
Net worth	Amount of farm net worth in $100,000
Diversification	Diversification index measured using entropy

Table 1. Variable names and descriptions used in empirical model.

Defining a Market Territory

Galbraith in 1934 outlined the effect that bank branching and bank charters had on the supply of agricultural credit in rural areas. Today, commercial bank charters have no geographic lending limitations and thus if banks' collectively choose not to serve certain geographic regions, competition for farm loans may suffer.[1] Because the commercial banking system remains the largest supplier of debt capital to agriculture, the presence

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[1] While interstate banking and branching exists today, in the earlier period of the study interstate banking was more restrictive thereby placing geographical barriers on some banks.

within a county of banks or branch offices of banks which are active farm lenders should be an indicator of local credit market competitiveness.

In the Call Reports to regulators, lending activity of a bank is aggregated and is associated with the county of bank's main office and not the county of its branches. Smaller banks that are likely sources of agricultural loans within a county are more easily identifiable than larger banks in the Call Report data. Because large banks' share of total bank lending is sizable and growing, their influence on agricultural credit market competitiveness is substantial and can not be ignored due to data limitations. Past research by Levonian has shown that the size and number of bank branches in agricultural areas are important to agricultural loan levels of large banks. Nonetheless, branches of larger banks that serve multiple counties or states may or may not represent a source of agricultural loans within all counties they serve.

To measure bank lending competition in local farm credit markets given the limitations of Call Report data, the number of banking institutions providing agricultural loans within each county was estimated using the following criteria. An agricultural lender was considered to be present in the county if either of the following two conditions were met: 1) the bank's farm loans were at least 10 percent of its total loans and it had at least 1 branch office within the county;[2] or 2) the bank had at least $50 million in agricultural loans outstanding and maintained at least 1 branch office in a rural area and the branch was in a county with a sizable farm population. A rural area was defined as being located 20 miles or more outside an urban cluster, as defined by Department of Commerce. A sizable farm population for a county is one having more than 350 indebted farmers, as reported by the Census of Agriculture for 2002. The first condition is intended to capture smaller community banks that make agricultural loans. The second condition is intended to capture larger regional banks that make agricultural loans while screening out branches in more urban areas that were less likely to make farm loans.

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[2] This 10 percent threshold is more lenient than the definitions of an agricultural bank used by the Federal Reserve or FDIC (USDA, 2003). The Federal Reserve and FDIC measures are intended to access an institution's safety and soundness and not to characterize the competitiveness of markets which the institution serves.

Each county was classified as to its competitiveness for farm lending.   A county was considered competitive if 3 or more banks meeting either of the aforementioned conditions were present in the county. About one-third, or 1,017, of all counties were considered highly competitive over the 2001- 2002 period.   These highly competitive counties were located in the more agricultural regions of the western Corn Belt and Great Plains. Highly competitive markets were also found in Texas, California, Florida, Georgia, Pennsylvania, Washington, and the Mississippi Delta. A county was considered not to be competitive if no banks meeting aforementioned conditions were present in the county.   Using these criteria, 1,035 counties were considered for the 2001–2002 period. These counties were located in the more urbanized Northeast, Appalachia, Southeast, and Mountain States (figure 1).
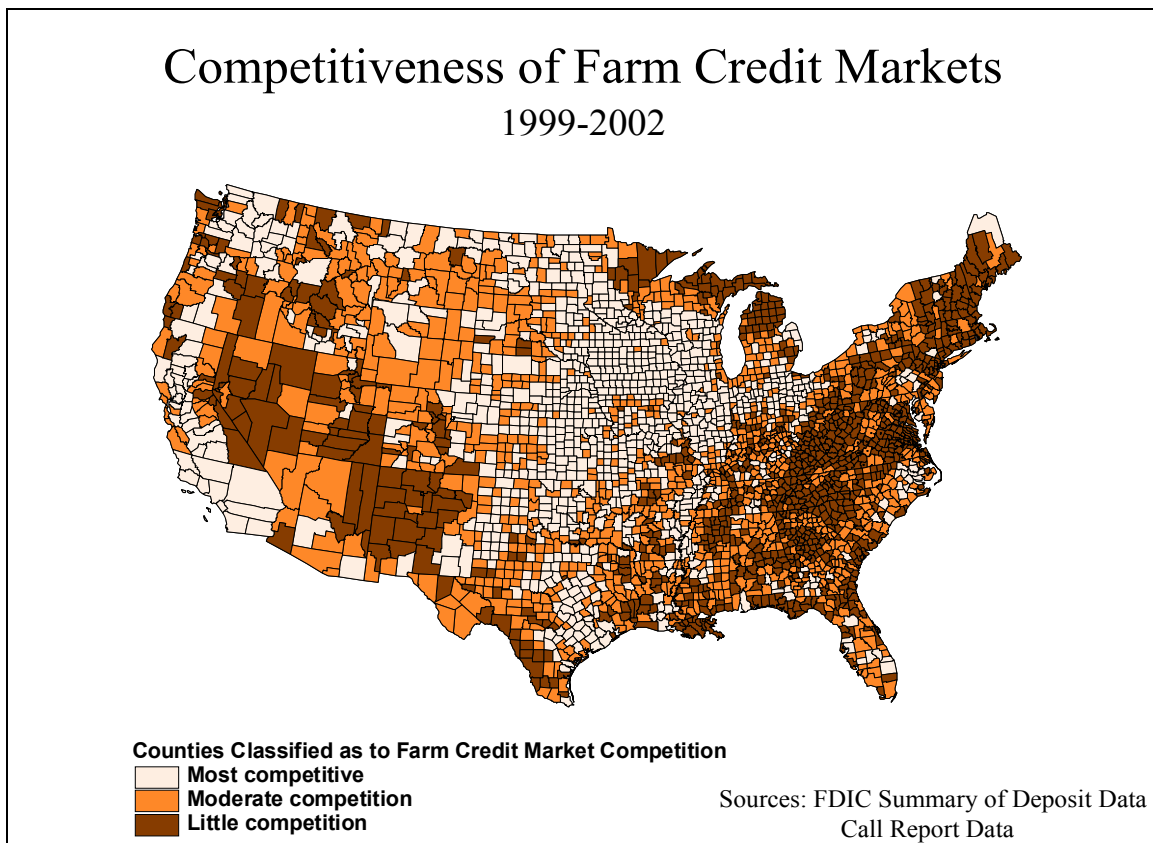

Figure 1. Farm Credit Competitiveness as Measured Using the Presence of Branch Offices of Banks Providing Farm Loans.

Borrower Characteristics by Loan Market Competitiveness

There were distinct structural differences among farms located in counties grouped according to loan market competitiveness Summary statistics were estimated using the ARMS for 2001 and 2002 and the 2002 Census of Agriculture. While counties considered to have little competition with respect to farm credit represented nearly one-third of all US counties, they comprised only a small share of farms production. Agricultural census data indicated that competitive counties represented 47 percent of all farms compared to only 19 percent among counties considered to have little credit market competition (table 2). Farms in counties considered to have little competition were smaller, averaging $36,964 in annual sales compared to $106,861 in competitive counties. Consequently, farms in these less competitive counties represented only 8.6 percent of all farm sales in 2002 compared to 63.4 percent in competitive counties.

There is also distinct difference in the type of farm by county categorized by competition. Larger shares of the farms located in competitive counties were commercial-size field crop or fruit and nut farms that were operated by full-time farmers.[3] Large shares of farms in regions considered to have little competition were more likely to be either smaller part-time or hobby farms specializing in beef cattle, hay, horses, nursery, or tobacco.[4] While farms in less competitive regions were smaller and less profitable, off-farm income tends to be greater resulting in similar levels of average household incomes. The ability to service debt, as indicated by the term debt coverage ratio, is greatest in counties with less credit market competition. Also, solvency among farms in non-competitive counties is higher than more competitive counties. The greater solvency and higher debt coverage ratios suggest that the risk premiums in counties with little credit market competition may be lower, perhaps countering any effect on borrower rates arising from limited competition.

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[3] A full-time commercial farmer was defined as someone who considers farming to be their primary occupation, is fully employed by the farm business, is reliant on the farm business for most of their family income, and has annual farm sales of greater then $250,000.

[4] For purposes of this analysis, part-time farms were defined as those with annual farm sales of less than $100,000, the primary operator considered farming to be their occupation, and the primary operator

Table 2. Structural and Financial Characteristics of Farms by Level of Credit Market Competition in County.

	Most Com-petitive	Moderate competition	Little competition	All farms
Number of farms \1	1,002,711	722,022	404,254	2,129,018
		Average per farm		
Farm sales \1	106,861	65,508	35,964	79,407
Total farm assets	574,755	553,942	480,476	550,095
Real estate	423,455	431,455	388,685	419,565
Farm debt	74,999	55,124	36,251	61,056
Farm Net worth	499,757	498,818	444,224	489,039
Net cash farm income	20,208	12,379	2,484	14,425
Net farm income	18,670	11,243	4,697	13,554
Household income \2	67,699	59,681	63,727	64,258
		Percent		
Percent of all US farms \1	47.1	33.9	19.0	100
Farms with debt \1	41.6	33.6	24.5	35.6
Percent of US farm sales \1	63.4	28.0	8.6	100
Selected financial ratios \3				
Term debt coverage ratio	1.1	1.2	1.9	1.2
Return on farm assets	0.3	-0.8	-2.1	-0.4
Debt/asset (all farms)	13.0	10.0	7.5	11.1
Debt/asset (indebted farms)	23.9	22.1	17.9	22.6
NAICS Farm type \4		Percent of all US farms		
Beef Cattle	29.6	37.9	37.4	33.9
Corn/soybean	19.7	7.7	3.8	12.6
Wheat	2.8	1.6	0.5	2.0
Horses	6.6	8.9	11.2	8.2
Dairy	3.7	3.4	2.8	3.4
Hay	7.6	10.2	13.3	9.6
Poultry	1.4	3.0	2.1	2.1
Nursery	2.0	3.1	5.1	3.0
Vegetable/peas/potato	1.3	1.8	2.4	1.7
Fruits and nuts	4.5	2.6	1.7	3.3
Tobacco	0.6	2.4	3.4	1.7
Cotton, Rice, Peanuts	1.3	1.0	0.4	1.0
All other farm types	18.9	16.4	15.9	17.5
Total	100	100	100	100
Full time farms \5	7.0	4.8	1.7	5.3
Family size farms \6	6.5	4.8	3.1	5.1
Part-time \7	34.2	35.9	37.6	35.4
Hobby \8	45.5	49.3	55.3	48.6

\1 Estimated using 2002 Census of Agriculture\2 Average per farm household.
\3 Estimated using only farms in ARMS which originated debt \4 North American
 Industrial Classification System (Estimated from 2002 Census of Agriculture).

supplied less than 1,000 hours of labor annually to the farm business. Farms defined as hobby included those with less than $100,000 in annual farm sales that were not already defined as part-time farmers.

Despite differences in the structural characteristics of farms in counties characterized by credit market competition, average lending rates on all new debt did not vary significantly (table 3). Likewise, commercial bank lending rates displayed no variability by level of competition. Rates on new FCS loans did appear to be higher in counties with lower levels of competition.[5] Also, market shares of farm debt held by the FCS and commercial banks were similar between the different county groups (table 3). This seems inconsistent with argument that deregulation leads to less farm credit availability. But, one must recognize the structural differences in the characteristics of farms between these groups of counties. Significant differences in market share among full-time farmers by level of credit market competition were found. Specifically, FCS's market share increased while commercial bank's share decreased with lower levels of competition. Meanwhile, debt market shares for part-time and hobby did not appear to be affected by level of credit market competition.

Empirical Application

Analysis of the relationship between the credit market competitiveness and borrower interest rates requires controlling for the variability arising from different loan purposes, lender preferences, and origination date. To control for differences in time of origination, our analysis considers only new loans made over the 2001-2002 period. To control for differences in loan purpose and lender preferences, new loans are grouped by real estate and nonreal estate and lender group. Due to data limitations with the ARMS, only two lender groups were considered: commercial banks and FCS. Specifically, we examine interest rates on loans made in 2000 and 2001 for 4 groups of lender and loan type: (1) commercial bank nonreal estate; (2) commercial bank real estate; (3) FCS nonreal estate; and (4) FCS real estate.

Interest rate variability among the aforementioned groups should be attributable to financial risk and level of competition. Regression analysis shows little apparent relationship between rates on new loans borrower financial characteristics. Farm net

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[5] Sample size limitations limited lender groups analyzed to FCS and commercial banks.

worth was significant for all FCS loans while term debt coverage ratio was significant

only for bank real estate loans (table 4).

Table 3. Debt market shares and average interest rates on farms originating debt in 2000 and 2001.

	Level of competition			
	Com-petitive	Moderately competitive	Non-competitive	All farms
Share of all farm debt held by:	Market share as percent			
FCS	19	24	20	21
Banks	57	52	62	56
FSA	3	4	3	3
Individuals	9	7	4	8
Merchants & dealers	4	3	3	4
Share of all full-time farm debt held by:				
FCS	25	37	40	29
Banks	54	43	38	50
Share of all noncommercial size farm debt held by:				
FCS	14	12	16	13
Banks	62	64	70	64
	Average interest rate as percent			
Rate on all new debt by purpose:				
Nonreal estate	7.1	7.0	6.7	7.0
Real estate	6.9	6.9	6.9	6.9
Rate on all new bank debt by purpose:				
Nonreal estate	6.9	7.0	6.8	6.9
Real estate	6.4	7.1	6.7	6.7
Rate on all new FCS debt by purpose				
Nonreal estate	6.0	6.2	7.2	6.3
Real estate	5.5	5.9	6.7	6.0

Source: 2001 and 2002 ARMS

Many of the variables which were significant had unexpected signs. Sensitivity analysis

indicated that rates tended to be inelastic with respect to the debt-to-asset ratio, return on

assets, net worth, operator diversification, diversification, and coverage ratio (table 5).

For example, a 1 percent increase in loan size resulted in only a 0.017 percent decline in

rates on new bank real estate loans. This would suggest that lender's do not necessarily price loans according to the financial risk of the borrower. However, there may be other risk factors considered by lenders that or not captured by the ARMS data. One is the presence of Federal or State guarantees, which are present on about 7 percent of all farm debt. Neither does ARMS capture the loan-to-value ratio nor the seniority of the lien. A borrower's credit history as well the presence of co-signers are additional risk factors which may affect loan pricing.

Whether or not borrowers were considered full-time or noncommercial farmers appeared to influence new loan rates. Status as a noncommercial farmers increased predicted rates on new bank real estate loans by 3.8 percent while status as a full time farmer decreased predicted rates on FCS real estate loans by nearly 20 percent (table 5). Borrowers with greater education tended to receive lower real estate and nonreal estate rates for both FCS and banks, though it was only significant for bank nonreal estate debt. This seems to suggest that lenders perceive those borrowers with higher education to have better management skills and, therefore, are less risky.

Location in counties considered to have little competitive with respect to farm credit appeared to have no impact on rates charge by banks on new loans. A significant relationship between bank nonreal estate rates and location in a competitive county was found, but the magnitude was trivial. Location in a competitive county was expected to reduce bank nonreal estate rates by 1.6 percent which on a 6 percent loan is less than 1-basis point.

Location in less competitive counties had a significant impact on borrowing rates charged by FCS institutions for both real estate and nonreal estate loans. Predicted rates for borrowers in less competitive counties were 32 percent higher on FCS real estate loans. On a 6 percent loan, this would represent nearly 2 percentage points higher. Likewise, predicted rates on FCS nonreal estate loans were greater in less competitive counties. Though, the differential was only 6 percent or about 50-basis points at current rates.

Table 4. Parameter Estimates from Jackknife Regression of Farm Interest Rates on Competitive and Risk Factors.

	Bank Real estate rates		Bank Nonreal estate		FCS Real Estate		FCS Nonreal estate	
	Parameter/ Standard error	P	Parameter/ Standard error	P	Parameter/ Standard error	P	Parameter/ Standard error	P
Intercept	0.06975	**	0.07855	**	0.05284	***	0.06175	***
	(0.0044)		(0.0011)		(0.0063)		(0.0018)	
Loan Size/$100,000	-0.00149	*	0.00700		0.00011		0.00033	
	(0.0010)		(0.0000)		(0.0009)		(0.0005)	
Noncompetitive county	-0.00571		0.00036		0.01610	*	0.00943	**
	(0.0065)		(0.0182)		(0.0167)		(0.0042)	
Competitive county	-0.00055		-0.00148	*	-0.00520		0.00070	
	(0.0041)		(0.0014)		(0.0151)		(0.0039)	
Debt-asset ratio	0.01319		-0.00217		-0.01842		-0.00381	
	(0.0134)		(0.0035)		(0.0184)		(0.0051)	
Term-debt-coverage-ratio	-0.00004		-0.00052	*	-0.00026		0.00091	
	(0.0008)		(0.0004)		(0.0017)		(0.0010)	
Return on assets	0.00000		-0.00014		0.00005		-0.00004	
	(0.0001)		(0.0002)		(0.0001)		(0.0000)	
Farm net worth	0.00015		0.00000	**	0.00012		-0.00020	*
	(0.0004)		(0.0000)		(0.0004)		(0.0002)	
Diversification	0.01111		0.00802		-0.03443		-0.00647	
	(0.0711)		(0.0144)		(0.0804)		(0.0396)	
Operator experience	-0.00020	*	0.00006		0.00024	*	0.00000	
	(0.0002)		(0.0001)		(0.0002)		(0.0001)	
Refinancing	-0.00947		-0.00435	**	-0.00677		0.00031	
	(0.0101)		(0.0027)		(0.0088)		(0.0162)	
Full-time farmer	-0.00584		-0.00427		-0.01600	*	-0.00150	
	(0.0061)		(0.0055)		(0.0162)		(0.0031)	
Noncommercial farmers	0.00555	*	0.00189		0.00442		0.00245	
	(0.0045)		(0.0048)		(0.0191)		(0.0058)	
Higher education	-0.00147		-0.00951	**	-0.00298		-0.00091	
	(0.0060)		(0.0029)		(0.0101)		(0.0023)	
Sample #	165		2,481		88		688	
Weighted # of farms	28,408		214,142		5,044		36,074	

* 0.05 < P ≤ 0.10/ ** 0.01 < P ≤ 0.05/ *** P ≤ 0.01

The higher rates charged on FCS loans in less competitive regions may seem somewhat counterintuitive. As a borrower owned cooperative, FCS would not be expected to charge rates higher than necessary to cover all costs including accumulating sufficient capital. This may be partially explained, however, by FCS's practice of paying patronage dividends to stockholders. This practice is more common among associations located in the southeast, and northeastern, and mid-Atlantic regions. These regions also were considered to have little competition with respect to farm credit. In these regions the patronage refund reduces the effective rate paid by the borrower. Rates reported on the ARMS represent initial loan contract rates and do not include the effect of patronage refunds. It is likely that considering patronage refunds would result in less difference in between FCS rates charged new FCS borrowers by level of credit market competition. Nonetheless, in these regions FCS tends to be the primary market player, especially for full-time operators of large commercial farms. Regardless of whether or not effective rates are reduced through patronage, the ability to charge such high rates initially would be consistent with a lack of credit market competition.

Table 5. Sensitivity of rates to changes in the dependent variable.				
	Bank Real estate rates	Bank Nonreal estate	FCS Real Estate	FCS Nonreal estate
Competitive \a	-1.696	**-1.604**	-4.566	1.033
Noncompetitive \a	-0.875	3.990	**32.200**	**5.591**
Debt asset	0.036	-0.007	0.001	-0.010
Coverage ratio	-0.000	**-0.000**	0.010	0.000
Loan size	**-0.017**	0.001	0.005	0.002
Return on assets	0.000	-0.000	0.005	-0.000
Net worth	0.007	**0.013**	0.026	**-0.015**
Diversification	-0.002	0.000	0.054	0.001
Farm experience	**-0.014**	0.003	**0.001**	0.009
Refinance \a	3.977	**0.297**	-2.800	4.007
Full time \a	-6.232	-7.188	**-19.808**	-4.979
Noncommercial \a	**3.826**	4.744	4.557	10.167
College \a	-2.762	**-8.356**	-4.126	-7.288

Estimated as the change in the predicted rate resulting from a 1% change in the independent variable.
Significant variables from Table 4 are shown as bold.
 \a Sensitivity for binary variables were estimated as the percent change in the predicted borrower rate for the binary variable =1 from the binary rate =0.

Summary

The commercial banking in the US has been transformed by deregulation. Banking institutions have consolidated while banking offices have proliferated. Federal credit programs for agriculture were implemented in a time prior to deregulation, when farmers and those in rural areas were considered to be underserved by commercial banks. The proliferation of banking offices occurring since deregulation may challenge some of the economic justifications for Federal farm credit programs. But, past studies have indicated most of the expansion in banking offices has occurred in more urban areas raising questions about what impact, if any, banking deregulation has had on the farm credit availability.

Our analysis suggests that a regional disparity in the availability of farm credit may exist. About one-third of all counties in the US were served by 3 or more commercial banks that provided farm loans and, therefore, were considered highly competitive. Another third of counties appeared not to be served by any commercial banks that provided farm loans and were likely to have little competition with respect to farm credit. Counties considered competitive with respect to farm credit were located in the farming regions of the Corn Belt and Great Plains while counties considered to have little competitive were located in regions where farming is less prevalent; Northeast, Mid-Atlantic, Appalachia, and Southeast. While counties with little competition counties represented large geographic areas, they contributed little to US farm production. Mostly, farms were of noncommercial size and engaged in production of beef cattle, hay, and horses. .

An analysis of rates charged by commercial banks on new real estate and nonreal estate loans indicated no differences in rates by level of credit market competition. This was true even after controlling for differences in loan purpose, time of origination, and level of risk. These results are not consistent with an expectation that farm borrowers in less competitive credit markets would pay higher interest rates. One explanation may be that there is enough banking presence even in counties little presence of farm bank branches to assure an adequate level of market competition. This may be especially true of smaller

noncommercial farms, which are common in regions with little competition, whose credit needs are more reflective of consumer rather than farm credit.

One may infer from our analysis that larger commercial size farms in counties with little competition may be disadvantaged by the lack of lenders providing farm credit. Full-time commercial farmers are more likely served by FCS rather than commercial banks. Rates charged by FCS on both real estate and nonreal estate loans were higher in counties with little competition, even after controlling for loan purpose, time of origination, loan size, and risk. While the effective rate paid by FCS borrowers may actually be lower because of the effect of patronage refunds, the ability to charge higher up-front rates is telling of the level competition.

Our analysis shows that despite the an increase in the number of banking offices occurring since banking deregulation, large numbers of counties appear not to be served by commercial banks that provide farms loans. However, farms in counties considered to have little competition contribute little to the overall production of the Nation's food and fiber. And, there is no evidence that farm interest rates charged by commercial banks is any higher in regions considered to have little competition. Higher FCS interest rates in less competitive counties suggest that full-time commercial-size farms may be disadvantaged by a lack of credit market competition.

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