How Mergers in the Farm Credit System Have Affected Ag Banks

By Francisco Scott

Commercial banks and the Farm Credit System (FCS) have been the most important sources of agricultural loans in the United States in recent decades. Since the 1990s, however, mergers and acquisitions have increasingly concentrated both FCS and commercial banks, raising concerns about potential effects on the agricultural credit market. Economic theory suggests that the merger of two or more competitors can change banks' portfolio choices and use of resources, potentially changing the prices and availability of agricultural credit.

The FCS gained a substantial market share of total agricultural debt starting in the 2000s, lending credibility to these concerns. Bankers' associations have argued that Congress has granted the FCS unfair advantages that have helped it expand in local credit markets, possibly altering the equilibrium in market prices and the distribution of ag loans across different lending institutions. Policymakers and researchers have noted the need to include the FCS in analysis of competition and concentration in the credit market; thus far, however, how the FCS's evolving size and scope affect agricultural bank operations, particularly through mergers, has not been adequately examined.

In this article, I explore the effects of FCS mergers on agricultural banks (ag banks), defined as commercial banks with more than 25

Francisco Scott is an economist at the Federal Reserve Bank of Kansas City. This article is on the bank's website at ***www.KansasCityFed.org***

percent of their loans allocated to agricultural operations or real estate. I find that FCS mergers have had mostly muted long-term aggregate effects on ag banks' interest income, efficiency, and agricultural real estate loans as a share of their total loans. However, I also show that FCS mergers likely decreased ag banks' agricultural operational loans as a share of their total loans and increased ag banks' interest expenses from their historical low levels. These findings suggest that FCS mergers may have altered some strategic portfolio decisions of ag banks in their respective markets, though the effects on ag banks' profitability were relatively minor.

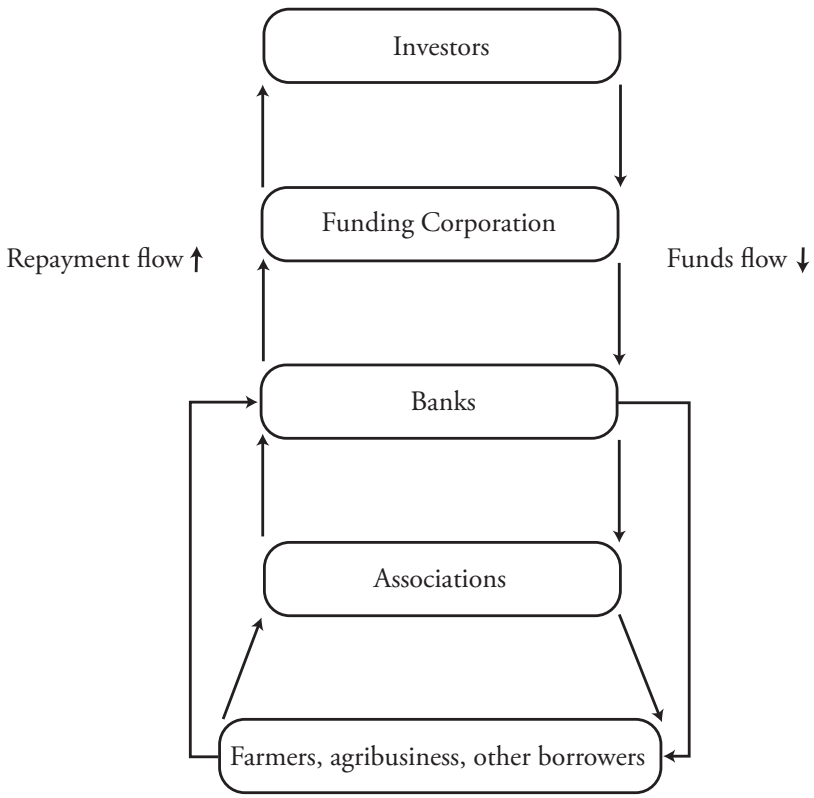
Section I describes the institutional structure of the FCS. Section II describes trends in outcomes for ag banks and the FCS. Section III describes the effects of FCS mergers on ag banks.

I. Structure of the Farm Credit System

Created in 1916 to increase credit access for the U.S. agricultural industry, the FCS is a private, for-profit, federally chartered set of cooperatives that holds the legal status of a government-sponsored enterprise (GSE). As a GSE, the FCS accrues tax benefits and has been suggested to hold an implicit federal loan guarantee (Turvey and Wang 2012; Monke 2016; Turvey, Carduner, and Ifft 2020). To be part of the cooperative, borrowers must buy FCS stock every time they take out a loan, which allows them to receive patronage (essentially, a small share of the cooperative's profits) at the end of a fiscal year. Since its inception, the FCS has succeeded in expanding credit access to agricultural businesses and has recently expanded lending activity to other parts of the agricultural supply chain (Jensen 2000; Hutchins 2022).

The FCS and commercial banks provide similar services to borrowers, albeit under different operational and regulatory frameworks. While commercial banks fund their operations largely by taking deposits, the FCS funds operations mostly by issuing bonds and notes (Monke 2016). Figure 1 shows how the FCS is structured, with a linear flow of funds from investors all the way down to agricultural borrowers. First, the Federal Farm Credit Banks Funding Corporation collects funds from investors and issues bonds. Second, the Funding Corporation allocates funding to FCS banks. The Funding Corporation takes no margins from its bond issuance, and FCS banks are jointly liable

Figure 1
FCS Supply Chain



Note: Adapted from Federal Farm Credit Banks Funding Corporation (2022) and Monke (2016).

for the debt. Third, FCS banks distribute funds to the *de facto* retail operation of the FCS, the FCS associations. Finally, the FCS associations grant loans to farmers.[1] Although all FCS banks have associations under them who distribute loans to farmers, some FCS banks also lend directly to farmers and businesses as reflected in Figure 1. Banks profit from the repayment of allocated funds from associations, and associations profit from farmers' repayment of loans.

Each FCS bank distributes funds to a set of associations, and each association has a specific charter territory in which no other association can operate (excluding a few special cases). When FCS banks or associations merge, they consolidate their assets and liabilities as well as their

chartered territories. In recent decades, mergers have led the number of FCS banks and associations to decline substantially, from around 900 banks and associations in the 1980s to only 71 in 2022. The FCS argues that these mergers improve efficiency. The Farm Credit Administration, which regulates the FCS, reports that smaller associations face resource constraints that effectively impede them from obtaining IT services and complying with regulations and examinations (Farm Credit Administration 2023). In theory, mergers can soften these resource constraints and increase the capacity of smaller associations to fund more projects—which can in turn affect competition for lending.

However, competition from the FCS has long been a point of contention for ag banks. The FCS has drawn heavy criticism from the American Bankers Association (ABA) not only for advantages granted by its GSE status, but also for its expansion in lending activity. For example, the ABA has argued that the FCS provides services that could be provided by banks, putting unfair competitive pressure on local credit markets (American Bankers Association 2015).

Whether FCS mergers have made it harder or easier for banks to compete has so far remained an open question. Economic theory suggests that mergers can significantly disrupt market equilibrium (Clark, Houde, and Kastl 2021; Klein 1971; Monti 1972; Vives 2016). These disruptions tend to manifest through changes in the quantity and prices of loans (Allen, Clark, and Houde 2014). If FCS mergers lead to more competition between the FCS and banks (for example, by improving FCS associations' access to funds), then loan prices are likely to decrease. In contrast, if FCS mergers lead to greater segmentation of the demand for ag credit across different types of borrowers, and thus less competition, then loan prices are likely to increase.

II. Trends in Lending, Profitability, and Efficiency

Understanding trends in the agricultural credit market can help contextualize any changes in market equilibrium that might result from an FCS merger. If ag banks and FCS associations respond similarly to economic conditions over time, for example, then they may also compete for the same set of borrowers in the economy. In this case, FCS mergers have the potential to influence ag banks' decisions as they compete in the ag credit market. In contrast, if ag banks and FCS associations *do not*

respond similarly to economic conditions, then they may serve different customers; in this case, FCS mergers are likely to have less influence on ag banks' decisions.

To assess whether FCS associations and ag banks respond similarly to changes in the economy, I examine three long-term trends—lending, profitability, and efficiency—that have been used by other researchers to capture the core activity of ag banks (for example, Morris, Wilkinson, and Hogue 2015; Marsh and Sengupta 2017; Jacewitz 2022). To analyze these trends for banks, I use the Federal Reserve Board's merger-adjusted database of bank balance sheet and income statements as described by English and Nelson (1998) and derived from the Consolidated Reports of Condition and Income (Call Reports). To analyze the same trends for FCS associations, I use the FCS Call Reports, which provide information about the financial operations of FCS institutions, as well as the archives of reports from the Farm Credit Administration.

Lending trends

The FCS has gained significant market share over the last 20 years. Chart 1 shows that in 2000, the FCS held around 28 percent of farmers' outstanding debt (green bar) in the United States, while commercial banks held around 46 percent (blue bar). By 2021, the FCS market share had increased to 44 percent, while commercial banks' market share declined to 36 percent.[2]

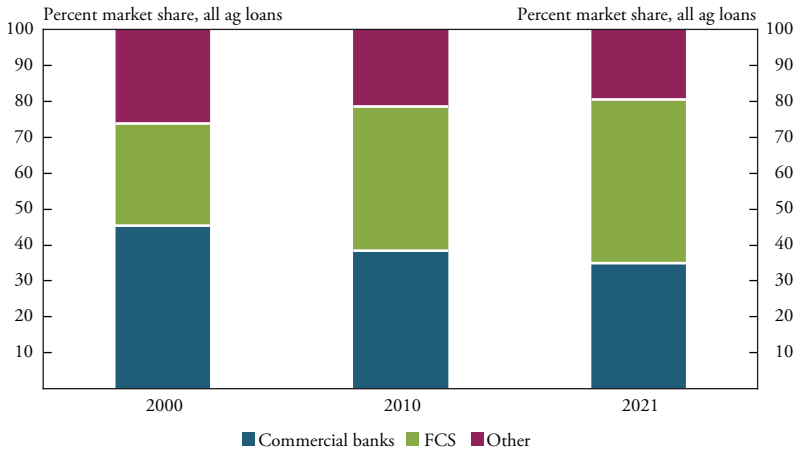
Most of the growth in market share by the FCS can be traced to the agricultural real estate market. Chart 2 shows that over the last 12 years, the volume of ag real estate loans in the United States has increased at both the FCS and commercial banks (solid green and dashed green lines). Since 2010, the FCS has experienced the highest growth in ag real estate loans (solid green line). And while banks still hold the most ag operational loans, the share of ag operational loans on their balance sheets has been declining since 2017 (dashed blue line).[3] These trends partially explain the fast increase in market share for the FCS.

Profitability trends

Over the last 20 years, the FCS and ag banks in particular have both earned and spent less on interest operations. Chart 3 shows that median values of both interest income and expenses as a percentage of average

Chart 1

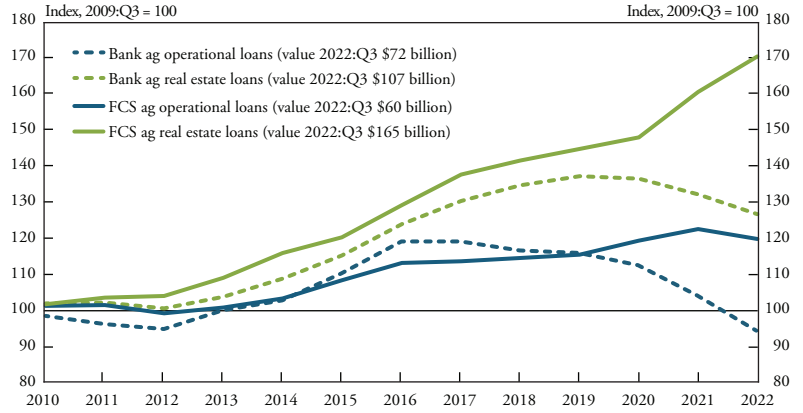
Shares of Farm Debt



Sources: U.S. Department of Agriculture and author's calculations.

Chart 2

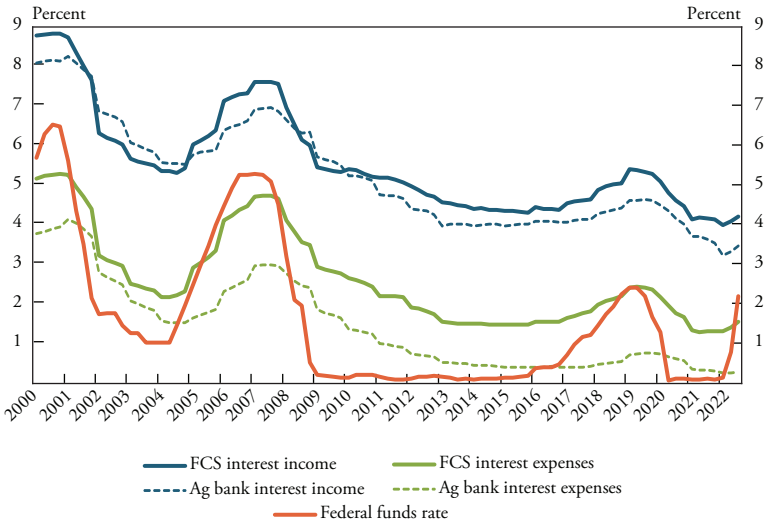
Evolution of Agricultural Loans by Type in National Markets



Note: Chart shows the evolution of agricultural loans for the FCS and commercial banks, measured by a four-quarter moving average in 2022 dollars.
Sources: FDIC Consolidated Reports of Condition and Income, FCS Call Reports, and author's calculations.

Chart 3

Evolution of Interest Income and Interest Expenses as a Percentage of Average Earning Assets



Note: Chart shows median values for interest expenses and income as a percentage of earning assets for the FCS and ag banks.
Sources: FDIC Consolidated Reports of Condition and Income, FCS Call Reports, Board of Governors of the Federal Reserve System (Haver Analytics), and author's calculations.

earning assets declined between 2000 and 2022. Earning less from interest operations implies that ag banks take in lower revenue for each dollar they lend. At the same time, spending less in interest operations implies that the cost of obtaining funds for loan activity has decreased.

Although the FCS and ag banks make similar interest income from their assets (blue lines), the gap between their interest expenses (green lines) is noteworthy. I define interest income as a measure of returns (yields) weighted by the share of assets. These figures suggest that the returns on assets (weighted by the share of assets) do not differ substantially between the FCS and ag banks in aggregate. The gap in interest expenses, on the other hand, reflects structural differences in how ag banks and the FCS are funded. As discussed previously, ag banks tend to acquire funds from depositors, while the FCS funds itself through notes and bonds. As a result, the effects of an increase in the federal funds rate (orange line) have historically had a more pronounced effect on the FCS and may have made it more expensive for the FCS to acquire funds.

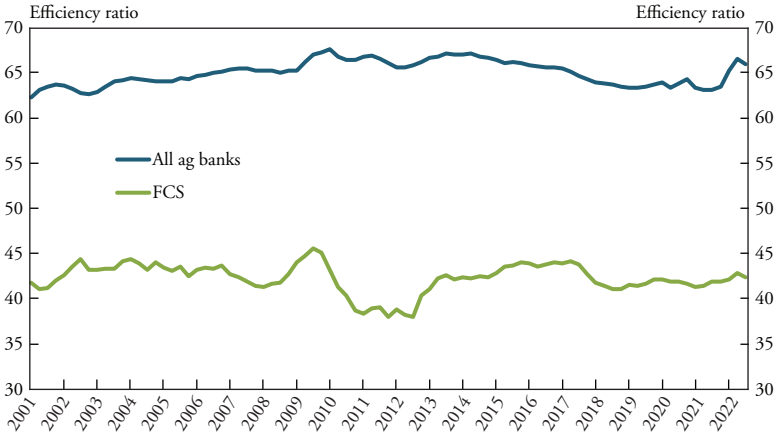
Efficiency trends

Overall, the FCS appears to be more efficient than ag banks in producing income. Bank efficiency is commonly measured by an "efficiency ratio," which divides the level of noninterest expenses a financial institution uses to produce a dollar of income by the sum of its interest and noninterest income. The lower the efficiency ratio, the more efficient the bank's use of resources (Jacewitz 2022). Chart 4 shows that the FCS has a lower efficiency ratio than ag banks. Ag banks' efficiency ratio (blue line) generally has remained constant at around 65 since the early 2000s, implying ag banks spent 65 cents to produce a dollar of income. The efficiency ratio for the FCS (green line), too, has remained relatively stable at around 45, suggesting the FCS spent around 45 cents to produce a dollar of income over the same period. This suggests that operational costs for banks are higher than for the FCS.

In sum, many FCS and ag banks' outcomes have moved similarly over time. Ag real estate loans have become an important part of agricultural debt for both ag banks and the FCS. Interest income and expenses have declined for both types of institutions, while efficiency ratios have been relatively stable, suggesting FCS associations have been more efficient than ag banks for some time.

In the analysis in the next section, I focus on ag banks in local markets that have been affected by FCS merger activity. Specifically, a total of 20 FCS associations have been merged or acquired since 2009, and I collect the counties affected by each of these merger activities.[4] I identify the ag banks likely to be affected by FCS mergers by exploring the areas of operation of each FCS association.[5] Out of the 20 FCS mergers (see Appendix A for a full list), I identify 10 that are likely to have large effects on local markets in that they feature a relatively small association merging with a relatively larger association—thus capturing associations that may have been more resource constrained. I call the area served by these relatively small FCS associations before mergers "local markets of interest." Figures in Appendix B show that trends in lending, profitability, and efficiency do not differ substantially between outcomes at the national level and at the level of local markets most likely to be affected by FCS mergers, suggesting that these local markets follow the major trends of

Chart 4
Efficiency Ratios for Ag Banks and the FCS



Note: Efficiency ratios are median four-quarter moving averages.
Sources: FDIC Consolidated Reports of Condition and Income, FCS Call Reports, and author's calculations.

agricultural credit markets.[6] Thus, mergers have the potential to change portfolio choices in this environment.

III. The Effects of FCS Mergers on Local Markets of Interest

To assess whether FCS mergers influenced ag banks in markets most likely to be affected ("local markets of interest"), I examine the following outcomes at ag banks before and after FCS mergers: the volume and share of agricultural loans at ag banks, banks' interest income and expenses, and bank efficiency. Charts 5 through 8 center the merger events in each local market as year 0 and extract the median of ag bank outcomes in local areas of interest five years before and after the merger and by quarter. Outcome values are indexed to 100 at the quarter of the merger (year 0), such that values below 100 imply a decline in the outcome in relation to the merger event, and values above 100 imply an increase. All charts also show the projected trend of the median outcome using data from the five years before the merger. While these aggregate measures captured by the median do not consider the variability of outcomes for each bank, they suggest the direction of the effects of mergers.[7]

Chart 5 shows that FCS mergers did not significantly change the volume of agricultural operational loans at ag banks in the local areas of interest but likely changed the volume of agricultural real estate loans. The volume of ag operational loans (in constant 2022 dollars before being converted to an index) follow the projected trend after merger events, while ag real estate loans increased sharply above trend after merger events.

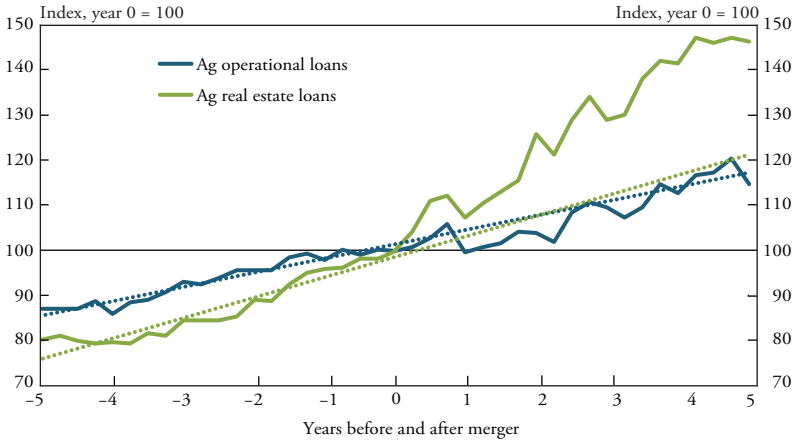
Although the volume of ag operational loans was not significantly affected by mergers, Chart 6 shows that FCS mergers may have affected ag operational loans as a share of total loans (blue line). The median share of ag operational loans trends down after mergers, indicating mergers may have decreased ag banks' ag operational loans as a share of their total loans. However, median volume of ag real estate loans as a share of total loans (green line) follows a similar trend before and after mergers, indicating FCS mergers had a muted effect on the share of ag real estate loans.[8] Altogether, mergers seem to have decreased the importance of ag operational loans in the loan portfolio of ag banks.

FCS mergers do not seem to have affected ag banks' asset-derived income but may have affected ag banks' interest expenses. Chart 7 shows that median interest income as a share of average earning assets (blue line) tends to jump above its pre-merger trend right after the merger events but converges to trend after three years. Median interest expenses as a share of average earning assets (green line), however, shifts above its pre-merger trend immediately after the event, implying a post-merger increase in interest expenses for ag banks compared with its pre-merger declining trend. Thus, FCS mergers may have affected the expense side of ag banks through, for example, increased deposit rates to capture funds as ag banks adjust funding needs. However, changes in interest expenses may have little effect on the level of profits if the level of interest expenses remains low (as shown in the dashed green line in Chart 3).

Chart 8 shows that the median efficiency ratio varies little before and after mergers and largely stays within the projected trend. After mergers, ag banks do not appear to change how they allocate resources to generate income, though median efficiency ratios become volatile about four years after the merger. Ag banks in the local markets of interest do not appear to allocate resources differently in the aftermath of an

Chart 5

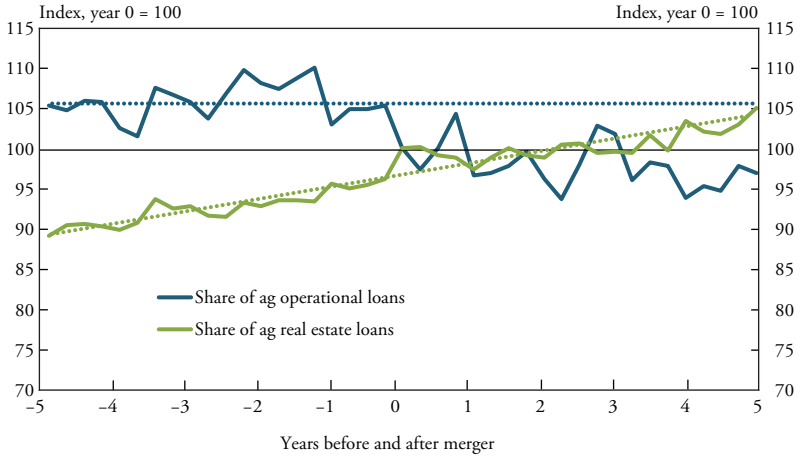
Volume of Agricultural Loans by Type at Ag Banks before and after FCS Mergers



Notes: Chart shows the evolution of the median volume of agricultural loans for agricultural banks in local markets of interest before and after the merger. Merger events are centered at year 0. The dotted lines represent the linear trends of the median outcomes before the merger (projected trend).
Sources: FDIC Consolidated Reports of Condition and Income, FCS Call Reports, and author's calculations.

Chart 6

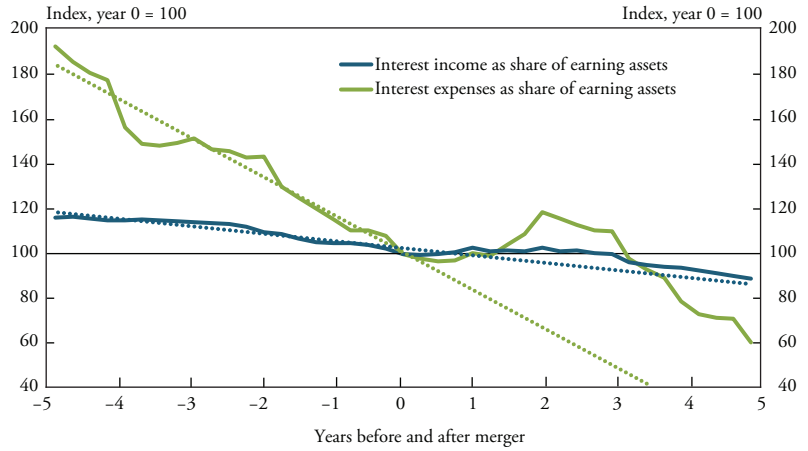
Share of Agricultural Loans by Type at Ag Banks before and after FCS Mergers



Notes: Chart shows the evolution of the median share of agricultural loans out of total loans for agricultural banks in local markets of interest before and after the merger. Merger events are centered at year 0. The dotted lines represent the linear trend of the median outcome before the merger (projected trend).
Sources: FDIC Consolidated Reports of Condition and Income, FCS Call Reports, and author's calculations.

Chart 7

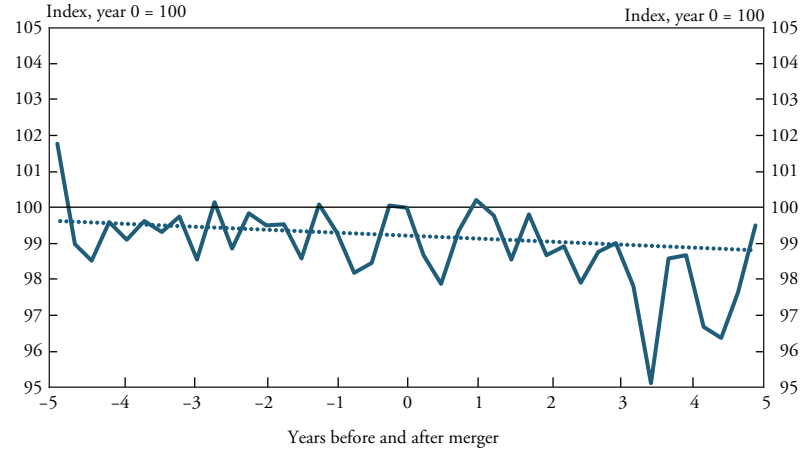
Interest Income and Interest Expenses as a Share of Average Earning Assets at Ag Banks before and after FCS Mergers



Note: Dotted lines represent the linear trends of the median outcomes before the merger.
Sources: FDIC Consolidated Reports of Condition and Income, FCS Call Reports, and author's calculations.

Chart 8

Median Efficiency Ratio for Ag Banks in Local Markets of Interest before and after FCS Mergers



Note: Dotted line represents the projected trend of the median outcome before the merger.
Sources: FDIC Consolidated Reports of Condition and Income, FCS Call Reports, and author's calculations.

FCS merger, even though the downward trend in their efficiency ratio implies ag banks have used fewer resources to generate income over time.

Conclusion

Mergers can disrupt local credit markets by changing financial institutions' optimal portfolios. I find evidence suggesting that FCS mergers may have affected some outcomes for banks in the markets most likely to be affected by mergers. In the short run, FCS mergers could have influenced these ag credit markets along two margins. Mergers may have contributed both to a decline in ag banks' ag operational loans as a share of total loans and to an increase in ag and non-ag real estate loans as a share of total loans in ag banks' portfolios. Mergers may also have led ag banks to incur higher interest expenses as a percent of earning assets than what pre-merger trends indicated. Although higher interest expenses likely have a minimal effect on the level of profits, even small movements in interest expenses may be important to profitability: thus far, low interest expenses have kept ag banks more profitable than the FCS.

Although I find little evidence that FCS mergers affected ag banks' efficiency ratios or interest income as a share of earning assets, banks that operate closer to important FCS branches and submarkets could have experienced larger effects than my results imply. Banks that operate closer to FCS associations in the credit product space could also be more affected by FCS mergers. Overall, my descriptive analysis suggests that FCS mergers likely have had an effect on some important outcomes for ag banks.

Appendix A
Information about Local Areas of Interest

Table A-1
List of Relevant FCS Association Merging Events

Merger event	Association name	Date	FCS ag loans one quarter before the merger	Ag bank ag loans one quarter before the merger
1	Farm Credit East, ACA	January 2022	6,881,253.26	56,720.20
2	North Dakota, ACA	January 2022	930,466.94	1,150,891.78
2	AgCountry, ACA	January 2022	6,144,023.19	5,458,274.22
3	AgPreference, ACA	January 2021	243,776.56	221,921.55
3	Western Oklahoma, ACA	January 2021	1,000,790.82	1,375,558.77
4	American AgCredit, ACA	July 2019	9,253,973.11	6,065,506.09
5	Badgerland Financial, ACA	July 2017	3,792,373.52	5,219,149.50
5	1st Farm Credit Services, ACA	July 2017	4,549,504.66	4,038,557.49
5	AgStar, ACA	July 2017	7,060,876.05	4,344,101.58
6	United FCS, ACA	July 2017	1,491,172.60	2,138,703.66
6	AgCountry Farm Credit Services, ACA	July 2017	4,285,978.96	3,399,145.53
7	Southwest Kansas, ACA	January 2017	744,134.76	1,270,289.14
7	American AgCredit, ACA	January 2017	6,686,160.00	4,990,288.62
8	Chisholm Trail, ACA	January 2016	323,783.45	818,838.83
8	East Central Oklahoma, ACA	January 2016	753,555.50	1,484,136.36
9	FCS Southwest, ACA	December 2015	983,550.61	2,734,480.53
9	Farm Credit West, ACA	December 2015	6,690,284.01	5,170,881.40
10	Great Plains Ag Credit, ACA	January 2015	565,919.41	2,567,815.85

Table A-1 (continued)

Merger event	Association name	Date	FCS ag loans one quarter before the merger	Ag bank ag loans one quarter before the merger
10	AgTexas Farm Credit Services	January 2015	603,440.65	997,868.99
11	Texas Land Bank, ACA	January 2014	560,695.29	139,615.64
11	Lone Star, ACA	January 2014	888,206.28	393,284.65
12	Farm Credit East, ACA	January 2014	4,964,100.01	62,809.77
13	AgriLand Farm Credit Services, ACA	January 2014	287,820.53	516,778.98
13	Texas AgFinance Farm Credit Service, ACA	January 2014	525,706.80	516,459.83
14	Jackson Purchase, ACA	July 2012	288,277.70	144,809.20
15	The Mountain Plains, ACA	January 2012	1,083,507.37	586,513.68
15	American AgCredit, ACA	January 2012	4,425,674.26	2,970,125.20
16	Southwest Florida, ACA	January 2011	165,495.10	254,526.91
16	North Florida, ACA	January 2011	510,677.18	123,405.17
17	Louisiana Ag Credit, ACA	December 2010	87,601.26	31,439.43
17	Southern AgCredit, ACA	December 2010	729,918.04	344,803.61
18	AgCredit of South Texas, ACA	July 2010	126,812.58	4,512.70
18	Texas AgFinance Farm Credit Services	July 2010	380,069.29	530,535.42
19	Farm Credit Western New York ACA	January 2010	1,016,739.86	20,200.41
19	First Pioneer, ACA	January 2010	3,504,123.31	1,786.10
20	Heartland, ACA	December 2009	1,209,916.30	2,326,440.64
20	American AgCredit. ACA	December 2009	3,950,437.46	657,365.24

Notes: ACA refers to Agricultural Credit Association. Ag loan numbers compare the mass of FCS associations and ag banks operating in the chartered area of the FCS association. Values in thousand dollars. Merger events 1, 4, and 14 involve associations that were operating in areas where no ag banks were operating. These mergers were therefore excluded from the analysis of the main text.
Source: Farm Credit Association.

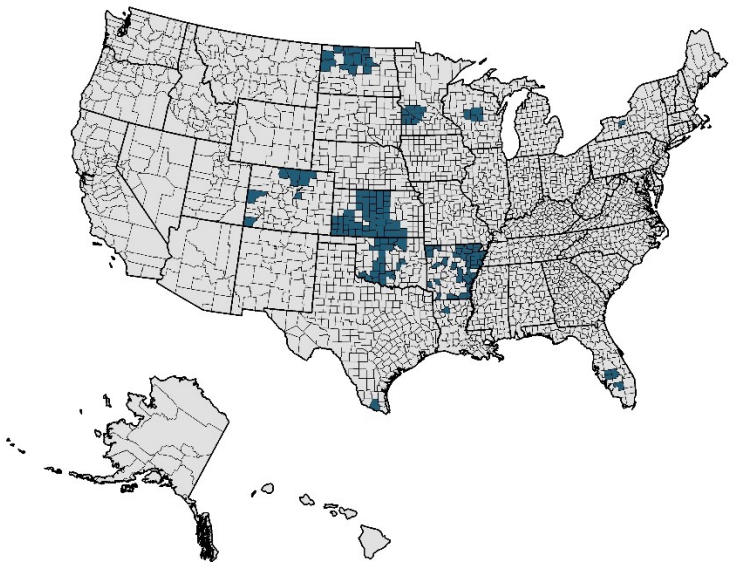
Table A-2

Algorithm to Select Local Areas of Interest

Steps	Selection of local area of interest
(a)	For each FCS merger event, take the set of ag loans (AgL) of FCS associations that merged in the quarter right before the merger
	Ex: associations A, B, and C merged; The set of total ag loans for the quarter before merger is S = {AgLA, AgLB, AgLC}
(b)	Take the largest value of agricultural loan in the set and divide this largest value by each individual ag loan value in the set. The result will be the ratio of the value of ag loans of the largest association to the value of ag loans for each individual association.
	Ex: from S, AgLA is the largest value in the set. Divide all values in the set by AgLA to find {AgLA/ AgLA, AgLB/ AgLA, AgLC/ AgLA}.
(c)	Take all ratios larger than 2. This is the threshold value by which I consider that a large association merged to a relatively smaller association. This is the local market of interest.
	Ex: If the ratio AgLB/ AgLA larger than 2, I consider the operating area of association B as part of the local market of interest. The same rationale applies to AgLC/ AgLA

Map A-1

Headquarter Location of Ag Banks Affected by FCS Mergers in Local Areas of Interest



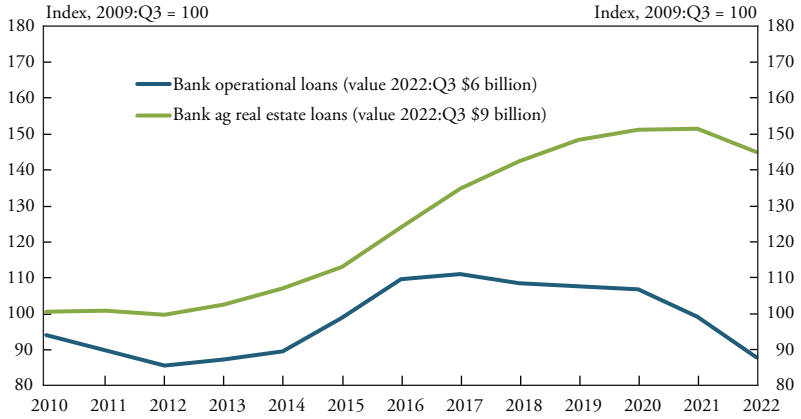
Note: Map highlights the counties within local areas of interest where the headquarters of banks in the sample are located.
Source: FDIC Summary of Deposits.

Appendix B

Outcomes of Ag Banks in Local Areas of Interest

Chart B-1

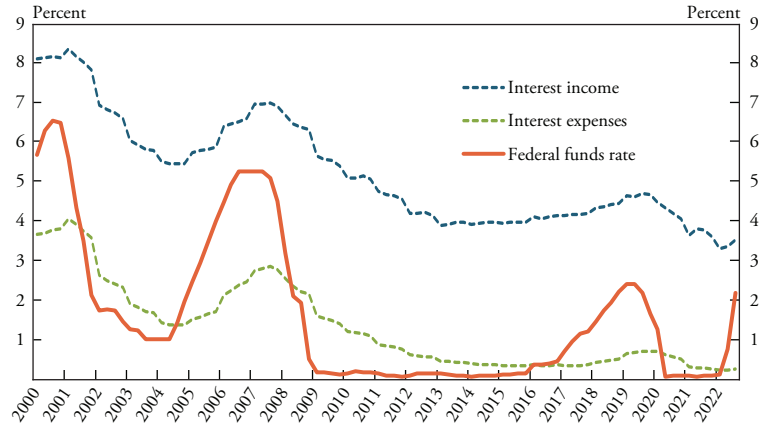
Evolution of Agricultural Loans by Type in Local Areas of Interest



Note: Chart shows the evolution of agricultural loans, measured by a four-quarter moving average in 2022 dollars for agricultural banks in local markets of interest.
Sources: FDIC Consolidated Reports of Condition and Income and author's calculations.

Chart B-2

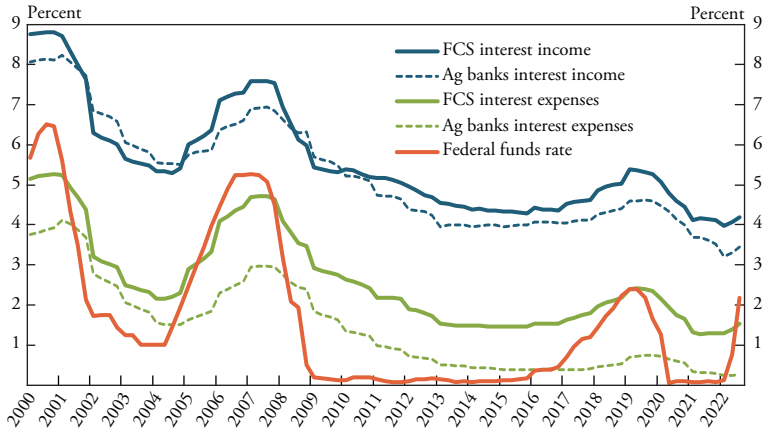
Evolution of Interest Income and Interest Expenses as a Share of Average Earning Assets in Local Areas of Interest



Note: Interest income and interest expenses are a percentage of earning assets.
Sources: FDIC Consolidated Reports of Condition and Income and author's calculations.

Chart B-3

Efficiency Ratio of Ag Banks in Local Areas of Interest



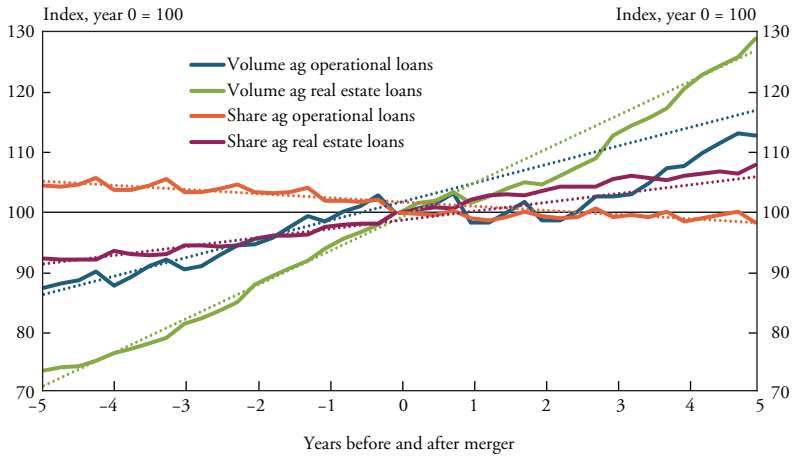
Note: Efficiency ratio is the median four-quarter moving average.
Sources: FDIC Consolidated Reports of Condition and Income and author's calculations.

Appendix C

Outcomes for Ag Banks Located in Areas That Did Not Experience FCS Mergers around FCS Merger Events

Chart C-1

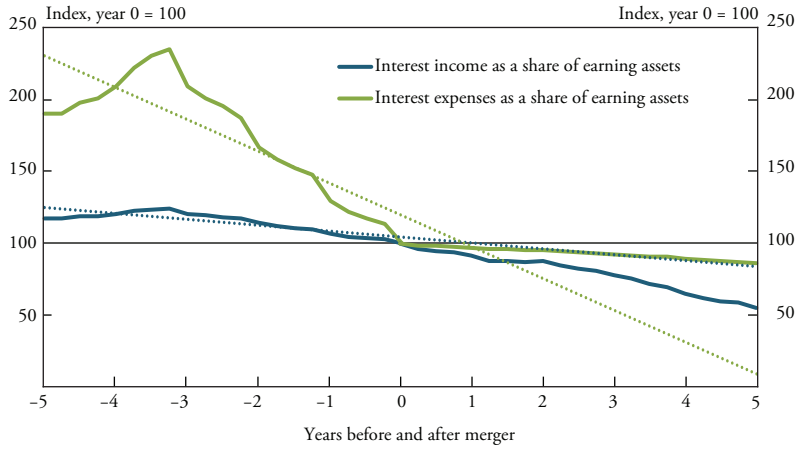
Volume and Share of Agricultural Loans by Type for Ag Banks in Areas That Did Not Experience an FCS Merger



Notes: Chart shows median volume and median share of loans for ag banks in areas that did not experience an FCS merger five years before and after each merger event in the sample. The dotted lines represent the linear trends of the median outcomes before the merger (projected trend).
Sources: FDIC Consolidated Reports of Condition and Income and author's calculations.

Chart C-2

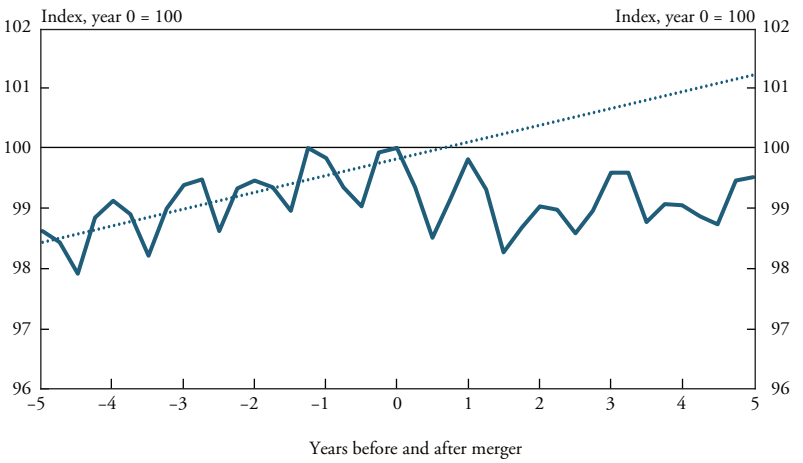
Evolution of Interest Income and Interest Expenses as a Share of Average Earning Assets for Ag Banks in Areas That Did Not Experience an FCS Merger



Note: Chart shows median interest income and median interest expenses of ag banks in areas that did not experience an FCS merger five years before and after each merger event in the sample. The dotted lines represent the linear trends of the median outcomes before the merger (projected trend).
Sources: FDIC Consolidated Reports of Condition and Income and author's calculations.

Chart C-3

Evolution of the Median Efficiency Ratio for Ag Banks around Other Merger Events in Areas That Did Not Experience an FCS Merger



Note: Chart shows median efficiency of ag banks in areas that did not experience an FCS merger five years before and after each merger event in the sample. The dotted lines represent the linear trends of the median outcomes before the merger (projected trend).
Sources: FDIC Consolidated Reports of Condition and Income and author's calculations.

Endnotes

[1]Some associations obtain funds from internally generated earnings, which mostly come from the issuance of equities (common and preferred) and subordinated debt (Farm Credit Banks Funding Corporation 2022).

[2]"Other" includes credit offered by input suppliers and insurance companies, among others.

[3]Large and smaller commercial banks experienced the same trends (see Appendix B for additional details).

[4]Since 2009, an average of 50 ag banks per year have also merged or been acquired by other banks. However, most mergers between ag banks involve small institutions, which are unlikely to disrupt market equilibrium due to smaller asset sizes (Kim and Katchova 2022). We abstract, then, from the effect of ag bank mergers on FCS outcomes in this paper. These numbers represent mergers in which the predecessor commercial bank transfers 95 percent or more of its assets to the successor commercial bank. They do not include bank failures.

[5]I use data from the Summary of Deposits (SOD), which tracks the location of branches and headquarters of banks. However, SOD register data are affected by centrally booked deposits, meaning banks do not have to report the deposits in the branch in which they were collected. This issue is mostly pervasive among larger banks and likely not a big problem for smaller ag banks, which are the focus of my analysis. See the map in Appendix A for counties where bank headquarters in our sample are located.

[6]Together, the high correlation between local and national trends and the theoretical argument that the effects of FCS mergers can be more pronounced in the local markets of interest suggest that the analysis in this paper is an upper bound for the overall effect of FCS mergers in general. In other words, other markets that are not the local markets of interest would show a smaller change in bank outcomes from FCS mergers.

[7]Appendix C shows the trends of outcomes in areas that did not experience a merger between FCS associations from 2009 to 2022. Under standard assumptions as outlined by Cunningham (2021), comparing trends from outcomes in the local areas of interest with trends in outcomes of areas that did not experience mergers could resemble a control and treatment experiment. A detailed check of these assumptions is beyond the scope of this paper.

[8]Loans secured by all kinds of real estate represent the larger share of total loan portfolio in the sample. After mergers, the median loan volume secured by real estate increased substantially, pushing median total loans up. As a result of a general increase in total loans, the share of ag operational loans decreased, and the share of ag real estate loans remained consistent with the linear trend before mergers.

References

Allen, Jason, Robert Clark, and Jean-François Houde. 2014. "The Effect of Mergers in Search Markets: Evidence from the Canadian Mortgage Industry." *American Economic Review*, vol. 104, no. 10, pp. 3365–3396. Available at https://doi.org/10.1257/aer.104.10.3365

American Bankers Association (ABA). 2015. "Letter to Senate Committee on Agriculture, Nutrition, and Forestry." February 2.

Clark, Robert, Jean-François Houde, and Jakub Kastl. 2021. "The Industrial Organization of Financial Markets," in *Handbook of Industrial Organization*, vol. 5, no. 1, pp. 427–520. Available at https://doi.org/10.1016/bs.hesind.2021.11.015

Cunningham, Scott. 2021. *Causal Inference: The Mixtape*. Yale University Press.

English, William B., and William R. Nelson. 1998. "Profits and Balance Sheet Developments at U.S. Commercial Banks in 1997." Board of Governors of the Federal Reserve System, *Federal Reserve Bulletin*, vol. 84, no. 6, pp. 391–419. Available at https://doi.org/10.17016/bulletin.1998.84-6

Farm Credit Administration (FCA). 2023. "Small Associations." February 24.

Federal Farm Credit Banks Funding Corporation. 2022. "2021 Annual Information Statement of the Farm Credit System." March 1.

Hutchins, Jared. 2022. "The U.S. Farm Credit System and Agricultural Development: Evidence from an Early Expansion, 1920–1940." *American Journal of Agricultural Economics*, vol. 105, no. 1, pp. 3–26. Available at https://doi.org/10.1111/ajae.12290

Jacewitz, Stefan. 2022. "The Increasing Brick-and-Mortar Efficiency of Community Banks." Federal Reserve Bank of Kansas City, *Economic Review*, vol. 107, no. 2, pp. 19–35. Available at https://doi.org/10.18651/ER/v107n2Jacewitz

Jensen, Farrell E. 2000. "The Farm Credit System as a Government-Sponsored Enterprise." *Applied Economic Perspectives and Policy*, vol. 22, no. 2, pp. 326–335. Available at https://doi.org/10.1111/1058-7195.00025

Kim, Kevin N., and Ani L. Katchova. 2022. "Agricultural Bank Acquisitions and Postacquisition Performance: An Examination of the Role of Shared Knowledge." *Agribusiness*, vol. 38, no. 4, pp. 743–770. Available at https://doi.org/10.1002/agr.21751

Klein, Michael A. 1971. "A Theory of the Banking Firm." *Journal of Money, Credit and Banking*, vol. 3, no. 2, pp. 205–218. Available at https://doi.org/10.2307/1991279

Marsh, W. Blake, and Rajdeep Sengupta. 2017. "Competition and Bank Fragility." Federal Reserve Bank of Kansas City, Research Working Paper no. 17-06, June. Available at https://doi.org/10.2307/1991279

Monke, Jim. 2016. "Farm Credit System." Congressional Research Service, report no. RS21278, May 17.

Monti, M. 1972. "Deposit, Credit and Interest Rate Determination under Alternative Bank Objective Function," in G.P. Szego and K. Shell, eds., *Mathematical Methods in Investment and Finance*. Amsterdam: North-Holland.

Morris, Charles S., James Wilkinson, and Eric Hogue. 2015. "Competition in Local Agricultural Lending Markets: The Effect of the Farm Credit System." Federal Reserve Bank of Kansas City, *Economic Review*, vol. 100, no. 4, pp. 51–78.

Turvey, Calum G., Amy Carduner, and Jennifer Ifft. 2020. "Market Microstructure and the Historical Relationship between the U.S. Farm Credit System, Farm Service Agency and Commercial Bank Lending." *Agricultural Finance Review*, vol. 81, no. 3, pp. 360–385. Available at https://doi.org/10.1108/AFR-06-2020-0089

Turvey, Calum G., and Yiwo Wang. 2012. "The Effects of Government Sponsored Enterprise (GSE) Status on the Pricing of Bonds Issued by the Federal Farm Credit Banks Funding Corporation (FFCB)." *Agricultural Finance Review*, vol. 72, no. 3, pp. 488–506. Available at https://doi.org/10.1108/00021461211277303

Vives, Xavier. 2016. "Competition and Stability in Banking," in *Competition and Stability in Banking*. Princeton University Press.