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Weathering the COVID-19 storm: The case of community banks

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\textbf{ABSTRACT}

We examine the immediate impact of COVID-19 on the performance of FDIC chartered banks. Our experimental design analyses the performance of community banks and large banks before and during the COVID-19 pandemic. Community banks significantly outperform large banks in several key measures in the first three-quarters of COVID-19. Findings are consistent with the view that the advantages of solid customer relationships and a greater understanding of local businesses are invaluable during periods of high externalities. This result is more pronounced for community banks located in metropolitan areas. We also find that the pandemic’s adverse effects on bank performance are minimized in states with higher quality healthcare facilities, as measured by our healthcare index. In addition, the performance of community banks varies across geographical regions during this pandemic period. Finally, our study expands the understanding of how community banks’ performance and risk-taking change during a pandemic.

1. Introduction

COVID-19 is an example of rare exogenous shock financial industries face occasionally. Like other businesses, financial institutions are in difficult positions and continue to navigate to avoid the unexpected. Both large and small financial institutions are absorbing the economic fallout caused by this pandemic. Because of the ongoing pandemic, financial institutions are sorting out their priorities to reposition themselves for the future.

In this study, we empirically investigate the immediate impact of COVID-19 on FDIC chartered banks’ performance. Mainly, we focus on how community banks (CBs)\textsuperscript{1} are performing compared to their large counterparts, such as large banks (NCBs). The NCBs have more resources to spend on remote banking technologies and are more prepared for tech-depended transactions than the community banks. Many believe that this COVID-19 pandemic brings an existential threat to the in-person traditional banking models embraced by most of the CBs. However, the U.S. Small Business Administration’s numbers show that CBs capitalized on their

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\textsuperscript{1} We define a bank with total asset less than $1 billion as community bank. The $1 billion threshold for community banks used in prior studies (Berger and Bouwman, 2013; DeYoung et al., 2004). As robustness check, in the later section, we use alternative measures of community banks such as FDIC definition of community banks and community banks with assets up to $10 billion.
relationship banking during this pandemic, even more, to distribute 80% of the first round of paycheck protection program (PPP) to 1.7 million businesses.\(^2\)

The U.S. community banks have played a pivotal role in economic development by providing essential support to local businesses and consumers over the past 120 years. A large body of literature (e.g., Haynes et al., 1999; Cole et al., 2004; Scott, 2004; Berger et al., 2005) documents that community banks’ ability to render customized services according to the local community’s needs, coupled with disciplined lending behavior, comprises their fundamental value propositions. Even though both large and small banks give large quantities of small business loans, community banks’ strong bonding with local communities and knowledge about the informationally opaque local businesses provide them a competitive advantage over their large counterparts. Dealing with informationally opaque firms requires processing soft information, which is often challenging to quantify and fit into the quantitative lending models adopted by large banks (Berger and Udell, 2002; Stein, 2002). Notably, local knowledge is crucial for certain businesses, such as real estate and small businesses in general. Unlike large national banks, community banks rely on local communities for deposits and lending. While large banks generate revenue mostly from non-interest income, trading, and investment activities, a significant portion of the community banks’ revenue stems from interest income. Over the past several decades, community banks have been losing the battle to large Wall Street financial institutions due to the increased costs associated with regulatory reforms and bank consolidation (Lux and Greene, 2015).\(^3\) Despite a significant decline in the number of community banks, as shown in Fig. 1, these banks’ contribution to small lending remains substantial.\(^4\) Community banks rely on relationship banking, which is non-standardized and often subject to local business vulnerabilities. Several studies show that borrowers benefit from stronger relationship banking as their lenders rely on soft information, which increases loan acceptance rate and reduces collateral requirements (Petersen and Rajan, 1995; Berger and Udell, 1995; Elsa, 2005; Harhoff and Korting, 1998; Moro and Fink, 2013). Bharath et al. (2011) study the lending relationship in the U.S. and find that solid relationship banking is associated with lower lending interest. Several studies find evidence that large banks are less inclined to relationship banking due to a lack of hard information for small and young businesses (Haynes et al., 1999; Scott, 2004; Berger et al., 2005). During 2007–2008 financial crisis, the community banks’ traditional relationship banking model reemerged (Gunther and Klemme, 2012). Personalized orientation with borrowers allowed these banks to lend high-quality loans, enabling them to withstand extreme externalities. Patron and Smith (2015) find that community banks capitalized on the Financial Accounting Standards Board’s (FASB) relaxation of mark-to-market accounting standard to selectively liquidate assets and lift asset prices during the financial crisis. As a result, community banks’ failure rates were significantly lower than large banks, and most community banks survived without or with little federal support.

Using the FDIC financial institutions data for the three quarters before COVID-19 and the first three quarters during COVID-19,\(^5\) we analyze the performance of CBs and NCBs. Our experimental design includes a binary variable, COVID, which takes a value of zero for the pre-pandemic period and a value of one for the pandemic period. To categorize the banks’ type, we construct a dummy variable, COM, which takes a value of one for CBs and zero for the NCBs. The interaction term between COVID and COM and the control variables suggest how banks’ performance has changed from the pre-pandemic to the pandemic period. A positive (negative)

\(^2\) Community banks with assets less than $1 billion distributed 20% of the total PPP and the remaining 60% was distributed by the banks with assets less than $10 billion. Altogether, a total $300 billion was distributed in the first round of PPP, which ran from March to August 2020.

\(^3\) For example, the Dodd-Frank Wall Street Reform and Consumer Protection Act increased costs of doing businesses disproportionately for the community banks. Baily and Montalbano (2015) find that the decline in the number of community banks largely happened among the banks with less than $100 million assets. These banks share a tiny fraction of market share and do not pose any systematic risk over the financial intermediation process.

\(^4\) In the U.S., the number of community banks declined by 64.97% during the period 1994–2020 (from 12,302 community banks reported in the first quarter of 1994 to 4,039 community banks in the first quarter of 2020). During the same period, the number large banks decreased only by 5.77% (from 866 to 816).

\(^5\) Lux and Greene (2015) report that community banks provide over 77% of agricultural loans and over 50% of small business loans. Pre-COVID-19 quarters are quarter 1-quarter 3 of 2019 and COVID-19 available quarters are quarter 1-quarter 3 of 2020. We assume the 4\(^{th}\) quarter of 2019 as the COVID-19 outbreak period. We have checked the robustness of including the fourth quarter of 2019 as in both pre and during the covid sample period. We included the findings in Table 1 of the online appendix.
### Table 1
Descriptive statistics.

#### Panel A

| Variable         | (1) All Banks |             | (2) Community Banks |             | (3) Non-Community Banks | Mean Diff (2 - 3) | P-Value |
|------------------|---------------|-------------|---------------------|-------------|-------------------------|-------------------|---------|
|                  | N             | Mean        | Median              | SD          | P25                     | P75               |         |
| ROA              | 30,515        | 0.0108      | 0.0105              | 0.008       | 0.007                   | 0.014             |         |
| ROE              | 30,515        | 0.094       | 0.092               | 0.069       | 0.057                   | 0.128             |         |
| NIM              | 30,509        | 0.037       | 0.036               | 0.008       | 0.032                   | 0.041             |         |
| EMPLOYEE         | 30,449        | 3.986       | 3.850               | 1.293       | 1.315                   | 4.691             |         |
| SIZE             | 30,569        | 12.586      | 12.411              | 1.437       | 11.626                  | 13.310            |         |
| LOAN             | 30,569        | 0.643       | 0.679               | 0.164       | 0.559                   | 0.762             |         |
| EQUITY           | 30,515        | 0.122       | 0.112               | 0.041       | 0.097                   | 0.132             |         |
| CORE CAPITAL     | 30,515        | 0.118       | 0.107               | 0.041       | 0.095                   | 0.127             |         |
| EFFICIENCY       | 30,512        | 0.676       | 0.663               | 0.168       | 0.571                   | 0.764             |         |
| ASSET/EMP        | 30,449        | 1.684       | 1.641               | 0.436       | 1.418                   | 1.912             |         |
| LOAN LOSSES      | 30,515        | 0.002       | 0.001               | 0.003       | 0.000                   | 0.002             |         |
| SECURITIES       | 30,569        | 0.185       | 0.154               | 0.146       | 0.076                   | 0.260             |         |
| CONCENTRATION    | 30,569        | 1.577       | 1.609               | 0.332       | 1.609                   | 1.609             |         |
| DEPOSIT          | 30,569        | 0.830       | 0.847               | 0.072       | 0.803                   | 0.877             |         |
| UNEMPLOYMENT     | 30,516        | 0.0639      | 0.044               | 0.042       | 0.033                   | 0.083             |         |
| AGE              | 30,552        | 4.2561      | 4.585               | 0.731       | 3.82864                 | 4.762             |         |
| SIZE(ROA)        | 30,497        | 0.004       | 0.002               | 0.006       | 0.001                   | 0.004             |         |
| SD(ROA)          | 30,497        | 0.030       | 0.017               | 0.042       | 0.009                   | 0.033             |         |
| SD(NIM)          | 30,490        | 0.002       | 0.001               | 0.002       | 0.001                   | 0.002             |         |

#### Panel B: Pre-Covid-19

| Variable         | (1) All Banks |             | (2) Community Banks |             | (3) Non-Community Banks | Mean Diff (2 - 3) | P-Value |
|------------------|---------------|-------------|---------------------|-------------|-------------------------|-------------------|---------|
|                  | N             | Mean        | Median              | SD          | P25                     | P75               |         |
| ROA              | 15,320        | 0.0111      | 0.011               | 0.008       | 0.007                   | 0.015             |         |
| ROE              | 15,320        | 0.098       | 0.096               | 0.065       | 0.063                   | 0.130             |         |
| NIM              | 15,317        | 0.038       | 0.038               | 0.008       | 0.034                   | 0.042             |         |
| EMPLOYEE         | 15,378        | 3.980       | 3.850               | 1.288       | 3.135                   | 4.682             |         |
| SIZE             | 15,347        | 12.524      | 12.340              | 1.426       | 11.573                  | 13.233            |         |
| LOAN             | 15,347        | 0.652       | 0.689               | 0.164       | 0.570                   | 0.771             |         |
| EQUITY           | 15,320        | 0.124       | 0.114               | 0.043       | 0.099                   | 0.134             |         |
| CORE CAPITAL     | 15,320        | 0.121       | 0.110               | 0.042       | 0.097                   | 0.130             |         |
| EFFICIENCY       | 15,319        | 0.676       | 0.666               | 0.162       | 0.575                   | 0.761             |         |
| ASSET/EMP        | 15,287        | 1.630       | 1.587               | 0.427       | 1.372                   | 1.848             |         |
| LOAN LOSSES      | 15,320        | 0.001       | 0.001               | 0.003       | 0.000                   | 0.001             |         |
| SECURITIES       | 15,347        | 0.189       | 0.160               | 0.146       | 0.081                   | 0.263             |         |
| CONCENTRATION    | 15,347        | 1.574       | 1.609               | 0.333       | 1.099                   | 1.609             |         |
| DEPOSIT          | 15,320        | 0.830       | 0.846               | 0.071       | 0.804                   | 0.876             |         |
| UNEMPLOYMENT     | 15,320        | 0.035       | 0.034               | 0.006       | 0.032                   | 0.040             |         |
| AGE              | 15,303        | 4.249       | 4.575               | 0.738       | 3.829                   | 4.762             |         |
| FACILITY INDEX   | 15,320        | 0.326       | 0.315               | 0.061       | 0.283                   | 0.362             |         |
| SD(ROA)          | 15,302        | 0.003       | 0.002               | 0.005       | 0.001                   | 0.003             |         |
| SD(ROE)          | 15,302        | 0.025       | 0.014               | 0.037       | 0.007                   | 0.027             |         |
| SD(NIM)          | 15,298        | 0.001       | 0.001               | 0.001       | 0.001                   | 0.001             |         |

During Covid-19

(continued on next page)
During Covid-19

| Variable       | (1) All Banks | (2) Community Banks | (3) Non-Community Banks | Mean Diff (2–3) | P-Value |
|----------------|---------------|----------------------|-------------------------|-----------------|---------|
|                | N  | Mean | Median | SD  | P25 | P75 | N  | Mean | Median | SD  | P25 | P75 | N  | Mean | Median | SD  | P25 | P75 | Mean Diff (2–3) | P-Value |
| **ROA**        | 15,195 | 0.010 | 0.010 | 0.009 | 0.006 | 0.014 | 12,551 | 0.010 | 0.010 | 2644 | 0.0101 | 0.0098 | 0.000 | 0.000 | 0.090 | 0.085 | 0.008 | 0.000 | 0.000 | 0.000 | 0.000 |
| **ROE**        | 15,192 | 0.035 | 0.035 | 0.008 | 0.031 | 0.040 | 12,548 | 0.036 | 0.035 | 2644 | 0.034 | 0.034 | 0.002 | 0.002 | 0.091 | 0.073 | 0.051 | 0.000 | 0.000 | 0.000 | 0.000 |
| **NIM**        | 15,162 | 3.993 | 3.871 | 1.298 | 3.135 | 4.700 | 15,223 | 3.579 | 3.611 | 2639 | 5.961 | 5.714 | 2.382 | 0.000 | 3.058 | 0.659 | 0.549 | 0.000 | 0.000 | 0.000 | 0.000 |
| **EMPLOYEE**   | 15,162 | 3.993 | 3.871 | 1.298 | 3.135 | 4.700 | 12,524 | 3.579 | 3.611 | 2639 | 5.961 | 5.714 | 2.382 | 0.000 | 3.058 | 0.659 | 0.549 | 0.000 | 0.000 | 0.000 | 0.000 |
| **SIZE**       | 15,222 | 12.648 | 12.473 | 1.446 | 11.680 | 13.870 | 15,222 | 12.648 | 12.473 | 11.680 | 13.870 | 12,551 | 12.148 | 12.198 | 2644 | 0.625 | 0.654 | 0.000 | 0.000 | 0.000 | 0.000 |
| **NIM**        | 15,192 | 0.035 | 0.035 | 0.008 | 0.031 | 0.040 | 12,548 | 0.036 | 0.035 | 2644 | 0.034 | 0.034 | 0.002 | 0.002 | 0.091 | 0.073 | 0.051 | 0.000 | 0.000 | 0.000 | 0.000 |
| **LOAN**       | 15,192 | 0.035 | 0.035 | 0.008 | 0.031 | 0.040 | 12,548 | 0.036 | 0.035 | 2644 | 0.034 | 0.034 | 0.002 | 0.002 | 0.091 | 0.073 | 0.051 | 0.000 | 0.000 | 0.000 | 0.000 |
| **EQUITY**     | 15,195 | 0.119 | 0.110 | 0.041 | 0.096 | 0.130 | 12,551 | 0.121 | 0.111 | 2644 | 0.111 | 0.106 | 0.010 | 0.010 | 0.091 | 0.073 | 0.051 | 0.000 | 0.000 | 0.000 | 0.000 |
| **CORE CAPITAL** | 15,195 | 0.119 | 0.110 | 0.041 | 0.096 | 0.130 | 12,551 | 0.121 | 0.111 | 2644 | 0.111 | 0.106 | 0.010 | 0.010 | 0.091 | 0.073 | 0.051 | 0.000 | 0.000 | 0.000 | 0.000 |
| **EFFICIENCY** | 15,222 | 12.648 | 12.473 | 1.446 | 11.680 | 13.870 | 12,551 | 12.148 | 12.198 | 2644 | 0.625 | 0.654 | 0.000 | 0.000 | 3.058 | 0.659 | 0.549 | 0.000 | 0.000 | 0.000 | 0.000 |
| **LOG(AME)**   | 15,195 | 0.010 | 0.010 | 0.009 | 0.006 | 0.014 | 12,551 | 0.010 | 0.010 | 2644 | 0.0101 | 0.0098 | 0.000 | 0.000 | 0.090 | 0.085 | 0.008 | 0.000 | 0.000 | 0.000 | 0.000 |
| **SD(ROA)**    | 15,195 | 0.006 | 0.002 | 0.009 | 0.002 | 0.014 | 12,551 | 0.006 | 0.002 | 2644 | 0.006 | 0.002 | 0.000 | 0.000 | 0.090 | 0.085 | 0.008 | 0.000 | 0.000 | 0.000 | 0.000 |
| **SD(ROE)**    | 15,195 | 0.035 | 0.035 | 0.008 | 0.031 | 0.040 | 12,548 | 0.036 | 0.035 | 2644 | 0.034 | 0.034 | 0.002 | 0.002 | 0.091 | 0.073 | 0.051 | 0.000 | 0.000 | 0.000 | 0.000 |
| **SD(NIM)**    | 15,192 | 0.030 | 0.030 | 0.008 | 0.031 | 0.040 | 12,548 | 0.036 | 0.035 | 2644 | 0.034 | 0.034 | 0.002 | 0.002 | 0.091 | 0.073 | 0.051 | 0.000 | 0.000 | 0.000 | 0.000 |

This table presents the summary statistics of the variables used in difference-in-differences tests. We consider the first three quarters of 2019 as the pre–COVID-19 period and the first three quarters of 2020 as the pandemic periods, and our τ = 0 is the 4th quarter of 2019. Banks with at least one observation in the pre and post ruling period are included in the sample. Definitions and measurements of all the variables used in this study are provided in the appendix, along with data sources. In Panel A, we present the summary statistics of the variables used in the Diff-in-Diff exercise. Panel B presents the summary statistics for before the pandemic (2019 Q1–2019:Q3). Panel C presents the summary statistics for the pandemic (2020 Q1–2020:Q3).
We use three bank performance measures, namely return on assets (ROA), return on equity (ROE), and the net interest margin (NIM), to examine the impact of the pandemic on banks’ performance. The findings imply that the advantages of strong customer relationships and a deeper understanding of the local markets help CBs to differentiate from large banks. The result is consistent with prior relationship banking literature (Haynes et al., 1999; Scott, 2004; Berger et al., 2005). Although both the CBs and the NCBs reported a decline in their operating performance as shown in Panel B and C of Table 1 (see tables in the appendix), the average decrease in ROA, ROE, and NIM in the first three-quarters of the pandemic for NCBs were 22%, 17%, and 8%, respectively. The average decrease in the same outcome variables in the first three-quarters of the pandemic for CBs was 8%, 6%, and 7%, implying a strong withstand of the COVID-19 storm in the CBs. This result is consistent with Elyasiani and Jia (2019), who study small and large US banks’ performance during the 2007–2009 financial crisis. As shown in Fig. 2, ROA and NIM of large banks declined sharply for the NCBs during the 2008–2009 period compared to CBs. Similarly, we observe a significant difference in the NIM for the community banks in the sample period. Consistent with Morris and Regehr (2014), we find CBs earn historically low NIM. However, as shown in Fig. 2, the NIM of CBs declined less than the NBS during high externality episodes.

We conduct several sub-sample analyses to explore the potential channel through which the CBs outperform the large banks. We find that the difference between the operating performance is more pronounced for the CBs in metropolitan areas where market competition is comparatively higher than the rural areas. Since the COVID-19 pandemic is directly related to health risk, we investigate the impacts of state-level preparedness in handling COVID-19 on banks’ performance. In doing so, we develop three health facility indices based on the total number of hospital beds, ICU beds, and the number of community health care service centers per state. A higher value of the facility index indicates less extreme externalities as the possibility of COVID-19 spread and related health risks are subsidized in high-quality healthcare facility states. We find that both bank groups’ performance increased during COVID-19 relative to pre–COVID-19 periods in the conditions with a high ICU Bed Index value reported in columns (4)–(5) in Table 6. The interaction among COVID-19 (COVID), community banks (COM), and facility index (HEALTH INDEX) imply that community banks deliver more when externalities worsen. We also investigate the performance of CBs and NCBs by geographical region. Results show that the performance of CBs varies across the FDIC supervisory regions during this pandemic. It is often argued that CBs, which are members of bank holding companies, have access to high-tech facilities. We find that a holding company membership is not associated with increased operating performance during COVID-19. One possible explanation is that CBs, which belong to bank holding companies, may replicate the large banks’ standardized business models and rely on their static banking services. De Haan and Poghosyan (2012) and Laeven et al. (2016) find that during the financial crisis of 2007–2009, large banks’ earnings volatility and risks increased more than small banks. We find that the risk-taking and the assets’ riskiness declined more in the CBs than the NCBs during the first three-quarters of the pandemic.

The aforementioned performance indicators are consistent with the literature. For example, Laeven et al. (2016) show that large banks are exposed to more systemic risks because of their size. They also argue that the severity of systematic risks increases for the large banks when their capital ratio decreases. Avramidis et al. (2018) find that bank size’s adverse effects are primarily associated with increased monitoring costs of the borrowers by the lenders and the managers’ increased monitoring costs by the banks’ owners. They conclude that monitoring costs outweigh the benefits of economies of scale for the large banks. A significant source of revenues for NCBs is non-traditional banking services fees, which behave like friends in good times and enemies in bad times. Berndt and Gupta (2009) and DeYoung and Torna (2013) find evidence that greater reliance on non-traditional sources of revenue is problematic for NCBs since their riskiness increases and profitability decreases during the crisis periods. Berger and Bouwman (2013) investigate why the CBs perform better than the NCBs in the crisis and find that the pre-crisis risk-taking behavior of the NCBs is associated with performance collapse during the crisis periods. NCBs’ practices of accounting are also associated with their deteriorating performance during the crisis period. Balla et al. (2012) and Beck and Naraynamoorthy (2013) show that large banks’ reduced conservatism in terms of loan loss provisions before the crisis period leads to an increase in provisioning during times of crisis, at the cost of profitability. CBs, on the other hand, are very selective in their lending and follow accounting conservatism, which helps them during the periods of high externalities.

Our study makes several contributions to both the financial institutions and the growing COVID-19 literature. First, taking COVID-19 as an exogenous shock to the banking industry, we compare the performance and risk-taking of CBs and NCBs in the extreme market externalities. Although CBs and NCBs compete in the same marketplace for businesses, they are fundamentally very different and ideally very distinct. Second, we add to the literature on banks’ failure and banks’ performance during the crisis periods by providing evidence on fundamental characteristics that differentiate the CBs from the NCBs (Berger and Bouwman, 2013; Cole and White, 2012; Ng and Roychowdhury, 2014). Third, we provide new evidence of how state-level preparedness can reduce the adverse effects of a public health crisis on banks’ performance. Finally, we extend the literature on risk-taking and de-risking of assets by the small and large banks during crisis periods.

We organize the rest of the paper as follows; section 2 discusses data and methodologies; section 3 presents and discusses empirical findings; section 4 describes robustness tests; and section 5 concludes the paper.

\footnote{Variable definitions are provided in the appendix.}
2. Data and methodology

Data on FDIC chartered depository institutions are obtained from FDIC\(^8\) statistics on depository institutions for 2019:Q1 – 2020:Q3. State-level unemployment data of the US Bureau of Labor Statistics are obtained from the Federal Reserve Bank of St. Louis.\(^9\) Data on states’ total hospital beds, the total number of ICU beds, and the total number of community healthcare centers are obtained from State Data and Policy Actions to Address Coronavirus.\(^10\) We consider the period 2019:Q4 as the COVID-19 outbreak period, which leaves three quarters before COVID-19 and three quarters during the COVID-19 periods for the experimental analyses. We have considered the banks that are present in both periods. Our sample includes 30,569 observations and 5,120 unique banks, of which 4,360 banks are CBs, and 945 banks are NCBs.

To compare and investigate the performance of the CBs and NCBs before and during (contemporary analysis) the pandemic, we use the following experimental design.

\[
y_{it} = \alpha + \beta \text{COVID}_t \times \text{COM}_i + \delta \text{COM}_i + \gamma \text{Controls}_{it} + \text{StateFE} + \text{Time FE} + \epsilon_{it}
\]  

Where \(t\) denotes the quarter, \(i\) denotes the bank. The indicator variable COVID takes a value of 1 from 2020:Q1 to 2020:Q3 and 0 from 2019:Q1 to 2019:Q3. COM is a binary variable that takes a value of 1 for the community banks and 0 for the non-community banks. Eq. (1) includes the state-fixed effects to address the latent unobserved factors associated with the states/counties. Standard errors are clustered by state and banks. We expect the estimated coefficient of \(\beta\) from the interaction between COVID and COM would be positive and statistically significant.

Our dependent variables \(y_{it}\) are ROA, ROE, and NIM and measure performance outcome. The dependent variables are consistent with the determinants of banks’ profitability (Athanasoglou et al., 2008; Dietrich and Wanzenried, 2011; Elyasiani and Jia, 2019; Pasiouras and Kosmidou, 2007; Golin and Delhaise, 2013). ROA is an indication of a bank’s ability to generate profit from available assets. Essentially, ROA tells how effectively a bank utilizes its assets towards profitability (Dietrich and Wanzenried, 2011). ROA is the most widely used measure for evaluating banks’ performance (Golin and Delhaise, 2013). ROE indicates the return on equity, i.e., returns to the owners, is commonly used in the literature as a proxy for profitability. We admit that ROE is a less reliable measure of profitability than ROA because a bank with a lower leverage ratio will report higher ROA and lower ROE. NIM measured our final performance as annualized total interest less total interest expenses as a percentage of total average earning assets. Thus, NIM implies

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\(^8\) Statistics on Depository Institutions obtained from https://www7.fdic.gov/sdi/index.asp

\(^9\) State Employment and Unemployment available at https://fred.stlouisfed.org/release?rid=112

\(^10\) State Data and Policy Actions to Address Coronavirus available at https://www.kff.org/coronavirus-covid-19/issue-brief/state-data-and-policy-actions-to-address-coronavirus/
profitability corresponding with interest.

We use a set of control variables commonly used in the bank’s performance literature (Athanasoglou et al., 2008; Beltratti and Stulz, 2009; Dietrich and Wanzenried, 2011; Pasiouras and Kosmidou, 2007; Smirlock, 1985; Stiroh and Rumble, 2006). Our bank-specific control variables include Size, Loan, Equity, Core Capital, Efficiency, Asset/Employee, Loan Losses, Securities, Concentration, and Deposit. Size is measured as the log of total assets; Loan is a total loan and leases scaled by total assets; Equity is the equity capital to total assets; Core Capital is measured as the Tier 1 (core) capital scaled by total assets minus the intangible liabilities; Efficiency ratio is the portion of net operating revenue is consumed by the overhead expenses implying a higher efficiency ratio indicates lower efficiency; Asset/Employee is the total assets in millions of US dollar scaled by the total number of full-time bank employees; Loan Losses is measured as the loan losses allowance to net loans and leases; Securities are calculated as total investment securities to total assets; Concentration variable indicates a bank’s primary specialization in terms of the composition of total assets and measures as log (1 + assets concentration hierarchy); Deposit is the bank’s total deposit to total assets ratio; Age is a bank’s age since its date of establishment. We also control for state unemployment to account for the macroeconomic condition. The definitions and data sources are explained in Appendix A.

3. Empirical results

3.1. Descriptive statistics

In this section, we present the descriptive statistics of the variables used in this study. Panel A, Panel B, and Panel C of Table 1 show the descriptive statistics for the full sample period, pre–COVID-19 period, and COVID-19, respectively.

In each panel, column (1), column (2), and column (3) report the descriptive statistics for the full sample, CBs, and NCBs, respectively. The table also includes the mean differences between CBs and NCBs sub-sample variables and the p-values of their mean differences. The sample’s period quarterly ROA is 1.08%. Specifically, the ROA was 1.10% in the pre–COVID-19 period and currently measures at 1.01% during the COVID-19 period. This indicates a decline of ROA in the COVID-19 period compared to the pre–COVID-19. The ROA of CBs and NCBs were 1.1% and 1.29%, respectively, in the pre–COVID-19 period implying higher profitability of NCBs in the pre-pandemic period. However, during the pandemic, the ROA declined to 1.0% and 1.1% for the CBs and NCBs. Although both types of banks reported a decline in ROA during the pandemic, the largest drop (22%) occurred to NCBs during the pandemic compared to the pre-pandemic period. The CBs reported a decline of 8% in ROA. The NCBs reported a 17% decline in ROE, and CBs reported a 6% decline. We observe a slight difference in NIM, where NIM of CBs and NCBs were 7% lower and 8% lower, respectively, in the COVID-19 period compared to the pre–COVID-19 period. The distribution of ROA for the NCBs was right-skewed before the pandemic, suggesting the highly profitable NCBs in the high end of the distribution. We observe that the profitability (ROA) distribution for NCBs becomes symmetric during the pandemic, implying that the highly profitable banks lose more than other NCBs during COVID-19. The Efficiency ratio increases more during the COVID-19 period for the NCBs than the CBs, suggesting a decline in efficiency for the large banks. The mean size of the CBs increased by 0.59%, and the mean size of the NCBs decreased by 0.07% during the pandemic. CBs lost 0.12% in deposit, 4% in core capital, and 3% in equity; NCBs gained 0.85% in deposits, lost 5% in core capital, and lost 7% in equity during the pandemic period. We observe a significant increase in the loan losses and a large decline in the equity in NCBs compared to CBs. The reduction of the number of employees observed more in the NCBs (1.68%) compared to CBs (0.82%) in the COVID-19 period. As depicted in Fig. 3, a sharp decline occurred in the NCBs’ profitability (ROA and ROE) in the first quarter. Overall, these statistics suggest that CBs are withstanding the COVID-19 better in fundamentals than the NCBs.

The Correlation matrix of the variables used in the empirical analyses is reported in Table 2. The statistical significance of the correlation matrix is denoted at a 5% level of significance.

3.2. Univariate results

In this section, we analyze the effects of COVID-19 on banks’ performance in a univariate setup. We compare the univariate results for the CBs and NCBs before and during COVI-19 in columns (1) and column (2) of Table 3, respectively.

In column (3) of Table 3, we present the differences in performance between CBs and NCBs using a diff-in-diff (DID) approach. The results reported in Table 3 show that CBs and NCBs were better-off pre–COVID-19 in performance measures. CBs exhibited a ROA of 0.11% and an ROE of 9.3% before the pandemic influx. The ratios have decreased to 1.0% and 9.0%, respectively. On the other hand, NCBs exhibited ROA and ROE of 1.30% and 11.30%, respectively, before the pandemic. The ratios declined to 1.00% and 9.40%, respectively, implying the pandemic’s costly effects upon NCBs. In column (3), the DID shows that CBs are doing significantly better than NCBs in terms of ROA and ROE. Overall, these univariate results show that CBs experience less severity from COVID-19 than the NCBs. We next move to multivariate analyses to empirically examine the impacts of COVID-19 on banks’ performance.

11 Tier 1 (core) capital includes common equity + non-cumulative perpetual preferred stock + minority interests in consolidated subsidiaries - goodwill and other intangible assets.

12 Calculated as net interest expenses minus amortization of intangible assets as a percentage of net interest income and other non-interest income.

13 For example, a bank is Agriculture specialized when its agricultural loans + real estate loans secured by farmland exceed 25% of total loan and leases. Similarly, a bank is commercial loan specialized when its commercial and industrial loans plus real estate loans plus the loans secured by commercial real estate exceeds 25% of the bank’s total assets.
3.3. Multivariate results of earnings

This section empirically examines whether the CBs and the NCBs performed significantly differently compared to their pre–COVID-19 period performance. Table 4 presents the multivariate regression analyses of banks’ performance measured by ROA, ROE, and NIM. The estimated coefficients of the interaction term COVID × COM are positive and statistically significant for all the performance measures. The economic significance of these findings is non-trivial. For example, CBs have 0.7 % more ROA, 0.60 % more ROE, and 0.11 % more NIM than NCBs in the first three-quarters of the pandemic. The estimated coefficients imply CBs perform better during the pandemic relative to NCBs, consistent with the view that CBs withstand high externalities better than the NCBs (De Haan and Poghosyan, 2012; Elyasiani and Jia, 2019; Laeven et al., 2016). The COM variable’s coefficients in NIM (columns 3 and 6) are negative and support the notion that CBs historically earn lower NIM than the NCBs (Morris and Regehr, 2014). The signs and significance level of the control variables’ coefficients are consistent with the bank performance literature. The negative sign of estimated coefficients of the Efficiency ratio in all three performance measures indicates that a significant portion of the net operating revenue absorbed by overhead expenses is associated with reduced bank performance. Loan losses are negatively associated with ROA and ROE. A higher asset to employee ratio negatively impacts banks’ performance. Finally, we find that state-level unemployment rates decline banks’ net interest margin (Balla and Rose, 2019).

3.4. Quantile regression

In this section, we analyze the effects of COVID-19 on the bank’s performance using DID quantile regression (QDID) based on conditional quantile function \( Q_q(y|x) \) where the quantiles are 0.25, 0.5, and 0.75. Our performance measures \( y \) (ROA, ROE, NIM) divides into below the \( q \) and above the \( 1-q \), and the median takes \( q = 0.5 \). We conduct this quantile regression for a more robust estimation of the outliers and avoiding the assumptions of the parametric distribution of the error terms. Thus, we use bootstrap to calculate the standard errors (Angrist and Pischke, 2009; Meyer et al., 1995).

In Table 5, the estimated coefficient of COVID × COM is significant in all the three performance measures at \( q = 0.25 \), \( q = 0.50 \), and \( q = 0.75 \), except the NIM at \( q = .25 \). In the before COVID-19 sample, the differences in performance measures are not consistently significant across the quantile. However, we observe substantial performance differences during the COVID-19 period at \( q = 0.50 \) and \( q = 0.75 \). In Fig. 4, we plot the QDID where the dependent variable is ROA. We find evidence that the effects of COVID-19 on banks’ performance are stronger at the upper quantile.
Table 2
Pairwise correlation.

| Variables        | (1)  | (2)  | (3)  | (4)  | (5)  | (6)  | (7)  | (8)  | (9)  | (10) | (11) | (12) | (13) | (14) | (15) | (16) | (17) | (18) |
|------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| (1) ROA          | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (2) ROE          | 0.907* | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (3) NIM          | 0.291* | 0.294* | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (4) EMPLOYEE     | 0.104* | 0.150* | 0.009 | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (5) SIZE         | 0.096* | 0.149* | -0.093* | 0.935* | 1    |      |      |      |      |      |      |      |      |      |      |      |      |      |
| (6) LOAN         | 0.020* | 0.105* | 0.410* | 0.234* | 0.226* | 1    |      |      |      |      |      |      |      |      |      |      |      |      |
| (7) EQUITY       | 0.109* | -0.194* | -0.070* | -0.161* | -0.173* | -0.284* | 1    |      |      |      |      |      |      |      |      |      |      |      |
| (8) CORE CAPITAL | 0.104* | -0.182* | -0.072* | -0.229* | -0.237* | -0.270* | 0.964* | 1    |      |      |      |      |      |      |      |      |      |      |
| (9) EFFICIENCY   | -0.686* | -0.655* | -0.182* | -0.183* | -0.306* | -0.104* | -0.003 | 0.025* | 1    |      |      |      |      |      |      |      |      |      |
| (10) EMP/ASSET   | 0.037* | 0.048* | -0.335* | 0.111* | 0.438* | 0.041* | -0.013* | -0.027* | -0.432* | 1  |      |      |      |      |      |      |      |      |
| (11) LOAN LOSSES | -0.136* | -0.125* | 0.219* | 0.221* | 0.237* | 0.175* | -0.039* | -0.049* | -0.118* | 0.097* | 1    |      |      |      |      |      |      |      |
| (12) SECURITIES  | 0.029* | -0.020* | -0.361* | -0.093* | -0.075* | -0.774* | 0.155* | 0.127* | -0.032* | 0.040* | -0.164* | 1    |      |      |      |      |      |      |
| (13) CONCENTRATION | -0.080* | -0.095* | -0.126* | 0.142* | 0.118* | -0.183* | 0.079* | 0.091* | 0.153* | -0.033* | -0.020* | 0.089* | 1    |      |      |      |      |      |
| (14) DEPOSIT     | -0.098* | 0.085* | 0.173* | -0.079* | -0.097* | 0.051* | -0.596* | -0.589* | 0.011 | -0.128* | -0.052* | 0.004 | -0.072* | 1    |      |      |      |
| (15) UNEMPLOYMENT| -0.125* | -0.126* | -0.121* | 0.070* | 0.087* | -0.025* | -0.01 | -0.006 | 0.071* | 0.076* | 0.130* | -0.022* | 0.095* | -0.036* | 1    |      |      |
| (16) AGE         | -0.023* | -0.029* | -0.068* | -0.086* | -0.133* | -0.110* | 0.002 | -0.014* | 0.035* | -0.195* | -0.115* | 0.188* | -0.107* | 0.069* | -0.029* | 1    |      |
| (17) SD(ROA)     | 0.059* | -0.008 | -0.004 | -0.030* | -0.069* | -0.102* | 0.208* | 0.216* | 0.121* | -0.096* | 0.202* | -0.040* | 0.034* | -0.221* | 0.070* | -0.085* | 1    |
| (18) SD(ROE)     | 0.011 | 0.027* | 0.020* | -0.016* | -0.041* | -0.016* | -0.060* | -0.046* | 0.124* | -0.081* | 0.209* | -0.082* | 0.006 | -0.045* | 0.062* | -0.061* | 0.902* | 1    |
| (19) SD(NIM)     | 0.053* | 0.034* | 0.100* | -0.084* | -0.080* | -0.060* | 0.067* | 0.072* | 0.035* | -0.01 | 0.181* | -0.126* | 0.003 | -0.095* | 0.073* | -0.119* | 0.301* | 0.283* |

This table presents the correlation between the variables used in difference-in-differences tests. We consider the first three quarters of 2019 as the pre–COVID-19 period and the first three quarters of 2020 as the pandemic periods, and our $t = 0$ is the 4th quarter of 2019. Banks with at least one observation in the pre and post ruling period are included in the sample. Definitions and measurements of all the variables used in this study are provided in the appendix, along with data sources. * Shows significance at the .05 level.
A significant portion of COVID-19 patients, specifically those who are elderly, need exceptional healthcare support. The states that could manage the massive influx of infected patients by providing them with ICU and other healthcare support could subdue the panic caused by this pandemic. Therefore, we are interested in examining whether the higher quality/capacity healthcare facilities impact

Table 3
Univariate Test.

| Variable          | (1) Community Banks Before | Covid-19 | P-Val | (2) Non-Community Banks Before | Covid-19 | P-Val | (3) Diff-in-Diff | P > t |
|-------------------|----------------------------|---------|-------|--------------------------------|---------|-------|-----------------|-------|
| ROA               | 0.011                      | 0.010   | 0.000 | 0.013                          | 0.010   | 0.000 | 0.002           | 0.000 |
|                   | [0.000]                    | [0.000] |       | [0.000]                        | [0.000] |       | [0.000]         |       |
| ROE               | 0.095                      | 0.090   | 0.000 | 0.113                          | 0.094   | 0.000 | 0.014           | 0.000 |
|                   | [0.000]                    | [0.000] |       | [0.000]                        | [0.000] |       | [0.000]         |       |
| NIM               | 0.038                      | 0.0357  | 0.000 | 0.037                          | 0.034   | 0.000 | 0.000           | 0.456 |
|                   | [0.000]                    | [0.000] |       | [0.000]                        | [0.000] |       | [0.000]         |       |

This table presents the univariate Diff-in-Diff results for the FDIC chartered Community banks (COM) and Non-Community Banks (Control). The sample period includes the 1st, 2nd, and 3rd quarter of 2019 and the 1st, 2nd, and 3rd quarter of 2020. Banks with at least one observation in the pre-COVID-19 and Covid-19 period are included in the sample. Definitions and measurements of all the variables used in this study are provided in the appendix, along with data sources. Standard errors are clustered by the states and the firms. Statistical significance is donated by *, **, and *** to indicate the significance level at less than 10%, 5%, and 1%, respectively.

Table 4
Multivariate Tests.

| Variables               | ROA (1) | ROE (2) | NIM (3) | ROA (4) | ROE (5) | NIM (6) |
|-------------------------|---------|---------|---------|---------|---------|---------|
| COVID * COM             | 0.0007* | 0.0060**| 0.0011***| 0.0007* | 0.0059**| 0.0011***|
|                         | [0.000] | [0.003] | [0.000] | [0.000] | [0.003] | [0.000] |
| COM                     | 0.0001  | 0.0013  | -0.0011***| 0.0000  | 0.0013  | -0.0010***|
|                         | [0.000] | [0.002] | [0.000] | [0.000] | [0.002] | [0.000] |
| SIZE                    | 0.0005***| 0.0049***| -0.0009***| 0.0004***| 0.0049***| -0.0008***|
|                         | [0.000] | [0.001] | [0.000] | [0.000] | [0.001] | [0.000] |
| LOAN                    | -0.0027*| -0.0193 | 0.0198***| -0.0033*| -0.0257*| 0.0184***|
|                         | [0.001] | [0.012] | [0.001] | [0.002] | [0.013] | [0.001] |
| EQUITY                  | -0.0328***| -0.9281***| 0.0565***| -0.0314***| -0.8984***| 0.0552***|
|                         | [0.009] | [0.072] | [0.009] | [0.010] | [0.083] | [0.091] |
| LEV (CORE CAPITAL)      | 0.0417***| 0.5184***| -0.0395***| 0.0415***| 0.5058***| -0.0367***|
|                         | [0.009] | [0.073] | [0.009] | [0.010] | [0.087] | [0.091] |
| EFFICIENCY              | -0.0416***| -0.3329***| -0.0148***| -0.0420***| -0.3363***| -0.0146***|
|                         | [0.001] | [0.008] | [0.001] | [0.001] | [0.008] | [0.001] |
| ASSETS/EMP              | -0.0070***| -0.0540***| -0.0073***| -0.0071***| -0.0557***| -0.0072***|
|                         | [0.000] | [0.003] | [0.000] | [0.000] | [0.003] | [0.000] |
| LOAN LOSSES             | -0.6404***| -5.2996***| 0.3915***| -0.6468***| -5.3312***| 0.3907***|
|                         | [0.054] | [0.428] | [0.067] | [0.055] | [0.445] | [0.068] |
| SECURITIES              | -0.0030**| -0.0233**| -0.0024*| -0.0031**| -0.0250**| -0.0033**|
|                         | [0.001] | [0.009] | [0.001] | [0.001] | [0.011] | [0.001] |
| CONCENTRATION           | 0.0005**| 0.0043**| 0.000 | 0.0005*| 0.004 | 0.000 |
|                         | [0.000] | [0.002] | [0.000] | [0.000] | [0.002] | [0.000] |
| DEPOSIT                 | -0.0143***| -0.1062***| 0.0155***| -0.0135***| -0.1037***| 0.0167***|
|                         | [0.002] | [0.018] | [0.002] | [0.002] | [0.018] | [0.022] |
| UNEMPLOYMENT            | 0.0017  | -0.0107  | -0.0088***| 0.0017  | -0.0064  | -0.0048  |
|                         | [0.003] | [0.027] | [0.003] | [0.003] | [0.027] | [0.004] |
| AGE                     | -0.0007**| -0.0058***| -0.0001 | -0.0007***| -0.0057***| -0.0004**|
|                         | [0.000] | [0.001] | [0.000] | [0.000] | [0.001] | [0.000] |
| Constant                | 0.0614***| 0.5300***| 0.0044***| 0.0616***| 0.5327***| 0.0423***|
|                         | [0.003] | [0.029] | [0.002] | [0.003] | [0.031] | [0.003] |
| Observations            | 30.378 | 30.378 | 30.378 | 30.378 | 30.378 | 30.378 |
| R-squared               | 0.65 | 0.62 | 0.57 | 0.69 | 0.67 | 0.63 |
| State FE                | Yes | Yes | Yes | NO | NO | NO |
| County FE               | NO | NO | NO | Yes | Yes | Yes |
| Time FE                 | Yes | Yes | Yes | Yes | Yes | Yes |

This table presents the multivariate Diff-in-Diff regression results for the FDIC chartered Community banks (COM) and Non-Community Banks (Control). The sample period includes the 1st, 2nd, and 3rd quarter of 2019 and the 1st, 2nd, and 3rd quarter of 2020. Banks with at least one observation in the pre-COVID-19 and Covid-19 period are included in the sample. Definitions and measurements of all the variables used in this study are provided in the appendix, along with data sources. Standard errors are reported in the parenthesis, and heteroskedasticity robust standard errors are clustered by the states and the firms. Statistical significance is donated by *, **, and *** to indicate the significance level at less than 10%, 5%, and 1%, respectively.

3.5. State-level healthcare facility

A significant portion of COVID-19 patients, specifically those who are elderly, need exceptional healthcare support. The states that could manage the massive influx of infected patients by providing them with ICU and other healthcare support could subdue the panic caused by this pandemic. Therefore, we are interested in examining whether the higher quality/capacity healthcare facilities impact
the performance across the banks’ type in those states. We develop three healthcare facility indexes (HFI) to gauge the state-level preparedness in the handling of COVID-19. The indexes are based on the number of hospital beds (Eq. 2), ICU beds (Eq. 3), and community health care services centers (Eq. 4) in the states. Following a regional patent index developed by Burrus et al. (2018), we construct the following indexes:

\[
\text{Hospital Bed Index} = \frac{\frac{\text{State Total Hospital Bed}}{\text{State Population}}}{\frac{\text{National Total Hospital Bed}}{\text{National Population}}} \tag{2}
\]

\[
\text{ICU Bed Index} = \frac{\frac{\text{State Total ICU Bed}}{\text{State Population}}}{\frac{\text{National Total ICU Bed}}{\text{National Population}}} \tag{3}
\]

\[
\text{CHCSC Index} = \frac{\frac{\text{State Total CHCSC}}{\text{State Population}}}{\frac{\text{National Total CHCSC}}{\text{National Population}}} \tag{4}
\]

We argue that a higher health index value indicates a state can handle the pandemic better than other states. We present the findings in Table 6.

Table 6
Quantile difference-in-differences with covariates.

| Outcome Variable | .25 quantile  | .50 quantile  | .75 quantile  |
|------------------|--------------|--------------|--------------|
|                  | ROA*10 | ROE | NIM*10 | ROA*10 | ROE | NIM*10 | ROA*10 | ROE | NIM*10 |
| **Before**       |         |    |       |         |    |       |         |    |       |
| Non-Community Banks | 0.397  | 0.393 | 0.401 | 0.483  | 0.469 | 0.526 | 0.617  | 0.574 | 0.643  |
| Community Banks   | 0.395  | 0.392 | 0.398 | 0.483  | 0.469 | 0.519 | 0.619  | 0.577 | 0.624  |
| Diff (CB-NCB)     | −0.002*** | −0.001 | −0.003* | 0.001  | 0.001 | −0.007*** | 0.002  | 0.003*** | −0.019*** |
| **COVID-19**      |         |    |       |         |    |       |         |    |       |
| Non-Community Banks | 0.395  | 0.393 | 0.372 | 0.481  | 0.469 | 0.495 | 0.618  | 0.577 | 0.599  |
| Community Banks   | 0.397  | 0.394 | 0.373 | 0.487  | 0.473 | 0.495 | 0.625  | 0.584 | 0.602  |
| Diff (CB-NCB)     | 0.002*** | 0.001* | 0.001  | 0.006*** | 0.004*** | 0.000  | 0.007*** | 0.007*** | 0.003  |
| **COVID × COM**  | 0.004*** | 0.002** | 0.004** | 0.005*** | 0.004*** | 0.007*** | 0.005*** | 0.004*** | 0.021*** |

This table presents the Quantile Difference-In-Differences with covariates for the FDIC chartered Community banks (COM) and Non-Community Banks (Control). The sample period includes the 1st, 2nd, and 3rd quarter of 2019 and the 1st, 2nd, and 3rd quarter of 2020. Banks with at least one observation in the pre-COVID-19 and Covid-19 period are included in the sample. Definitions and measurements of all the variables used in this study are provided in the appendix along with data sources. Robust standard errors are reported in the parenthesis. Statistical significance is donated by *, **, and *** to indicate the significance level at less than 10 %, 5%, and 1%, respectively.

3.6. Urban vs. rural market

Hannan and Prager (2009) study the effects of geographically diversified banks on the small single rural market banks’ profitability. They find that small-single market banks outperform their rivals in terms of profitability. The pricing strategies of large banks are not perfectly aligned with local market conditions. However, these results do not hold in urban areas where competition is more intense than the rural markets. CBs distinguish themselves from large banks in a highly competitive banking field by offering customized services to their customers. Gilbert et al. (2013) show that well-run CBs that maintain robust control over their business standards thrive during the crisis period compared to other banks. Strong customer relationships are one of the critical advantages CBs have over their rivals. We hypothesize that CBs in the urban areas will enforce a stronger consumer banking relationship to survive the competition. This strategy will pay off more during the episodes of higher market externalities. Thus, CBs in the urban areas will outperform the large NCBs in the performance matrix more than the CBs in rural areas. We identify whether a bank is in an urban area using the Metropolitan Statistical Areas (MSA) based on Census Bureau data, as defined by the US Office of Management (OMB) before 2000. MSA is a binary variable and takes a value of 1 if a bank is in an urban area and 0 otherwise.

Table 7 presents the findings of the performance of CBs in urban areas relative to CBs in rural areas. Although the CBs in rural areas
have higher ROA, ROE, and NIM than the urban CBs\textsuperscript{14} (Amel and Prager, 2013) in our sample, the CBs in the metropolitan areas exhibit a performance edge over the NCBs, unlike the CBs in rural areas.\textsuperscript{15} The estimated coefficients of COVID × COM × MSA are significant and positive for all three measures (ROA, ROE, and NIM). Consistent with our prediction, these results indicate that during the COVID-19 period, CBs in the urban areas performed better than the CBs in the rural areas. Controlling for MSA significantly weakens the coefficients of COVID × COM, implying that most of the variation in the CBs outperformance of NCBs during the pandemic is explained by CBs located in urban areas. The coefficients of COVID × MSA are negative for all three performance measures and significant for ROE, NIM, indicating that banks average profitability decreased during the pandemic period in the MSA.

3.7. Bank holding company

CBs are more exposed to local market risks because their businesses are focused on a few local customers (idiosyncratic risk). Emmons et al. (2004) find that idiosyncratic risk dominates the local market risk for CBs located in rural areas. They argue that since the effects of local market risk are minimum regarding performance, CBs in the urban regions partially offset the idiosyncratic risks by increasing their size compared to their small rural areas’ counterparts. Because the effects of COVID-19 on banks’ performance are not confined to a specific geographical region, the benefit of being part of a Bank Holding Company (BHC) would not yield superior performance for CBs corresponding with geographical diversification. The CBs, which are a part of BHC, tend to replicate large banks’ offerings to the local market and lack the options to customize services when needed. We empirically investigate these arguments on whether BHC membership generates superior performance during the pandemic. We present the results in Table 8.

We use a binary variable BHC\textsuperscript{16} to identify whether a CB is part of a BHC. If so, BHC takes a value of 1 and 0 otherwise. We are interested in the interaction term COVID × COM × BHC, which tells us whether, being a part of BHC, CBs get a performance edge over the stand-alone CBs during the pandemic. The coefficient of ROA and ROE is insignificant and negative, providing support in favor of our arguments. NIM’s coefficient is positive and significant, implying that CBs that are part of BHC has an advantage over stand-alone CBs in terms of NIM. Morris and Regehr (2014) show that CBs earn historically low NIM relative to NCBs. We find that during high

\textsuperscript{14} Rural CBs earn 0.13%, 1.06%, and 0.13% higher ROA, ROE, NIM respectively in our sample compared to their urban counterparts.
\textsuperscript{15} We do not report these statistics due to conciseness.
\textsuperscript{16} Please refer to https://www.federalreserve.gov/boarddocs/legalint/BHC_ChangeInControl/2002/20020813/ for a definition of BHC.
| Variables                        | Hospital Bed Index | ICU Bed Index | Community Health Center Index |
|---------------------------------|--------------------|---------------|--------------------------------|
|                                 | ROA (1)           | ROA (4)       | ROA (7)                        |
|                                 | ROE (2)           | ROE (5)       | ROE (8)                        |
|                                 | NIM (3)           | NIM (6)       | NIM (9)                        |
| **COVID * COM * HEALTH INDEX**  |                   |               |                                |
| –0.0021*                        | –0.0176*          | –0.0001       | –0.0024**                      |
| [0.001]                         | [0.009]           | [0.001]       | [0.001]                        |
| **COVID * COM**                 | 0.0029**          | 0.0243**      | 0.0031**                       |
| [0.001]                         | [0.011]           | [0.001]       | [0.001]                        |
| **COM * HEALTH INDEX**          | 0.0028*           | 0.0214*       | 0.0012                         |
| [0.001]                         | [0.011]           | [0.001]       | [0.001]                        |
| **COVID * HEALTH INDEX**        | 0.0012            | 0.0109        | 0.0209                         |
| [0.001]                         | [0.007]           | [0.001]       | [0.001]                        |
| **COM**                         | –0.0012           | –0.010        | –0.0029**                      |
| [0.001]                         | [0.009]           | [0.001]       | [0.001]                        |
| **SIZE**                        | 0.0005**          | 0.0049**      | 0.0005**                       |
| [0.000]                         | [0.001]           | [0.000]       | [0.001]                        |
| **LOAN**                        | –0.0202**         | –0.0193       | –0.0027*                       |
| [0.001]                         | [0.012]           | [0.001]       | [0.012]                        |
| **EQUITY**                      | –0.0332**         | –0.9034**     | –0.0320**                      |
| [0.008]                         | [0.072]           | [0.009]       | [0.009]                        |
| **LEV (CORE CAPITAL)**          | 0.0419**          | 0.5201**      | 0.0418**                       |
| [0.009]                         | [0.073]           | [0.009]       | [0.009]                        |
| **EFFICIENCY**                  | –0.0416**         | –0.3329**     | –0.0416**                      |
| [0.001]                         | [0.008]           | [0.001]       | [0.008]                        |
| **EMP/ASSET**                   | –0.0070**         | –0.0540**     | –0.0070**                      |
| [0.000]                         | [0.003]           | [0.000]       | [0.000]                        |
| **LOAN LOSSES**                 | –0.6399**         | –5.2972**     | –0.6405**                      |
| [0.054]                         | [0.429]           | [0.067]       | [0.054]                        |
| **SECURITIES**                  | –0.0030**         | –0.0234**     | –0.0030**                      |
| [0.001]                         | [0.009]           | [0.001]       | [0.009]                        |
| **CONCENTRATION**               | 0.0005**          | 0.0043**      | 0.0005**                       |
| [0.000]                         | [0.002]           | [0.000]       | [0.002]                        |
| **DEPOSIT**                     | –0.0143**         | –0.1066**     | –0.0143**                      |
| [0.002]                         | [0.018]           | [0.002]       | [0.018]                        |
| **UNEMPLOYMENT**                | 0.0027            | 0.0006        | 0.0014                         |
| [0.004]                         | [0.030]           | [0.003]       | [0.003]                        |
| **AGE**                         | –0.0007**         | –0.0058**     | –0.0007**                      |
| [0.000]                         | [0.001]           | [0.000]       | [0.001]                        |
| **Constant**                    | 0.0597**          | 0.5177**      | 0.0598**                       |
| [0.003]                         | [0.030]           | [0.002]       | [0.002]                        |
| **Observations**                | 30,378            | 30,378        | 30,378                         |
| **R-squared**                   | 0.648             | 0.623         | 0.57                           |
| **State FE**                    | Yes               | Yes           | Yes                            |
| **Time FE**                     | Yes               | Yes           | Yes                            |

This table presents the regression results of changes in firm performance in quarter t relative to the COVID-19 impacted quarters for the FDIC chartered Community banks (COM) and Non-Community Banks (Control) conditioned on the states healthcare facilities index. The sample period includes the 1st, 2nd, and 3rd quarter of 2019 and the 1st, 2nd, and 3rd quarter of 2020. Banks with at least one observation in the pre-COVID-19 and COVID-19 period are included in the sample. Definitions and measurements of all the variables used in this study are provided in the appendix along with data sources. Standard errors are reported in the parenthesis, and heteroskedasticity robust standard errors are clustered by the states and the firms. Statistical significance is donated by *, **, and *** to indicate the significance level at less than 10%, 5%, and 1%, respectively.
3.8. Performance by geography

To examine the effects of COVID-19 on the geographic regions, in this section, we analyze the banks’ performance in six FDIC supervisory regions. This approach provides an overall understanding of the performance variations across the regions. We present the findings in Table 9.

Table 7

| Variables                        | ROA (1)        | ROE (2)        | NIM (3)        |
|----------------------------------|----------------|----------------|----------------|
| **COVID-19 * COM * MSA**         | 0.0008**       | 0.0102***      | 0.0006*        |
|                                  | [0.000]        | [0.003]        | [0.000]        |
| **COVID-19 * COM**               | 0.000          | -0.0021        | 0.0004         |
|                                  | [0.000]        | [0.002]        | [0.000]        |
| **COM * MSA**                    | -0.0004        | -0.0052*       | -0.0012**      |
|                                  | [0.000]        | [0.003]        | [0.001]        |
| **COVID-19 * MSA**               | -0.0009**      | -0.0095**      | -0.0010***     |
|                                  | [0.000]        | [0.004]        | [0.000]        |
| **COM**                          | 0.001          | 0.0056**       | -0.0001        |
|                                  | [0.000]        | [0.003]        | [0.000]        |
| **MSA**                          | 0.0010***      | 0.0093***      | 0.0013**       |
|                                  | [0.000]        | [0.003]        | [0.001]        |
| **SIZE**                         | 0.0004***      | 0.0045***      | -0.0009***     |
|                                  | [0.000]        | [0.001]        | [0.000]        |
| **LOAN**                         | -0.0028*       | -0.0197        | 0.0199***      |
|                                  | [0.001]        | [0.012]        | [0.001]        |
| **EQUITY**                       | -0.0326***     | -0.9253***     | 0.0564***      |
|                                  | [0.008]        | [0.072]        | [0.009]        |
| **LEV (CORE CAPITAL)**           | 0.0412***      | 0.5142***      | -0.3935**      |
|                                  | [0.009]        | [0.073]        | [0.009]        |
| **EFFICIENCY**                   | -0.0419***     | -0.3346***     | -0.148***      |
|                                  | [0.001]        | [0.008]        | [0.001]        |
| **EMP/ASSET**                    | -0.0070***     | -0.0543***     | -0.0073***     |
|                                  | [0.000]        | [0.003]        | [0.000]        |
| **LOAN LOSSES**                  | -0.6391***     | -5.2929***     | 0.3919***      |
|                                  | [0.054]        | [0.431]        | [0.067]        |
| **SECURITIES**                   | -0.0029**      | -0.0224**      | -0.0023*       |
|                                  | [0.001]        | [0.009]        | [0.001]        |
| **CONCENTRATION**                | 0.000          | 0.0004*        | 0.000          |
|                                  | [0.000]        | [0.002]        | [0.000]        |
| **DEPOSIT**                      | -0.0141***     | -0.1047***     | 0.0155***      |
|                                  | [0.002]        | [0.018]        | [0.002]        |
| **UNEMPLOYMENT**                 | 0.002          | -0.0079        | -0.0076**      |
|                                  | [0.004]        | [0.028]        | [0.003]        |
| **AGE**                          | -0.0006***     | -0.0052***     | -0.0001        |
|                                  | [0.000]        | [0.001]        | [0.000]        |
| **Constant**                     | 0.0615***      | 0.5313***      | 0.0437***      |
|                                  | [0.003]        | [0.029]        | [0.002]        |
| **Observations**                 | 30,378         | 30,378         | 30,378         |
| **R-squared**                    | 0.65           | 0.62           | 0.57           |
| **State FE**                     | Yes            | Yes            | Yes            |
| **Time FE**                      | Yes            | Yes            | Yes            |

This table presents the regression results of bank performance changes due to COVID-19 for the FDIC chartered Community banks (COM) and Non-Community Banks (Control) conditioned on whether the bank is located in the metropolitan area as defined in the MSA number based on the 2000 Census. The sample period includes the 1st, 2nd, and 3rd quarter of 2019 and the 1st, 2nd, and 3rd quarter of 2020. Banks with at least one observation in the pre-COVID-19 and COVID-19 period are included in the sample. Definitions and measurements of all the variables used in this study are provided in the appendix, along with data sources. Standard errors are reported in the parenthesis, and heteroskedasticity robust standard errors are clustered by the states and the firms. Statistical significance is donated by *, **, and *** to indicate the significance level at less than 10 %, 5%, and 1%, respectively.

Externalities BHC member CBs have higher NIM compared to their stand-alone counterparts.

17 The FDIC supervisory regions are Atlanta, Chicago, Dallas, Kansas City, New York, San Francisco, and Washington. We exclude Washington because it is an administrative district. The supervisory FDIC office assigned to the institution. States included in the FDIC Supervisory Regions are; New York - states and territories: CT, DE, ME, MD, MA, NH, NJ, NY, PA, RI, VT, PUERTO RICO, VIRGIN ISLANDS, Atlanta - states: AL, FL, GA, NC, SC, VA, Chicago - states: IL, IN, KY, MI, OH, Kansas City - states: IA, KS, MN, MO, NE, ND, SD, Dallas- states and territories: AR, CO, LA, MS, NM, OK, TN, TX, San Francisco - states territories: AK, AZ, CA, HI, ID, MT, NV, OR, UT, WT, WY, AMERICAN SAMOA, GUAM.
Results indicate the presence of performance variations by geography. Among the FDIC regions, CBs in the Atlanta region, which comprises AL, FL, GA, NC, SC, and VA show higher performance efficiencies relative to other areas. CBs in San Francisco performed well in ROA and ROE in the first three-quarters of 2020. In terms of NIM, CBs seem to dominate the NCBs during the pandemic in most regions. We cannot relate these performance variations to the FDIC supervisory regions’ efficiencies due to insufficient empirical evidence. Bank specific and industry-specific factors (i.e., local business conditions, relationship with customers, competition in the local market, ownership structure) explain a great deal about the banks’ profitability (Anderlik et al., 2015; Dietrich and Wanzenried, 2011). However, we find the presence of geographical phenomenon in the performance of CBs during the pandemic.

3.9. Multivariate results of risk-taking

In this section, we examine the risk-taking by the banks before and during the pandemic. Following the literature (Balla and Rose, 2019), we measure risk-taking by standard deviations of the past three quarters’ performance measures (ROA, ROE, and NIM). We use the same set of control variables, as in Table 4. As before, we include state-fixed effects in columns (1)-(3) and county fixed effects in columns (4)-(6). The coefficient of the interaction term COVID × COM is our variable of interest. The interaction term is a negative and

| Variables                  | ROA       | ROE       | NIM       |
|----------------------------|-----------|-----------|-----------|
|                            | (1)       | (2)       | (3)       |
| COVID * COM * BHC          | −0.0007   | −0.0069   | 0.0010*** |
|                            | [0.001]   | [0.006]   | [0.000]   |
| COVID * COM                | 0.0113*   | 0.0125*   | 0.0002    |
|                            | [0.001]   | [0.007]   | [0.000]   |
| COM * BHC                  | 0.0011    | 0.0062    | 0.000     |
|                            | [0.001]   | [0.008]   | [0.001]   |
| COVID * BHC                | 0.0011    | 0.0094    | −0.0007   |
|                            | [0.001]   | [0.006]   | [0.000]   |
| COM                        | −0.001    | −0.0046   | −0.0012   |
|                            | [0.001]   | [0.008]   | [0.001]   |
| BHC                        | −0.0009   | −0.0053   | 0.0009    |
|                            | [0.001]   | [0.009]   | [0.001]   |
| SIZE                       | 0.0004*** | 0.0047*** | −0.0010***|
|                            | [0.000]   | [0.001]   | [0.000]   |
| LOAN                       | −0.0027*  | −0.0191   | 0.0199*** |
|                            | [0.001]   | [0.012]   | [0.001]   |
| EQUITY                     | −0.0325***| −0.0927***| 0.0565*** |
|                            | [0.009]   | [0.074]   | [0.009]   |
| LEV (CORE CAPITAL)         | 0.0423*** | 0.5234*** | −0.0370***|
|                            | [0.009]   | [0.077]   | [0.009]   |
| EFFICIENCY                 | −0.0415***| −0.3321***| −0.0144***|
|                            | [0.001]   | [0.008]   | [0.001]   |
| EMP/ASSET                  | −0.0069***| −0.0537***| −0.0071***|
|                            | [0.000]   | [0.003]   | [0.000]   |
| LOAN LOSSES                | −0.6408***| −5.3036***| 0.3925*** |
|                            | [0.053]   | [0.426]   | [0.068]   |
| SECURITIES                 | −0.0030** | −0.0233** | −0.0023*  |
|                            | [0.001]   | [0.009]   | [0.001]   |
| CONCENTRATION              | 0.0005**  | 0.0045**  | −0.0001   |
|                            | [0.000]   | [0.002]   | [0.000]   |
| DEPOSIT                    | −0.0142***| −0.1059***| 0.0156*** |
|                            | [0.002]   | [0.018]   | [0.002]   |
| UNEMPLOYMENT               | 0.0015    | −0.007    | −0.0085** |
|                            | [0.004]   | [0.027]   | [0.003]   |
| AGE                        | −0.0007***| −0.0058***| −0.0001   |
|                            | [0.000]   | [0.001]   | [0.000]   |
| Constant                   | 0.0616*** | 0.5302*** | 0.0439*** |
|                            | [0.003]   | [0.030]   | [0.003]   |
| Observations               | 30,378    | 30,378    | 30,378    |
| R-squared                  | 0.648     | 0.623     | 0.572     |
| State FE                   | Yes       | Yes       | Yes       |
| Time FE                    | Yes       | Yes       | Yes       |

This table presents the regression results of firm performance changes in quarter t relative to the Covid-19 impacted quarters for the FDIC chartered Community banks (COM) and Non-Community Banks (Control) conditioned whether the bank is a member of a bank holding company. The sample period includes the 1st, 2nd, and 3rd quarter of 2019 and the 1st, 2nd, and 3rd quarter of 2020. Banks with at least one observation in the pre-COVID-19 and COVID-19 period are included in the sample. Definitions and measurements of all the variables used in this study are provided in the appendix along with data sources. Standard errors are reported in the parenthesis, and heteroskedasticity robust standard errors are clustered by the states and the firms. Statistical significance is donated by *, **, and *** to indicate the significance level at less than 10%, 5%, and 1%, respectively.

Results indicate the presence of performance variations by geography. Among the FDIC regions, CBs in the Atlanta region, which comprises AL, FL, GA, NC, SC, and VA show higher performance efficiencies relative to other areas. CBs in San Francisco performed well in ROA and ROE in the first three-quarters of 2020. In terms of NIM, CBs seem to dominate the NCBs during the pandemic in most regions. We cannot relate these performance variations to the FDIC supervisory regions’ efficiencies due to insufficient empirical evidence. Bank specific and industry-specific factors (i.e., local business conditions, relationship with customers, competition in the local market, ownership structure) explain a great deal about the banks’ profitability (Anderlik et al., 2015; Dietrich and Wanzenried, 2011). However, we find the presence of geographical phenomenon in the performance of CBs during the pandemic.
Table 9
Performance Change - FDIC Supervisory Region.

| FDIC Supervisory Region | VARIABLES |
|-------------------------|-----------|
|                         | (1)       | (2)       | (3)       | (4)       | (5)       | (6)       | (7)       | (8)       | (9)       | (10)      | (11)      | (12)      |
|                         | ATLANIA   | CHICAGO   | DALLAS    | KANSAS    |           |           |           |           |           |           |           |           |
| COM                    | ROA       | ROE       | NIM       | ROA       | ROE       | NIM       | ROA       | ROE       | NIM       | ROA       | ROE       | NIM       |
|                        | 0.000     | 0.000     | -0.001**  | 0.000     | 0.004     | -0.0017*  | 0.0007*   | 0.0063**  | -0.0006   | 0.0009*   | 0.0054*** | -0.0007  |
|                        | [0.001]   | [0.005]   | [0.001]   | [0.000]   | [0.006]   | [0.001]   | [0.000]   | [0.003]   | [0.000]   | [0.000]   | [0.002]   | [0.000]   |
| COVID * COM            | 0.0008**  | 0.007     | 0.0007**  | 0.000     | -0.001    | 0.0013*** | 0.000     | -0.002    | 0.0011*** | 0.000     | -0.001    | 0.0010**  |
|                        | [0.000]   | [0.004]   | [0.000]   | [0.002]   | [0.000]   | [0.005]   | [0.000]   | [0.003]   | [0.000]   | [0.000]   | [0.004]   | [0.000]   |
| Controls               | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       |
| Observations           | 3423      | 3423      | 3423      | 6471      | 6471      | 6471      | 6686      | 6686      | 6686      | 8004      | 8004      | 8004      |
| R-squared              | 0.716     | 0.668     | 0.592     | 0.685     | 0.657     | 0.499     | 0.675     | 0.656     | 0.601     | 0.658     | 0.664     | 0.535     |
| Firm FE                | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       |
| Year FE                | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       |
|                         | (13)      | (14)      | (15)      | (16)      | (17)      | (18)      |           |           |           |           |           |           |
|                         | NEW YORK  | SAN FRANCISCO |           |           |           |           |           |           |           |           |           |           |
| COM                    | ROA       | ROE       | NIM       | ROA       | ROE       | NIM       |           |           |           |           |           |           |
|                        | -0.0016***| -0.0142***| -0.0005   | 0.0003    | 0.0028    | -0.0014   |           |           |           |           |           |           |
|                        | [0.000]   | [0.003]   | [0.000]   | [0.001]   | [0.004]   | [0.001]   | [0.000]   | [0.005]   | [0.001]   |           |           |           |
| COVID * COM            | 0.001     | 0.0091    | 0.000     | 0.0014**  | 0.0130**  | 0.0009    |           |           |           |           |           |           |
|                        | [0.001]   | [0.005]   | [0.000]   | [0.001]   | [0.005]   | [0.001]   |           |           |           |           |           |           |
| Controls               | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       |           |           |           |           |           |           |
| Observations           | 3515      | 3515      | 3515      | 2069      | 2069      | 2069      |           |           |           |           |           |           |
| R-squared              | 0.621     | 0.575     | 0.556     | 0.603     | 0.558     | 0.572     |           |           |           |           |           |           |
| Firm FE                | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       |           |           |           |           |           |           |
| Year FE                | Yes       | Yes       | Yes       | Yes       | Yes       | Yes       |           |           |           |           |           |           |

This table presents the regression results of bank performance changes in quarter t relative to the COVID-19 impacted quarters for the FDIC chartered Community banks (COM) and Non-Community Banks (Control) for the sub-sample of banks sorted based on FDIC Supervisory Region. The sample period includes the 1st, 2nd, and 3rd quarter of 2019 and the 1st, 2nd, and 3rd quarter of 2020. Banks with at least one observation in the pre-COVID-19 and COVID-19 period are included in the sample. Definitions and measurements of all the variables used in this study are provided in the appendix along with data sources. Standard errors are reported in the parenthesis, and heteroskedasticity robust standard errors are clustered by the states and the firms. Statistical significance is donated by *, **, and *** to indicate the significance level at less than 10%, 5%, and 1%, respectively.
significant coefficient, implying a reduction in risk-taking during the pandemic period compared to the pre-pandemic period.

The estimated coefficients of COVID × COM in ROA and ROE are negative and significant at less than a 1% level. Controlling for the county fixed effects increases the coefficients’ explanatory power and significance level in columns (4)-(5). The coefficient of COVID × COM implies that CB’s risk-taking reduced during the pandemic relative to NCBs by 0.10 %, 0.79 % (in column (1)-(2)) for SD (ROA) and SD (ROE) respectively and increased by 0.04 % in SD (NIM). In addition, we observe changes in signs and significance levels of several control variables compared to those reported in Table 4. Fig. 5 presents the differences in risk-taking in the banks. Among the control variables, size, efficiency, deposit size, and bank age are negatively associated with volatilities, whereas loan losses increase the banks’ risk-taking. Overall, these results suggest that CBs and NCBs demonstrate contrasting profitability and risk-taking behavior in extreme market externalities such as COVID-19 (Table 10).

3.10. Capital decomposition

This section empirically examines capital decomposition as additional risk adjustment channels used by the CBs and NCBs. Cohen and Scatigna (2016) and Balla and Rose (2019) use the decomposition of risk-weighted capital ratio changes to investigate the banks’ risk-adjustment behavior. We also use the changes in total risk-weighted assets adjusted. The total risk-based capital ratio changes to understand the risk-taking by the CBs and NCBs during the pandemic. The changes in total risk-weighted assets adjusted calculated as $\frac{(\text{rwaj}_{t} - \text{rwaj}_{t-1})}{\text{asset}_{t-1}}$ where rwajt is the total risk-weighted assets adjusted. The changes in the total risk-based capital ratio calculated as $\text{rbcrwaj}_{t} - \text{rbcrwaj}_{t-1}$ where rbcrwaj is the total risk-based capital ratio. Risk-based capital is the minimum capital requirement for a bank set by the regulators. The Dodd-Frank rules require a bank to maintain a risk-based capital ratio of 8% and a tier 1 risk-based capital ratio of 4%. Total risk-weighted assets adjusted are the assets adjusted for risk-based capital. Table 11 presents the results.

We observe a substantial decline in the risk-based capital ratio and the total risk-weighted assets adjusted in the CBs. The magnitude of the change in risk-based capital ratio 0.21 % higher for the CBs compared to NCBs. In terms of total risk-weighted assets adjusted, CBs exhibit a significantly larger decline, implying that CBs de-risked 4.85 % more than the NCBs. Overall, these results

Fig. 5. Risk-taking adjustments. This figure presents risk-taking adjustments before and during the Covid-19 pandemic for the Community banks and Non-Community Banks. We consider the first three quarters of 2019 as the pre-COVID-19 period and the first three quarters of 2020 as the pandemic periods, and our $t = 0$ is the 4th quarter of 2019. The horizontal axis shows the event quarter, where Quarter $= 0$ is the 4th quarter of 2019.

Beginning March 1, 2020, the total risk-based capital ratio is not available for the CBs who adopted the Community Bank Leverage Ratio framework, which results in a reduction of the number of CBs. We include the CBs in this section who have reported a total risk-based capital ratio in the first three quarters of 2020.

Please see Appendix A for definition of the bank characteristics variables. Source: https://www7.fdic.gov/idasp/warp_download_all.asp
For a community bank is not uncommon in the literature (Akhigbe et al., 2017; Anderlik et al., 2015; Stiroh and Rumble, 2006; Hughes et al., 2016). FDIC CBs are identified based on criteria defined in the FDIC community banking study (FDIC, 2012). So far, we have used a $1 billion size cutoff point to define a community bank, which does not consider the industry growth and other attributes associated with community banking insights. In this section, we use two alternative measures of community banks; 1.) Community banks with assets less than $10 billion, and 2.) FDIC-defined community banks. The use of the $10 billion asset threshold for a community bank is not uncommon in the literature (Akhigbe et al., 2017; Anderlik et al., 2015; Stiroh and Rumble, 2006; Hughes et al., 2016). FDIC CBs are identified based on criteria defined in the FDIC community banking study (FDIC, 2012).\footnote{FDIC community banking study 2012 that defines community banks is available at https://www.fdic.gov/regulations/resources/cbi/report/cbi-full.pdf} We present the results in Table 12.

The estimated coefficients of the interaction term COVID × COM are positive and statistically significant at less than 1% for all the performance measures for CBs with assets less than $10 billion. The COM’s coefficient is strongly negative in the FDIC definition of CBs compared to alternative asset-size-based measures of CBs. This suggests the FDIC definition of CBs demonstrates some fundamental differences from the traditionally used asset-size-based CB measures. The economic significance of these findings is non-trivial. The

suggest significant differences in risk-based capital ratio adjustments and de-risking strategies across the bank types during the pandemic.

4. Robustness check

4.1. Alternative measure of community banks

This table presents the multivariate Diff-in-Diff regression results of the standard deviations of the performance measures. The sample period includes the 1st, 2nd, and 3rd quarter of 2019 and the 1st, 2nd, and 3rd of quarter 2020. Banks with at least one observation in the pre–COVID-19 and Covid-19 period are included in the sample. Definitions and measurements of all the variables used in this study are provided in the appendix, along with data sources. Standard errors are reported in the parenthesis, and heteroskedasticity robust standard errors are clustered by the states and the firms. Statistical significance is donated by *, **, and *** to indicate the significance level at less than 10 %, 5%, and 1%, respectively.

Table 10
Risk-taking.

| Variables              | SD(ROA) (1) | SD(ROA) (2) | SD(NIM) (3) | SD(ROA) (4) | SD(ROA) (5) | SD(NIM) (6) |
|------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| COVID × COM            | -0.0010***  | -0.0079***  | 0.0004***   | -0.0011***  | -0.0082***  | 0.0004***   |
|                        | [0.000]     | [0.002]     | [0.000]     | [0.000]     | [0.002]     | [0.000]     |
| COM                    | -0.0003     | -0.0026     | -0.0001**   | -0.0002     | -0.0026     | -0.0001**   |
|                        | [0.000]     | [0.002]     | [0.000]     | [0.000]     | [0.002]     | [0.000]     |
| SIZE                   | 0.000       | -0.0022**   | -0.0001***  | 0.000       | -0.0023***  | -0.0001***  |
|                        | [0.000]     | [0.002]     | [0.000]     | [0.000]     | [0.002]     | [0.000]     |
| LOAN                   | -0.0088***  | -0.0521***  | -0.0031***  | -0.0088***  | -0.0496***  | -0.0033***  |
|                        | [0.000]     | [0.007]     | [0.000]     | [0.000]     | [0.007]     | [0.000]     |
| EQUITY                 | 0.0027      | -0.2004***  | 0.0015      | -0.0035     | -0.2184***  | 0.0017      |
|                        | [0.009]     | [0.068]     | [0.003]     | [0.010]     | [0.076]     | [0.003]     |
| LEV (CORE CAPITAL)     | 0.0164*     | 0.0431      | -0.0018     | 0.0180*     | 0.0612      | -0.0019     |
|                        | [0.009]     | [0.065]     | [0.003]     | [0.010]     | [0.070]     | [0.003]     |
| EFFICIENCY             | 0.0026***   | 0.0236***   | 0.0002      | 0.0021***   | 0.0174***   | 0.0000      |
|                        | [0.001]     | [0.006]     | [0.000]     | [0.001]     | [0.006]     | [0.000]     |
| ASSET/EMP              | -0.0016***  | -0.0075***  | -0.0002     | -0.0018***  | -0.0098***  | -0.0002***  |
|                        | [0.000]     | [0.002]     | [0.000]     | [0.000]     | [0.002]     | [0.000]     |
| LOAN LOSSES            | 0.3580***   | 2.7252***   | 0.0792***   | 0.3418***   | 2.5880***   | 0.0751***   |
|                        | [0.035]     | [0.254]     | [0.007]     | [0.030]     | [0.223]     | [0.008]     |
| SECURITIES             | -0.0074***  | -0.0484***  | -0.0038***  | -0.0070***  | -0.0427***  | -0.0039***  |
|                        | [0.001]     | [0.006]     | [0.000]     | [0.001]     | [0.006]     | [0.000]     |
| CONCENTRATION          | -0.0002     | -0.0002     | 0.000       | -0.0002     | -0.0004     | -0.0001**   |
|                        | [0.000]     | [0.001]     | [0.000]     | [0.000]     | [0.002]     | [0.000]     |
| DEPOSIT                | -0.0127***  | -0.0835***  | -0.0027***  | -0.0118***  | -0.0769***  | -0.0025***  |
|                        | [0.002]     | [0.013]     | [0.000]     | [0.002]     | [0.013]     | [0.000]     |
| UNEMPLOYMENT           | -0.0021     | -0.0248     | 0.000       | -0.0029     | -0.0346     | -0.0012     |
|                        | [0.003]     | [0.025]     | [0.001]     | [0.003]     | [0.022]     | [0.001]     |
| AGE                    | -0.0006***  | -0.0023***  | -0.0002***  | -0.0066***  | -0.0025**   | -0.0002***  |
|                        | [0.000]     | [0.001]     | [0.000]     | [0.000]     | [0.001]     | [0.000]     |
| Constant               | 0.0249***   | 0.1975***   | 0.0084***   | 0.0251***   | 0.2015***   | 0.0091***   |
|                        | [0.003]     | [0.019]     | [0.001]     | [0.003]     | [0.022]     | [0.001]     |
| Observations           | 30,377      | 30,377      | 30,377      | 30,377      | 30,377      | 30,377      |
| R-squared              | 0.18        | 0.13        | 0.25        | 0.28        | 0.24        | 0.32        |
| State FE               | Yes         | Yes         | Yes         | NO          | NO          | NO          |
| County FE              | NO          | NO          | Yes         | Yes         | Yes         | Yes         |
| Time FE                | Yes         | Yes         | Yes         | Yes         | Yes         | Yes         |
signs and significance levels of the control variables and the reported r-squares are identical to Table 4. Altogether, the use of the $1 billion thresholds seems a robust measure that can capture performance variations.

4.2. Small vs. large community banks

In this section, we compare the performance of small and large community banks. First, we identify a small community bank, which holds less than $1 billion in assets, and a large community bank as having assets between $1 billion and $10 billion. Beyond that point, questions the entity’s title as solely a community bank. The objective of this exercise is to eliminate the effects of extremely large banks in the sample. This approach reduced the sample size to 26,291. Hughes et al. (2016) find that regulatory burdens such as Dodd-Frank Wall Street Reform and the Consumer Protection Act incentivizes small community banks to grow and achieve economies of scale in credit risk monitoring. As reported in Table 13, our results show that small community banks outpaced large ones as indicated by the coefficient of COVID $\times$ COM. These findings are consistent with Berger et al. (2005); Chakraborty and Hu (2006), and Kowalik (2014), who find that small CBs have advantages over their large counterparts in more focused relationships banking. Notably, in times of externalities such as this pandemic, relationship banking’s usefulness is more pronounced.

4.3. Impacts of PPP loan on performance

This section examines the impact of the first round of PPP loans that ran from March to August 2020. We find that 3598 out of 4360 (82.52 %) Community Banks in our sample distributed the first round of PPP loans. The participation rate among the large banks is about 90.47 %. We find that 855 large banks out of 945 in our sample distributed PPP loans. To test the impact of PPP loans on the

| Table 11 Capital Decomposition. |
|----------------------------------|
| Variables                        | $\Delta$ Total risk-based capital ratio | $\Delta$ Total risk weighted assets adjusted |
|                                  | (1)                                    | (2)                                          |
| $COVID \times COM$               | $-0.0021^{***}$                        | $-0.0485^{***}$                             |
|                                  | $[-0.000]$                             | $[-0.005]$                                  |
| $COM$                            | $0.0008^{**}$                          | $0.0165^{***}$                              |
|                                  | $[0.000]$                              | $[0.003]$                                  |
| $SIZE$                           | $-0.0002^{*}$                          | $0.0085^{***}$                              |
|                                  | $[0.000]$                              | $[0.001]$                                  |
| $LOAN$                           | $-0.0070^{***}$                        | $0.0447^{***}$                              |
|                                  | $[-0.002]$                             | $[0.010]$                                  |
| $EQUITY$                         | $0.0590^{***}$                         | $-0.0215$                                   |
|                                  | $[0.014]$                              | $[0.077]$                                  |
| $LEV\ (CORE\ CAPITAL)$          | $-0.0746^{***}$                        | $-0.1430^{*}$                               |
|                                  | $[0.016]$                              | $[0.081]$                                  |
| $EFFICIENCY$                     | $-0.0131^{***}$                        | $0.0610^{***}$                              |
|                                  | $[0.001]$                              | $[0.008]$                                  |
| $EMP\/ASSET$                    | $-0.0017^{***}$                        | $0.0077^{***}$                              |
|                                  | $[0.001]$                              | $[0.003]$                                  |
| $LOAN\ LOSSES$                  | $-0.2095^{***}$                        | $2.1848^{***}$                              |
|                                  | $[0.051]$                              | $[0.439]$                                  |
| $SECURITIES$                     | $-0.0059^{***}$                        | $-0.0284^{***}$                             |
|                                  | $[0.002]$                              | $[0.009]$                                  |
| $CONCENTRATION$                  | $0.0003$                               | $0.0090^{**}$                               |
|                                  | $[0.000]$                              | $[0.004]$                                  |
| $DEPOSIT$                        | $0.0036$                               | $-0.0668^{***}$                             |
|                                  | $[0.003]$                              | $[0.017]$                                  |
| $UNEMPLOYMENT$                   | $0.0115$                               | $-0.0022$                                   |
|                                  | $[0.007]$                              | $[0.174]$                                  |
| $AGE$                            | $0.0002^{*}$                           | $-0.0031^{**}$                              |
|                                  | $[0.000]$                              | $[0.001]$                                  |
| $Constant$                       | $0.0175^{***}$                         | $-0.0857^{**}$                              |
|                                  | $[0.005]$                              | $[0.034]$                                  |
| Observations                     | 24,764                                 | 30,378                                      |
| $R^{2}$                          | 0.048                                  | 0.228                                       |
| State FE                         | Yes                                    | Yes                                         |
| Time FE                          | Yes                                    | Yes                                         |

This table presents the multivariate Diff-in-Diff regression results of the decomposition of risk-based capital ratio changes and the changes in the total risk-weighted assets adjusted. The sample period includes the 1st, 2nd, and 3rd quarter of 2019 and the 1st, 2nd, and 3rd quarter of 2020. Banks with at least one observation in the pre–COVID-19 and COVID-19 period are included in the sample. Definitions and measurements of all the variables used in this study are provided in the appendix along with data sources. Standard errors are reported in the parenthesis, and heteroskedasticity robust standard errors are clustered by the states and the firms. Statistical significance is donated by *, **, and *** to indicate the significance level at 10 %, 5%, and 1%, respectively.
community banks’ performance during the first three quarter of 2020, we create a dummy variable (PPP_LOAN) that equals one if a bank distributed PPP loan and zeroed otherwise. We then interact it with COVID * COM and report in Panel A of Table 14 that PPP loan participation does not significantly impact the performance between participating and non-participating banks.

Next, to delineate the performance of the CBs that distributed PPP compared to those that did not, we considered a sample consists of community banks only. Specifically, we excluded 5010 observations of large banks from the sample. Finally, to test the impact of PPP loans on the community banks’ performance during the first three quarter of 2020, we create a dummy variable (COM_PPP_LOAN) that equals one if a community bank distributed a PPP loan zeroed otherwise. We then interact it with COVID, the variable, and find that PPP loan participation does not significantly impact the performance between participating and non-participating CBs. We report the findings in Table 14 (Panel B).

5. Conclusions

This paper examines how community banks and large banks withstanding the extreme exogenous shock from the COVID-19 pandemic in profitability, risk-taking, and capital decomposition. In doing so, we use FDIC chartered bank data in a difference-in-difference setup where the variable COVID takes a value of 0 for the period three quarters (2019q1 to 2019q3) before the pandemic and 1 for the three quarters since the pandemic (2020q1 to 2020q3). Our study extends how CBs distinguish themselves while competing with their large counterparts during the crisis period. Our findings are consistent with a set of important studies that document how CBs outperform their large peers in several performance measures during high externalities. We also explore the potential channels through which CBs achieve these performance feats over their rivals.

Since the COVID-19 pandemic is a public health crisis, its effects should be less severe in states with more and/or better quality

| Variables | FDIC Defined Community Bank | Community Bank with Assets up to $10bln |
|-----------|-----------------------------|----------------------------------------|
|           | ROA (1)                     | ROE (2)                                | NIM (3) | ROA (4) | ROE (5) | NIM (6) |
| COVID * COM | 0.0016***                  | 0.1111**                              | 0.0014*** | 0.0021*** | 0.0175*** | 0.0019*** |
| COM | -0.0027***                  | -0.0166***                            | -0.0012** | 0.0004   | 0.003   | -0.0025*** |
| SIZE | 0.0002**                   | 0.0002**                              | -0.0009** | 0.0005*** | 0.0047*** | -0.0009*** |
| LOAN | -0.0015                    | -0.0106                               | 0.0199*** | -0.0030   | -0.0209  | 0.0200**  |
| EQUITY | -0.0397***                 | -0.9770***                            | 0.0560*** | -0.0304   | -0.9093** | 0.0543**  |
| LEV (CORE CAPITAL) | 0.0477***          | 0.5615***                             | -0.0391*** | 0.0392*** | 0.4986*** | -0.0371*** |
| EFFICIENCY | -0.0417***          | -0.3338***                            | -0.0147*** | -0.0415** | -0.3323** | -0.0148*** |
| EMP/ASSET | -0.0070***          | -0.0543***                            | -0.0073*** | -0.0069** | -0.0537** | -0.0073*** |
| LOAN LOSSES | -0.6507***         | -5.3857***                            | 0.3875*** | -0.6379** | -5.2841*** | 0.3851*** |
| SECURITIES | -0.0022*              | -0.0174*                              | -0.0024*  | -0.0031** | -0.0244** | -0.0022*  |
| CONCENTRATION | 0.0004*               | 0.0040**                              | -0.0002   | 0.0005**  | 0.0042**  | -0.0002   |
| DEPOSIT | -0.0134***               | -0.0997***                            | 0.0157*** | -0.0144** | -0.1069** | 0.0157*** |
| UNEMPLOYMENT | 0.0038              | -0.0145**                             | -0.0095*** | 0.0005   | -0.0057** | -0.0300** |
| AGE | -0.0087***               | -0.0055***                            | -0.0001   | -0.0077** | -0.0055** | -0.0002   |
| Constant | 0.0655***               | 0.5632***                             | 0.0434*** | 0.0603**  | 0.5243**  | 0.0453**  |
| Observations | 30,378                | 30,378                                | 30,378    | 30,378   | 30,378   | 30,378   |
| R-squared | 0.65                     | 0.62                                  | 0.57      | 0.65     | 0.62     | 0.57     |
| State FE | Yes                      | Yes                                   | Yes       | Yes      | Yes      | Yes      |
| Time FE | Yes                      | Yes                                   | Yes       | Yes      | Yes      | Yes      |

This table presents the multivariate Diff-in-Diff regression results for the FDIC chartered Community banks (COM) and Non-Community Banks (Control) using alternative measures of community banks. The sample period includes the 1st, 2nd, and 3rd quarter of 2019 and the 1st, 2nd, and 3rd quarter of 2020. Banks with at least one observation in the pre—COVID-19 and COVID-19 period are included in the sample. Definitions and measurements of all the variables used in this study are provided in the appendix, along with data sources. Standard errors are reported in the parenthesis, and heteroskedasticity robust standard errors are clustered by the states and the firms. Statistical significance is donated by *, **, and *** to indicate the significance level at 10%, 5%, and 1%, respectively.
healthcare facilities. Therefore, we develop a healthcare index and interact it with COVID × COM. The results show that performance differences are pronounced less in the states with a higher health index. This result provides new evidence to the literature by highlighting the importance of improved public health facilities to counteract unforeseeable pandemics.

We consider the performance of CBs in rural vs. urban areas and find that CBs located in urban areas perform better in the first three quarters during the pandemic. This finding is consistent with our prediction that CBs in metropolitan regions impose stronger customer relationships, distinguishing them from large banks. Next, we show that being a part of a bank holding company does not benefit CBs during the pandemic. One possible explanation for this is that CBs that belong to BHC often behave like large banks and offer standardized products without assessing the needs of local businesses. We also find differences in the performance of CBs across geographical regions during the pandemic. We argue that bank-specific and industry-specific factors are possible reasons for variations in FDIC supervisory regions’ performance.

Finally, we find a significant difference in the risk-taking and de-risking behavior of CBs during the pandemic. Results show CBs de-risked more than the large banks during the pandemic period. Moreover, we show that our findings are robust in using alternative community banking measures and the inclusion of PPP loans. The results hold even when we split the sample between large and small community banks.

Community banks face many challenges but continue to play an important part in serving the local community and businesses. Greater familiarities with local business environments provide CBs a competitive edge over their large rivals. They rely on the local

| Variables                  | ROA (1) | ROE (2) | NIM (3) |
|----------------------------|---------|---------|---------|
| COVID × COM               | 0.0020*** | 0.0173** | 0.0020*** |
|                           | [0.001] | [0.006] | [0.000] |
| COM                       | 0.001   | 0.0092  | −0.0041*** |
|                           | [0.001] | [0.008] | [0.001] |
| SIZE                      | 0.0006*** | 0.0060*** | −0.0011*** |
|                           | [0.000] | [0.001] | [0.000] |
| LOAN                      | −0.0024 | −0.0175 | 0.0209*** |
|                           | [0.002] | [0.013] | [0.001] |
| EQUITY                    | −0.0237** | −0.8396*** | 0.0363*** |
|                           | [0.011] | [0.104] | [0.010] |
| LEV (CORE CAPITAL)        | 0.0321*** | 0.4399*** | −0.0220** |
|                           | [0.012] | [0.105] | [0.010] |
| EFFICIENCY                | −0.0419*** | −0.3346*** | −0.0159*** |
|                           | [0.001] | [0.009] | [0.001] |
| EMP/ASSET                 | −0.0071*** | −0.0553*** | −0.0080*** |
|                           | [0.000] | [0.003] | [0.000] |
| LOAN LOSSES               | −0.6635*** | −5.3863*** | 0.3736*** |
|                           | [0.053] | [0.450] | [0.069] |
| SECURITIES                | −0.0026** | −0.0221** | −0.0014 |
|                           | [0.001] | [0.010] | [0.001] |
| CONCENTRATION             | 0.0004** | 0.005*  | −0.0001 |
|                           | [0.000] | [0.002] | [0.000] |
| DEPOSIT                   | −0.0146*** | −0.1063*** | 0.0146*** |
|                           | [0.002] | [0.017] | [0.002] |
| UNEMPLOYMENT              | −0.0002 | −0.0169 | −0.0096*** |
|                           | [0.003] | [0.023] | [0.003] |
| AGE                       | −0.0007*** | −0.0058*** | −0.0001 |
|                           | [0.000] | [0.001] | [0.000] |
| Constant                  | 0.0591*** | 0.5060*** | 0.0507*** |
|                           | [0.003] | [0.027] | [0.003] |

This table presents the multivariate Diff-in-Diff regression results for the FDIC chartered Small Community banks (COM) and Large Community Banks (Control) using alternative measures of Community banks. The sample period includes the 1st, 2nd, and 3rd quarter of 2019 and the 1st, 2nd, and 3rd quarter of 2020. Banks with at least one observation in the pre–COVID-19 and COVID-19 period are included in the sample. Definitions and measurements of all the variables used in this study are provided in the appendix along with data sources. Standard errors are reported in the parenthesis, and heteroskedasticity robust standard errors are clustered by the states and the firms. Statistical significance is donated by *, **, and *** to indicate the significance level at 10 %, 5%, and 1%, respectively.
market for their core deposits and extend a significant portion of their loans to local businesses. Although CBs are more exposed to idiosyncratic risks because they collect the deposit and distribute loans, their fundamental banking ideology embraces relationship banking rather than transactional banking. We conclude that relationship banking is paying off for CBs in withstanding the effects of COVID-19 thus far.

**Author contributions**

M. Kabir Hassan: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Software, Visualization, Writing – Original draft and Editing.  
Mohammad Sydul Karim: Conceptualization; Validation; Supervision; Investigation, Writing – Editing.  
Shari Lawrence: Conceptualization; Investigation; Validation, Writing – Revising, Reviewing, and Editing.  
Tastaftiyan Risfandy: Conceptualization; Investigation; Validation; Writing – Revising, Reviewing, and Editing.

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**Table 14**

Performance change – the impacts of PPP loan on performance.

| Variables                          | ROA (1) | ROE (2) | NIM (3) | ROA (4) | ROE (5) | NIM (6) |
|------------------------------------|---------|---------|---------|---------|---------|---------|
| Panel A: PPP Loan and Participating Banks |
| COVID * COM * PPP LOAN             | -0.0011 | 0.0139  | 0.0010  | -0.0010 | -0.0140 | 0.0007  |
|                                    | [0.001] | [0.011] | [0.001] | [0.001] | [0.011] | [0.001] |
| COVID * COM                        | 0.0016  | 0.0178  | 0.0001  | 0.0016  | 0.0180  | 0.0004  |
|                                    | [0.002] | [0.012] | [0.001] | [0.001] | [0.012] | [0.001] |
| COM * PPP LOAN                     | 0.0035**| 0.0333**| 0.0038  | 0.0036**| 0.0329**| 0.004   |
|                                    | [0.001] | [0.013] | [0.002] | [0.001] | [0.014] | [0.003] |
| COVID * PPP LOAN                   | 0.001   | 0.0123  | 0.0007  | 0.001   | 0.0127  | -0.0004 |
|                                    | [0.001] | [0.011] | [0.001] | [0.001] | [0.011] | [0.001] |
| PPP LOAN                           | -0.0039**| -0.0367***| -0.0027 | -0.0039**| -0.0357***| -0.0029 |
|                                    | [0.001] | [0.012] | [0.002] | [0.001] | [0.013] | [0.003] |
| COM                                | -0.0032**| -0.0293***| -0.0049*| -0.0033**| -0.0289***| -0.0049**|
|                                    | [0.001] | [0.013] | [0.002] | [0.001] | [0.014] | [0.003] |
| Controls                           | Yes     | Yes     | Yes     | Yes     | Yes     | Yes     |
| Observations                       | 30,378  | 30,378  | 30,378  | 30,378  | 30,378  | 30,378  |
| R-squared                          | 0.65    | 0.625   | 0.575   | 0.687   | 0.674   | 0.632   |
| State FE                           | Yes     | Yes     | Yes     | NO      | NO      | NO      |
| County FE                          | NO      | NO      | NO      | Yes     | Yes     | Yes     |
| Time FE                           | Yes     | Yes     | Yes     | Yes     | Yes     | Yes     |

| Panel B: PPP Loan and Participating Community Banks |
| Variables                          | ROA (1) | ROE (2) | NIM (3) | ROA (4) | ROE (5) | NIM (6) |
|------------------------------------|---------|---------|---------|---------|---------|---------|
| COVID * COM PPP LOAN               | -0.0004 | -0.0015 | 0.0003* | -0.0003 | -0.0013 | 0.0003**|
|                                    | [0.000] | [0.001] | [0.000] | [0.000] | [0.001] | [0.000] |
| PPP LOAN                           | -0.0006***| -0.0048***| 0.0011***| -0.0004*| -0.0040***| 0.0010***|
|                                    | [0.000] | [0.002] | [0.000] | [0.000] | [0.002] | [0.000] |
| Controls                           | Yes     | Yes     | Yes     | Yes     | Yes     | Yes     |
| Observations                       | 25,458  | 25,458  | 25,458  | 25,458  | 25,458  | 25,458  |
| R-squared                          | 0.69    | 0.65    | 0.59    | 0.73    | 0.71    | 0.66    |
| State FE                           | Yes     | Yes     | Yes     | NO      | NO      | NO      |
| County FE                          | NO      | NO      | NO      | Yes     | Yes     | Yes     |
| Time FE                           | Yes     | Yes     | Yes     | Yes     | Yes     | Yes     |

This table presents the multivariate Diff-in-Diff regression results for the sample banks that distributed the first round of PPP loans that ran from March to August 2020. The PPP LOAN in Panel A equals one if a bank distributed PPP loan and zeroed otherwise. In Panel B, to delineate the performance of the CBs that distributed PPP compared to those that did not, we considered a sample consists of community banks only. Therefore, we incorporate a dummy variable COM PPP LOAN that equals one if a community bank distributed PPP loan and zeroed otherwise. In both Panels, the sample period includes the 1st, 2nd, and 3rd quarter of 2019 and the 1st, 2nd, and 3rd quarter of 2020. Banks with at least one observation in the pre–COVID-19 and Covid-19 periods are included in the sample. Definitions and measurements of all the variables used in this study are provided in the appendix, along with data sources. Standard errors are reported in the parenthesis, and heteroskedasticity robust standard errors are clustered by the states and the firms. Statistical significance is donated by *, **, and *** to indicate the significance level at less than 10 %, 5%, and 1%, respectively.
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Appendix A. Variable Definition

| Variables          | Definition [SDI Data Item] |
|--------------------|----------------------------|
| ROA                | Return on assets [roaq]    |
| ROE                | Return on equity [roeq]    |
| NIM                | Net interest margin [nimyq]|
| EMPLOYEE           | log number of full-time employees [numemp] |
| SIZE               | log total assets [asset]   |
| LOAN               | Total loan and leases scaled by total assets [lnlsgr/asset] |
| EQUITY             | Equity capital scaled by total assets [eqv] |
| CORE CAPITAL       | Core capital ratio [rbc1aaj] |
| EFFICIENCY         | (Non-interest expense: Intangible assets amortization)/ (Net interest income + Non-interest expense) [eefr] |
| ASSET/EMP          | Total assets in millions to the total number of full-time employees [astempm] |
| LOAN LOSSES        | Loan loss allowance to net loans and leases [lnatres/lnlsnet] |
| SECURITIES         | Total investment securities to total assets [sc/asset] |
| CONCENTRATION      | log (1 + assets concentration hierarchy) [specgr] |
| DEPOSIT            | Total deposits to total assets [dep/asset] |
| UNEMPLOYMENT       | State-level unemployment data from the US Bureau of Labor Statistics |
| AGE                | Firms age since establishment date [estymd] |
| FACILITY INDEX     | [(Total hospital beds in a state + Total ICU beds in a state + Community health center delivery sites)/Per 10,000 population of the state] |
| FACILITY INDEX2    | [(Total hospital beds in a state + Total ICU beds in a state + Community health center delivery sites)/Per 10,000 population of the state]/ [(Total hospital beds in U.S + Total ICU beds in U.S.+Community health center delivery sites in the US)/Per 10,000 population of US] |
| MSA                | Metropolitan areas based on 2000 Census [CBSA_Metro] |
| HOLDING            | A dummy variable takes a value of 1 if a company directly or indirectly owns, controls, or has the power to vote 25 percent or more of a bank’s or direct holding company’s shares and zero otherwise [namehcr] |
| \( \Delta \) TOTAL RISK-BASED CAPITAL RATIO | Changes in the total risk-based capital ratio \( [\text{rbcrwaj}_t - \text{rbcrwaj}_{t-1}]/\text{asset}_{t-1} \) |
| SD (ROA)           | The standard deviation of the last three-quarters return on assets [roaq] |
| SD (ROE)           | The standard deviation of the last three-quarters return on equity [roeq] |
| SD (NIM)           | The standard deviation of the last three-quarters Net interest margin [nimyq] |

Appendix B. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.ribaf.2021.101608.

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