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## **COVID-19 Impacts on Agricultural and Non-Agricultural Banks**

by

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May 2020

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## **Summary:**

The uncertainty of the COVID-19 crisis is exposing community banks to a severe adverse shock that is arguably greater than the 2008 financial crisis. A stress test for the 1,671 agricultural banks and 2,261 non-agricultural banks in the United States is completed to provide an estimate of the potential effect of the COVID-19 crisis on bank financial status for 2000-2024. The stress test applies chargeoff rates derived from banks' actual chargeoff rates for 2008 through 2012, which includes the recession and recovery following the financial crisis. The chargeoff rates applied to each bank in a local market are taken from the 90<sup>th</sup> percentile chargeoff rates for all banks in the market.

Non-agricultural banks are projected by the simulation to be more adversely impacted than agricultural banks. A greater share of non-agricultural banks are expected to fail and to have lower profitability than the share of agricultural banks. A key assumption of the simulation is that agricultural loan chargeoff rates are less than non-agricultural loan chargeoff rates was the case during the 2008-2012 financial crisis. For this assumption to hold, it is implicitly assumed financial support will be provided to farmers and ranchers and the support when allocated and distributed will offset the negative impact from the COVID-19 shock experienced by farmers and ranchers. Without the support, more agricultural banks would be expected to have financial difficulties and fail. Moreover, if support is not allocated to match the parts of the agricultural sector most negatively impacted by the COVID-19 crisis, regional differences in the impact on agricultural banks are likely to emerge.

## COVID-19 Impacts on Agricultural and Non-Agricultural Banks

*Bruce L. Ahrendsen, Timothy J. Yeager, and Cao Fang*

The COVID-19 crisis is exposing community banks<sup>1</sup> to a severe adverse shock not experienced since 2008 at the onset of the financial crisis. The uncertainty associated with the COVID-19 crisis is arguably greater than the financial crisis since there is no modern case of a global shock that has broadly disrupted households, businesses, and governments to such an extent.

A stress test of community banks is completed to provide an estimate of the potential effect of the COVID-19 crisis on bank financial status, including balance sheet, profitability, and survival. A stress test provides insights to potential worse-case conditions for banks, although given the early stages and unprecedented uncertainty of the COVID-19 virus, “worse-case” conditions are subject to change.

Bank stress testing assumes all banks are impacted by an adverse shock even though a shock typically affects only certain sectors of the economy and a particular bank may not be exposed to those sectors. Relative to previous crises, the pervasiveness of the COVID-19 shock in affecting the overall economy makes stress testing particularly relevant for analyzing the impact on community banks of the COVID-19 crisis.

### *A Historical Loss Approach and Loan Chargeoff Rates*

The community bank stress test applied here was developed after the 2007-2009 financial crisis and is based on a historical loss approach to estimate five-year changes to bank capital from a severe adverse shock.<sup>2</sup> It does this by applying chargeoff rates derived from banks’ actual chargeoff rates for 2008 through 2012, which includes the recession and recovery following the financial crisis. The chargeoff rates applied to each bank in a local market are taken from the 90<sup>th</sup> percentile chargeoff rates for all banks in the market. For example, the chargeoff rate for agricultural production loans for a bank in the first year of the five-year simulation is the 90<sup>th</sup> percentile chargeoff rate experienced by banks in its market in 2008. The chargeoff rate for the second year is the 90<sup>th</sup> percentile chargeoff rate for those banks in 2009, and so on through 2012.

Agricultural loans are listed on a bank’s balance sheet as either loans to finance agricultural production (nonreal estate loans) or loans secured by farm real estate (real estate loans). A bank is considered an agricultural bank if its ratio of agricultural loans to total loans is greater than or equal to the industry average. In 2018, the industry average was 16 percent.<sup>3</sup>

The annual average chargeoff loss rates for agricultural banks based on quarterly reports for 1996-2019 are presented in Figure 1. The chargeoff rate for agricultural loans at agricultural banks has remained relatively low over the period. The agricultural loan chargeoff rate has trended down from a high of 0.21% in 1996 to 0.03% in 2013. However, the more recent trend in ag loan chargeoff rate has been upward to 0.10% in 2019. The ag nonreal estate chargeoff rate went from a

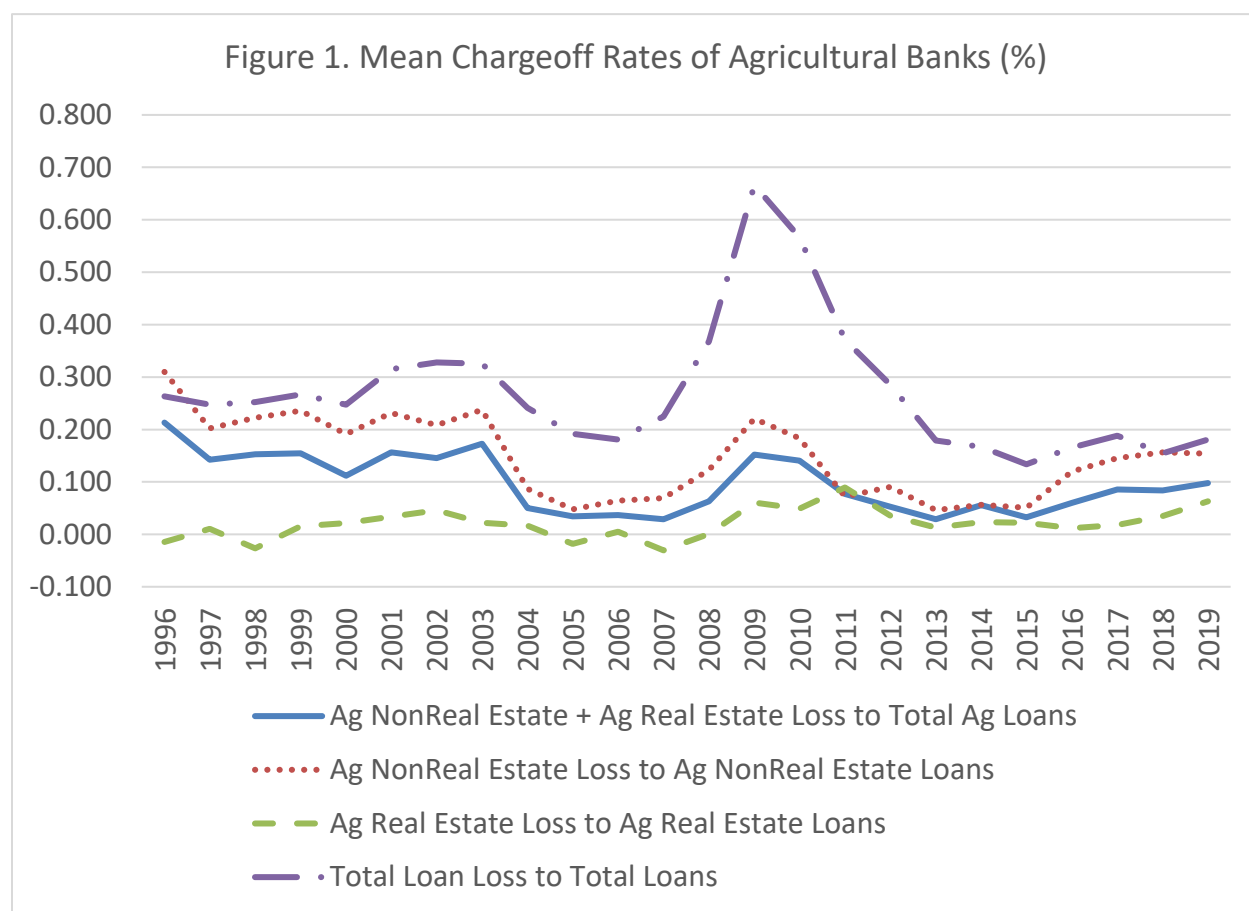
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<sup>1</sup> Community banks are those with less than \$10 billion in real total assets.

<sup>2</sup> For more information on the stress test model, see, “A Historical Loss Approach to Community Bank Stress Testing,” *Journal of Banking and Finance*, forthcoming. The working paper is available at <https://walton.uark.edu/departments/finance/community-bank-stress-test.php>.

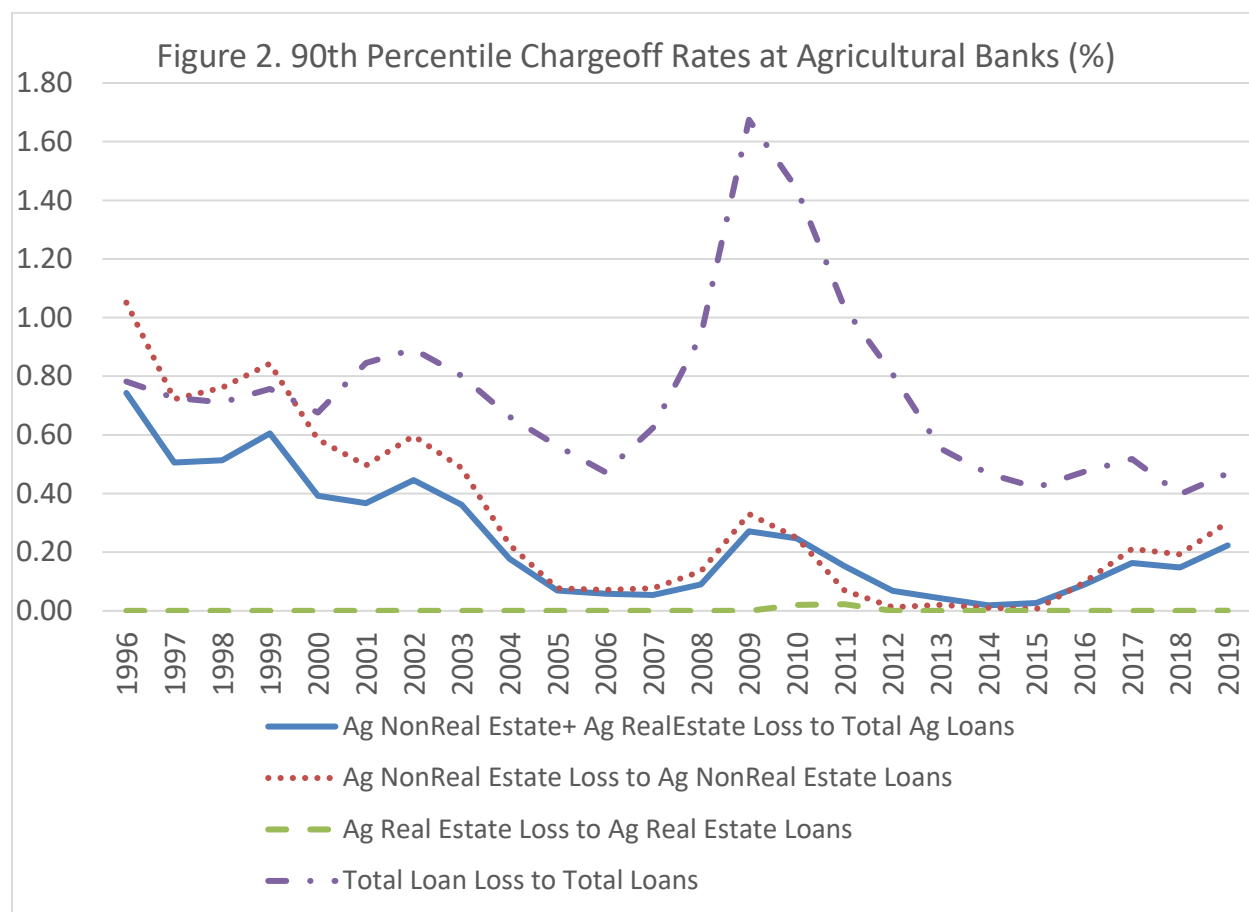
<sup>3</sup> American Bankers Association 2018 Farm Bank Performance Report available at <https://www.aba.com/news-research/research-analysis/2018-farm-bank-performance-report>.

high of 0.31% in 1996 to a low of just under 0.05% in 2013 before raising to about 0.15% in 2017-2019. Agricultural real estate average chargeoff rates have been much lower with less variability, never rising above 0.09% for 1996-2019. Although agricultural chargeoff rates at agricultural banks have been low, chargeoff rates for other loans have been higher as indicated by greater total loan chargeoff rates in most years. The total loan chargeoff rate peaked at 0.67% in 2009 during the financial crisis and was three and eleven times greater than the chargeoff rates for nonreal estate and real estate agricultural loans that same year.



Similar patterns hold for the 90<sup>th</sup> percentile chargeoff loss rates for agricultural banks during 1996-2019 (Figure 2). The chargeoff rate for agricultural loans at agricultural banks has remained relatively low over the period. The agricultural loan chargeoff rate at the 90<sup>th</sup> percentile has trended down from a high of 0.74% in 1996 to about 0.01% in 2014-2015 before increasing to 0.22% in 2019. The changes in ag loan chargeoff rate at the 90<sup>th</sup> percentile is driven by changes in ag nonreal estate loan chargeoffs. The agricultural nonreal estate chargeoff rate at the 90<sup>th</sup> percentile went from a high of 1.05% in 1996 to a low between 0.01% and 0.02% during 2012-2015 before increasing to 0.30% in 2019. Agricultural real estate chargeoff rates at the 90<sup>th</sup> percentile have been zero percent at agricultural banks for nearly the entire period. This means that 90% of agricultural banks did not experience a loss associated with a loan secured by farmland in a given year. No losses have likely been the result of average farm real estate values increasing

throughout the period, except for slight decrease in 2009.<sup>4</sup> As was the case for mean chargeoff rates, 90<sup>th</sup> percentile chargeoff rates for other loans have been higher. The 90<sup>th</sup> percentile chargeoff rate for total loans at agricultural banks spiked up to 1.67% in 2009 at the height of the financial crisis before declining to between 0.40% and 0.52% during 2015-2019.



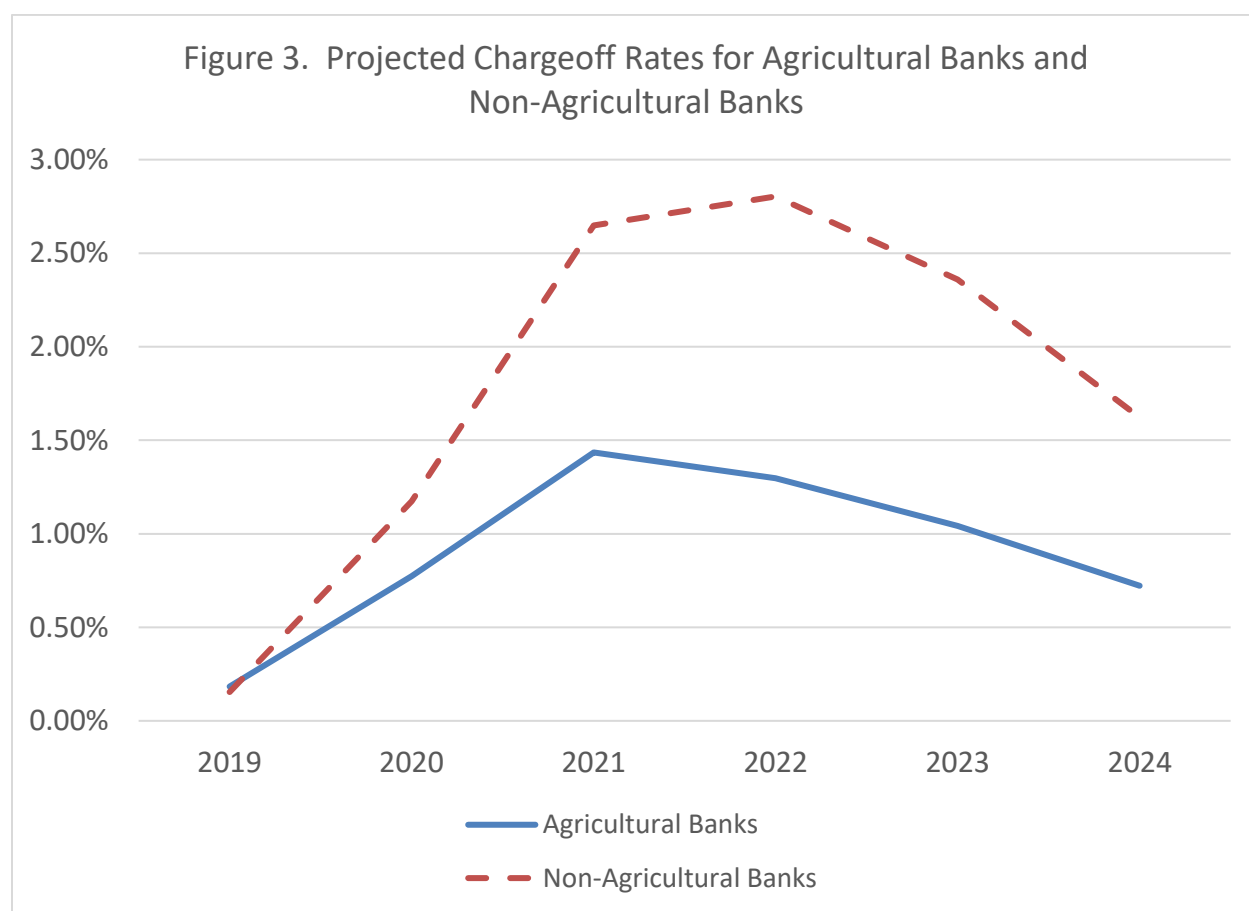
### *U-shaped Business Cycle and Chargeoff Rates*

The adverse scenario for the COVID-19 stress test should reflect the macroeconomic conditions that are likely to take place. Forecasters are discussing U-shaped, V-shaped, or even L-shaped business cycles as the result of the COVID-19 crisis. We assume a U-shaped business cycle for the bank stress test where economic decline lasts for two years before the recovery begins. The V-shaped business cycle assumes a dramatic economic decline and a quick recovery. The quickness in the recovery of the V-shaped business cycle makes it less severe than a more delayed recovery of the U-shaped business cycle. The L-shaped business cycle is much more severe than the U-shaped business cycle, since after the initial drop, the economy is assumed to remain in a declined state for the forecasted period, five years for our stress test.

<sup>4</sup> U.S. Department of Agriculture. "Agricultural Land Values." National Agricultural Statistics Service, release dates 2006 and 2019, available at <https://usda.library.cornell.edu/concern/publications/pn89d6567?locale=en#release-items>, accessed May 14, 2020.

We use 2019 as the base year to establish initial conditions for the stress test. Chargeoff rates for the COVID-19 crisis are assumed to change like they did over the 2008-2012 financial crisis. The actual average chargeoff rate for all loans and leases was 0.2% in 2019. The projected chargeoff rates for agricultural banks (Figure 3) taken from the 90<sup>th</sup> percentile loss rates from 2008-2012 are assumed to increase to 0.8% in 2020 and to 1.4% in 2021 before declining to 1.3% in 2022, 1.0% in 2023, and 0.7% in 2024 as the economy improves. As is usually the case, changes in loan chargeoff rates lag changes in the economy.

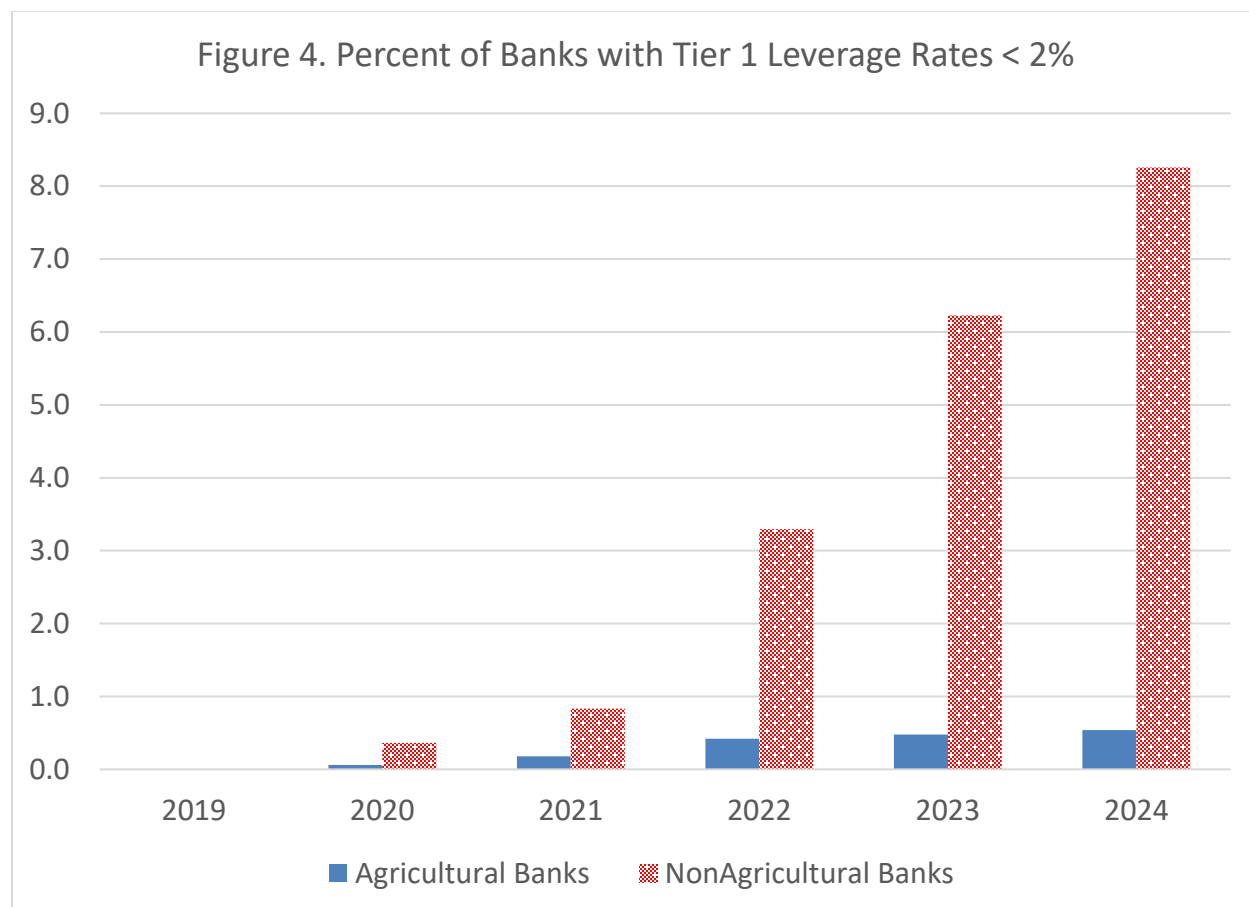
Chargeoff rates are much higher for non-agricultural banks because these banks by definition hold few agricultural loans and, as Figures 1 and 2 show, default risk from agricultural loans was lower than other loans during the 2008-2012 financial crisis. Chargeoff rates for non-agricultural banks are projected to peak at 2.8% in 2022 before declining to 2.4% in 2023 and 1.6% in 2024.



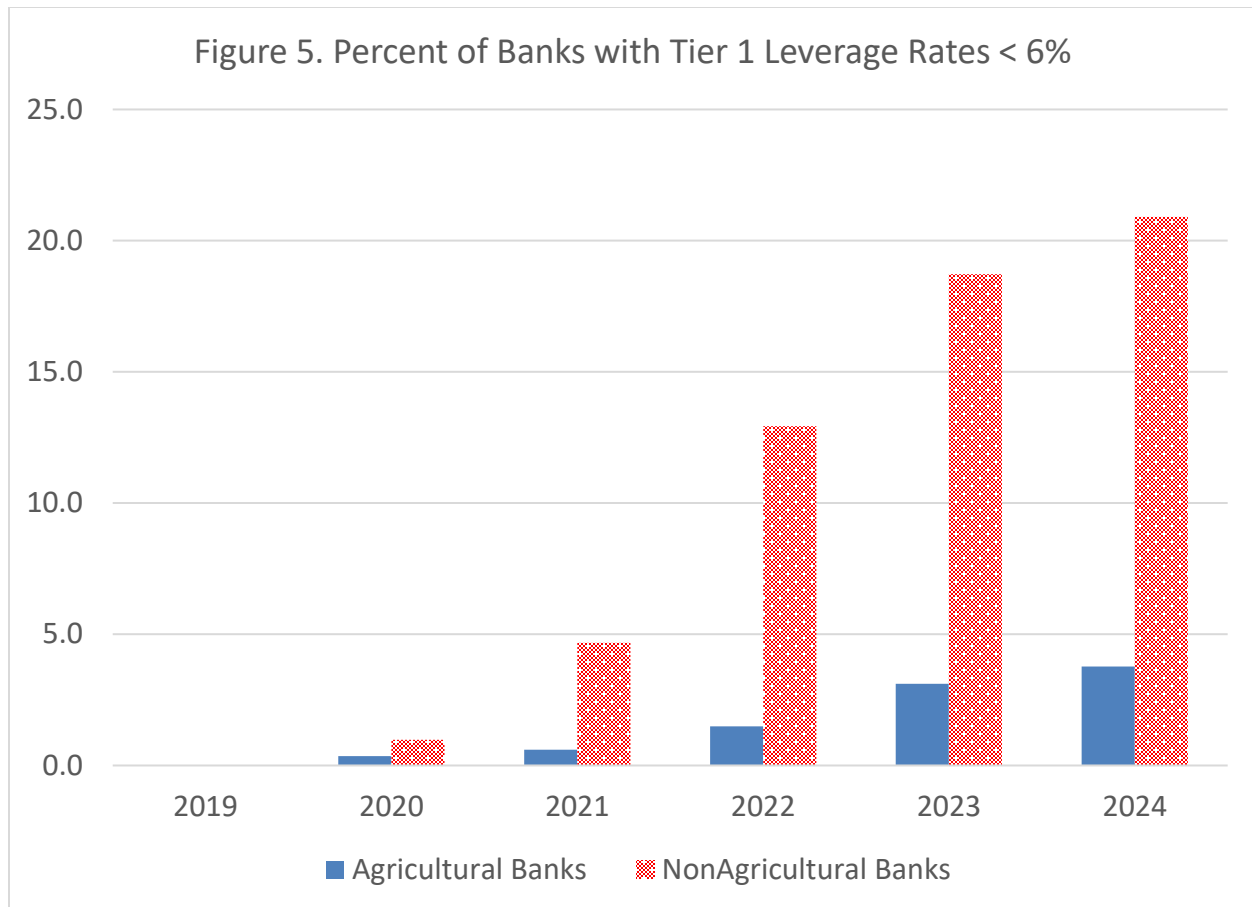
### *Stress Test Results*

We run the community bank stress tests for the 1,671 agricultural banks and 2,261 non-agricultural banks in the United States. Given the underlying assumptions for a U-shaped business cycle, the numbers of banks in danger of failing are estimated. When a bank's Tier 1 leverage ratio (Tier 1 capital to total assets) falls below 2%, Prompt Corrective Action guidelines mandate that regulators close the bank if the bank does not present a credible capital restoration plan.

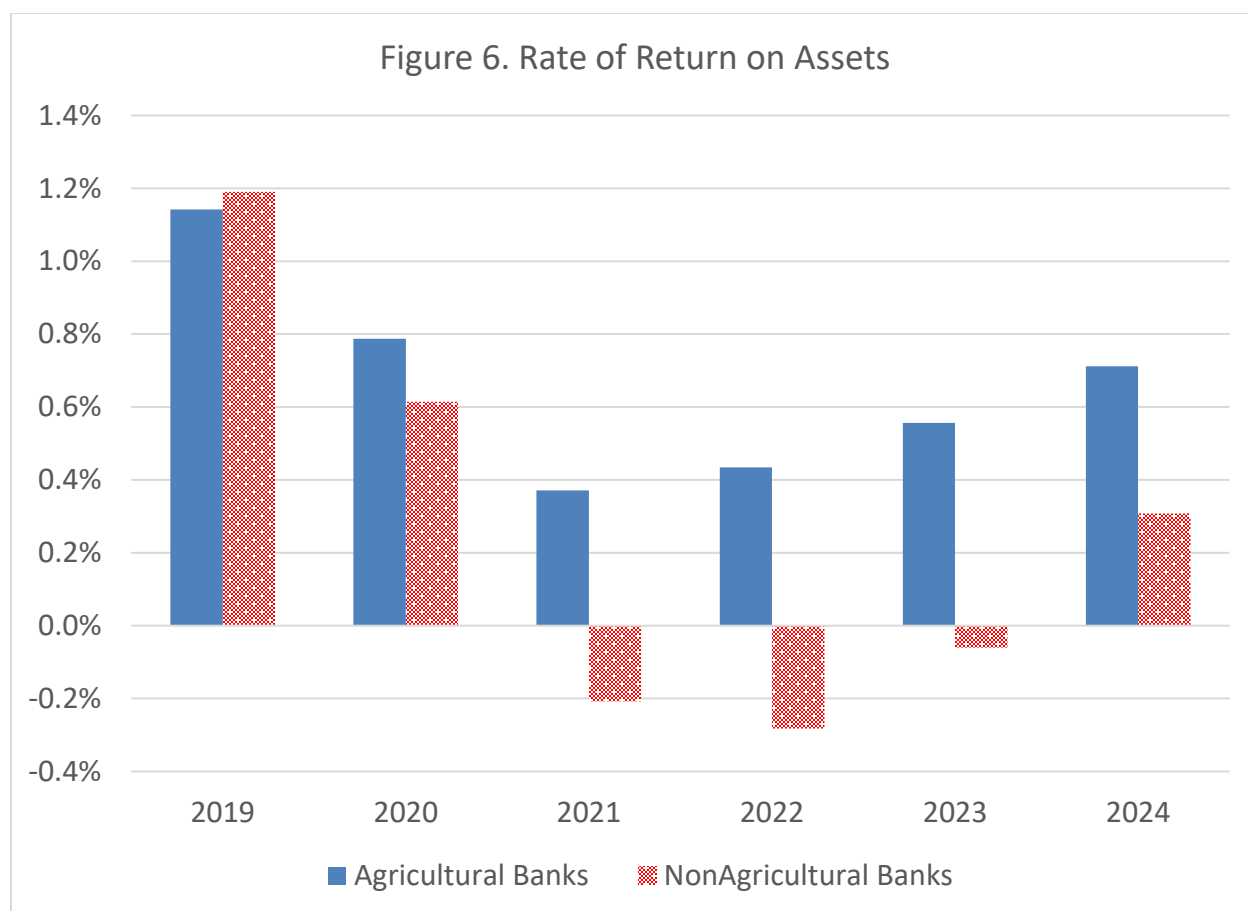
The percent of distinct banks in a given year of the simulation with less than a 2% Tier 1 leverage ratio are shown in Figure 4. Non-agricultural banks are projected to fail at a greater rate than agricultural banks. Of the 2,261 non-agricultural banks, 228 banks (8.3%) are expected to fall below the 2% Tier 1 leverage threshold and fail over the 5-year simulation, but only nine agricultural banks (0.5%) of the 1,671 agricultural banks are expected to fail.



We also estimate the number of banks that become severely distressed even if failure is not imminent. A seriously distressed bank is defined as having a Tier 1 leverage ratio below 6%, which is about half the mean ratio of community banks in 2019. A stressed bank may need to reduce lending to preserve capital, which can exacerbate the economic decline and slow the recovery. Similar to the 2% Tier 1 leverage results, the results in Figure 5 show more non-agricultural banks at 577 banks (20.9%) are expected to fall below the 6% Tier 1 level than 63 agricultural banks (3.8%).



In addition to capital ratios, we project bank profitability with the stress test. The mean rates of return on assets (ROA) are expected to be impacted by the COVID-19 shock (Figure 6). The mean ROAs for agricultural and non-agricultural banks were a healthy 1.14% and 1.19% in 2019. The mean ROA for agricultural banks declines in 2020 and 2021 to a low of 0.37% before recovering to 0.71% in 2024. Like agricultural banks, the mean ROA for non-agricultural banks falls in 2020 and 2021, but unlike agricultural banks, the mean ROA for non-agricultural banks continues to fall in 2022 and declines into negative territory at -0.28% before rising to a weak level of profitability of 0.31% in 2024.



### *Limitations*

We should note that stress tests were also performed assuming a V-shaped business cycle with much less dire results than our assumed U-shaped business cycle. Both agricultural banks and non-agricultural banks had bank failures, but the shares of banks failing were far less at 0.4% and 2.2%, respectively. Again, profitability was negatively impacted with a V-shaped business cycle, although much less severely and for a shorter period of time with mean ROAs returning to greater than 1% in 2022.

Besides the difference in greater agricultural loan concentration for agricultural banks than non-agricultural banks, agricultural banks on average are much smaller than non-agricultural banks in terms of total assets. Agricultural banks averaged \$252 million in total assets in 2019, whereas non-agricultural banks averaged nearly 20 times more in total assets at \$5,007 million.

Another difference in agricultural and non-agricultural banks is chargeoff rates. Agricultural loans have typically had lower chargeoff rates than other loans on average and that was true for the 2008-2012 financial crisis. Since agricultural banks are more concentrated in agricultural loans, their loan chargeoff rates are assumed to be less than non-agricultural bank chargeoff rates in the bank stress test simulation. However, this assumes agricultural loans and the underlying agricultural businesses are less impacted by the COVID-19 shock than non-agricultural loans and their businesses.

There has been significant fiscal stimulus to the economy by the Federal government. The Coronavirus Aid, Relief, and Economic Security (CARES) Act of late March 2020 included more than \$2 trillion to provide emergency assistance to individuals and businesses affected by the pandemic. On April 17, 2020, Senator John Hoeven provided a news release following the announcement of the \$19 billion Coronavirus Food Assistance Program (CFAP) targeted to agriculture saying that \$16 billion in direct payments is for farmers and ranchers and \$3 billion is for purchases of agricultural products.<sup>5</sup> The \$19 billion is similar in the amount of the negative \$20 billion impact to farm income from the COVID-19 shock estimated by the Food and Agricultural Policy Research Institute (FAPRI).<sup>6</sup> According to the news release, \$3.9 billion of the CFAP funds is targeted for row crop producers. However, a more recent estimate of the negative impact of the COVID-19 shock is a loss of \$8.5 to \$10.2 billion in revenue just for corn and soybean producers and only for the 2020 crop year.<sup>7</sup> Therefore, we expect the negative impact on agriculture is more than the early \$20 billion estimate by FAPRI and that the \$19 billion available in CFAP will be insufficient to offset losses. However, our model implicitly assumes additional support will be provided to farmers and ranchers and the total support when allocated and distributed will offset the negative impact from the COVID-19 shock experienced by farmers and ranchers. Without additional support, more agricultural banks would be expected to have financial difficulties and fail. Moreover, if support is not allocated to match the parts of the agricultural sector most negatively impacted by the COVID-19 crisis, regional differences in the impact on agricultural banks are likely to emerge.

#### *Banks Are Better Prepared for a Shock*

There will undoubtedly be damage to banks from the COVID-19 shock to the economy. However, banks are better prepared today to absorb an adverse shock than they were in 2007. Fewer community banks have relatively low capital ratios today than they did in 2007 so that a greater percentage of banks have strong capital ratios. These higher capital ratios will allow more banks to withstand negative shocks such as the one presented by the COVID-19 crisis.

We caution that economic forecasts are highly uncertain, particularly given the extraordinary uncertainty created by the COVID-19 pandemic. We noted that the COVID-19 shock and its financial impact could be shorter and less pronounced if it has a V-shaped business cycle. However, if the COVID-19 shock follows an L-shaped business cycle, the adverse effects on the overall economy and banking industry would be longer and more severe. We do not expect an L-shaped business cycle and we certainly hope for a shorter and much less severe impact on the economy from the COVID-19 epidemic.

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<sup>5</sup> Hoeven: USDA to Provide \$16 Billion in Direct Assistance to Farmers and Ranchers, \$3 Billion in Agriculture Purchases, available at <https://www.hoeven.senate.gov/news/news-releases/hoeven-usda-to-provide-16-billion-in-direct-assistance-to-farmers-and-ranchers-3-billion-in-agriculture-purchases>.

<sup>6</sup> Food and Agricultural Policy Research Institute (FAPRI) FAPRI-MU Report #02-20 available at: <https://www.fapri.missouri.edu/wp-content/uploads/2020/04/FAPRI-Report-02-20.pdf>.

<sup>7</sup> Zulauf, C., G. Schnitkey, N. Paulson, K. Swanson and J. Coppess. "Corn and Soybeans, COVID-19, and the US Farm Safety Net." *farmdoc daily* (10):84, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, May 6, 2020.

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**Appendix Table 1. Agricultural Banks U-Shaped Financial Crisis Scenario<sup>a</sup>**

Tier 1 Equity to Assets	2019	2020	2021	2022	2023	2024
Mean	11.81%	11.88%	11.73%	11.61%	11.54%	11.57%
Median	11.07%	11.16%	11.07%	10.98%	11.00%	11.06%
Min	1.67%	0.43%	-2.01%	-4.39%	-7.35%	-14.13%
Max	39.01%	39.18%	39.07%	39.01%	39.06%	39.14%
Standard Deviation	3.19%	3.21%	3.33%	3.50%	3.72%	3.93%
T1 Leverage < 2%	0	1	3	7	8	9
Percent of Banks with T1 Leverage < 2%	0.00	0.06	0.18	0.42	0.48	0.54
T1 Leverage < 6%	0	6	10	25	52	63
Percent of Banks with T1 Leverage < 6%	0.00	0.36	0.60	1.50	3.11	3.77
Chargeoffs to Loans	2019	2020	2021	2022	2023	2024
Mean	0.18%	0.77%	1.43%	1.30%	1.04%	0.72%
Median	0.04%	0.70%	1.21%	1.09%	0.83%	0.59%
Min	-1.02%	0.09%	0.10%	0.06%	0.05%	0.01%
Max	8.64%	4.89%	5.80%	6.37%	5.38%	3.86%
Standard Deviation	0.58%	0.42%	0.85%	0.85%	0.78%	0.55%
ROA	2019	2020	2021	2022	2023	2024
Mean	1.14%	0.79%	0.37%	0.43%	0.56%	0.71%
Median	1.18%	0.78%	0.41%	0.49%	0.61%	0.74%
Min	-10.23%	-4.93%	-5.48%	-5.35%	-5.21%	-5.06%
Max	9.57%	6.66%	6.86%	7.05%	7.19%	7.44%
Standard Deviation	0.80%	0.60%	0.65%	0.65%	0.64%	0.58%
ROA<0%	0	101	413	448	449	450
Percent of banks	0.00	6.04	24.72	26.81	26.87	26.93

<sup>a</sup> Agricultural banks have an agricultural loan to total loan ratio greater or equal to 16%.

Appendix Table 2. Non-Agricultural Banks U-Shaped Financial Crisis Scenario<sup>a</sup>

Tier 1 Equity to Assets	2019	2020	2021	2022	2023	2024
Mean	12.28%	13.87%	13.07%	12.20%	11.55%	11.26%
Median	10.68%	10.78%	10.27%	9.93%	9.72%	9.67%
Min	1.30%	-1.72%	-9.71%	-18.07%	-26.45%	-49.01%
Max	220.45%	391.81%	352.33%	318.43%	289.02%	269.22%
Standard Deviation	9.02%	18.34%	17.53%	17.00%	16.61%	16.30%
T1 Leverage < 2%	0	10	23	91	172	228
Percent of Banks with T1 Leverage < 2%	0.00	0.36	0.83	3.30	6.23	8.26
T1 Leverage < 6%	0	27	129	357	517	577
Percent of Banks with T1 Leverage < 6%	0.00	0.98	4.67	12.93	18.73	20.90
Chargeoffs to Loans	2019	2020	2021	2022	2023	2024
Mean	0.15%	1.17%	2.65%	2.80%	2.36%	1.62%
Median	0.04%	0.97%	2.09%	2.35%	2.00%	1.40%
Min	-2.18%	0.03%	0.04%	0.20%	0.13%	0.03%
Max	10.70%	5.71%	14.77%	17.35%	10.22%	14.78%
Standard Deviation	0.52%	0.82%	1.87%	1.89%	1.47%	1.05%
ROA	2019	2020	2021	2022	2023	2024
Mean	1.19%	0.61%	-0.21%	-0.28%	-0.06%	0.31%
Median	1.12%	0.56%	-0.06%	-0.17%	-0.02%	0.30%
Min	-26.53%	-20.99%	-19.99%	-19.00%	-18.13%	-17.41%
Max	45.34%	44.30%	44.30%	44.30%	44.30%	44.30%
Standard Deviation	1.99%	2.02%	2.11%	2.10%	2.00%	1.91%
ROA<0%	0	554	1473	1672	1714	1718
Percent of banks	0.00	20.07	53.35	60.56	62.08	62.22

<sup>a</sup> Non-agricultural banks have an agricultural loan to total loan ratio less than 16%.