COVID-19 ORIGINATED ECONOMIC PRESSURE & THE SUSTAINABLE GROWTH MODEL OF THE AGRICULTURAL AND THE NON-AGRICULTURAL BANKS IN USA.

by

DHIRAJ BHATTA

(Under the Direction of Cesar L. Escalante and William Secor)

ABSTRACT:

By using the sustainable growth paradigm and seemingly unrelated regression (SURE), this study analyzes US banks' financial indicators (profit margin, earning retention, asset turnover, and leverage) before and during the COVID pandemic. In addition, structural variables such as bank size, agricultural lending, loan diversification, and liquidity have been taken into consideration. Results indicate that agricultural banks have higher profitability, and higher growth on average than the non-agricultural banks. Banks' decision to retain earnings is independent of the anticipated growth during the COVID period suggesting a more cautious stance. Bank's growth is negatively related to its size in the PRE-COVID period. The findings reveal important implications useful for banks to minimize risk, to improve financial health, and even to avert failure during similar economic crises in future.

INDEX WORDS: Agricultural Banking, COVID, Leverage, Profit Margin, Seemingly Unrelated Regression, Sustainable Growth Challenge.

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DEDICATION

"Dedicated to the almighty, to my beloved grandparents, to my uncle in heavens, to parents, family, and to my gurus whose blessings have been the fuel of my life-journey."

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CHAPTER 1

INTRODUCTION

1.1.The COVID Crisis

The COVID crisis is a global economic downturn borne out of an ongoing pandemic caused by SARS-CoV-2 virus. Though the virus was first identified in December 2019, the disease gained widespread global attention after the World Health Organization (WHO) declared COVID to be an International Public Health Emergency on January 30, 2020. In the United States, several states, cities, and county governments imposed stay at home quarantines to slow the spread of the virus. The U.S. economy contracted by 3.5 percent in the year 2020, as businesses, factories and households experienced slowed growth (*U.S. Bureau of Economic Analysis (BEA)*, 2020). About 10 million adults were jobless in 2020 (ABC News, 2021). The 3.5 percent contraction in GDP in 2020 was the largest decline since World War-II (*U.S. Bureau of Economic Analysis (BEA)*, 2020).

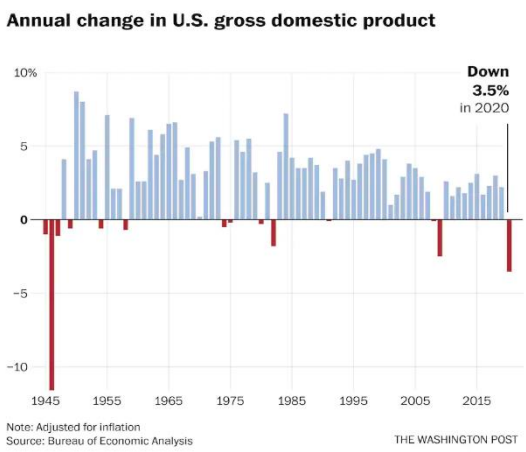

Figure 1.Annual Change in U.S. Gross Domestic Product since WW-II.

The hardest hit sectors were the travel and tourism sector, meat packers and other food processors, and small businesses. A study by researchers at the University of Illinois, Harvard Business school and the University of Chicago project that more than 100,000 small businesses, which account for 2% of all small businesses, have shutdown permanently since the pandemic escalated in March(Sraders & Lambert, 2021).

1.2. US Banks During the COVID

Financial markets in the U.S. have been experiencing stress and volatility because of the COVID crisis. Banks have shifted to online and mobile banking services as in-person service seemed potentially dangerous. Banks experienced a general sluggishness in their business activity with a decline in the gross revenue. Annual income of all banks in the U.S. shrunk by 38% in 2020, with the largest decline in the first and the second quarters (FDIC, 2020).

The current COVID crisis has some similarities to the 2008-9 downturn. Because both put a significant strain on the economy through widespread bankruptcies, liquidity shortages, large income loss, and employment losses. But unlike the 2008-9 downturn, the COVID crisis is more like an aggregate demand and supply shock for both lenders and the borrowers. Whereas the 2008-9 downturn was primarily endogenous, the COVID crisis represents an entirely exogenous shock to the financial system.

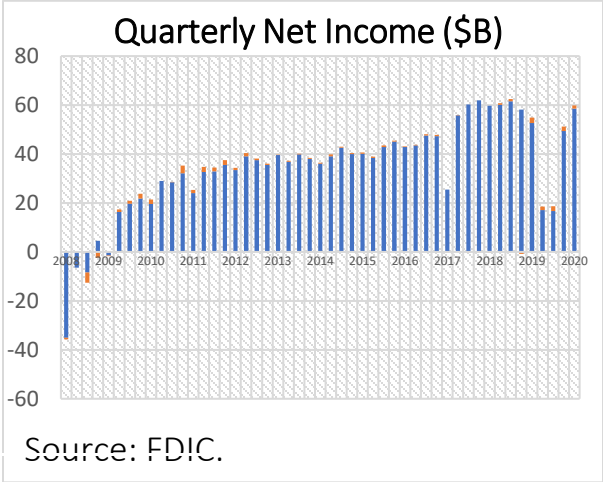

Figure 2. Quarterly Income of US Banks (2008-2020)

However, even amidst the COVID crisis, most banks successfully confronted the pressures and challenges. Only four banks failed in the year 2020 (FDIC, 2020). Banks must have adopted some remedial strategies to mitigate the adverse effects of the downturn or adopted a more cautious and conservative stance in making earlier business decisions.

The smaller size and funding constraints may inhibit agricultural banks from diversifying their clientele to accommodate non-farming clientele. Because of the pessimistic view on agricultural banks, this sector's financial performance during the COVID crisis has been a subject of scrutiny.

1.3. **Research Question**

Did banks aggressively spend their resources to meet the anticipated growth challenge or did they follow conservative stance to cope with the stressed financial environment during the COVID? In addition, the study tries to answer how the agricultural banks performed as compared to the non-agricultural banks before and during the COVID crisis.

CHAPTER 2

LITERATURE REVIEW

Bank lending during period of economic downturns has been the subject of significant interest. Financial crises lead to restricted credit supply and/or increased costs of borrowing. For example, during the US credit crunch and the consequent 2008-9 financial crisis, higher loan spreads were driven by large bank losses leading to skyrocketed rates of bank failures following the years of the crisis (Cornett et al., 2011).

Several studies have tried to analyze the performance of banks during and following the periods of economic crisis. Years following the farm crisis of 1980, Belongia and Gilbert concluded that the failed banks had higher agricultural production lending and lower investment in federal government securities. With decreased income from sales and the declining land prices, farmers at that time could not pay their accumulated debt. Consequently, most banks with a higher proportion of investment in agriculture failed. However, the performance of agricultural banks during and following the recession of 2008 was commendable (Li et al., 2013a). It has been found that the banks with a higher proportion of lending in the agricultural sector were least affected by the credit bubble of the real estate sector and showed more resiliency to the crisis.

According to Cornett, McNutt, Strahan, and Tehranian (2011), banks effort to manage liquidity crisis leads to a decline in credit supply. During the crisis of 2008, banks with more illiquid assets in their balance sheet strategically accumulated more liquidity thereby decreasing lending. Berger and Bouwman (2017) argued that banks' high liquidity creation (relative to trend) is an indication of an oncoming financial crisis. Li, Brewer, and Escalante (2018) estimated the technical and

allocative efficiencies of agricultural and non-agricultural banks and found that banks utilizing cheaper inputs survived.

Varying findings have been reported about the effect of bank size on a bank's profitability and performance. Applying the dynamic panel model to 1270 European Banks from 2005 until 2012, Terraza (2015) showed that the medium-sized banks had significant and positive profitability persistence, and evidence of a positive relationship between bank size and profitability was observed.

Loan diversification studies mostly use the Herfindahl-Hirschman Index (HHI) Herfindahl as a measure of portfolio diversification. Shim (2019) found higher portfolio diversification to be positively associated with a bank's financial stability. Similar other studies suggest that a bank's diversifying loan portfolio can reduce risks more efficiently than that of specialized lending in a single sector.

Robert Higgins derives a sustainable growth rate assuming a firm can use earnings and/or leverage to finance growth. DeAngelo and DeAngelo (2006) suggest that an increase in dividends brings about a change in the firm's life cycle from a higher growth phase to a slower growth phase. Similarly, Fama and French (2001) found that firms tend to pay dividends when they experience high profitability and low growth rate. Benartzi et al. (1997) and Grullon et al. (2002) confirm that dividend changes imply a causative effect on growth rate and the rate of return on asset.

Recent empirical studies suggest that agricultural lending does not significantly increase banks' likelihood of failure. For example, Paulson and Sherrick (2009) showed that agricultural lending institutions performed better financially due to this sector's lower exposure to real estate lending.

Similarly, Kauffman and Akers (2013) found consistently lower delinquency rates among farm borrowers.

CHAPTER 3

SUSTAINABLE GROWTH MODEL

3.1. Sustainable Growth Rate

According to Higgins, each institution is assumed to have a targeted capital and a targeted dividend policy (Higgins, 1981). Furthermore, it is assumed that equity remains constant during the study period. With these two assumptions, consider an institution with rising revenue which implies that assets must also increase. The growth in assets must come from additional retained earnings or increased liabilities. The rate of increase in revenue at which a bank's targeted capital and dividend distribution policies could be met in the long-term is the Sustainable Growth Rate (SGR).

A SGR is, therefore, the maximum rate at which a company's revenue can increase without depletion of its financial resources. Popular in the corporate finance sector, the concept was first applied in the agricultural finance sector by Escalante (Escalante et al., 2006). As suggested by Higgins, the sustainable growth paradigm is based on four pillars of growth: (1). Profit Margin, (2). Asset Turnover ratio (3). Revenue Retention ratio and (4). Leverage. The sustainable growth rate can be expressed as a product of the four components.

$$SGR = PM \times ATR \times ER \times LEV$$

Where

$$PM = Profit\ Margin = \frac{Net\ Income}{Revenue}$$

$$ATR = Asset\ Turnover\ Ratio = \frac{Revenue}{Assets}$$

$$ER = Earnings\ Retention\ Ratio = \frac{Net\ Income - Dividends}{Net\ Income}$$

$$LEV = Leverage\ = \frac{Assets}{Beginning\ Equity}$$

3.2. Sustainable Growth Challenge

The SGC equation is also a management decision tool that a bank can use to adjust its growth rate when actual revenue growth exceeds or lags the SGR. A firm that is growing at a higher rate than the SGR would have a positive challenge and would have to increase leverage to fund the growth. Similarly, a firm growing slower than the given SGR would be experiencing a negative challenge while accumulating more capital, therefore enabling the firm to decrease leverage or increase the dividends. The SGC is calculated according to the equation:

SGC = Actual Growth Rate – Sustainable Growth Rate

$$SGC_t = ln\left(\frac{Revenue_t}{Revenue_{t-1}}\right) - SGR_t$$

Revenue $_t$ = Revenue for quarter t in current year

Revenue $_{(t-1)}$ = Revenue for quarter t in the previous year.

Based on this equation, if SGC is positive, the institution must make certain adjustments to maintain growth. As to realize this challenge, the bank should either increase net profit margins and/or by increasing financial leverage. Often growing at an exceptional rate puts the bank at greater risk. On the flip side, negative SGC implies that the bank's resources have not been

optimally utilized and that adequate growth is not occurring. By using the SGC concept, Deloitte Consulting has defined appropriate growth targets for banks (Deloitte Consuklting AG, 2015).

CHAPTER 4

EMPIRICAL METHODS & DATA

4.1. Data

The data was obtained from the website of the Federal Financial Institutions Examination Council (FFIEC) Central Data Repository's Public Data Distribution. All the financial institutions in U.S., are required to be filed the quarterly Consolidated Report of Condition and Income, popularly referred as "The Call Report". A call report must be filed as of the close of business of the last day of each calendar quarter (i.e., the report date) by every institution insured under the Federal Deposits Insurance Council (FDIC). The specific requirements to file the call report depend upon the size of the bank, and whether it has any foreign offices.

A panel dataset is compiled from the call report database. It covers a total of eight quarterly financial reports during the years 2019 to 2020. The study's sample includes the observations from the pre-COVID period (four quarters of 2019) and the COVID period (four quarters of 2020). The balanced final dataset consists of 3990 US banks.

4.2. Empirical Design

a). Seemingly Unrelated Regression (SUR)

Seemingly unrelated regression (SUR) consists of a set of regression equations, each having its own dependent variable and independent variables. As the assumption of zero correlation among error terms is unrealistic in our case, simple OLS could not account for the contemporaneous cross-

equation error correlation leading to inaccurate estimation results. The SUR method addresses the violation of such conditions.

We applied SUR to identify the determinants of the sustainable growth challenge, and additionally, included variables for loan diversification (HHI) and the bank size (SIZE). Dummy variables have been created for the nature of the bank (agricultural bank =1 and non-agricultural bank = 0), and for the COVID period (COVID PERIOD=1, NON-COVID PERIOD=0). For analysis purposes, STATA's *sureg* procedure, which gives an asymptotically efficient result, has been used.

The following are the systems of equations used in the SUREG procedure. PM, ER, AT, LEV and SGC represent profit margin, earning retention, asset turnover and financial leverage, respectively. The t-1 subscript is used to denote the lagged (first lag) values of the variables. Apart from the financial ratios, some other structural variables (indicators) have been used as the independent variables in the regression equations.

$$PM_t = \alpha_0 + \alpha_1 PM_{t-1} + \alpha_2 SGC_t + \alpha_3 HHI_{t-1} + \alpha_4 DL_{t-1} + \alpha_5 SIZE_{t-1} + \alpha_6 AG + \alpha_7 COVID$$

$$ER_t = B_0 + B_1 ER_{t-1} + B_2 SGC_t + B_3 SIZE_{t-1} + B_4 AG + B_5 COVID$$

$$AT_t = \gamma_0 + \gamma_1 AT_{t-1} + \gamma_2 SGC_t + \gamma_3 HHI_{t-1} + \gamma_4 DL_{t-1} + \gamma_5 SIZE_{t-1} + \gamma_6 AG + \gamma_7 COVID$$

$$LEV_t = \delta_0 + \delta_1 LEV_{t-1} + \delta_2 SGC_t + \delta_3 HHI_{t-1} + \delta_4 DL_{t-1} + \delta_5 SIZE_{t-1} + \delta_6 AG + \delta_7 COVID$$

$$SGC_t = \theta_0 + \theta_1 \Delta PM_{t-1} + \theta_2 \Delta ER_{t-1} + \theta_3 \Delta AT_{t-1} + \theta_4 \Delta LEV_{t-1} + \theta_5 HHI_{t-1} + \theta_6 DL_{t-1} + \theta_7 SIZE_{t-1} + \theta_8 AG + \theta_9 COVID$$

We first ran the regression equations using the whole dataset, and then separately for the PRE-COVID period (year 2019) and the COVID period (year 2020). The Bruesch-Pagan test of independent is highly significant, which justifies the use of the *sureg* procedure in the regression of our dataset.

b). Variables

The dataset consists of banks' the balance sheet and the income statement variables. Assets, deposits, liabilities, and equity, respectively, capture the total assets, total deposits, total liabilities, and the total equity capital reported in each quarter of the year. Similarly, revenue, net-income, and dividends, respectively, cover the gross revenue, net-income (profits) and dividends declared in the corresponding quarters. In addition, gross revenue is also the sum of the interest revenue and the non-interest revenue. Dividends includes the dividends declared to both the preferred and the common stocks. In addition, dividend payments are assumed to capture the withdrawals and it has been assumed that no additional equity has been attained during the study period. Finally, net-income is the profit remained after deducting all the expenses from the gross revenue.

Herfindahl-Hirschman's index is used to account for the level of loan diversification. The loan balances categories used to calculate HHI include agricultural, commercial and industrial, real estate, consumer loans, and lease receivables. The agricultural category includes both the loans for agricultural production and the loans to farmlands. For diversification index, first the relative contribution of each loan category is calculated, then HHI is derived as the sum of squares of all the loan categories shares as shown in the equation below.

$$HHI = \sum_{i=1}^{n} \quad (loan\ share_i)^{\wedge 2}$$

A lower value of HHI indicates higher level of loan diversification, whereas a value close to one implies lesser diversification or conversely, more specialization.

Table 1. Variable Description

Variable Name	Description
Profit Margin	Net income expressed as the fraction of the gross revenue.
Lagged Profit Margin	Profit margin in the previous quarter of the year.
Earnings Retention	Retained earnings expressed as the fraction of the net income.
Lagged Earnings Retention	Retained earnings in the previous quarter of the year.
Assets Turn Over	Gross revenue expressed as a fraction of the total assets.
Lagged Assets Turn Over	Assets Turn Over in the previous quarter of the year.
Financial Leverage	Total assets expressed as a fraction of the total equity at the beginning of the period.
Lagged Financial Leverage	Leverage in the previous quarter of the year.
Sustainable Growth Challenge	Difference between the actual growth rate and the prescribed sustainable growth rate.
Herfindahl-Hirschman's Index	An index for loan diversification. A higher HHI implies less diversification or more specialization.
Deposits to Liabilities Ratio	An indicator of the bank’s liquidity.
Bank Size	Log of the total assets to signify bank size.
Agricultural Bank	Categorical variable for the extent of Agricultural lending. Agricultural bank is the one with at least 25 percent lending in agricultural sector.
COVID period.	Categorical variable to account for the COVID pandemic. All four quarters of 2020 consists of the COVID period.

Banks' liquidity has been measured by accounting the deposit to liabilities ratio (DL-ratio). Because deposits indicate the available liquid asset to meet instant financial needs, and liabilities represent total of the bank's obligations, DL-ratio is a reasonable measure of banks' liquidity.

Log of the total assets signify banks' SIZE. Because we need a non-negative variable for the size, and because total assets follow a log-normal distribution, log of total assets is a suitable variable for size.

Using the classification criterion suggested by the FDIC, banks having 25% or more of their investments in the agricultural production sector have been designated as "agricultural banks", therefore, dichotomously categorizing banks into the agricultural and the non-agricultural banks. Similarly, a dummy variable 'COVID' has been constructed to account for the period of the coronavirus pandemic.

c). Summary Statistics

We investigated the summary statistics of the balanced panel dataset, and statistically compared the means between the two periods i.e., the PRE-COVID period and the COVID period. We also attempted to graph the distributions of the variables before and after the COVID period. In an attempt to figure out the quarterly movement of the variables, we plotted the graph of the variables by quarter.

Presented in the Table.1 is the summary statistics of the complete dataset.

Table 2. Summary Statistics of the Balanced Complete Data.

Variable	Obs	Mean	Std. Dev.	Min	Max
Assets	29000	1064706.4	4310669.2	3670	1.089e+08
Deposits	29000	853233.63	3405649.6	500	94445092
Liabilities	29000	939643.1	3811694.6	3138	99904765
Equity	29000	124997.25	520266.52	507	12485000
net income	29000	6476.81	48857.947	-1847123	3228000
Revenue	29000	34469.384	207954.97	-630	14132000
Dividends	29000	4137.296	38516.685	0	3900000
agr	28991	.071	2.027	-11.964	11.08
SGR	25368	.031	.056	-1.621	1.312
SGC	25360	.037	2.025	-12.005	11.012
PM	28996	.203	.509	-59.9	52.558
ER	28991	.57	2.498	-267.456	81
AT	29000	.03	.028	-.002	1.327
LEV	25375	9.163	2.466	.412	53.615
Liquidity	29000	94.77	6.72	.162	100
ag share	29000	15.777	21.162	0	98.041
hhi	29000	1108.119	1518.99	0	10000

The accounting variables viz. assets, deposits, liabilities, equity, net income, and dividends are expressed in the thousands of US dollars. Whereas the sustainable growth variables viz. AGR, SGR, SGC, PM, ER, AT, and LEV have been expressed as percentage. Again, liquidity and ag-share also represent the proportion out of 100. HHI is an index variable with no units.

For comparison purposes, summary statistics of the variables has been presented for the two subsets of the data. The year 2019 refers to the PRE-COVID PERIOD.

Table 3. Summary Statistics of the PRE-COVID Period Dataset (2019).

	N	Mean	Std	min	Max
assets	14500	989597.99	4070525	4135	92292000
deposits	14500	785438.57	3153044.7	500	77730625
liabilities	14500	868454.3	3574107.7	3563	80559701
equity	14500	121078.79	516679.61	558	12485000
net income	14500	7850.253	49064.414	-26479	3228000
revenue	14500	34317.522	218532.32	53	14132000
dividends	14500	4431.146	47621.538	0	3900000
agr	14497	.067	2.023	-11.964	11.08
SGR	10875	.035	.047	-.863	.49
SGC	10873	.022	2.018	-12.005	11.012
PM	14500	.212	.158	-2.512	4.28
ER	14498	.583	1.761	-130.25	81
AT	14500	.032	.028	.001	1.327
LEV	10875	8.856	2.202	1.036	38.596
liquidity	14500	94.988	6.335	3.81	100
ag share	14500	15.858	21.238	0	97.921
hhi	14500	1048.326	1524.052	0	10000

Table 4. Summary Statistics of the COVID Period Dataset (2020).

	N	Mean	Sd	Min	Max
assets	14500	1139814.8	4537021.3	3670	1.089e+08
deposits	14500	921028.69	3639617.4	500	94445092
liabilities	14500	1010831.9	4034185.3	3138	99904765
equity	14500	128915.72	523817.37	507	10100000
net income	14500	5103.366	48613.505	-1847123	1429000
revenue	14500	34621.247	196817.42	-630	11873000
dividends	14500	3843.446	26442.179	0	1325000
agr	14494	.075	2.03	-11.547	10.762
SGR	14493	.028	.062	-1.621	1.312
SGC	14487	.047	2.03	-11.58	10.764
PM	14496	.194	.702	-59.9	52.558
ER	14493	.557	3.062	-267.456	67.4
AT	14500	.029	.027	-.002	1.102
LEV	14500	9.393	2.624	.412	53.615
liquidity	14500	94.552	7.077	.162	100
ag share	14500	15.696	21.086	0	98.041
Hhi	14500	1167.912	1511.599	0	10000

CHAPTER 5

RESULTS AND DISCUSSION

5.1. Income Statement Variables: Gross Revenue, Net Income and Dividends

Distribution curves for gross revenue, net income, and the dividends did not change between the two time periods. Also, the mean of the gross revenue in the COVID year is on a par with that of the PRE-COVID year at 5% α-level. Though the income curve did not change between the two years, average net-income in COVID year is significantly lower (p-value>0.002) than that in the PRE-COVID period as evident from the two sample t-test. Also, the dividends payments, on average, in the COVID period are significantly lower than that of the PRE-COVID period.

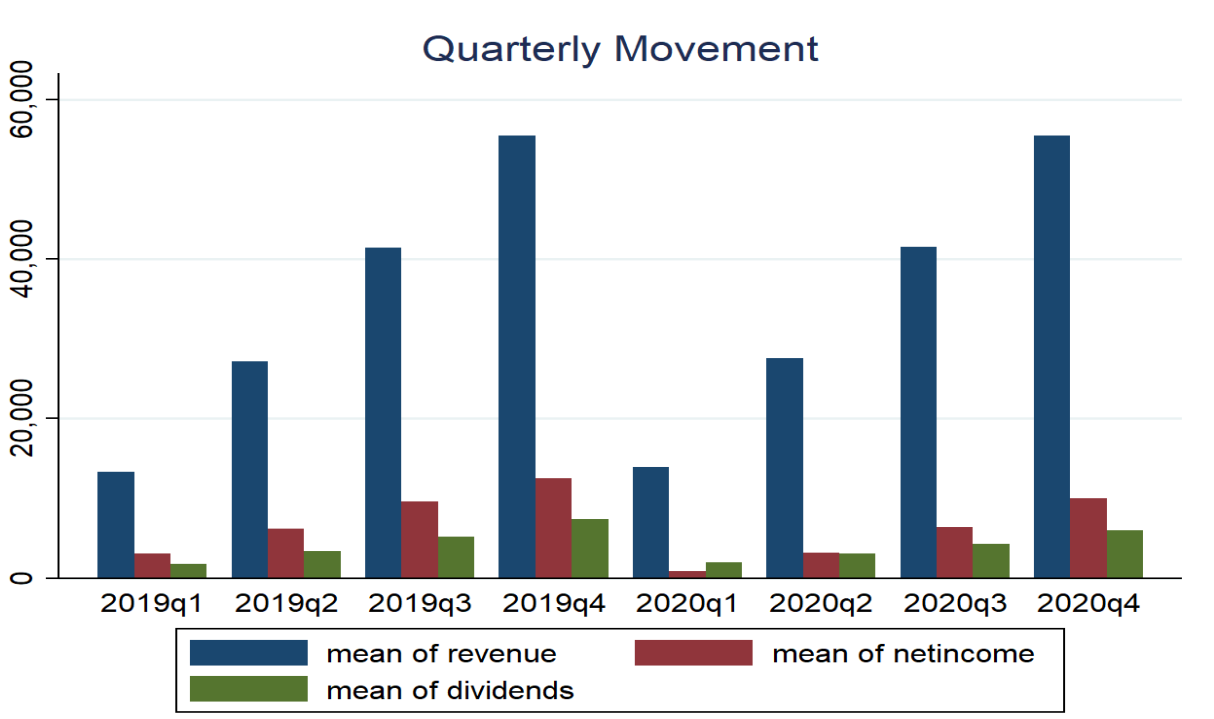

Figure 3. Quarterly Movement in Revenue, Income and Dividends

Quarterly net-incomes and quarterly dividends payments in each quarter of the COVID year decreased significantly from that of respective quarter in the PRE-COVID year. The reduction in quarterly gross revenue in all quarters of the COVID year from those of the PRE-COVID year is insignificant.

5.2. Balance Sheet Variables: Assets, Liabilities and Equity

There is an overall "right-shift" in the log-normal distributions of the assets, deposits, liabilities, and the equity in the COVID year from the PRE-COVID year implying that these variables increased for all banks during the COVID. Both the assets and the deposits have, on average, increased significantly in the COVID year. Also, on average, the liabilities have gone up in the COVID year as evident from the two-sample t-tests. However, equity capital in the COVID year is on par with that of the PRE-COVID year.

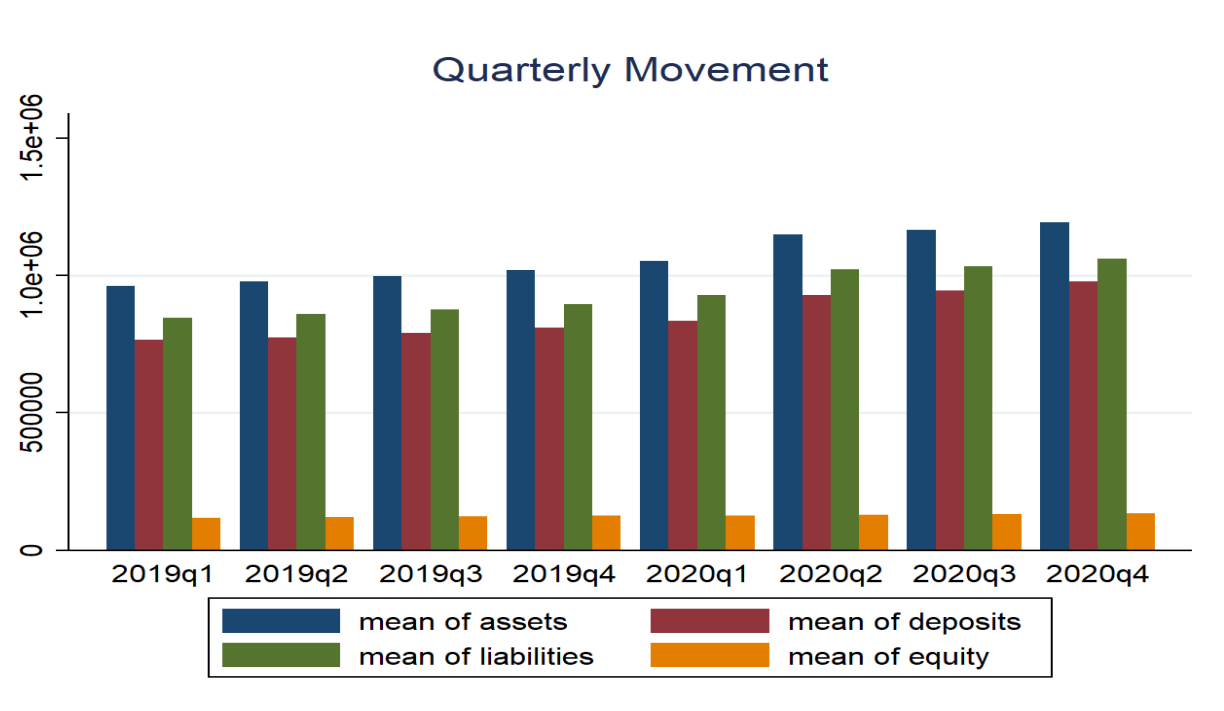

Figure 4. Quarterly Movement in Assets, Liabilities and Equity.

The total assets, deposits and the liabilities are higher in COVID year than the PRE-COVID year. However, the equity capital remained constant throughout the period, which fulfills an assumption of the sustainable growth model.

5.3.Banks' liquidity

Banks maintained very high liquidity in both the time periods as evident from the density graph. On average, the liquidity in the two years was about 94 percent. Also, the overall liquidity curve did not change in the COVID period. However, the average liquidity is lower in the COVID year being significant at 5% α-level.

5.4. **Banks' Growth Rates**

A portion of the density graph of actual growth rate (AGR) in the COVID period has been projected on the axis below zero implying that a significant fraction of the banks had a negative

revenue growth in the COVID year. However, the overall distribution of SGR has remained unchanged during both years. All the banks in the PRE-COVID period had non-negative SGC values. This means banks were growing at the rates higher than their sustainable growth rates. In other words, they were growing 'aggressively' before the COVID. The growth pattern changed in the COVID period. It showed that 42 percent of the banks experienced negative SGC values in the COVID period. The finding tells an interesting story about the change in the growth pattern of the banks. Banks during the pandemic experienced very slowed actual growth rates. The actual growth rate for some banks was so low that it fell below their SGR, thereby leading to negative SGC. Banks' earlier history of aggressive growth reversed during the COVID. Therefore, it is most convincing that they took a 'precautionary' stance during the stressful period. Even the positive SGC curve was flatter in the COVID period as compared to the PRE-COVID period. Two sample t-tests also infer that the AGR, the SGR and the SGC were lower in the COVID year than the PRE-COVID year on average.

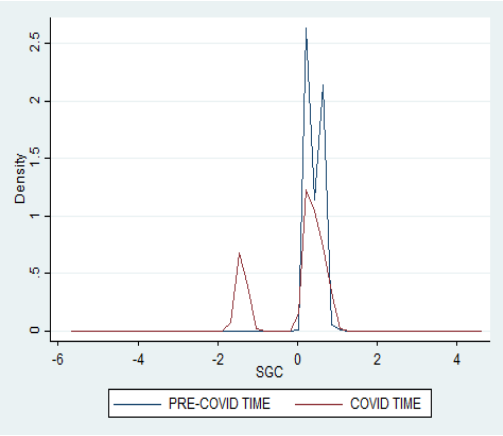

Figure 5. Growth Challenge.

5.5. Agricultural Lending:

Neither the share of agricultural lending nor the number of agricultural banks differed between the two years. Results indicate that the average share of agricultural lending by the financial institutions was 15% in both the years. A total of 892 agricultural banks, which consists of 24.6 percent of all the banks, were reported in both the years.

5.6. Regression Results:

Findings from the seemingly unrelated regression have been presented for each growth levers and the sustainable growth challenge. Three groups of equations have been run, each by using the complete dataset, the PRE-COVID dataset and the COVID dataset, respectively.

a). The Profit Margin

The profit margin in the current quarter is positively correlated with profit margin in the previous quarter, which implies the current quarter's profit margin increases when the lagged profit margin was higher. The association between profit margin with its lagged value was even higher during the normal year, being as high as 0.91 in the PRE-COVID year.

Again, the SGC variable's upward change will cause an increase in the profit margin in the normal year, indicating that banks with higher growth target had higher profitability. There was no significant effect of loan diversification on profit margin in neither period. Results indicate that lagged value of liquidity has a small positive impact on the profitability of all the banks, but no effect of liquidity was seen when running for the separate datasets.

Table 5. SUR Results for Profit Margin Equation.

Profit margin	**PRE-COVID**	**COVID**	**OVERALL**
Lagged PM	0.914***	0.052***	0.070***
SGC	0.001*	0.003 ns	0.002 ns
Lagged HHI	0.000 ns	0.000 ns	0.000 ns
Lagged Liquidity	0.000	0.001 ns	0.001***
Bank Size	0.003***	0.012***	0.015***
AG	0.004**	0.032**	0.036***
COVID	-	-	- 0.019 *

Similarly, larger bank size is associated with higher profitability in all the periods. Larger banks can meet the economies of scale consequently experience higher efficiency in profitability. Interestingly, agricultural banks had higher profit margin than the non-agricultural banks. Agricultural lending sector's lower exposure to delinquencies than non-agricultural banks during the study period could have increased profit margin for agricultural banks. On average, agricultural banks' profitability was 3.6 percentage points higher than that of the non-agricultural banks. Profitability during the COVID slowed by 1.9 percentage points.

b). **The Earning Retention**

The association between earnings retention and its lagged value is different in different periods. The lagged earnings retention had a positive effect on the earnings retention in the PRE-COVID period. The association became negative in the COVID period and no correlation, in overall, was seen between the earnings retention and its lag. Again, the earnings retention in the PRE-COVID period is negatively associated with the SGC implying slower growths lead to increased earnings retention. However, earnings retention during the COVID is independent of SGC meaning that banks keep earnings as a risk management tool regardless of their growth challenge.

Table 6. Regression Results of Earning Retention Equation.

Earnings Retention	**PRE-COVID**	**COVID**	**OVERALL**
Lagged ER	0.200***	-0.016*	-0.006 ns
SGC	-0.016**	-0.002 ns	-0.004 ns
Bank Size	-0.038***	-0.040**	-0.038***
AG	-0.083**	0.031 ns	-0.013 ns
COVID			-0.035 ns

Interestingly, ER is negatively associated with the banks' size variable (*lnasset*) in all three data groups. This finding might be because of the larger banks allocating greater proportion of their net income in dividends. Lower earnings retention of the agricultural banks over non-agricultural banks has been obtained in the PRE-COVID period. However, the difference in earnings retention between the agricultural and non-agricultural banks became insignificant in the COVID period.

c). **The Asset Turn-Over Equation:**

According to the results, lagged asset turnover variable has a significant positive effect on asset turnover in the current quarter. Again, the magnitude of the effect is greater in the PRE-COVID period than that of the COVID period. No effect of SGC on the asset turnover has been seen. This finding supports that banks' growth strategy does not have any effect on its asset management.

Again, the SGC variable's upward change will cause an increase in the profit margin in the normal year, indicating that banks with higher growth target **had** profitability. There was no significant effect of loan diversification on profit margin in neither period. Results indicate that lagged value of liquidity has a small positive impact on the profitability of all the banks, but no effect of liquidity was seen when running for the separate datasets.

Table 7. Regression Results: Asset Turnover

Asset Turnover	**PRE-COVID**	**COVID**	**OVERALL**
Lag AT	1.326***	0.500***	0.715***
SGC	0.000 ns	0.000 ***	0.000 ***
Lag HHI	0.000 ns	0.000 ns	0.000 ***
Liquidity	0.000 ns	0.000 ns	0.000 ***
Bank Size	0.000 ns	0.000 ns	0.000 ns
AG	- 0.004***	0.001**	0.000 ns
COVID	-	-	- 0.015 *

The asset turnover, on average, fell by 1.5 percentage points during the COVID. Decreased borrowing by businesses and households, and the restrictions could be responsible for slowed revenue generation causing decline in AT ratio.

d). The Financial Leverage Equation:

Results indicate that financial leverage is highly and positively correlated with its lagged value. Again, the effect of SGC on leverage was insignificant, except in the PRE-COVID period when it is negative. It could mean that LEV decisions have been made beyond the growth optimizing intentions, for example based on market conditions, ease of borrowing and so on. Bank size is significant in the COVID period which implies capital seeking tendency was higher in larger banks. During the COVID period, banks' liability decisions increases if the previous liquidity were higher and vice-versa. Again, agricultural banks do not differ from the non-agricultural banks in terms of the capital seeking tendency.

Table 8. Regression Results: Financial Leverage.

LEV	**PRE-COVID**	**COVID**	**OVERALL**
Lag LEV	0.932***	0.929***	0.928***
SGC	- 0.007*	0.001 ns	-0.002 ns
HHI	0.000	0.000 ns	0.000
Liquidity	0.000	0.008 ***	0.005***
Bank Size	0.000	0.015**	0.010 ns
AG	-0.014	-0.026 ns	-0.019 ns
COVID	-	-	0.320***

e). The Sustainable Growth Challenge Equation

The SGC equation consolidates the quarter-to-quarter change in the four growth levers along with the structural variables as the independent variables. The estimated SGC equation reveals that SGC is positively correlated with the quarterly changes in the profit margin. Earnings retention did not have a significant effect on the SGC in the COVID period suggesting that banks postpone growth decisions even if they have earnings for potential business expansion purposes.

Table 9. Regression Results: Sustainable Growth Challenge

SGC	**PRE-COVID**	**COVID**	**OVERALL**
ΔPM	0.932*	0.035**	0.037*
ΔER	- 0.019	0.004	0.003*
ΔAT	-2.307	- 1.402**	-1.538*
ΔLEV	-0.062*	0.004 ns	-0.005 ns
Lagged HHI	0.000	0.000 ns	0.000 ns
Lagged Liquidity	0.002 ns	0.005 *	0.004 *
Bank Size	0.002 ns	0.018 ns	0.014 ns
AG	0.049 ns	0.084**	0.063*
COVID	-	-	-0.008 ns

Again, LEV has different findings in PRE-COVID and the COVID period. LEV had a small negative marginal effect in PRE-COVID period whereas its effect was insignificant in the COVID year. Bank size and diversification did not have a significant effect on SGC. Agricultural banks had higher SGC than the non-agricultural banks during the COVID period. The COVID caused some downward effect on SGC though the effect was non-significant.

CHAPTER 6

CONCLUSIONS AND IMPLICATIONS

6.1. Results Conclusions

This study sheds light on the growth and management strategies followed by the U.S. banks before and during the COVID pandemic. Findings reveal important insights about the growth levers and other bank structural variables. As compared to the non-agricultural banks higher profitability has been reported in agricultural banks during normal times. This finding infers better efficiency of agricultural banks. However, both types of banks stand together in terms of profitability during the COVID. Higher SGC during the PRE-COVID period leads to lower earnings retention, whereas banks' decision related to earnings retention is independent of the anticipated growth during the COVID period. Perhaps banks viewed retained earnings as a risk management tool during the COVID and took cautious stance irrespective of their growth challenge.

Similarly, higher SGC leads to higher asset turnover in both the periods, suggesting ambitious growth requiring efficient asset management. Agricultural and non-agricultural banks stand together in terms of asset management in both the PRE-COVID and COVID period.

Interestingly, lower SGC in the PRE-COVID period leads to higher leverage. This finding could be justified from the notion that banks' capital seeking tendency have been done not in accordance with the growth challenge. Banks' leverage decision in the period is more likely driven by other factors such as competition, favorable borrowing opportunities and market conditions.

Referring to the SGC equation, upward movements in profit margins, asset turnover, and earnings retention caused higher growth in the PRE-COVID period. Also, higher SGC resulting from higher previous quarter's liquidity suggest that banks see liquidity as an important factor for expansion. Growth and bank size were negatively related in the PRE-COVID period, except when it was insignificant in the COVID period meaning that all banks (whether larger or smaller) experienced similar setbacks in their anticipated growth.

6.2**. Results Implications:**

US banks can benefit from the study's findings. For example, banks in the future can avert failure by taking more cautious and prudent management decisions during similar economic crisis as the COVID. In general, banks can minimize risk and improve financial health from the findings of this study.

This study also challenges the pessimistic view of the researchers, policy makers and the public about the ability of the agricultural banks to face the economic crisis. While other sectors were hurdling during the pandemic, agricultural banks were functioning normally as evident by their higher profitability and higher growth rates.

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APPENDICES

Table 10. Seemingly Unrelated Regression from Complete Dataset.

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
PM	21,734	7	.5770029	0.0076	165.91	0.0000
ER	21,734	5	2.596695	0.0005	10.59	0.0601
AT	21,734	7	.0208962	0.5118	22750.88	0.0000
LEV	21,734	7	1.028556	0.8300	106267.71	0.0000
SGC	21,734	9	2.029787	0.0005	19.89	0.0186

	Coef.	**Std.Err.**	**Z**	**P>z**	**[95%Conf.**	**Interval]**
PM						
lagPM	0.070	0.007	10.380	0.000	0.057	0.084
SGC	0.002	0.002	1.220	0.223	-0.001	0.006
laghhi	0.000	0.000	2.140	0.032	0.000	0.000
lagliquidity	0.001	0.001	2.280	0.022	0.000	0.003
laglnasset	0.015	0.003	5.160	0.000	0.010	0.021
ag_dummy	0.036	0.009	3.840	0.000	0.018	0.054
covid	-0.019	0.008	-2.240	0.025	-0.035	-0.002
_cons	-0.140	0.076	-1.840	0.065	-0.288	0.009
ER						
lagER	-0.006	0.007	-0.920	0.360	-0.020	0.007
SGC	-0.004	0.009	-0.420	0.674	-0.021	0.013
laglnasset	-0.038	0.013	-2.940	0.003	-0.064	-0.013
ag_dummy	-0.013	0.041	-0.310	0.756	-0.094	0.068
covid	-0.035	0.037	-0.930	0.351	-0.108	0.038
_cons	1.078	0.166	6.480	0.000	0.752	1.404
AT						

lagAT	0.715	0.005	133.020	0.000	0.705	0.726
SGC	-0.000	0.000	-2.770	0.006	-0.000	-0.000
laghhi	0.000	0.000	4.810	0.000	0.000	0.000
lagliquidity	-0.000	0.000	-21.120	0.000	-0.001	-0.000
laglnasset	0.000	0.000	0.340	0.732	-0.000	0.000
ag_dummy	-0.000	0.000	-0.950	0.343	-0.001	0.000
covid	-0.015	0.000	-49.140	0.000	-0.015	-0.014
_cons	0.065	0.003	23.170	0.000	0.059	0.070
LEV						
lagLEV	0.928	0.003	318.960	0.000	0.922	0.934
laghhi	-0.000	0.000	-1.500	0.133	-0.000	0.000
SGC	-0.002	0.003	-0.540	0.592	-0.009	0.005
lagliquidity	0.005	0.001	4.940	0.000	0.003	0.007
laglnasset	0.010	0.005	1.930	0.053	-0.000	0.021
ag_dummy	-0.019	0.017	-1.130	0.258	-0.052	0.014
covid	0.320	0.015	21.590	0.000	0.291	0.350
_cons	-0.088	0.138	-0.630	0.526	-0.358	0.183
SGC						
dPM	0.037	0.017	2.090	0.036	0.002	0.071
dER	0.003	0.004	0.670	0.503	-0.005	0.010
dAT	-1.538	0.620	-2.480	0.013	-2.754	-0.322
dLEV	-0.005	0.013	-0.360	0.718	-0.031	0.021
laghhi	0.000	0.000	0.320	0.751	-0.000	0.000
lagliquidity	0.004	0.002	1.940	0.053	-0.000	0.008
laglnasset	0.014	0.011	1.360	0.174	-0.006	0.035
ag_dummy	0.063	0.033	1.900	0.057	-0.002	0.127
covid	-0.008	0.031	-0.250	0.799	-0.068	0.053
_cons	-0.531	0.268	-1.980	0.047	-1.055	-0.006

Correlation matrix of residuals:

	PM	ER	AT	LEV	SGC
PM	1.0000				
ER	-0.0112	1.0000			
AT	0.0081	-0.0006	1.0000		
LEV	-0.0150	-0.0006	-0.0230	1.0000	
SGC	-0.0067	-0.0022	0.0083	0.0011	1.0000

Breusch-Pagan test of independence: chi2(10) = 23.172, Pr = 0.0101

Table 10. Seemingly Unrelated Regression using the PRE-COVID Dataset.

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
PM	7,248	6	.0451074	0.9053	70459.42	0.0000
ER	7,248	4	1.196837	0.0297	218.26	0.0000
AT	7,248	6	.0050641	0.9753	315139.89	0.0000
LEV	7,248	6	.656389	0.9077	78587.23	0.0000
SGC	7,248	8	2.03029	0.0003	9.46	0.3047

	Coef.	Std.Err.	z	P>z	[95%Conf.	Interval]
PM						
lagPM	0.914	0.004	254.300	0.000	0.907	0.921
SGC	0.001	0.000	2.330	0.020	0.000	0.001
laghhi	-0.000	0.000	-0.020	0.983	-0.000	0.000
lagliquidity	0.000	0.000	2.380	0.017	0.000	0.000
laglnasset	0.003	0.000	7.800	0.000	0.003	0.004
ag_dummy	0.004	0.002	2.340	0.019	0.001	0.007
_cons	-0.046	0.011	-4.220	0.000	-0.068	-0.025
ER						
lagER	0.211	0.015	13.840	0.000	0.181	0.241
SGC	-0.016	0.007	-2.290	0.022	-0.029	-0.002

laglnasset	-0.038	0.011	-3.500	0.000	-0.060	-0.017
ag_dummy	-0.083	0.034	-2.420	0.016	-0.150	-0.016
_cons	0.964	0.141	6.840	0.000	0.687	1.240
AT						
lagAT	1.326	0.002	544.090	0.000	1.322	1.331
SGC	-0.000	0.000	-0.430	0.669	-0.000	0.000
laghhi	0.000	0.000	2.890	0.004	0.000	0.000
lagliquidity	-0.000	0.000	-10.900	0.000	-0.000	-0.000
laglnasset	-0.000	0.000	-3.650	0.000	-0.000	-0.000
ag_dummy	-0.001	0.000	-4.040	0.000	-0.001	-0.000
_cons	0.015	0.001	11.600	0.000	0.012	0.017
LEV						
lagLEV	0.932	0.003	277.200	0.000	0.926	0.939
laghhi	-0.000	0.000	-0.720	0.470	-0.000	0.000
SGC	-0.007	0.004	-1.750	0.081	-0.014	0.001
lagliquidity	0.000	0.001	0.150	0.884	-0.002	0.003
laglnasset	-0.000	0.006	-0.060	0.950	-0.013	0.012
ag_dummy	-0.014	0.025	-0.590	0.555	-0.063	0.034
_cons	0.489	0.161	3.050	0.002	0.174	0.804
SGC						
dPM	0.932	0.510	1.830	0.068	-0.068	1.932
dER	-0.019	0.017	-1.120	0.264	-0.053	0.014
dAT	-2.307	2.653	-0.870	0.384	-7.506	2.892
dLEV	-0.062	0.036	-1.740	0.082	-0.132	0.008
laghhi	-0.000	0.000	-0.640	0.525	-0.000	0.000
lagliquidity	0.002	0.004	0.420	0.672	-0.006	0.010
laglnasset	-0.002	0.019	-0.100	0.922	-0.040	0.036
ag_dummy	0.049	0.076	0.640	0.524	-0.101	0.198
_cons	-0.077	0.511	-0.150	0.880	-1.078	0.924

Correlation matrix of residuals:

	PM	ER	AT	LEV	SGC
PM	1.0000				
ER	-0.0849	1.0000			
AT	0.0970	0.0034	1.0000		
LEV	-0.0114	-0.0120	-0.2941	1.0000	
SGC	-0.0111	0.0070	0.0002	0.0097	1.0000

Breusch-Pagan test of independence: chi2(10) = 751.543, Pr = 0.0000

Table 11. Seemingly Unrelated Regression for COVID period dataset.

Equation	Obs	Parms	RMSE	"R-sq"	chi2	P
PM	14,486	6	.70044	0.0037	55.08	0.0000
ER	14,486	4	3.062194	0.0006	8.63	0.0710
AT	14,486	6	.0224809	0.3158	6645.54	0.0000
LEV	14,486	6	1.170865	0.8007	58388.07	0.0000
SGC	14,486	8	2.029251	0.0009	19.93	0.0106

	Coef.	Std.Err.	z	P>z	[95%Conf.	Interval]
PM						
lagPM	0.052	0.008	6.230	0.000	0.035	0.068
SGC	0.003	0.003	0.930	0.351	-0.003	0.008
laghhi	0.000	0.000	1.390	0.164	-0.000	0.000
lagliquidity	0.001	0.001	1.090	0.275	-0.001	0.003
laglnasset	0.012	0.004	2.660	0.008	0.003	0.020
ag_dummy	0.032	0.014	2.370	0.018	0.006	0.059
_cons	-0.066	0.109	-0.600	0.546	-0.281	0.149
ER						
lagER	-0.016	0.008	-1.970	0.049	-0.033	-0.000
SGC	0.002	0.013	0.180	0.855	-0.022	0.027
laglnasset	-0.040	0.019	-2.140	0.032	-0.076	-0.003
ag_dummy	0.031	0.059	0.530	0.599	-0.085	0.147
_cons	1.058	0.235	4.500	0.000	0.597	1.519
AT						
lagAT	0.500	0.007	74.320	0.000	0.486	0.513
SGC	-0.000	0.000	-2.760	0.006	-0.000	-0.000
laghhi	0.000	0.000	4.800	0.000	0.000	0.000
lagliquidity	-0.001	0.000	-19.380	0.000	-0.001	-0.000
laglnasset	0.000	0.000	0.640	0.525	-0.000	0.000
ag_dummy	0.001	0.000	2.170	0.030	0.000	0.002

_cons	0.063	0.004	17.680	0.000	0.056	0.070
LEV						
lagLEV	0.929	0.004	237.450	0.000	0.921	0.936
laghhi	-0.000	0.000	-1.480	0.138	-0.000	0.000
SGC	0.001	0.005	0.120	0.901	-0.009	0.010
lagliquidity	0.008	0.001	5.150	0.000	0.005	0.010
laglnasset	0.015	0.007	2.030	0.042	0.001	0.029
ag_dummy	-0.026	0.023	-1.150	0.250	-0.071	0.018
_cons	-0.040	0.188	-0.210	0.834	-0.408	0.329
SGC						
dPM	0.035	0.017	2.020	0.044	0.001	0.069
dER	0.004	0.004	0.920	0.357	-0.004	0.011
dAT	-1.402	0.639	-2.190	0.028	-2.654	-0.150
dLEV	0.004	0.014	0.310	0.754	-0.023	0.032
laghhi	0.000	0.000	1.060	0.289	-0.000	0.000
lagliquidity	0.005	0.003	1.910	0.056	-0.000	0.010
laglnasset	0.018	0.013	1.460	0.145	-0.006	0.043
ag_dummy	0.084	0.039	2.140	0.032	0.007	0.161
_cons	-0.676	0.317	-2.130	0.033	-1.298	-0.054

Correlation matrix of residuals:

	PM	ER	AT	LEV	SGC
PM	1.0000				
ER	-0.0090	1.0000			
AT	0.0107	-0.0009	1.0000		
LEV	-0.0136	0.0016	-0.0375	1.0000	
SGC	-0.0079	-0.0037	0.0090	-0.0014	1.0000

Breusch-Pagan test of independence: chi2(10) = 28.258, Pr = 0.0016

Two-sample t test with unequal variances

	obs1	obs2	Mean 1	Mean 2	dif	St Err	t value	p value
Revenue	14520	14520	34281.126	34586.423	-305.29	2439.013	-.15	.9

Two-sample t test with unequal variances

	obs1	obs2	Mean 1	Mean 2	dif	St Err	t value	p value
Net income by yr~2020	14520	14520	7841.8	5099.3	2742.5	572.80	4.8	0

Two-sample t test with unequal variances

	obs1	obs2	Mean1	Mean2	dif	St Err	t value	p value
assets by yr: 2~2020	14520	14520	988619.75	1138698.9	-150079.1	50552.04	-2.95	.003

Two-sample t test with unequal variances

	obs1	obs2	Mean 1	Mean 2	dif	St Err	t value	p value
deposits by yr:~2020	14520	14520	784683.18	920140.34	-135457.16	39935.935	-3.4	.001

Two-sample t test with unequal variances

	obs1	obs2	Mean 1	Mean 2	dif	St Err	t value	p value
liabilities by ~2020	14520	14520	867598.02	1009833.9	-142235.85	44698.435	-3.2	.002

Two-sample t test with unequal variances

	obs1	obs2	Mean1	Mean2	dif	St Err	t value	p value
equity by yr: 2~2020	14520	14520	120956.92	128789.71	-7832.789	6101.875	-1.3	.2

Two-sample t test with unequal variances

	obs1	obs2	Mean 1	Mean 2	dif	St Err	t value	p value
liquidity by yr~2020	14520	14520	94.99	94.555	.435	.079	5.5	0

Two-sample t test with unequal variances

	obs1	obs2	Mean1	Mean2	dif	St Err	t value	p value
AGR by yr: 2019 2020	10890	14512	.477	.005	.472	.008	58.25	0

Two-sample t test with unequal variances

	obs1	obs2	Mean1	Mean2	dif	St Err	t value	p value
SGR by yr: 2019 2020	10890	14513	.036	.028	.007	.001	10.6	0

Two-sample t test with unequal variances

	obs1	obs2	Mean1	Mean2	dif	St Err	t value	p value
SGC by yr: 2019 2020	10890	14509	.441	-.023	.465	.008	57.8	0

Two-sample t test with unequal variances

	obs1	obs2	Mean1	Mean2	dif	St Err	t value	p value
ag share by yr:~2020	14520	14520	15.844	15.693	.152	.249	.6	.542

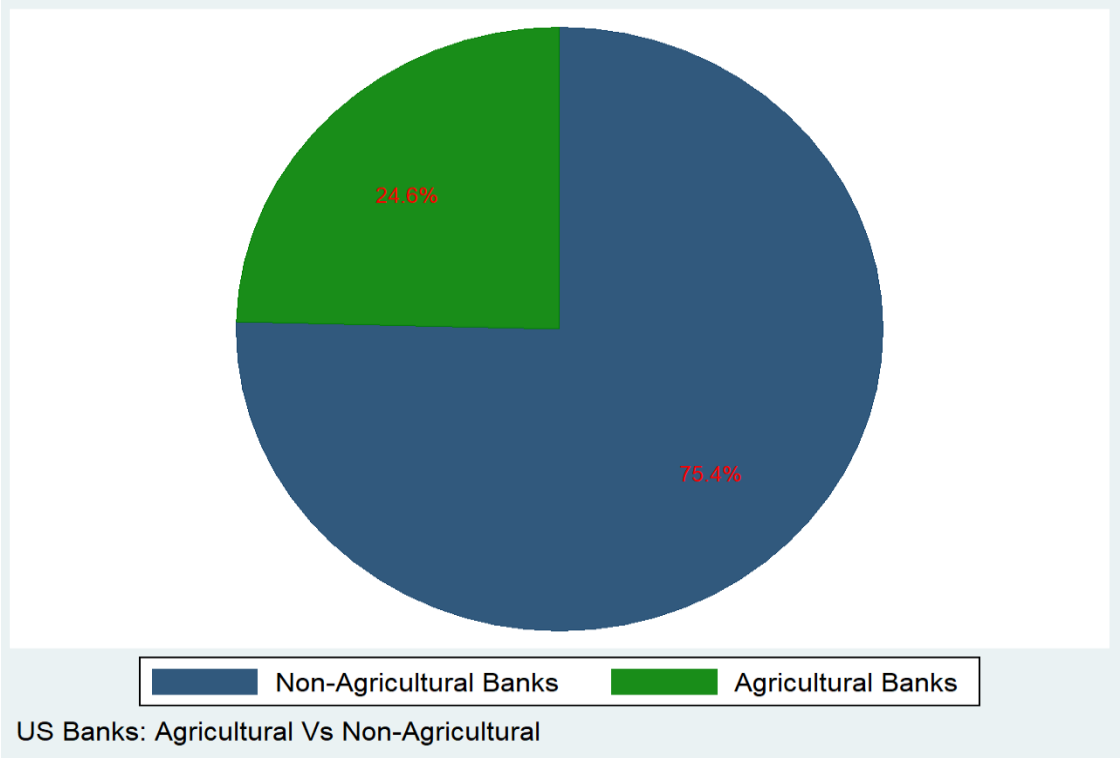

Figure 6. Share of Agricultural Banks in U.S.