Financing a Changing Agricultural and Rural Landscape

By Allen M. Featherstone

The agricultural economy is in a constant state of adjustment, having undergone several major adjustments over the last 40 years ranging from the farm financial crisis of the early 1980s—a relatively long period of stability and low to moderate levels of profitability—to a period of high profitability from 2007 through 2014, to a recent period of low profitability with average net farm income for some Midwestern states close to or below zero.

During this period, the number of farms in the United States has declined and average farm size has steadily increased.

Similar consolidation has occurred in the agricultural lending industry; specifically, with commercial banks and in the Farm Credit System. Wheelock and Wilson (2012) state that from 1984 to 2008, the number of commercial banks fell from 14,482 to 7,086. In addition, the number of Farm Credit Associations decreased from 304 in 1990 to 77 in 2017 (U.S. Department of Agriculture Economic Research Service; Farm Credit Administration). The decrease in the number of farms has also coincided with consolidation of the firms that provide inputs to or purchase outputs from farmers (Saitone and Sexton). Langemeier and Boehlje discuss the drivers of consolidation occurring in production agriculture and the agribusiness industry.

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As the farming sector has consolidated, the agricultural lending situation has also changed. Brewer and others illustrate that the average number of lender relationships for Kansas farms increased from 1.8 in 2002 to 2.0 in 2010, and the number of loans per farm increased from 3.1 to 3.4 over the same period. While they report that single-institution relationships are still most common, with 49.6 percent of Kansas farmers working with one lender, 48.3 percent of Kansas farmers have from two to four lender relationships, with the remaining 2.1 percent having more than four relationships.

Just as economies of scale are often cited as a reason for consolidation in production agriculture, economies of scale have also been argued as a reason for consolidation in the banking literature. Using Call Report data from 1990, Featherstone and Moss estimate that multiproduct economies of scale for agricultural and rural banks was very near constant returns to scale. Research on banking in the 1980s found that scale economies exist up until about $100 million in assets, while research in the 1990s found that scale economies are exhausted at about $10 billion in assets (Mester).

Wheelock and Wilson (2012), using a nonparametric method for estimation and data through 2006, find that most U.S. banks face increasing returns to scale. They attribute that to increased off-balance-sheet bank activity. Wheelock and Wilson (2017) also examine economies of size in U.S. banking using a cost-function approach with data through the fourth quarter of 2015. They again find that a large majority of banks face either constant returns to scale or increasing returns to scale. They conclude that their results "are thus similar to other recent studies finding that even many large banks operate under increasing returns to scale."

Thus, the implication is that consolidation will continue in the banking sector. Given the continued consolidation in the production agriculture sector and the economies of scale of the commercial banking industry reported by Wheelock and Wilson (2017), the delivery of credit will continue to change into the future. In this article, I examine the heterogeneity of consolidation across states for both production agriculture and the agricultural financial services industry along with future growth opportunities in agricultural and rural lending.

A discussion of the agricultural economy within the states that make up the Tenth Federal Reserve District reveals differences among states. Information regarding trends in agricultural banking in the states within the Tenth District also reveals differences. The future of agricultural lending will depend upon how agricultural lenders adapt to new opportunities, factors that underlie future consolidation in the agricultural lending arena, and how communities and businesses need to position themselves to be vibrant into the future.

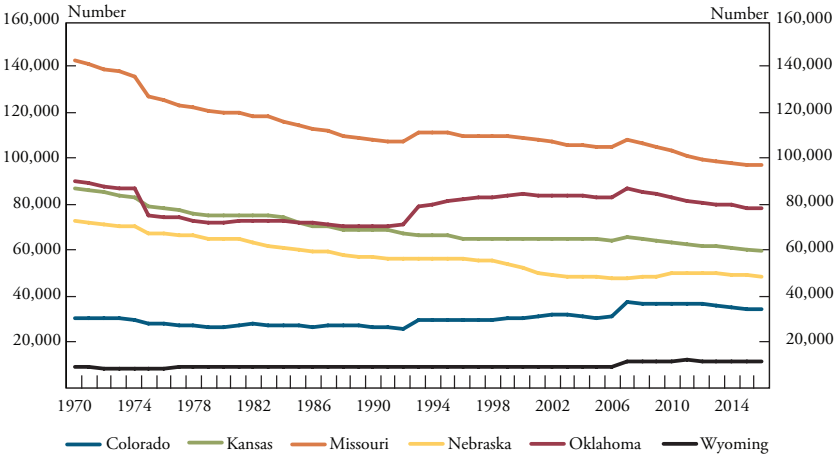
I. Production Agriculture

The Tenth District of the Federal Reserve System comprises a diversity of agriculture, ranging from corn and soybean production similar to the Corn Belt to large expanses of land devoted to the grazing of livestock.[1] Much of the subsurface irrigated acreage in the United States underlies the land base of the Tenth District, which itself will affect the future of agriculture due to the declining water levels of the Ogallala acquifer. In addition, the location of population centers differs widely within the District: some states have major population centers on their borders, while others have population centers that are more geographically centered. Given these differences, it is unlikely for aggregate changes in agriculture to occur in lock step across states within the District.

I obtain farm numbers in Colorado, Kansas, Missouri, Nebraska, Oklahoma, and Wyoming since 1970 from the USDA National Agricultural Statistics Service (NASS) (Chart 1). Since 1970, the number of farms has decreased in Kansas (31.5 percent), Missouri (32.3 percent), Nebraska (33.7 percent), and Oklahoma (13.2 percent), but increased in Colorado (10.8 percent) and Wyoming (33.3 percent). Thus, very different trends have occurred through the Tenth District. Since 1990, after the farm crisis of the 1980s had passed, the number of farms in Kansas, Missouri, and Nebraska continued to decrease by 13.6 percent, 10.4 percent, and 15.1 percent, respectively, while the number of farms in Colorado, Oklahoma, and Wyoming increased by 27.6 percent, 11.6 percent, and 30.3 percent. States that are large producers of feed grains and oilseeds appear to have seen more consolidation than states with more diversified farms.

Chart 1

Number of Farms

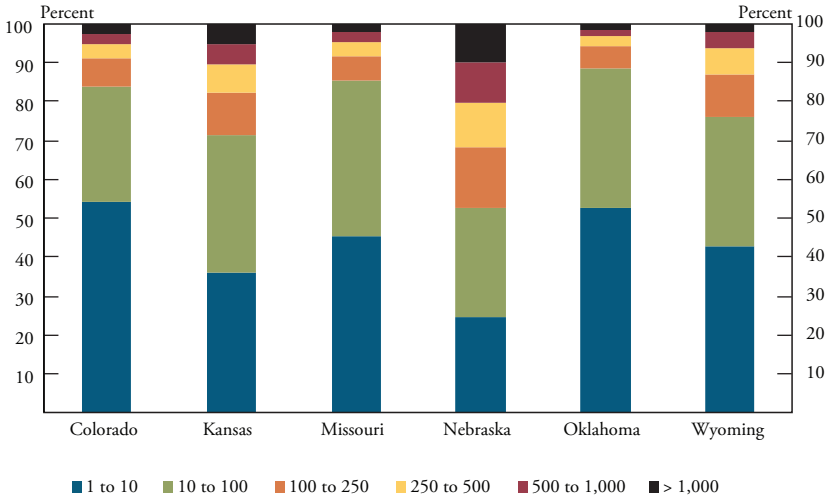


Source: USDA-NASS.

Given the diverse trends in farm numbers, it is instructive to examine both the current distribution of farm size and also changes in farm size over time. The USDA NASS uses annual sales to classify farm size into the $1,000 to $10,000 annual sales category, $10,000 to $100,000 category, $100,000 to $250,000 category, $250,000 to $500,000 category, $500,000 to $1,000,000 category, and greater than $1,000,000 category. Chart 2 shows a stacked bar graph of the distribution of farms within each state by size. In Colorado, Missouri, and Oklahoma, 83.7 percent, 85.4 percent, and 88.5 percent of farms, respectively, had 2016 annual sales of less than $100,000. In Kansas, Nebraska, and Wyoming, 71.6 percent, 52.7 percent, and 75.9 percent of farms had sales less than $100,000. Farms in Kansas and Nebraska were notably larger than farms in other states: 10.4 percent and 19.9 percent of farms, respectively, had annual sales in 2016 greater than $500,000.

Given the change in the number of farm operations within the Tenth District, it is likely that the distribution of farm size has changed over time. Table 1 lists the distribution of farm size in 2000, 2005, 2010, and 2015 for Colorado, Kansas, Missouri, Nebraska, and Oklahoma using the sales categories of $1,000 to $10,000, $10,000 to $100,000, $100,000 to $250,000, $250,000 to $500,000, and greater than $500,000.[2] During the last 15 years, the number of farms with greater than $500,000

Chart 2
Percent of Farms by 2016 Sales Class



Note: Sales class in thousands of dollars.
Source: USDA-NASS.

in sales increased by 1.6 percent in Colorado, 7.2 percent in Kansas, 2.7 percent in Missouri, 14.5 percent in Nebraska, and 1.9 percent in Oklahoma. The number of farms with less than $100,000 in sales decreased by 1.3 percent in Colorado, 8.0 percent in Kansas, 5.6 percent in Missouri, 22.2 percent in Nebraska, and 4.0 percent in Oklahoma. Changing farm numbers and size have not been consistent across states. Kansas and Nebraska have experienced an increase in large farms and a decrease in smaller farms. But Colorado, Missouri, and Oklahoma have not experienced similar increases in large farms.

Given the differences in the distribution of farm size across states, it is important to examine differences in the demand for credit by farms in different size categories. The USDA Agricultural Resource Management Survey (ARMS) reports debt use for Kansas, Missouri, and Nebraska within the Tenth District. The calculated debt-to-asset ratio (total liabilities divided by total assets) differs by farm size in Kansas, Missouri, and Nebraska (Table 2).[3] Generally, the larger the farm size, the higher the debt-to-asset ratio, indicating that larger farms use debt more intensively than smaller farms. In addition, the use of debt by farms differs by state and over time. Due to the rapid increase in land values from 2005 to 2015, the debt-to-asset ratio has generally decreased.

Table 1

Percent of Farms by Sales Class and State

Sales class (in thousands)	Colorado (percent)	Kansas (percent)	Missouri (percent)	Nebraska (percent)	Oklahoma (percent)
			2000		
$1 to $10	51.3	38.8	55.6	26.0	62.1
$10 to $100	33.3	41.2	34.9	40.4	30.5
$100 to $250	8.0	11.9	5.7	19.6	4.3
$250 to $500	3.7	5.0	2.3	8.7	1.9
Greater than $500	3.7	3.1	1.6	5.4	1.2
			2005		
$1 to $10	56.1	43.4	55.1	26.0	61.4
$10 to $100	30.5	38.4	34.4	36.9	30.4
$100 to $250	6.9	10.4	6.1	18.5	4.7
$250 to $500	3.0	4.5	2.6	10.2	1.9
Greater than $500	3.6	3.3	1.8	8.3	1.6
			2010		
$1 to $10	55.1	40.7	53.0	27.3	56.4
$10 to $100	29.8	35.0	35.3	28.9	33.7
$100 to $250	6.7	10.6	5.5	17.0	4.8
$250 to $500	3.6	6.7	2.9	12.1	2.5
Greater than $500	4.8	7.0	3.3	14.7	2.6
			2015		
$1 to $10	54.1	36.4	45.5	25.7	52.7
$10 to $100	29.2	35.6	39.4	28.5	35.9
$100 to $250	7.6	10.8	7.6	15.0	5.7
$250 to $500	3.8	7.0	3.1	10.9	2.6
Greater than $500	5.3	10.3	4.3	19.9	3.1

Source: USDA-NASS.

Table 2
Debt-to-Asset Ratio by Sales Class, Percent

Sales class (in thousands)	Kansas (percent)	Missouri (percent)	Nebraska (percent)
	2015		
$1 to $100	3.9	6.5	6.4
$100 to $250	12.0	8.2	9.9
$250 to $500	7.8	21.0	12.4
$500 to $1,000	9.5	14.2	14.9
Greater than $1,000	22.7	16.0	14.5
	2010		
$1 to $100	7.5	5.3	5.2
$100 to $250	9.9	6.0	8.7
$250 to $500	11.9	9.4	9.6
$500 to $1,000	13.5	9.4	10.8
Greater than $1,000	19.0	17.6	21.3
	2005		
$1 to $100	9.1	7.0	7.7
$100 to $250	12.2	11.6	14.4
$250 to $500	15.5	10.0	16.3
$500 to $1,000	19.6	10.9	19.6
Greater than $1,000	29.8	10.9	32.3

Source: USDA-NASS.

The average level of total liabilities by sales class differs by state (Table 3). Generally, Missouri has a smaller amount of total liabilities for the $500,000 to $1,000,000 and the greater than $1,000,000 sales classes than Kansas or Nebraska. In addition, the amount of total liabilities per annual sales does not increase linearly as the farms grow larger.

II. Commercial Banks

As with production agriculture in the Tenth District, the commercial banking sector has also differed over time. Chart 3 reports the number of banks by state since 1934 (FDIC). The 2015 data indicate that Colorado, Kansas, Missouri, Nebraska, Oklahoma, and Wyoming had 82, 260, 279, 181, 209, and 30 commercial banks, respectively. From 2000 to 2015, the number of commercial banks decreased in all states. Colorado saw the largest decrease in the number of banks (54.7 percent), and Missouri saw the smallest decrease (22.9 percent). While

Table 3

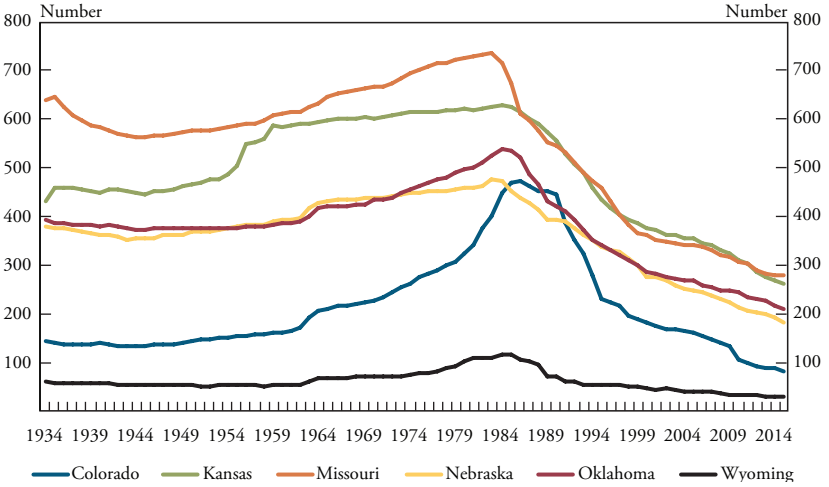
Total Liabilities by Sales Class, Current Dollars

Sales class (in thousands)	Kansas (U.S. dollars)	Missouri (U.S. dollars)	Nebraska (U.S. dollars)
	2015		
$1 to $100	27,284	42,346	55,063
$100 to $250	185,380	147,838	187,664
$250 to $500	253,858	500,071	399,452
$500 to $1,000	420,812	513,797	558,165
Greater than $1,000	1,657,371	802,650	1,112,490
	2010		
$1 to $100	38,684	26,820	38,212
$100 to $250	150,833	93,053	111,657
$250 to $500	234,148	203,531	237,825
$500 to $1,000	330,042	230,165	350,393
Greater than $1,000	1,253,656	716,820	1,207,895
	2005		
$1 to $100	29,171	32,177	36,219
$100 to $250	129,728	153,663	135,484
$250 to $500	225,247	184,630	231,821
$500 to $1,000	484,788	272,917	414,134
Greater than $1,000	1,258,653	679,309	1,654,689

Source: USDA-NASS.

Chart 3

Number of Banks



Source: FDIC.

the number of banks has decreased, the state aggregate volume of loans made to agriculture has increased. I report two classifications of agricultural loans made by commercial banks: those that finance agricultural production and those that are secured by agricultural real estate.

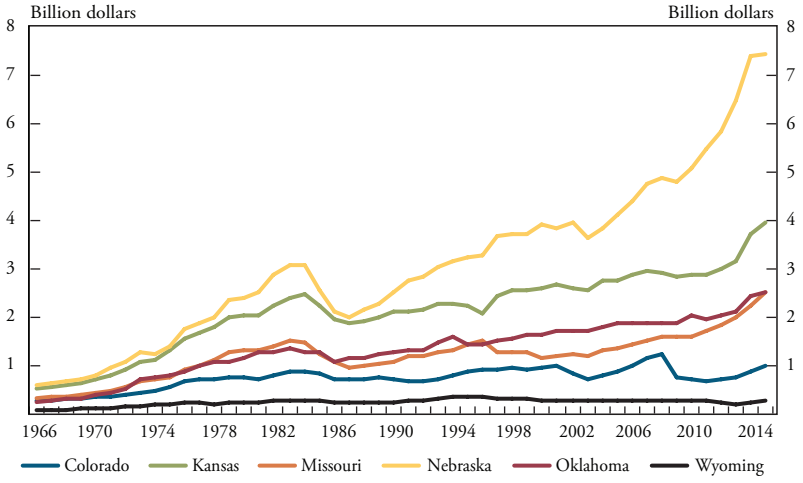
Agricultural production loans finance farms' year-to-year operations. From 1966 to 2015, the aggregate value of agricultural production loans by state generally increased (Chart 4). The major exception was from 1982 to 1987, during the agricultural financial crisis, when the value decreased in Colorado (13.9 percent), Missouri (15.3 percent), Kansas (31.0 percent), Nebraska (30.1 percent), Oklahoma (10.0 percent), and Wyoming (12.3 percent). The aggregate state value decreased much more in Kansas and Nebraska than the other states. From 2000 to 2015, the value of loans increased in Colorado (2.4 percent), Kansas (51.9 percent), Missouri (116.6 percent), Nebraska (91.2 percent), and Oklahoma (54.8 percent). The value of production agricultural loans fell by 5.3 percent in Wyoming. Thus, while the number of commercial banks has fallen, the aggregate value of loans that finances agricultural production has increased.

In addition to agricultural production loans, banks also finance farm real estate. The development of Farmer Mac has facilitated some of this lending. Chart 5 illustrates the aggregate value of farm real estate loans by state from 1966 to 2015. Farmland loans in Missouri did not surpass $1 billion until 1990, while production loans reached $1 billion much earlier. From 2000 to 2015, the value of agricultural real estate loans increased in Colorado (179.1 percent), Kansas (148.6 percent), Missouri (199.8 percent), Nebraska (187.0 percent), Oklahoma (46.1 percent), and Wyoming (76.8 percent). The aggregate state value of loans to finance agricultural land has doubled in each state except Oklahoma and Wyoming since 2000. Thus, while the number of institutions has fallen, the value of loans financing farm real estate has increased. The increase in financing of farm real estate by commercial banks from 2000 is much greater than for agricultural production.

Farm real estate lending has increased in relative importance in commercial bank agricultural lending since 2000 (Chart 6). In 2015, lending for agricultural real estate was nearly 50 percent in Colorado, Kansas, Oklahoma, and Wyoming; 39.1 percent in Nebraska; and 66.5 percent in Missouri. In 2000, however, lending for agricultural real estate was between 29 percent and 36 percent for all states except

Chart 4

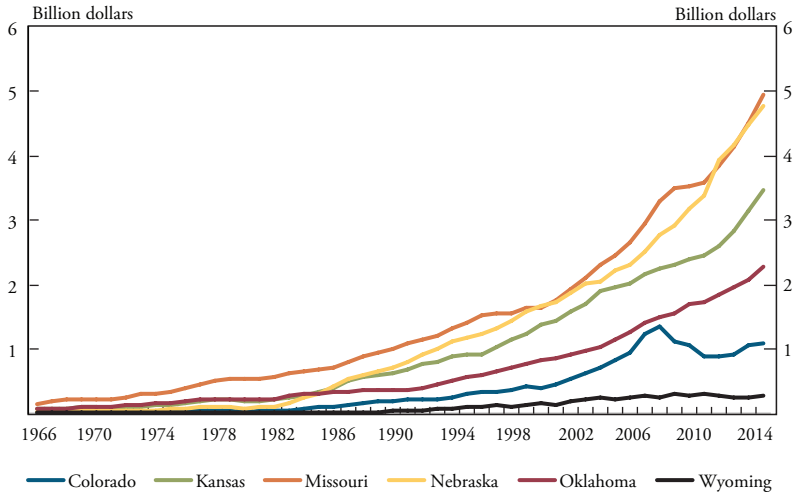
Agricultural Production Loan Values



Source: FDIC.

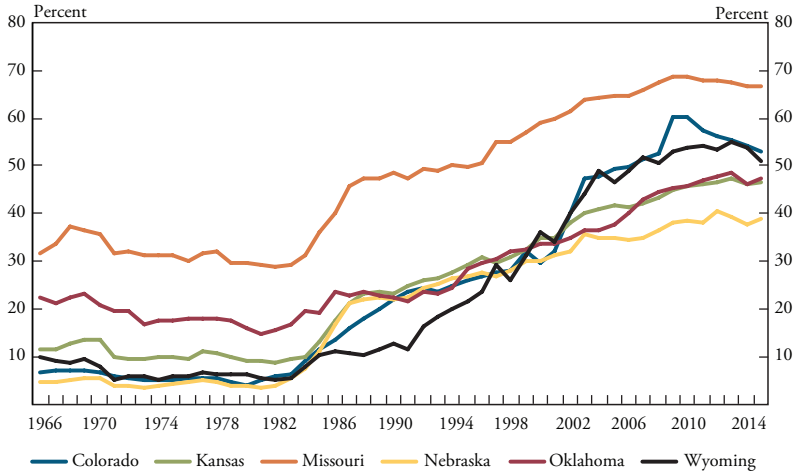
Chart 5

Farmland Loan Values



Source: FDIC.

Chart 6
Farm Real Estate Loan Value, Percent of Total Loans



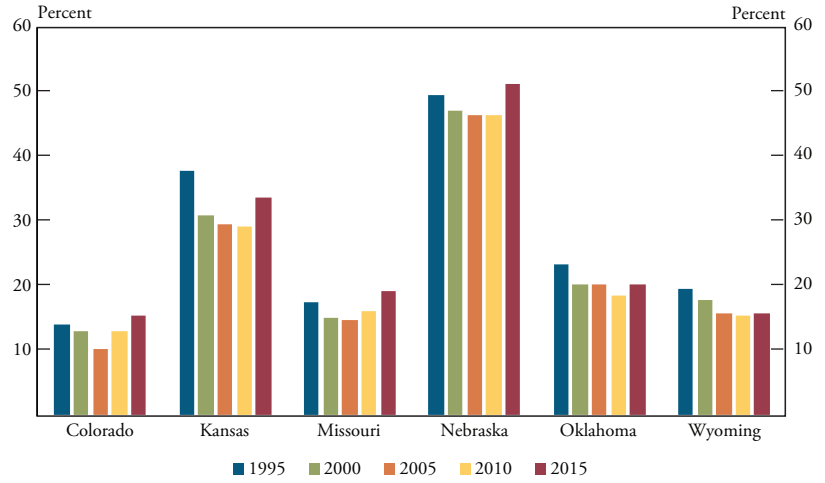
Source: FDIC.

Missouri (59 percent). The portfolio of loans financing agricultural real estate has shifted as the number of financial institutions has declined.

As banks consolidate, concerns in the agricultural industry have grown about the availability of funds to finance agriculture by commercial banks. Using FDIC data, I calculate the agricultural loan values of each bank as a percentage of state total loan values made by commercial banks for 1995, 2000, 2005, 2010, and 2015. Agricultural loans for this analysis are the sum of production agricultural loans and agricultural real estate loans. I calculate the average by state to examine whether the decreasing number of banks has changed the share of agricultural lending (Chart 7). The importance of agricultural lending differs by state within the Tenth District. Historically, nearly 50 percent of loan values in Nebraska finance agriculture. The agricultural share is near 30 percent in Kansas and between 10 percent and 20 percent in Colorado, Missouri, Oklahoma, and Wyoming. Average agricultural loan values to total loan values generally decreased through 2010 but increased after. Commercial banks appear to have shifted their lending portfolios to agriculture during the high profitability period for production agriculture.

Chart 7

Average Agricultural Loans, Percent of Total Loans



Source: FDIC.

The percent of banks offering production agricultural loans and farmland loans since 1995 has increased in each state in the Tenth District (Table 4). In 2015, 76.9 percent of banks made agricultural loans in Colorado, 96.3 percent in Kansas, 91.6 percent in Missouri, 98.4 percent in Nebraska, 97.6 percent in Oklahoma, and 96.9 percent in Wyoming. In the same year, 65.9 percent of banks made agricultural real estate loans in Colorado, 90.8 percent in Kansas, 83.2 percent in Missouri, 96.3 percent in Nebraska, 91.0 percent in Oklahoma, and 90.6 percent in Wyoming. Thus, agricultural lending has remained an important activity in the Tenth District. Bank consolidation does not appear to have reduced the importance of agricultural lending in the remaining commercial banks.

Table 4 also reports the shares of state agricultural loans made by the largest agricultural lender, the 10 largest agricultural lenders (CR 10), the 20 largest agricultural lenders (CR20), and the 30 largest agricultural lenders (CR30) in each state for 1995, 2000, 2005, 2010, and 2015. Comparing these shares provides information on whether agricultural lending has become more concentrated in a few institutions or several institutions. The market share of the largest agricultural lender has been increasing since 1995 in Colorado, Missouri, Nebraska, and

Table 4

Agricultural Lending Concentration on December 31

Variable	Colorado (percent)	Kansas (percent)	Missouri (percent)	Nebraska (percent)	Oklahoma (percent)	Wyoming (percent)
	2015					
Percent of banks with ag loans	76.9	96.3	91.6	98.4	97.6	96.9
Percent of banks with farmland loans	65.9	90.8	83.2	96.3	91.0	90.6
Top ag lending market share, percent	21.2	3.1	7.1	12.8	10.3	32.0
Top 10 bank market share, percent	62.8	23.4	28.6	39.1	38.2	78.9
Top 20 bank market share, percent	82.9	38.1	41.2	51.8	51.2	94.1
Top 30 bank market share, percent	92.4	48.2	50.3	60.6	60.3	99.9
	2010					
Percent of banks with ag loans	71.8	93.3	86.3	94.6	94.8	89.2
Percent of banks with farmland loans	61.5	89.0	77.4	93.3	88.7	86.5
Top ag lending market share, percent	13.4	3.0	5.1	10.7	9.9	18.2
Top 10 bank market share, percent	56.9	20.6	23.4	35.5	36.3	72.4
Top 20 bank market share, percent	76.3	34.6	35.1	47.5	48.7	92.0
Top 30 bank market share, percent	87.0	44.4	43.8	56.7	56.9	99.5
	2005					
Percent of banks with ag loans	62.2	91.6	83.1	93.8	93.0	86.0
Percent of banks with farmland loans	51.2	87.6	79.1	92.2	89.0	90.7
Top ag lending market share, percent	13.5	4.7	5.5	10.6	8.8	18.9
Top 10 bank market share, percent	54.9	21.4	23.0	33.2	32.0	70.9
Top 20 bank market share, percent	72.9	33.9	33.8	44.5	44.8	90.5
Top 30 bank market share, percent	83.3	42.9	41.4	53.0	54.1	98.1

Table 4 (continued)

Variable	Colorado (percent)	Kansas (percent)	Missouri (percent)	Nebraska (percent)	Oklahoma (percent)	Wyoming (percent)
	2000					
Percent of banks with ag loans	66.0	91.1	83.5	92.8	91.2	86.0
Percent of banks with farmland loans	55.5	90.6	79.1	91.1	88.1	86.0
Top ag lending market share, percent	12.0	3.7	4.9	9.0	7.8	20.7
Top 10 bank market share, percent	47.1	20.7	22.8	34.2	34.5	65.6
Top 20 bank market share, percent	64.6	32.3	31.7	44.0	45.8	83.7
Top 30 bank market share, percent	76.1	40.8	39.2	51.3	54.0	95.1
	1995					
Percent of banks with ag loans	62.8	91.9	83.8	93.7	89.9	84.2
Percent of banks with farmland loans	61.9	89.5	79.7	94.0	90.1	89.5
Top ag lending market share, percent	10.3	6.9	4.2	3.8	5.0	32.7
Top 10 bank market share, percent	42.4	18.1	18.7	23.3	23.1	69.7
Top 20 bank market share, percent	58.6	27.1	26.9	32.7	33.6	86.3
Top 30 bank market share, percent	69.8	34.0	33.7	40.2	41.4	93.9

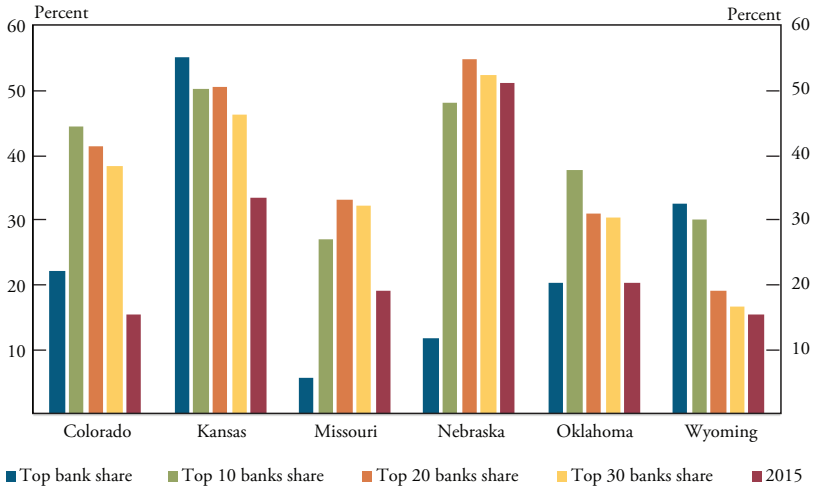
Oklahoma. The state agricultural lending share held by the largest agricultural commercial bank—in terms of loan value—in 2015 was highest in Wyoming (32.0 percent) and lowest in Kansas (3.1 percent). The share held by the 10 largest agricultural commercial banks has generally increased since 1995. In 2015, the largest 10 banks in Colorado and Wyoming held 62.8 percent and 78.9 percent of the state agricultural loan value. The share held by the top 10 banks in other states ranged from 20 percent to 40 percent.

The share of the state agricultural lending market held by the 20 and 30 largest agricultural lenders has generally increased since 1995 (Table 4). The largest 20 banks in Colorado and Wyoming held 82.9 percent and 94.1 percent of state agricultural loan value in 2015, respectively. In the other states, the share ranged from 35 percent to 55 percent. The largest 30 banks in Colorado and Wyoming held 92.4 percent and 99.9 percent of state agricultural loan value, respectively, while the share ranged from 48.2 percent to 60.6 percent in the other states. Agricultural lending is much more concentrated in Colorado and Wyoming compared with Kansas, Missouri, Nebraska, and Oklahoma. This may be the result of differences in state lending and other regulations.

Chart 8 shows agricultural lending as a percentage of total lending for the largest agricultural lending bank, the top 10 agricultural lending banks, the top 20 agricultural lending banks, and the top 30 agricultural lending banks for each state in the Tenth District. In agricultural banking research, a bank is often considered an agricultural bank if it lends 25 percent or more of its total market share to agriculture (Featherstone and Moss). Only in Kansas and Wyoming is the bank with the largest share of agricultural loans an agricultural bank. In all states but Wyoming, the average share of lending to agriculture is above 25 percent for the top 10, top 20, and top 30 banks. In Wyoming, the average share of agricultural lending is above 25 percent for the top 10 banks, while the average share for the top 20 and top 30 banks is below 25 percent. Researchers studying agricultural banking may want to consider whether a fixed market share amount is appropriate for the analysis of commercial bank agricultural lending.

Chart 8

Average Agricultural Loans, Percent of Total Loans



Source: FDIC.

III. The Farm Credit System

The Farm Credit System has also experienced consolidation and is the key competitor to commercial banks. The current institutions located in each state in the Tenth District are reported in Table 5. Colorado is predominantly served by three organizations: two are located within Colorado, and one is located outside of Colorado (FCA). Missouri is predominantly served by two Farm Credit organizations. Kansas is predominantly served by five organizations. Nebraska and Wyoming are served by the same Farm Credit organization that also serves Iowa and South Dakota. Oklahoma is predominantly served by five organizations. The lending values for each of the organizations as of December 31, 2015, are also reported in Table 5.

The table allows for a comparison between the value of agricultural lending by Farm Credit Associations and by commercial banks in Kansas, Missouri, and Oklahoma, thereby indicating the relative importance of the two types of organizations.[4] The agricultural loan value for a state is the sum of the loans held by its commercial banks and Farm Credit institutions. The percentage of loans made by Farm Credit institutions in 2015 was 35.3 percent in Kansas, 35.4 percent in Missouri, and 31.8 percent in Oklahoma, respectively. In Kansas,

Table 5
Farm Credit Institutions and Loans, 2015

Farm credit institution	Loan volume (millions of U.S. dollars)
Colorado	
Premier ACA	651.8
Southern Colorado ACA	943.8
Kansas	
Southwest Kansas ACA	736.7
High Plains ACA	751.7
Western Kansas ACA	361.9
Frontier ACA	1,856.4
Ness City, FLCA	342.3
Missouri	
Progressive FCS, ACA	591.4
FCS Financial, ACA	3,486.2
Nebraska and Wyoming	
FCS of America ACA	23,967.2
Oklahoma	
Chisholm Trail ACA	289.3
Western Oklahoma ACA	752.7
AgPreference, ACA	223.7
Enid ACA	205.3
East Central Oklahoma ACA	775.2

Note: "Nebraska and Wyoming" covers Iowa and South Dakota as well.
Sources: Farm Credit Administration, Call Report Data for Download.

all five Farm Credit institutions held a larger agricultural loan portfolio than the largest commercial bank agricultural lender. In Missouri, both Farm Credit institutions held a larger agricultural loan portfolio than the largest commercial bank agricultural lender. In Oklahoma, the largest two agricultural lenders are Farm Credit institutions, the third and fourth largest lenders are commercial banks, and the next largest lenders are the remaining three Farm Credit institutions.

I make similar comparisons for Kansas, Missouri, and Oklahoma in 2005 to examine the change over the last decade. In 2005, Kansas had six Farm Credit institutions, Missouri had two institutions, and Oklahoma had seven institutions. From 2005 to 2015, the number of Farm Credit institutions in Kansas fell by one, and the number of institutions in Oklahoma fell by two. Missouri had the same number

of institutions in both 2005 and 2015. The percentage of loans made by Farm Credit institutions in 2005 was 34.9 percent in Kansas, 33.2 percent in Missouri, and 26.2 percent in Oklahoma. The percentage of loans increased substantially in Oklahoma since 2005 but remained nearly the same in Kansas and Missouri. In Kansas, the four largest agricultural lenders were Farm Credit Associations followed by a bank and then the remaining two Farm Credit Associations. Both Farm Credit institutions in Missouri held greater loan values in 2005 than the largest commercial bank agricultural lender. In Oklahoma, the largest 10 agricultural lenders were (in descending order) a Farm Credit institution, a commercial bank, a Farm Credit institution, a bank, three Farm Credit institutions, two commercial banks, and a Farm Credit institution. From 2005 to 2015, consolidations in the Farm Credit System in Kansas and Oklahoma created agricultural lending entities larger than the agricultural loan value of the largest commercial banks.

IV. Implications

The previous analysis suggests there is substantial heterogeneity among Tenth District states regarding the consolidation of farms, the consolidation and agricultural lending practices of commercial banks, and the structure of the Farm Credit Associations. Thus, heterogeneity across the District must be considered when analyzing policy prescriptions and the financing of agriculture and rural communities in the future.

Both Langemeier and Boehlje and Saitone and Sexton indicate that additional vertical coordination is expected to occur in the agricultural and food supply chain in the future. Barry, Sonka, and Lajili suggest that vertical coordination and financial structure are intertwined. They argue that with more complex coordination among firms, asymmetric information becomes more problematic and monitoring more relevant as the lender knows less about the goals of the borrower and the characteristics of the productive assets. Financial risks will shift as production moves from an undifferentiated output to a more differentiated output.

Featherstone and Sherrick provide evidence that one of the motivations for a more coordinated system is the ability to obtain financing. They argue that coordination can increase the opportunities for obtaining credit through both traditional suppliers of credit—such as commercial banks and the Farm Credit System—and nontraditional

suppliers of credit—such as input suppliers or output processors—or through a broader access to bond and equity markets.

Duncan and Stam examine the lending environment looking forward to the 21st century. They argue that "while the trends toward scale, complexity, and technological advancement are pervasive across commercial-scale farms, smaller, specialized, or simpler business enterprises remain abundant and offer interesting market niches to lenders who wish to concentrate on certain market segments" (p .1). While that statement is nearly 20 years old, it continues to be appropriate for today's lending environment.

In regions of the United States where consolidation is rapidly occurring, agricultural lending institutions will need to be able to either enhance their ability to meet the financing needs through price competition or develop the ability to bundle services that larger production units may demand. Certainly, these services may include off-balance sheet income opportunities that Wheelock and Wilson (2012) suggest lead to increased economies of scale in the U.S. banking industry. The classic profit margin versus volume trade-off becomes critical for financial institutions to strategically consider as they strive to meet the needs of larger, more complex farms. Some financial institutions have moved into providing services such as crop insurance, record keeping, and tax services, either as profit centers or as loss-leaders to retain their current customers. Certainly, keeping abreast of the services larger, more complex farms demand is critical in developing bank strategy.

Conversely, in many other regions of the United States, the focus is on local food. This food is produced using high tunnel technology or other climate-controlled technology that allows fruit and vegetables to be produced close to urban centers through much or all of the year. Some of the financing for these facilities arise from the Small Business Administration lending programs and other less traditional sources of capital for agriculture. These nontraditional farms may provide a niche lending market in the future.

The economies of size that Wheelock and Wilson (2017) identify suggest that banks and other agricultural lenders will consider consolidation in the future. Economies of scale, whether due to the efficiency of information technology or regulation such as lending limits to individual borrowers, certainly remain important drivers of merger activity.

In addition, managerial or ownership capabilities in rural areas can lead to consolidation as a local bank faces a transition in management. Often, generational transitions provide an impetus for consolidation, whether it be in production agriculture, agribusinesses, or lending. Often the most profitable and effective opportunity for exit for existing owners or managers is to transition assets to more vibrant economic agents.

V. Conclusions

The heterogeneity of consolidation in production agriculture and agricultural lending is an important factor to consider in the future. Consolidation is not a monolithic occurrence across the United States. Within the Tenth Federal Reserve District, the consolidation of production agriculture is occurring at substantially different rates across states. Since 1980, Kansas, Missouri, Nebraska, and Oklahoma have seen a decrease in the number of farms, while Colorado, Oklahoma, and Wyoming have seen an increase. More than 80 percent of farms in Colorado, Missouri, and Oklahoma had annual sales of less than $100,000, while more than 20 percent of farms in Nebraska had annual sales greater than $500,000. Thus, the trend of increasing farm size is not consistent across states. In addition, the demand for debt does not increase in a linear fashion as farm size increases. Generally, larger farms are more leveraged. Differences in the production capabilities lead to alternative strategic objectives as one considers the financing of those organizations.

As with production agriculture, the industry structure of commercial banks and Farm Credit Associations is heterogeneous across states. The number of commercial banks ranges from 30 in Wyoming to 279 in Missouri. As the banking industry has consolidated, the value of agricultural lending provided by the remaining commercial banks has increased. Thus, in aggregate, fewer institutions are lending more dollars to agriculture. In addition, the mix of agricultural lending differs across the district. The share of lending for agricultural real estate by commercial banks is higher in Missouri and lower in Nebraska. Nearly 50 percent of the loan portfolio of commercial banks in Nebraska is agricultural lending, compared with less than 20 percent in Colorado and Wyoming. Agricultural lending is more concentrated among banks in Colorado and

Wyoming than among banks in Kansas, Missouri, Nebraska, and Oklahoma. In addition, competition from the Farm Credit System differs among states, ranging from a single Farm Credit institution in Nebraska and Wyoming to five institutions in Kansas and Oklahoma.

With the heterogeneity within agriculture and the consolidation that has occurred in the banking sector, it is apparent that agricultural lending remains an important activity for commercial banks. In some cases, consolidation has enhanced the importance of agricultural lending. Research on economies of scale in banking suggests that consolidation in the financial services industry is likely to continue due to the cost savings associated with information technology and off-balance-sheet income opportunities into the future. As agriculture becomes more heterogeneous, opportunities exist for those financial institutions to appropriately position themselves to take advantage of those opportunities whether through competition on price or competition through services.

Endnotes

[1]The Tenth District, which the Federal Reserve Bank of Kansas City serves, consists of all counties in Colorado, Kansas, Nebraska, Oklahoma, and Wyoming. It also includes 43 counties in western Missouri and 15 counties in northern New Mexico. Since much of the data used is at a state level and cannot be subdivided within the state, I consider Colorado, Kansas, Missouri, Nebraska, Oklahoma, and Wyoming.

[2]The $500,000 to $1,000,000 and greater than $1,000,000 categories are not available for all periods. Therefore, I combine those categories into a greater than $500,000 category. In addition, data are not available for Wyoming for all years.

[3]The debt-to-asset ratios use a market valuation of assets.

[4]Colorado, Nebraska, and Wyoming were not able to be calculated due to some territories within each state being served by organizations that cross state lines.

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