Natural Disaster Impacts on U.S. Banks

James R. Barth, Stephen Matteo Miller, Yanfei Sun and Shen Zhang

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ABSTRACT
We examine how natural disasters affect bank performance during the 2000-2017 period. The results suggest bank offices in affected counties raise loan rates more than deposit rates. However, we find that community banks, not non-community banks, drive the results, and by being located in disaster-prone areas, they contribute to helping communities recover from natural disasters without any evidence of price gouging. This contributes to higher returns on assets and net interest margins for community banks. Yet, the banks' resulting higher return on assets is not large enough that their offices in disaster-prone communities contribute to economically meaningful profits. Moreover, banks increase their use of brokered deposits after natural disasters to help offset any withdrawal of deposits by individuals and firms in affected communities.

KEYWORDS
Natural Disasters, Banks, Community Banks, Credit, Deposit Rates, Loan Rates, Brokered Deposits

INTRODUCTION
Natural disasters, including hurricanes, tornadoes, floods, wildfires, and earthquakes, cause severe property damage to homes, businesses, and automobiles in the communities in which they occur. Boustan et al. (2020) find that, through most of the 20th century, the U.S. experienced about 500 natural disasters across counties each year, but since 2000 county-level disaster counts have roughly tripled to 1,500 each year. Moreover, according to Deryugina (2017), the costs of natural disasters have grown faster than GDP over time. Individuals and business owners typically obtain funds to repair damages due to disasters from private insurance policies as well as relief from state and federal agencies. However, these funds typically do not cover the full repair costs, which means that the market for such risks remains incomplete (see Federal Reserve Banks of Dallas, New York, Richmond, and San Francisco, 2018). This requires individuals and business owners to seek liquidity by withdrawing deposits and credit by applying for loans at local bank offices to obtain additional...
funds for reconstruction efforts.¹

Several studies have examined the impact of natural disasters on various bank responses. For example, some find bank deposits increase in areas that experience natural disasters (see Steindl and Weinrobe, 1983, Dlugosz et al., 2021 and Barth et al., 2022). Others find that loan originations increase in response to natural disasters (see Cortés, 2014, Cortés and Strahan, 2017, Cortés, 2017, Bos, Li and Sanders, 2022, He, 2018, Schüwer, Lambert and Noth, 2019, and Koetter, Noth and Rehbein, 2020). Still others find natural disasters have short-term adverse effects on bank performance as measured by failures, but without resulting in bank runs (Steindl and Weinrobe, 1983, FDIC, 2005, Klomp, 2014, and Noth and Schüwer, 2018).

If banks experience increased deposits and lending after natural disasters, without experiencing a greater likelihood of failure, then they may also experience an increase in profitability. In contrast to earlier studies, we examine whether bank profitability does increase in response to natural disasters and disaster recovery efforts of local communities across counties in the U.S. from 2000 to 2017. We also examine whether any increase in overall deposits is due to an increase in brokered deposits that may be offsetting any deposit withdrawals by affected individuals and firms when disasters occur, which again has not been previously studied. We start by examining the impact of natural disasters across counties on overall bank profitability, measured by return on assets (ROA) and net interest margin (NIM). Using direct property damages in disaster-affected areas, we find a significantly positive and cumulative effect on both ROA and NIM. Specifically, for all banks, a one standard deviation increase in disaster exposure is associated with a 2-basis point increase in ROA and a 1 basis point increase in NIM. However, we find that this result is driven entirely by community banks.

When exploring whether bank profitability improves following natural disasters, we investigate if any impact is due to the pricing strategy of banks at the branch level on various deposit and loan products. Specifically, using rates for various deposits, including certificates of deposit, interest checking accounts, money market deposit accounts, and various loans, including auto loans, home equity loans, and mortgages, we find that both deposit and loan rates increase at branches of community banks in counties in which disasters occur. The increase in average deposit rates is smaller than the increase in average loan rates, consistent with our finding of increased ROA and NIM for all banks, especially for community banks, following disasters.

Furthermore, brokered deposits can provide affected banks with an alternative source of funding to deposits in the event there are deposit withdrawals by parties seeking funds to cover disaster-related expenses. This may be an easier and less costly alternative to raising interest rates or to shifting deposits in offices of a branch network located outside of the affected communities. We do find that for all banks, a one standard deviation increase in disaster exposure is associated with a 24 basis points increase in the ratio of the brokered-to-total deposits, indicating that banks do turn to this market as a source of additional funding following natural disasters.

Since damages might be endogenous due to mitigation efforts, we also replace the dollar value of property damages with an indicator variable that equals one if a natural disaster occurs in a county, and zero otherwise, and repeat our empirical tests. In contrast to property damages due to natural disasters, the occurrence of natural disasters should be exogenous, at least in the short term. For instance, while some may argue that human actions can contribute to future disasters due to their effect on, for example, deforestation and global warming, in the short run, this is unlikely to be the case for the types of natural disasters we consider here. Our results with this alternative disaster variable confirm our findings regarding bank profitability and deposit and loan pricing.

¹ The Federal Deposit Insurance Corporation (FDIC) issues Financial Institution Letters in response to various natural disasters that strike different parts of the country over time in which the general message is that banks in the affected areas are encouraged to meet the financial services needs of their communities. See, for example, https://www.fdic.gov/news/news/financial/2018/fil18048.html, accessed August 8, 2019.
Overall, our study makes several contributions to the existing literature. First, we investigate the response of bank branches in communities affected by natural disasters by examining how they can affect overall bank profitability through changes in lending and deposit rates. Second, we examine whether the use of brokered deposits serves as an alternative to a branch network when seeking additional funding in response to natural disasters. Third, in our study, we differentiate between community and non-community banks since community banks operate more locally and with fewer branches than non-community banks. In this regard, we present new data showing that community banks operate to a far greater degree than non-community banks in counties affected more frequently and by more costly natural disasters.

Moreover, we find that the empirical results for all banks are driven by community banks and not non-community banks, which is a new finding to this literature. This is not surprising because, as we document, community banks are more than 90 percent of all the banks headquartered in the top 25 counties experiencing the most significant property damage due to natural disasters.

The remainder of the paper proceeds as follows. The following section discusses the data and the specification of the model used in the empirical estimation. The third section presents and discusses the empirical results. In the fourth section, we present robustness tests as a check on our basic findings. The fifth section examines the importance of community banks in our findings in more detail. Concluding comments are presented in the last section.

DATA AND MODEL

DATA

We use four sources of data. First, we obtain information on natural disasters from the Spatial Hazard Event Loss for the United States (SHELDUS). For each month in each county from 1960 to 2017, SHELDUS estimates the direct property losses caused by natural disasters, including thunderstorms, hurricanes, floods, wildfires, and tornadoes, as well as perils such as flash floods and heavy rainfall. Second, we obtain branch locations for each bank in each county-year from the Summary of Deposits from the Federal Deposit Insurance Corporation (FDIC). Third, we also use bank call report data for the bank control variables and performance variables included in our empirical model. Lastly, we obtain the office-level deposit and loan rates from RateWatch, established in 1989. RateWatch has conducted weekly surveys on the interest rates of various deposit and loan products for bank offices (bank headquarters and branches) throughout the country since 2000. This dataset enables us to determine the response of banks in terms of the deposit and loan rates charged at the office level after natural disasters in both counties experiencing such disasters and those contemporaneously not experiencing them.

AN OVERVIEW OF DISASTER LOCATION AND SEVERITY

In Figure 1, we show the property damage due to 974 Presidentially Declared Disasters (PDD) in counties throughout the U.S. from 2000 to 2017. The total damages over the period are $584 billion.
and counties reporting the most significant property damage are located near coastal areas. The darkest shading on the map reflects the greatest damage. Of course, the number of PDDs can include more than one county. During the period, 14,840 natural disasters occurred across all counties. With more than three thousand counties in the sample, counties on average experienced nearly five disasters during the sample period, although this masks the substantial heterogeneity across counties.

Figure 1. Property Damage in Counties, 2000-2017

Note: This figure shows the total property damage caused by natural disasters in counties throughout the U.S. over 2000 – 2017. Source: SHELDUS.

Figure 2 shows the percentage of the 3,142 counties that suffered from natural disasters from 2000 to 2017. As shown in Table A1, the numbers ranged from a high of 34 percent (1,082 counties) in 2005 to a low of 6 percent (186 counties) in 2014. Approximately 81 percent of all the counties experienced more than one disaster over the entire period.

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4 In our study, we include both counties and county equivalents. County equivalents consist of geographical units within states that are the statistical equivalent of counties.
In terms of counties suffering the most extensive property damages from natural disasters, Figure 3 shows that the top 25 counties account for $322 billion of the $584 billion, or 55 percent, in total damages over the entire period. Table A2 shows that the 25 counties lie in eight states, with all but two counties located near coastal regions. Among the top 25 counties, the property damage during the sample ranges from $32 billion (Jefferson, Louisiana) to $4.3 billion (Livingston, Louisiana).

In terms of the number of banks and bank offices in these 25 counties, as Table A2 shows, the number of bank headquarters ranges from a low of 0 to a high of 83, while the number of offices ranges from a low of 8 to a high of 2,798. Harris County, Texas, the most populous county in Texas and the third-most populous county in the U.S., has the highest number of bank headquarters and bank offices.
In 2005, Hurricane Katrina struck the southeastern U.S. and caused damages in many counties in the states of Florida, Alabama, Louisiana, and Mississippi. Although not shown in a figure, we provide information on the top 25 counties ranked by the greatest single damages within the eighteen years in Table A3, which overlaps the information in Figure 3 and Table A2. In particular, 19 of the 25 top counties appear when ranked by the most significant total damages and the greatest single damages. The differences in the damages occur mainly because of multiple disasters in some counties over the entire 2000-2017 period. Differences also exist in the number of bank headquarters and bank offices in Tables A2 and A3 because the former table covers eighteen years, while the latter table covers a single month and year. As a result, the total property damages in Table A2 exceed those in Table A3 by $17 billion.

Figure 4 shows the average number of bank headquarters and their branches in counties throughout the U.S. over the 2000-2017 period. During this period, the number of banks declined from 10,098 in 2000 to 5,787 in 2017, a reduction of 43 percent. At the same time, the number of offices, including bank headquarters and their branches, equaled 84,909 in 2000 and increased to a high of 98,963 in 2009, before declining to 89,466 in 2017 (see Table A1). The yellow regions in Figure 4 indicate a county with no bank offices; as such, the figure shows banks have headquarters and branches in almost all counties in the U.S. (see Table A1). Over the entire period, there are as few as three counties (in 2002) and as many as 28 counties (in 2016) without bank offices. Stated another way, 99 percent or more of all the counties have at least one bank office. However, differences exist between the number of locations with bank headquarters and bank branches, as indicated above. In particular, 484 counties (15 percent) in 2000 had no bank headquarters, and that increased to 924 (29 percent) in 2017 (see Table A1), which reflects the declining number of banks across the U.S.

Figure 5 shows the percentage of counties with natural disasters and bank headquarters and/or offices. The figure shows that almost all the counties suffering natural disasters had either bank headquarters or offices of the banks located in them. The percentage of counties with offices exceeds 99 percent throughout the sample. However, the percentage of counties with bank headquarters ranges from a high of 92 percent in 2007 to a low of 71 percent by 2016. Of course, the percentage of

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5 In 2005, Hurricane Katrina struck the southeastern U.S. and caused damages in many counties in the states of Florida, Alabama, Louisiana, and Mississippi.
all the counties with both disasters and bank offices ranges from a high of 34 percent in 2005 to a low of 6 percent in 2014, while the percentage of all the counties with both disasters and bank headquarters range from a high of 29 percent in 2005 to a low of 5 percent in 2014. As Table A1 shows, these figures were 35 percent or less because the percentage of counties with disasters never exceeds 35 percent.

![Figure 5](image.png)

**Figure 5.** Percentage of Counties with Both Natural Disasters and Bank Headquarters /Offices, 2000-2017

*Note:* This figure shows the percentage of counties with both natural disasters and bank headquarters and/or offices.

*Source:* U.S. Census Bureau, FDIC and SHELDUS.

Figure 6 shows the states in which the top 25 banks have headquarters and the total property damages from natural disasters to which they had exposure, including the total property damages and the number of disasters, over the 2000-2017 period. The total damage exposure for these banks was $144 billion, or 25 percent of the total damages over the entire period.

Interestingly, these 25 banks also had headquarters in counties that were collectively exposed to 181 natural disasters. For instance, Mississippi River Bank in Plaquemines County, Louisiana, was exposed to the largest damages, at $16 billion, and had exposure to eight disasters. Table A4 shows that four banks, all located in Jefferson County, Louisiana, had exposure to 11 disasters, the most in the sample.
Figure 6. Top 25 Banks: Total Property Damages and Number of Natural Disasters, 2000-2017

Note: This figure shows the states in which the top 25 banks have headquarters and the total property damages from natural disasters that they had exposures to, including both the total property damages and the number of disasters, over the 2000-2017 period. Source: FDIC & SHELDUS.

Tables A5 and A6 provide information on the top 25 banks and the top 25 bank headquarters and bank offices, ranked by the highest single damage within the eighteen years. Table A4 only shows total damages for bank headquarters, while Tables A5 and A6 show single damages for both bank headquarters and their branches, respectively. Table A5 shows that all of the top 25 banks have headquarters in five states, while Table A6 shows all of the top 25 banks have locations in nine states. Three states show up in both tables, Louisiana, Mississippi, and Texas. Not surprisingly, the total damage exposure to bank offices exceeds that of bank headquarters by $54 billion.

MODEL SPECIFICATION

To estimate the effects of natural disasters on banks based on either quarterly or monthly data, we use the following model specification:

\[
Outcome \text{ Variable}_{i,j,t} = \alpha + \sum_{k=1}^{4} \beta_k \text{Disaster Exposure}_{i,t-k} + \text{Control Variables}_{i,t} + \gamma_i + q_t + \epsilon_{i,j,t}
\]  

(1)

where \(i\) represents bank headquarters or offices, \(j\) represents counties, \(t\) represents time, and \(k\) represents lags of the disaster exposure variable. We also include bank fixed (office fixed effects for the office-level analysis) effects, \(\gamma_i\), to control for omitted time-invariant bank characteristics, and quarterly fixed effects (monthly fixed effects for the office-level analysis), \(q_t\), to account for seasonality. As quarterly outcome variables for the overall bank, we use return on assets (ROA), net interest margin (NIM), and brokered deposits-to-total deposits, loan volumes, and deposit volumes. We use deposit and loan rates at bank offices as monthly outcome variables. Our control variables include bank assets, loan loss provisions-to-assets, and the Federal Funds rate. We use the standard errors clustered at the bank level.
We use disaster exposure as our primary explanatory variable, which we measure following Cortés and Strahan (2017):

\[
\text{Disaster Exposure}_{i,t} = \ln \left( \sum_{j=1}^{n} \text{Property Damage in Shocked Counties}_{j,t} \right) * \frac{\text{Bank Office Share}_{i,j,t-1}}{N_{i,t}}
\]  

(2)

where i represents banks, j represents counties, and t represents quarters for bank headquarters-level data and months for bank office-level data. Bank Office Share_{i,j,t-1} equals the number of offices of bank i in county j, divided by the total number of bank offices in county j, and N_{i,t} represents the number of bank offices for bank i at time t.

Our analysis compares bank headquarters and bank offices affected by natural disasters with those unaffected by natural disasters in the same county, which allows us to hold constant any aggregate impacts of natural disasters throughout a county. We estimate the impact of natural disasters on bank profitability, brokered deposit funding, and deposit and loan rates, holding constant the conditions of affected and non-affected banks following natural disasters.

EMPIRICAL RESULTS

SUMMARY DATA

We list the variables used in our regression equations, and their summary statistics, in Table 1. Panel A reports the quarterly disaster exposure and bank-level variables, while Panel B reports the monthly deposit and loan rates at the bank office level. Panel A shows that the average number of offices per bank equals about 12. Also, as shown in Panel B, the average interest rate on a checking account of less than $2,500 equals 0.5 percent. Furthermore, as different bank offices may offer different products, our monthly sample sizes range substantially by outcome variable from 233,106 to 1,682,131 observations.

Table 1. Summary Statistics
Panel A. Bank-Level Data, Quarterly

|                           | Obs.  | Average | S.D. | P25 | P50 | P75 |
|---------------------------|-------|---------|------|-----|-----|-----|
| Disaster Exposure (Ln Dollars) | 576,904 | 0.32 | 1.46 | 0.00 | 0.00 | 0.00 |
| ROA (%)                   | 576,256 | 0.85 | 3.53 | 0.50 | 0.91 | 1.32 |
| NIM (%)                   | 576,207 | 3.92 | 4.02 | 3.35 | 3.87 | 4.41 |
| Broked Deposits-to-Total Deposits (%) | 576,036 | 3.09 | 15.53 | 0.00 | 0.00 | 1.60 |
| Total Assets ($ Millions) | 576,904 | 1547 | 28,865 | 62 | 132 | 309 |
| Ln Assets                 | 576,904 | 18.84 | 1.53 | 17.94 | 18.69 | 19.55 |
| Total Loan (% of Total assets) | 565,390 | 65.03 | 91.82 | 54.64 | 66.87 | 76.99 |
| Domestic Real Estate Loan (% of Total assets) | 565,390 | 45.96 | 91.02 | 32.15 | 46.28 | 59.56 |
| Auto Loan (% of Total assets) | 184,849 | 1.41 | 3.54 | 0.08 | 0.58 | 1.60 |
| Total Domestic Deposits (% of Total assets) | 576,904 | 81.62 | 11.48 | 79.03 | 84.36 | 88.08 |
| Demand Deposits (% of Total assets) | 549,704 | 12.28 | 8.89 | 6.50 | 10.93 | 16.17 |
| Money Market Deposit Accounts (% of Total assets) | 549,704 | 13.67 | 40.02 | 4.88 | 10.46 | 18.53 |
| Loan Loss Provisions to Total Assets (%) | 576,256 | 0.30 | 0.81 | 0.01 | 0.12 | 0.29 |
| Number of Offices | 576,904 | 11.84 | 116.41 | 2.00 | 3.00 | 6.00 |
Table 2 presents correlations among the disaster exposure and bank-level variables used in our analysis. Our key explanatory variable, disaster exposure, has a positive and statistically significant correlation with NIM, brokered deposits-to-total deposits, and it has a negative and statistically significant correlation with total assets and loan loss provisions-to-total assets. No significant correlation exists between the disaster exposure variable and ROA.
Table 2. Correlations

|                      | Disaster Exposure | ROA   | NIM  | Brokered Deposits-to-Total Deposits | Ln Assets | Loan Loss Provisions to Assets | Fed Funds Rate |
|----------------------|-------------------|-------|------|-----------------------------------|-----------|---------------------------------|---------------|
| Disaster Exposure    | 1.000             |       |      |                                   |           |                                 |               |
| ROA                  | -0.000            | 1.000 |      |                                   |           |                                 |               |
| NIM                  | 0.003             | 0.044 | 1.000|                                   |           |                                 |               |
| Brokered Deposits-to-Total Deposits | 0.007         | -0.005 | 0.015 | 1.000                            |           |                                 |               |
| Ln Assets            | -0.083            | 0.035 | -0.016 | 0.116                            |           |                                 |               |
| Loan Loss Provisions to Assets | -0.005         | -0.178 | 0.077 | 0.122                           | 0.088     |                                 | 1.000         |
| Fed Funds Rate       | 0.021             | 0.033 | 0.042 | -0.017                          | -0.062    | -0.066                          | 1.000         |

Note: p-values are in parentheses.

REGRESSION ANALYSIS: ROA, NIM, AND BROKERED-TO-TOTAL DEPOSITS

Table 3 presents the empirical results relating to the impact of natural disasters on bank profitability and funding as measured by ROA, NIM, and brokered deposits-to-total deposits. We report results for all banks and community and non-community banks. We rely on the FDIC's definition of community banks, whereby such banks tend to be smaller, but they also tend to focus more on local relationship banking rather than transactional banking.6 Analyzing the two types of banks separately is important because they are quite different in many respects, as shown in Panel C of Table 1. There are significant differences in all the bank balance sheet items shown in that panel and the total number of offices. Also, we focus on the sum of the coefficients of the disaster exposure variables due to the multicollinearity that exists among them.

Our results indicate that the main variable of interest, disaster exposure, has a significantly positive cumulative association with the two performance variables and one funding variable for all banks. In terms of economic significance, the association between a one standard deviation increase in disaster exposure and ROA for all banks results in a 1.8 basis points7 increase. For community banks, the association between a one standard deviation increase in disaster exposure and the increase in ROA is a 1.3 basis points. Non-community banks differ in that the association between a one standard deviation increase in disaster exposure and ROA translates into a 6.5 basis points increase.

A bank’s response to a one standard deviation increase in disaster exposure is a 1 basis point increase in NIM. For community banks, the association between a one standard deviation increase in disaster exposure and changes in NIM equals 0.7 basis points. For non-community banks, the association between a one standard deviation increase in disaster exposure and the increase in NIM is a 6.5 basis points. However, the coefficient estimates for all banks and non-community banks have large standard errors, and the p-value for the F-test of the coefficients being different from zero lies equal to 0.1672 and 0.4741, respectively, indicating one cannot reject the null that sum of the coefficients equal zero.

For brokered deposits, a bank’s response to a one standard deviation increase in disaster exposure results in a 23.6 basis points increase in the brokered-to-total deposits, indicating that banks do turn to this market as a source of funding during natural disasters. We obtain similar results for community

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6 See FDIC Community Banking Study (2012), https://www.fdic.gov/regulations/resources/cbi/report/cbsi-1.pdf.
7 The standard deviation of disaster exposure is 1.46, and the coefficient sum of disaster exposures is 0.012. This means a 2.1% (=0.018%/0.85%) increase in ROA, as the average value of ROA equals 0.85%.
banks, a one standard deviation increase in disaster exposure results in a 15.9 basis points increase in the brokered-to-total deposits. For non-community banks, a one standard deviation increase in disaster exposure is associated with a 62.9 basis points increase in brokered-to-total deposits. Given the length of our sample, we also report results for sub-samples before, during, and after the financial crisis of 2008-2009.

### Table 3. Bank Performance and Natural Disasters

|                          | ROA           | NIM           | Brokred deposits to total deposits |
|--------------------------|---------------|---------------|-----------------------------------|
|                          | All Banks     | Non-Community Banks | All Banks | Non-Community Banks | All Banks | Non-Community Banks | All Banks | Non-Community Banks |
| Disaster                 | 0.000         | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.094   | 0.021*** | 0.147** |
| Exposure_{it-1}          | (0.002)       | (0.001)       | (0.022) | (0.001) | (0.001) | (0.010) | (0.066) | (0.005) | (0.062) |
| Disaster                 | 0.002         | 0.000         | 0.026   | 0.001   | 0.001   | 0.001   | 0.018   | 0.027*** | 0.134*** |
| Exposure_{it-2}          | (0.003)       | (0.002)       | (0.017) | (0.001) | (0.001) | (0.011) | (0.017) | (0.005) | (0.050) |
| Disaster                 | 0.003*        | 0.004**       | -0.003  | 0.003   | 0.002***| 0.027   | 0.024*  | 0.030*** | 0.122** |
| Exposure_{it-3}          | (0.002)       | (0.001)       | (0.020) | (0.002) | (0.001) | (0.035) | (0.014) | (0.004) | (0.058) |
| Disaster                 | 0.007***      | 0.004**       | 0.045** | 0.003   | 0.002** | 0.021   | 0.026** | 0.029*** | 0.113** |
| Exposure_{it-4}          | (0.002)       | (0.002)       | (0.023) | (0.002) | (0.001) | (0.029) | (0.013) | (0.005) | (0.066) |
| Log Assets_{it}          | 0.292**       | 0.251***      | 0.178   | -0.197***| -0.272***| -0.036  | 2.985*** | 3.087*** | 2.340*** |
| Loan Loss Provisions to  | -0.945***     | -1.007***     | -0.785***| 0.105   | -0.019**| 0.447** | 0.716*** | 0.641*** | 0.737*** |
| Assets_{it}              | (0.124)       | (0.027)       | (0.531) | (0.049) | (0.012) | (0.226) | (0.156) | (0.117) | (0.581) |
| Federal Funds Rate_{it}  | 0.067***      | 0.056***      | 0.112** | 0.069***| 0.056***| 0.135** | 0.249***| 0.241*** | 0.012   |
|                          | (0.010)       | (0.003)       | (0.048) | (0.008) | (0.002) | (0.065) | (0.031) | (0.013) | (0.101) |
| Constant                 | -4.461*       | -3.693***     | -1.922  | 7.485***| 8.901***| 4.135   | 53.828***| 55.733***| 39.668***|
|                          | (2.360)       | (0.502)       | (11.046)| (0.945) | (0.221) | (4.862) | (2.961) | (2.190) | (12.045) |
| Bank Fixed Effects       | Yes           | Yes           | Yes     | Yes     | Yes     | Yes     | Yes     | Yes     | Yes |
| Quarter Fixed Effects    | Yes           | Yes           | Yes     | Yes     | Yes     | Yes     | Yes     | Yes     | Yes |
| Observations             | 530,979       | 482,469       | 48,341  | 530,943 | 482,469 | 48,304  | 530,859 | 482,464 | 48,234 |
| Number of Banks          | 10,826        | 9,804         | 1,788   | 10,826  | 9,804   | 1,787   | 10,823  | 9,803   | 1,779 |
| Average Number of Offices per Bank | 12 | 5 | 78 | 12 | 5 | 78 | 12 | 5 | 78 |
| Adjusted R-squared       | 0.565         | 0.715         | 0.583   | 0.366   | 0.606   | 0.350   | 0.230   | 0.629   | 0.963   |
| Disaster Exposure Coefficient Sum | 0.012 | 0.009 | 0.053 | 0.007 | 0.005 | 0.053 | 0.162 | 0.107 | 0.516 |
| F-value                  | 3.35          | 2.92          | 0.68    | 1.91    | 6.53    | 0.51    | 24.13   | 38.89   | 5.98    |
| P-value                  | 0.0672        | 0.0874        | 0.4083  | 0.1672  | 0.0106  | 0.4741  | 0.0000  | 0.0000  | 0.0146  |
Table 4 reports the relationship between bank profitability and brokered deposit funding for all banks and natural disasters before, during, and after the financial crisis. The periods cover 2001-2007, Q1 2008 to Q2 2009 based on the National Bureau of Economic Research, and 2009-2017. We find that before the crisis, a one standard deviation increase in disaster exposure is associated with a 3.7 basis point increase in ROA. A one standard deviation increase in disaster exposure is associated with an 8.5 basis point decrease in ROA during the crisis. After the crisis, we also find a one standard deviation increase in disaster exposure is associated with a 1.3 basis point increase in ROA. The F-test indicates that statistically speaking, the impact of during and after crisis does not differ from zero. Taken together, these findings suggest that (1) the association between disaster exposure and ROA responds pro-cyclically, and (2) ROA responds asymmetrically to increases in disaster exposure through the cycle, in that we find a small positive association in ordinary times and a larger but still small negative association during the downturn. The response of NIM differs somewhat from ROA. We find that a one standard deviation increase in disaster exposure is associated with a 3.6 basis point increase in NIM before the crisis. However, though not statistically significant during the crisis, a one standard deviation increase in disaster exposure is associated with a 2.2 basis point decrease in NIM. After the crisis, we also find a one standard deviation increase in disaster exposure is associated with a 1.8 basis point increase in NIM. These findings suggest that (1) the association between disaster exposure and NIM responds in a slightly pro-cyclical manner, and (2) NIM responds more or less symmetrically to increases in disaster exposure through the cycle, in that we find a small positive relationship in ordinary times and a small negative relationship during the downturn.

In the case of brokered-to-total deposits, we find an insignificantly negative association between disaster exposure and the brokered-to-total deposit ratio before and during the crisis, and a significantly positive association after the crisis. After the crisis, a one standard deviation increase in disaster exposure is associated with a 4.8 basis point increase in the brokered-to-total deposit ratio. In the following subsection, we examine in somewhat more detail the results for bank profitability by examining the association between disaster exposure and deposit and loan rates.
### Table 4. Bank Performance and Natural Disasters Before, During, and After Financial Crisis

|                     | Pre-Crisis | ROA | Post-Crisis | Net Interest Margin | Pre-Crisis | Deposits-to-Total Deposits | Post-Crisis |
|---------------------|------------|-----|-------------|---------------------|------------|----------------------------|-------------|
| Disaster Exposure_{t-1} | 0.003      | -0.007 | -0.000      | 0.002               | -0.004***  | 0.006**                    | 0.100       |
|                      | (0.002)    | (0.006) | (0.004)     | (0.002)             | (0.001)    |                           | (0.008)     |
| Disaster Exposure_{t-2} | 0.004      | -0.014 | 0.004       | 0.003               | -0.003***  | -0.049                     | -0.011      |
|                      | (0.002)    | (0.010) | (0.002)     | (0.002)             | (0.001)    |                           | (0.013)     |
| Disaster Exposure_{t-3} | 0.007**    | -0.011 | 0.000       | -0.002              | 0.003      |                           | 0.045       |
|                      | (0.003)    | (0.010) | (0.003)     | (0.005)             | (0.003)    |                           | 0.001       |
| Disaster Exposure_{t-4} | 0.010***   | -0.014 | 0.007       | 0.010               | -0.003***  | -0.045                     | 0.002       |
|                      | (0.003)    | (0.010) | (0.003)     | (0.004)             | (0.002)    |                           | (0.011)     |
| Ln Assets_{i,t}     | 0.405      | 2.104  | 0.885       | -0.109              | -0.163     | 4.080                      | 4.700       |
|                      | (0.095)    | (1.069) | (0.313)     | (0.174)             | (0.129)    |                           | (0.283)     |
| Loan Loss Provisions to Assets_{i,t} | -0.727*** | -0.957 | -0.897       | 0.412               | -0.049     | 0.039                      | 0.096       |
|                      | (0.068)    | (0.033) | (0.017)     | (0.179)             | (0.010)    |                           | (0.255)     |
| Federal Funds Rate_{i,t} | -0.016**   | 0.162  | -0.191      | 0.007               | 0.055      | -0.043                     | 0.171       |
|                      | (0.008)    | (0.048) | (0.081)     | (0.003)             | (0.007)    |                           | (0.010)     |
| Constant            | -6.277***  | -38.979 | -15.829     | 6.004               | 6.805      | 5.339                      | -73.992     |
|                      | (1.767)    | (20.279) | (5.961)     | (3.267)             | (2.438)    |                           | (17.687)    |

Note: Based upon NBER US Business Cycle Expansions and Contractions, we define a financial crisis as the period of Q1 2008 to Q2 2009. Also, standard errors are clustered at the bank level and presented in parentheses.
REGRESSION ANALYSIS: LOAN AND DEPOSIT RATES

We next turn to examine the source of banks’ increased profitability after natural disasters. As we show in Figure 1, natural disasters may cause tremendous property damages to local residents. These households are thus in need of additional credit to fund the rebuilding or even the purchase of new properties. As such, we expect banks located in disaster areas to originate more loans after natural disasters. Table 5 presents the regression results. Columns 1 – 3 show that, in general, the magnitude of lending is positively associated with disaster exposures, but the effects are small. A one standard deviation increase in disaster exposure is associated with an 18 basis points increase in total loan origination. As real estate and automobile constitute a significant portion of household properties, we further examine loan originations in these two categories. On average, following a one standard deviation increase in disaster exposure, banks extend 6 basis points more real estate loans and 3.5 basis points more auto loans.

As residents suffer from disaster damages need to smooth their consumption and pay for unexpected losses, local banks may face a short supply in deposits. We confirm this hypothesis in Table 6. One standard increase in disaster exposure leads to a 9.6 basis points drop in total domestic deposits for community banks, while non-community banks are unaffected. The effects are larger for demand deposits than money market deposit accounts (22 bps vs. 7 bps), consistent with the notion that demand deposit accounts offer the greatest liquidity and allow withdrawal at any time, but still small.

In principle, banks might have to increase deposit rates to attract funds after a natural disaster, while increased demand for credit after a natural disaster might result in higher loan rates. As shown in the previous section that natural disasters positively impact NIM, one would expect a bigger positive impact on loan rates than deposit rates. If so, this would help explain why natural disasters positively impact NIM, and thereby ROA.
### Table 5. Loan Volumes and Natural Disasters

|                        | Total Loans | Domestic Real Estate Loans | Auto Loans |
|------------------------|-------------|---------------------------|------------|
|                        | All Banks   | Community Banks           | Non-Community Banks | All Banks | Community Banks | Non-Community Banks | All Banks | Community Banks | Non-Community Banks |
| Disaster Exposure<sub>i,t-1</sub> & Disaster Exposure<sub>i,t-2</sub> & Disaster Exposure<sub>i,t-3</sub> & Disaster Exposure<sub>i,t-4</sub> | | | | | | | | | |
| Log Assets<sub>i,t-1</sub> | 3.445 *** | 3.248 *** | 4.588 *** | 5.530 *** | 6.678 *** | 2.778 *** | 0.002 | -0.108 | 0.214 |
| Loan Loss Provisions to Assets<sub>i,t-1</sub> | 0.856 *** | 0.577 *** | 1.540 *** | 0.148 | 0.219 | 0.110 | 0.036 | 0.064 | -0.257 |
| Federal Funds Rate<sub>i,t-1</sub> | 1.183 | 1.149 | 1.299 | 0.566 | 0.593 | 0.802 | -0.078 | -0.079 | 0.089 |
| Constant | -2.644 | 2.241 | -37.531 *** | -59.471 *** | -79.346 *** | -19.504 | 1.374 | 3.449 | -2.917 |
| Bank Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Quarter Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 530,794 | 482,367 | 48,257 | 530,876 | 482,412 | 48,294 | 184,743 | 170,905 | 13,800 |
| Number of Banks | 10,826 | 9,804 | 1,788 | 10,826 | 9,804 | 1,788 | 7,571 | 7,040 | 792 |
| Average Number of Offices per Bank | 12 | 5 | 78 | 12 | 5 | 80 | 14 | 6 | 123 |
| Adjusted R-squared | 0.754 | 0.744 | 0.820 | 0.834 | 0.834 | 0.870 | 0.932 | 0.924 | 0.964 |
| Disaster Exposure Coefficient Sum | 0.123 | 0.116 | 0.344 | 0.041 | 0.058 | 0.235 | 0.027 | 0.023 | 0.055 |
| F-value | 12.16 | 11.60 | 3.51 | 1.69 | 3.45 | 2.71 | 10.50 | 7.66 | 2.17 |
| P-value | 0.0005 | 0.0007 | 0.0613 | 0.1939 | 0.0633 | 0.1000 | 0.0012 | 0.0057 | 0.1413 |

**Note:** Loan volumes are scaled by total assets in the previous quarter.
Table 6. Deposit Volumes and Natural Disasters

|                              | Total Domestic Deposits | Demand Deposits | Money Market Deposit Accounts |
|------------------------------|-------------------------|----------------|-----------------------------|
|                              | All Banks               | Community Banks | Non-Community Banks | All Banks | Community Banks | Non-Community Banks | All Banks | Community Banks | Non-Community Banks |
| Disaster Exposure_{it-1}     | -0.005 ***              | -0.017          | 0.048                | -0.029 *** | -0.028          | 0.022                | 0.008     | 0.001           | 0.003               |
|                              | (0.007)                 | (0.005)         | (0.065)              | (0.006)   | (0.006)         | (0.044)              | (0.007)   | (0.006)         | (0.060)             |
| Disaster Exposure_{it-2}     | -0.006 ***              | -0.016          | 0.043                | -0.025 *** | -0.023          | 0.005                | -0.006 *** | -0.011          | -0.007              |
|                              | (0.006)                 | (0.005)         | (0.058)              | (0.005)   | (0.005)         | (0.041)              | (0.006)   | (0.006)         | (0.048)             |
| Disaster Exposure_{it-3}     | -0.016 ***              | -0.012          | 0.023                | -0.041 *** | -0.040          | 0.022                | 0.015     | 0.016           | -0.052              |
|                              | (0.006)                 | (0.004)         | (0.054)              | (0.055)   | (0.055)         | (0.042)              | (0.006)   | (0.005)         | (0.049)             |
| Disaster Exposure_{it-4}     | -0.016 ***              | -0.021          | 0.010                | -0.057 *** | -0.057          | 0.031                | -0.020 *** | -0.023          | -0.026              |
|                              | (0.006)                 | (0.005)         | (0.056)              | (0.056)   | (0.056)         | (0.039)              | (0.006)   | (0.006)         | (0.051)             |
| Log Assets_{it}              | 1.211                   | 0.082           | 5.424                | 0.625     | 0.930           | 0.136                | 3.631     | 2.994           | 5.693               |
|                              | (0.226)                 | (0.098)         | (0.720)              | (0.120)   | (0.146)         | (0.215)              | (0.164)   | (0.144)         | (0.590)             |
| Loan Loss Provisions to Assets_{it} | 0.268 ***               | 0.222           | 0.435                | -0.844 *** | -0.968          | -0.277               | -0.519 *** | -0.506          | -0.533              |
|                              | (0.077)                 | (0.025)         | (0.287)              | (0.053)   | (0.068)         | (0.051)              | (0.043)   | (0.047)         | (0.102)             |
| Federal Funds Rate_{t}       | -0.270 ***              | -0.305          | -0.398               | -0.308 *** | -0.303          | -0.208               | -0.361 *** | -0.364          | -0.471              |
|                              | (0.020)                 | (0.012)         | (0.114)              | (0.011)   | (0.012)         | (0.052)              | (0.017)   | (0.015)         | (0.090)             |
| Constant                     | 59.432 ***              | 82.162          | -43.089              | 1.256     | -3.948          | 6.163                | -54.211 *** | -42.482         | -94.792             |
|                              | (4.296)                 | (1.838)         | (15.013)             | (2.277)   | (2.736)         | (4.430)              | (3.115)   | (2.700)         | (12.275)            |
| Bank Fixed Effects           | Yes                     | Yes             | Yes                  | Yes       | Yes             | Yes                  | Yes       | Yes             | Yes                 |
| Quarter Fixed Effects        | Yes                     | Yes             | Yes                  | Yes       | Yes             | Yes                  | Yes       | Yes             | Yes                 |
| Observations                 | 530,979                 | 482,469         | 48,341               | 519,231   | 472,125         | 46,941               | 519,218   | 472,122         | 46,931              |
| Number of Banks              | 10,826                  | 9,804           | 1,788                | 10,695    | 9,686           | 1,750                | 10,695    | 9,686           | 1,750               |
| Average Number of Offices per Bank | 12                     | 5               | 79                   | 12        | 5               | 80                   | 12        | 5               | 80                  |
| Adjusted R–squared           | 0.794                   | 0.696           | 0.851                | 0.684     | 0.682           | 0.709                | 0.782     | 0.776           | 0.795               |
| Disaster Exposure Coefficient Sum | -0.033                 | -0.066          | 0.124                | -0.152 *** | -0.148          | 0.08                 | -0.033 *** | -0.049          | -0.082              |
| F-value                      | 2.24                    | 15.25           | 0.32                 | 58.54     | 60.77           | 0.38                 | 2.07      | 5.29            | 0.19                |
| P-value                      | 0.1343                  | 0.0001          | 0.5718               | 0.0000    | 0.0000          | 0.5399               | 0.1507    | 0.0215          | 0.6646              |

Note: Deposit volumes are scaled by total assets in the previous quarter.
We also provide additional empirical work on the association between natural disasters and deposit and loan rates for all banks and community banks in the interest of space. The analysis here makes use of bank office data rather than banks or bank headquarters, and at monthly frequencies rather than quarterly frequencies. Table 7a shows that, in all cases, there is an association between disaster exposure and six different interest rates examined, three for each category of deposits and loans. The association is positive and statistically significant in all cases. The average increase in loan rates equaled 31 basis points, and the average increase in deposit rates equaled 13 basis points. More specifically, the magnitude of the association between disaster exposure and two of the deposit rates is smaller than the same association with each of the three loan rates, consistent with our finding that disaster exposure has a positive association with NIM. The one exception is that the association between disaster exposure and the 12-month CD rate is greater than two loan rates but not the 15-year fixed mortgage rate. Overall, disaster exposure has a larger association with longer-term rates than shorter-term rates, but the effects are still small.

The results for community banks are reported in Table 7b. They are qualitatively similar, which also indicates that disaster exposure is associated with an increase in both deposit and loan rates, with the latter increasing more than the former such that net interest margin increases. The effect is positive and statistically significant in all cases. The average increase in loan rates equaled 30 basis points, and the average increase in deposit rates equaled 13 basis points. However, even though the association between disaster exposure and the 12-month CD rate exceeds that for the 15-year fixed mortgage rates, the association with the other two deposit rates lies below those for the three loan rates. Again, in terms of economic significance, a one standard deviation increase in disaster exposure is associated with a 36.5 basis points increase in the auto-loan rate, an 18.5 basis points increase in the mortgage-loan rate, and a 35.7 basis points increase in the home-equity-loan rate. The magnitude of these effects indicates that banks are not unduly benefiting, or profiteering, in terms of charging significantly higher loan rates when natural disasters strike. While for non-community banks, as shown in Panel C of Table 7, only two out of six cases show a statistically significant relationship between disasters exposure and rate increase.

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9 The results reported in Table 7 are based upon only those bank offices that are rate setters, according to RateWatch.
10 The rise in lending rates could reflect the fact that natural disasters destroy part of the capital stock. To see why, based on the typical neoclassical production function, a reduction to the capital stock increases the marginal product of capital. Investment becomes more productive, and lending rates might rise to reflect the higher return on lending. We gratefully acknowledge Ned Prescott for pointing this out to us.
11 We consider a wider range of interest rates and get similar results. We accordingly omit these results.
### Table 7a. Bank Deposit and Loan Rates and Natural Disasters: All Banks

| Loans | Auto Used 4 Yrs, 36-month term | 15 Yr Fxd Mtg @ 175K | H.E. Loan Up to 80% LTV @ 20K - 180 Mo Term | 12-month CD @ $10,000 | Deposits Interest Checking Accounts with Less Than $2,500 | Money Market Deposit Account @ $25,000 |
|-------|--------------------------------|----------------------|---------------------------------------------|-----------------------|------------------------------------------------|-------------------------------------|
| Exposure_{i,t-1} | 0.016*** | 0.033*** | 0.018* | 0.013*** | 0.003*** | 0.005*** |
| Exposure_{i,t-8} | (0.007) | (0.007) | (0.009) | (0.001) | (0.001) | (0.001) |
| Disaster | 0.017*** | 0.025*** | 0.021** | 0.012*** | 0.002*** | 0.004*** |
| Exposure_{i,t-7} | (0.006) | (0.006) | (0.010) | (0.001) | (0.001) | (0.001) |
| Disaster | 0.022*** | 0.020*** | 0.020** | 0.014*** | 0.002*** | 0.005*** |
| Exposure_{i,t-6} | (0.006) | (0.007) | (0.010) | (0.001) | (0.000) | (0.001) |
| Disaster | 0.027*** | 0.017** | 0.022** | 0.018*** | 0.002*** | 0.005*** |
| Exposure_{i,t-5} | (0.006) | (0.008) | (0.009) | (0.001) | (0.000) | (0.001) |
| Disaster | 0.024*** | 0.016** | 0.015* | 0.020*** | 0.002*** | 0.006*** |
| Exposure_{i,t-4} | (0.006) | (0.007) | (0.009) | (0.001) | (0.000) | (0.001) |
| Disaster | 0.023*** | 0.017*** | 0.014** | 0.021*** | 0.002*** | 0.006*** |
| Exposure_{i,t-3} | (0.006) | (0.006) | (0.007) | (0.001) | (0.000) | (0.001) |
| Disaster | 0.017*** | 0.011* | 0.017** | 0.019*** | 0.001*** | 0.005*** |
| Exposure_{i,t-2} | (0.006) | (0.008) | (0.008) | (0.001) | (0.000) | (0.001) |
| Disaster | 0.022*** | 0.014*** | 0.019*** | 0.017*** | -0.000 | 0.003*** |
| Exposure_{i,t-1} | (0.006) | (0.009) | (0.007) | (0.001) | (0.000) | (0.001) |
| Disaster | 0.022*** | 0.018*** | 0.014* | 0.017*** | -0.001 | 0.003*** |
| Exposure_{i,t} | (0.006) | (0.005) | (0.007) | (0.001) | (0.000) | (0.001) |
| Disaster | 0.012* | 0.014** | 0.012 | 0.017*** | -0.001*** | 0.002*** |
| Exposure_{i,t+1} | (0.006) | (0.005) | (0.008) | (0.001) | (0.000) | (0.001) |
| Disaster | 0.013** | 0.006 | 0.018** | 0.017*** | -0.002*** | 0.002** |
| Exposure_{i,t+2} | (0.005) | (0.005) | (0.008) | (0.001) | (0.000) | (0.001) |
| Disaster | 0.021*** | 0.006 | 0.017* | 0.019*** | -0.002*** | 0.002*** |
| Exposure_{i,t+3} | (0.007) | (0.007) | (0.008) | (0.001) | (0.001) | (0.001) |
| Assets_{i,t} | -0.995*** | -0.825*** | -0.386*** | -0.456*** | -0.293*** | -0.453*** |
| Loan Provision to Assets_{i,t} | (0.075) | (0.079) | (0.086) | (0.032) | (0.018) | (0.027) |
| Federal Funds Rate_{i,t} | 0.567*** | 0.306*** | 0.555*** | 0.207*** | 0.041*** | 0.115*** |
| Constant | (0.068) | (0.030) | (0.106) | (0.010) | (0.003) | (0.007) |

| Office Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Month Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 157,456 | 103,239 | 91,481 | 1,432,791 | 1,409,255 | 1,402,738 |
| Adjusted R-squared | 0.758 | 0.798 | 0.740 | 0.866 | 0.569 | 0.690 |
| Disaster Exposure Coefficient Sum | 0.239 | 0.197 | 0.207 | 0.204 | 0.008 | 0.048 |
| F-value | 15.64 | 10.73 | 7.12 | 562.90 | 2.75 | 33.61 |
| P-value | 0.0001 | 0.0011 | 0.0077 | 0.0000 | 0.0974 | 0.0000 |
### Table 7b. Bank Deposit and Loan Rates and Natural Disasters: Community Banks

|                          | Loans  | H.E. Loan Up to 80% LTV @ 20K - 180 Mo Term | 12-month CD @ $10,000 | Deposits Interest Checking Accounts with Less Than $2,500 | Money Market Account Deposit @ $25,000 |
|--------------------------|--------|--------------------------------------------|-----------------------|-------------------------------------------------------------|----------------------------------------|
|                          |        | Auto Used 4 Yrs, 36-month term             | 15 Yr Fxd Mtg @ 175K  |                                                               |                                        |
| Disaster                 | 0.023**| 0.024**                                    | 0.024**               | 0.012**                                                      | 0.002**                               |
|                          |        | (0.007)                                    | (0.006)               | (0.001)                                                      | (0.001)                               |
| Disaster                 | 0.020**| 0.019**                                    | 0.018**               | 0.012**                                                      | 0.001**                               |
|                          |        | (0.006)                                    | (0.006)               | (0.001)                                                      | (0.001)                               |
| Disaster                 | 0.023**| 0.009                                      | 0.021**               | 0.013**                                                      | 0.002**                               |
|                          |        | (0.006)                                    | (0.006)               | (0.001)                                                      | (0.001)                               |
| Disaster                 | 0.026**| 0.013                                      | 0.023**               | 0.017**                                                      | 0.003**                               |
|                          |        | (0.006)                                    | (0.007)               | (0.001)                                                      | (0.001)                               |
| Disaster                 | 0.023**| 0.009                                      | 0.021**               | 0.020**                                                      | 0.003**                               |
|                          |        | (0.006)                                    | (0.006)               | (0.001)                                                      | (0.001)                               |
| Disaster                 | 0.024**| 0.009                                      | 0.017**               | 0.020**                                                      | 0.002**                               |
|                          |        | (0.006)                                    | (0.006)               | (0.001)                                                      | (0.001)                               |
| Disaster                 | 0.017**| 0.005                                      | 0.022**               | 0.019**                                                      | 0.007**                               |
|                          |        | (0.006)                                    | (0.006)               | (0.001)                                                      | (0.001)                               |
| Disaster                 | 0.020**| 0.009                                      | 0.019**               | 0.017**                                                      | 0.001**                               |
|                          |        | (0.006)                                    | (0.006)               | (0.001)                                                      | (0.001)                               |
| Disaster                 | 0.020**| 0.014                                      | 0.019**               | 0.017**                                                      | 0.001**                               |
|                          |        | (0.006)                                    | (0.006)               | (0.001)                                                      | (0.001)                               |
| Disaster                 | 0.016**| 0.011                                      | 0.018**               | 0.016**                                                      | 0.003**                               |
|                          |        | (0.006)                                    | (0.005)               | (0.001)                                                      | (0.001)                               |
| Disaster                 | 0.013**| 0.003                                      | 0.018**               | 0.016**                                                      | 0.002**                               |
|                          |        | (0.005)                                    | (0.006)               | (0.001)                                                      | (0.001)                               |
| Disaster                 | 0.023**| 0.000                                      | 0.021**               | 0.018**                                                      | 0.002**                               |
|                          |        | (0.006)                                    | (0.006)               | (0.001)                                                      | (0.001)                               |
| Assets _l_2              | -1.276***| -1.382***                               | -0.923***             | -0.605***                                                    | -0.388***                             |
|                          |        | (0.096)                                    | (0.077)               | (0.106)                                                      | (0.023)                               |
| Loan Provision to Assets _l_1 | 0.428***| 0.231***                               | 0.263***             | 0.199***                                                      | 0.039***                              |
|                          |        | (0.053)                                    | (0.030)               | (0.047)                                                      | (0.010)                               |
| Federal Funds Rate _l_1 | 0.360***| 0.384***                               | 0.229***             | 0.655***                                                      | 0.102***                              |
|                          |        | (0.011)                                    | (0.008)               | (0.012)                                                      | (0.002)                               |
| Constant                 | 30.861***| 31.299***                              | 24.453***             | 12.217***                                                    | 7.624***                              |
|                          |        | (1.887)                                    | (1.516)               | (2.096)                                                      | (0.445)                               |

| Office Fixed Effects         | Yes | Yes | Yes | Yes | Yes |
| Month Fixed Effects          | Yes | Yes | Yes | Yes | Yes |
| Observations                | 100,296 | 66,032 | 42,126 | 1,090,473 | 1,072,298 |
| Adjusted R-squared          | 0.760 | 0.800 | 0.794 | 0.856 | 0.562 |
| Disaster Exposure Coefficient Sum | 0.246 | 0.125 | 0.241 | 0.197 | 0.011 |
| F-value                     | 17.52 | 4.28 | 18.62 | 499.71 | 5.20 |
| P-value                     | 0.0000 | 0.387 | 0.0000 | 0.0226 | 0.0000 |
### Table 7c. Bank Deposit and Loan Rates and Natural Disasters: Non-Community Banks

|                           | Loans | H.E. Loan Up to 80% LTV @ 20K - 180 Mo Term | 12-month CD @ $10,000 | Deposits Interest Checking Accounts with Less Than $2,500 | Money Market Deposit Account @ $25,000 |
|---------------------------|-------|---------------------------------------------|------------------------|--------------------------------------------------------|----------------------------------------|
|                           |       | b1                                          | b2                     | b3                                                     | b4                                     |
| Disaster                  | -0.023| 0.016                                       | -0.067                 | 0.012*                                                 | -0.003                                 | 0.005                                  |
| Exposurei,t-1             | (0.040)| (0.013)                                    | (0.055)                | (0.006)                                                | (0.002)                                | (0.006)                                |
| Disaster                  | -0.034| 0.030*                                      | 0.028                  | 0.015**                                                | -0.004**                               | 0.001                                  |
| Exposurei,t-2             | (0.025)| (0.018)                                    | (0.101)                | (0.006)                                                | (0.002)                                | (0.005)                                |
| Disaster                  | -0.016| 0.054***                                    | -0.048                 | 0.021***                                               | 0.002                                  | 0.009*                                 |
| Exposurei,t-3             | (0.044)| (0.016)                                    | (0.064)                | (0.006)                                                | (0.003)                                | (0.005)                                |
| Disaster                  | -0.036| 0.053***                                    | 0.026                  | 0.020***                                               | -0.000                                 | 0.007                                  |
| Exposurei,t-4             | (0.047)| (0.013)                                    | (0.070)                | (0.007)                                                | (0.002)                                | (0.005)                                |
| Disaster                  | -0.017| 0.021                                       | -0.105**               | 0.022***                                               | 0.003                                  | 0.013**                                |
| Exposurei,t-5             | (0.031)| (0.021)                                    | (0.045)                | (0.008)                                                | (0.003)                                | (0.005)                                |
| Disaster                  | -0.003| -0.002                                      | 0.006                  | 0.023***                                               | -0.000                                 | 0.007                                  |
| Exposurei,t-6             | (0.029)| (0.024)                                    | (0.032)                | (0.008)                                                | (0.003)                                | (0.005)                                |
| Disaster                  | -0.038| -0.007                                      | -0.011                 | 0.018**                                                | -0.000                                 | 0.005                                  |
| Exposurei,t-7             | (0.032)| (0.013)                                    | (0.039)                | (0.008)                                                | (0.003)                                | (0.005)                                |
| Disaster                  | -0.004| 0.011                                       | 0.008                  | 0.015*                                                 | -0.004*                                | -0.001                                 |
| Exposurei,t-8             | (0.044)| (0.012)                                    | (0.032)                | (0.007)                                                | (0.002)                                | (0.005)                                |
| Disaster                  | 0.044 | -0.030***                                   | -0.012                 | 0.019***                                               | -0.002                                 | 0.006                                  |
| Exposurei,t-9             | (0.031)| (0.011)                                    | (0.026)                | (0.006)                                                | (0.002)                                | (0.005)                                |
| Disaster                  | -0.010| -0.013                                      | 0.005                  | 0.019***                                               | -0.004*                                | 0.002                                  |
| Exposurei,t-10            | (0.043)| (0.015)                                    | (0.041)                | (0.006)                                                | (0.002)                                | (0.006)                                |
| Disaster                  | 0.024 | -0.028***                                   | 0.026                  | 0.022***                                               | -0.002                                 | 0.003                                  |
| Exposurei,t-11            | (0.029)| (0.009)                                    | (0.051)                | (0.006)                                                | (0.003)                                | (0.006)                                |
| Disaster                  | -0.006| 0.055***                                    | 0.022                  | 0.023***                                               | -0.001                                 | 0.001                                  |
| Exposurei,t-12            | (0.053)| (0.020)                                    | (0.039)                | (0.007)                                                | (0.003)                                | (0.006)                                |
| Assetsi,t                 | -0.821***| -0.604***                                   | -0.267**               | -0.269***                                               | -0.162***                               | -0.271***                               |
| Loan Provision to Assetsi,t| (0.120)| (0.052)                                    | (0.121)                | (0.051)                                                | (0.026)                                | (0.043)                                |
| Federal Funds Ratei       | 0.753***| 0.404***                                    | 0.69***                | 0.216***                                               | 0.017***                                | 0.114***                                |
|                         | (0.136)| (0.053)                                    | (0.165)                | (0.021)                                                | (0.005)                                | (0.014)                                |
| Constant                 | 0.576***| 0.423***                                    | 0.264***               | 0.681***                                               | 0.066***                                | 0.303***                                |
|                         | (0.066)| (0.023)                                    | (0.052)                | (0.009)                                                | (0.006)                                | (0.024)                                |
|                         | 25.158***| 18.694***                                   | 13.28***               | 6.744***                                               | 3.961***                                | 6.654***                                |
|                         | (3.031)| (1.279)                                    | (3.127)                | (1.207)                                                | (0.610)                                | (1.022)                                |
| Office Fixed Effects      | Yes                        | Yes                         | Yes                        | Yes                        | Yes                        | Yes                        |
| Month Fixed Effects       | Yes                        | Yes                         | Yes                        | Yes                        | Yes                        | Yes                        |
| Observations             | 50,999                  | 32,665                      | 45,486                    | 320,055                   | 311,800                   | 316,768                   |
| Adjusted R-squared       | 0.774                    | 0.826                       | 0.7                        | 0.9                        | 0.632                       | 0.712                         |
| Disaster Exposure Coefficient Sum | -0.119 | 0.16                                   | -0.122                   | 0.227                   | -0.015                     | 0.058                         |
| F-value                  | 0.18                      | 4.53                        | 0.06                       | 9.36                      | 0.43                       | 1.13                         |
| P-value                  | 0.6688                   | 0.0340                      | 0.7990                    | 0.0023                    | 0.5104                      | 0.2872                         |

**Note:** Standard errors are clustered at the bank level and presented in parentheses.
ROBUSTNESS TESTS

One concern that might arise with our basic results is that property damages might be endogenous because communities may devote effort to mitigate the costs associated with natural disasters. If so, the disaster-related property damages will be endogenous. To address this issue, we replace the variable "property damage in shocked counties" in equation (2) with a dummy variable equal to 1 if there is a disaster in a county, and 0 otherwise. Although this disaster measure does not consider whether natural disasters have small or large impacts on communities, addressing the potential endogeneity issue with a dummy variable provides a useful check on the reliability of our earlier regression results.

The robustness test results regarding bank performance using the alternative disaster exposure variable are provided in Table 8. In all cases, the results suggest that the disaster exposure variable has a statistically significant positive and cumulative association with ROA, NIM, and brokered deposits-to-total deposits, both for all banks and community banks. For all banks, a one standard deviation increase in the alternative disaster exposure is associated with a 1.14 basis points increase in ROA, a 1.01 basis points increase in NIM, and a 5.94 basis points increase in the brokered-to-total deposits. These results resemble those reported in Table 3, confirming our basic findings regarding bank performance and natural disasters.
Table 8. Bank Performance and Natural Disasters – Alternative measure of Disaster Exposure

|                          | ROA                  | NIM                  | Brokered Deposits to Total Deposits |
|--------------------------|----------------------|----------------------|-------------------------------------|
|                          | All Banks            | Community Banks      | Non-Community Banks                 |
| Disaster Exposure_{t-1}  | 0.117***             | 0.142***             | -0.928***                           |
|                          | (0.038)              | (0.032)              | (0.750)                             |
| Disaster Exposure_{t-2}  | 0.081*               | 0.086***             | -0.230***                           |
|                          | (0.045)              | (0.041)              | (0.536)                             |
| Disaster Exposure_{t-3}  | 0.113***             | 0.127***             | -1.373***                           |
|                          | (0.044)              | (0.033)              | (0.999)                             |
| Disaster Exposure_{t-4}  | 0.291**              | 0.251***             | -0.198***                           |
|                          | (0.048)              | (0.046)              | (0.516)                             |
| Log Assets_{t}           | 0.067***             | 0.056**              | 0.112***                            |
|                          | (0.124)              | (0.027)              | (0.531)                             |
| Loan Loss Provisions to Assets_{t} | -0.945*** | -1.007*** | -0.785*** |
|                          | (0.021)              | (0.013)              | (0.051)                             |
| Federal Funds Rate_{t}   | 0.067***             | 0.056**              | 0.112***                            |
|                          | (0.010)              | (0.003)              | (0.048)                             |
| Constant                 | -4.448***            | -3.685***            | -1.910***                           |
|                          | (2.356)              | (0.507)              | (11.046)                            |
| Bank Fixed Effects       | Yes                  | Yes                  | Yes                                 |
| Quarter Fixed Effects    | Yes                  | Yes                  | Yes                                 |
| Observations             | 530979               | 482469               | 48341                               |
| Number of Banks          | 10,070               | 9,161                | 1,536                               |
| Average Number of Offices per Bank | 12                  | 5                    | 78                                  |
| Adjusted R-squared       | 0.565                | 0.715                | 0.583                               |
| Disaster Exposure Coefficient Sum | 0.419              | 0.480                | -2.856***                          |
| F-value                  | 8.80                 | 15.12                | 1.86                                |
| P-value                  | 0.0030               | 0.0001               | 0.1727                              |

Also, we use the alternative disaster exposure variable as a check on our earlier results for the effect of natural disasters on deposit and loan rates for all banks and community banks. These results
are reported in Tables 9, respectively, and confirm the earlier findings reported in Tables 7.

Table 9a. Bank Deposit and Loan Rates and Natural Disasters: All Banks with Alternative measure of Disaster Exposure

| Loans       | Deposits Interest Checking Accounts with Less than $2,500 | Money Market Deposit Account @ $25,000 |
|-------------|----------------------------------------------------------|---------------------------------------|
| Auto Used 4| 15 Yr Fxd Mtg @ 175K | H.E. Loan Up to 80% LTV @ 20K - 180 Mo Term | 12-month CD @ $10,000 |
| Disaster Exposure, t−1 | 0.082*** | 0.045** | 0.029 | 0.037*** | -0.005 | -0.007 |
| Disaster Exposure, t−2 | 0.058*** | 0.052*** | 0.015 | 0.028*** | -0.003 | -0.004 |
| Disaster Exposure, t−3 | 0.087*** | 0.035*** | 0.033** | 0.036*** | -0.001 | -0.004 |
| Disaster Exposure, t−4 | 0.103*** | 0.028** | 0.051*** | 0.044*** | -0.004* | -0.006 |
| Disaster Exposure, t−5 | 0.090*** | 0.036*** | 0.041** | 0.046*** | -0.004* | -0.004 |
| Disaster Exposure, t−6 | 0.083*** | 0.041*** | 0.047** | 0.051*** | -0.004* | -0.002 |
| Disaster Exposure, t−7 | 0.083*** | 0.046*** | 0.073*** | 0.041*** | -0.012*** | -0.011 |
| Disaster Exposure, t−8 | 0.089*** | 0.039*** | 0.060*** | 0.048*** | -0.007*** | -0.005 |
| Disaster Exposure, t−9 | 0.095*** | 0.055*** | 0.079*** | 0.049*** | -0.012*** | -0.010 |
| Disaster Exposure, t−10 | 0.081*** | 0.043*** | 0.093*** | 0.048*** | -0.012*** | -0.010* |
| Disaster Exposure, t−11 | 0.086*** | 0.027** | 0.089*** | 0.044*** | -0.014*** | -0.014** |
| Disaster Exposure, t−12 | 0.100*** | 0.012 | 0.185*** | 0.051*** | -0.019*** | -0.018** |
| Assets, t−1 | -1.024*** | -0.844*** | -0.410*** | -0.473*** | -0.291*** | -0.452*** |
| Loan Provision to Assets, t−1 | 0.549*** | 0.297*** | 0.525*** | 0.203*** | 0.042*** | 0.115*** |
| Federal Funds Rate, t−2 | 0.436*** | 0.407*** | 0.248*** | 0.667*** | 0.109*** | 0.313*** |
| 27.252*** | 21.977*** | 15.523*** | 10.087*** | 6.047*** | 9.480*** |
| Office Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Month Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 157,456 | 103,239 | 91,481 | 1,432,791 | 1,409,255 | 1,402,738 |
| Adjusted R-squared | 0.760 | 0.798 | 0.742 | 0.866 | 0.569 | 0.690 |
| Disaster Exposure Coefficient Sum | 1.037 | 0.447 | 0.684 | 0.523 | -0.088 | -0.042 |
| F-value | 16.59 | 10.88 | 14.49 | 86.42 | 13.73 | 1.63 |
| P-value | 0.0000 | 0.0010 | 0.0001 | 0.0000 | 0.0002 | 0.2011 |
Table 9b. Bank Deposit and Loan Rates and Natural Disasters: Community Banks with Alternative measure of Disaster Exposure

|                  | Auto Used 4 Yrs, 36-month term | 15 Yr Fxd Mtg @ 175K | H.E. Loan Up to 80% LTV @ 20K - 180 Mo Term | 12-month CD @ $10,000 | Interest Checking Accounts with Less Than $2,500 | Money Market Deposit Account @ $25,000 |
|------------------|-------------------------------|-----------------------|---------------------------------------------|------------------------|-----------------------------------------------|--------------------------------------|
| Disaster Exposure_{i,t-1} | 0.104*** (0.018)              | 0.076*** (0.019)      | 0.049** (0.020)                            | 0.068*** (0.004)       | 0.068*** (0.003)                              | 0.013*** (0.002)                     |
| Disaster Exposure_{i,t-2} | 0.107*** (0.015)              | 0.059*** (0.016)      | 0.028* (0.016)                             | 0.061*** (0.004)       | -0.003 (0.002)                                | 0.008** (0.003)                      |
| Disaster Exposure_{i,t-3} | 0.095*** (0.016)              | 0.018                | 0.045*** (0.016)                           | 0.067*** (0.004)       | 0.003* (0.002)                                | 0.014*** (0.003)                     |
| Disaster Exposure_{i,t-4} | 0.104*** (0.015)              | 0.032*               | 0.047*** (0.016)                           | 0.080*** (0.004)       | 0.005*** (0.002)                              | 0.019*** (0.003)                     |
| Disaster Exposure_{i,t-5} | 0.102*** (0.016)              | 0.024                | 0.035** (0.016)                            | 0.089*** (0.004)       | 0.007*** (0.002)                              | 0.023*** (0.003)                     |
| Disaster Exposure_{i,t-6} | 0.095*** (0.016)              | 0.024                | 0.014 (0.016)                              | 0.090*** (0.004)       | 0.002 (0.002)                                 | 0.020*** (0.003)                     |
| Disaster Exposure_{i,t-7} | 0.090*** (0.016)              | 0.026                | 0.028 (0.016)                              | 0.083*** (0.004)       | -0.001 (0.002)                                | 0.015*** (0.003)                     |
| Disaster Exposure_{i,t-8} | 0.093*** (0.015)              | 0.024                | 0.037** (0.016)                            | 0.072*** (0.004)       | -0.001 (0.002)                                | 0.012*** (0.003)                     |
| Disaster Exposure_{i,t-9} | 0.091*** (0.015)              | 0.047*** (0.016)     | 0.034** (0.016)                            | 0.074*** (0.004)       | -0.004** (0.002)                              | 0.013*** (0.003)                     |
| Disaster Exposure_{i,t-10} | 0.084*** (0.015)             | 0.028*               | 0.036** (0.017)                            | 0.070*** (0.004)       | -0.010*** (0.002)                             | 0.006*** (0.003)                     |
| Disaster Exposure_{i,t-11} | 0.065*** (0.014)             | 0.021               | 0.040** (0.017)                            | 0.069*** (0.004)       | -0.014*** (0.002)                             | 0.003 (0.003)                        |
| Disaster Exposure_{i,t-12} | 0.098*** (0.018)             | 0.000               | 0.054** (0.016)                            | 0.082*** (0.004)       | -0.018*** (0.002)                             | 0.001 (0.004)                        |
| Assets_{i,t}       | -1.274*** (0.096)             | -1.383*** (0.077)    | -0.929*** (0.105)                          | -0.619*** (0.023)      | -0.388*** (0.015)                             | -0.592*** (0.023)                    |
| Loan Provision to Assets_{i,t} | 0.424*** (0.052)          | 0.229*** (0.030)     | 0.263*** (0.047)                           | 0.195*** (0.010)       | 0.039*** (0.003)                              | 0.102*** (0.006)                     |
| Federal Funds Rate_{t} | 0.365*** (0.011)             | 0.384*** (0.008)     | 0.292*** (0.012)                           | 0.655*** (0.002)       | 0.102*** (0.001)                              | 0.296*** (0.003)                     |
| Constant           | 30.799*** (1.872)             | 31.327*** (1.694)    | 24.573*** (2.090)                          | 12.460*** (0.439)      | 7.631*** (0.288)                              | 11.738*** (0.432)                    |
| Office Fixed Effects | Yes                          | Yes                  | Yes                                         | Yes                    | Yes                                           | Yes                                  |
| Month Fixed Effects | Yes                          | Yes                  | Yes                                         | Yes                    | Yes                                           | Yes                                  |
| Observations       | 100,296                      | 66,032               | 42,126                                      | 1,090,473              | 1,072,298                                     | 1,061,354                            |
| Adjusted R-squared | 0.760                        | 0.800                | 0.794                                       | 0.857                  | 0.562                                         | 0.680                                |
| Disaster Exposure Coefficient Sum | 1.097                      | 0.379                | 0.447                                       | 0.905                  | -0.034                                        | 0.147                                |
| F-value            | 51.19                        | 5.26                 | 7.72                                        | 438.73                 | 2.49                                          | 15.78                                |
| P-value            | 0.0000                       | 0.0220               | 0.0055                                      | 0.0000                 | 0.1145                                        | 0.0001                               |
### Table 9c. Bank Deposit and Loan Rates and Natural Disasters: Non-Community Banks with Alternative measure of Disaster Exposure

|                | Auto Used 4 Yrs, 36-month term | 15 Yr Fxd Mtg @ 175K | H.E. Loan Up to 80% LTV @ 20K - 180 Mo Term | 12-month CD @ $10,000 | Interest Checking Accounts with Less Than $2,500 | Money Market Deposit Account @ $25,000 |
|----------------|--------------------------------|-----------------------|---------------------------------------------|------------------------|-----------------------------------------------|-----------------------------------------|
| Disaster       | 0.039                          | 0.008                 | -0.002                                      | -0.001                 | -0.012***                                     | -0.027**                                |
| Exposure\_i,t-1| (0.025)                        | (0.022)               | (0.032)                                     | (0.007)                | (0.004)                                       | (0.013)                                 |
| Disaster       | 0.013                          | 0.031**               | -0.015                                      | -0.005                 | -0.012***                                     | -0.028***                               |
| Exposure\_i,t-2| (0.019)                        | (0.015)               | (0.019)                                     | (0.006)                | (0.003)                                       | (0.010)                                 |
| Disaster       | 0.051*                         | 0.018                 | 0.006                                       | 0.006                  | -0.009***                                     | -0.024**                                |
| Exposure\_i,t-3| (0.028)                        | (0.016)               | (0.020)                                     | (0.006)                | (0.003)                                       | (0.010)                                 |
| Disaster       | 0.079**                        | 0.008                 | 0.034                                       | 0.013**                | -0.011***                                     | -0.025***                               |
| Exposure\_i,t-4| (0.037)                        | (0.016)               | (0.028)                                     | (0.006)                | (0.003)                                       | (0.009)                                 |
| Disaster       | 0.056                          | 0.015                 | 0.020                                       | 0.007                  | -0.009***                                     | -0.021***                               |
| Exposure\_i,t-5| (0.037)                        | (0.014)               | (0.025)                                     | (0.008)                | (0.003)                                       | (0.008)                                 |
| Disaster       | 0.059                          | 0.025                 | 0.045*                                      | 0.016**                | -0.012***                                     | -0.025***                               |
| Exposure\_i,t-6| (0.039)                        | (0.019)               | (0.024)                                     | (0.007)                | (0.003)                                       | (0.009)                                 |
| Disaster       | 0.066                          | 0.027                 | 0.061**                                     | 0.018***               | -0.011***                                     | -0.025***                               |
| Exposure\_i,t-7| (0.045)                        | (0.017)               | (0.024)                                     | (0.006)                | (0.004)                                       | (0.009)                                 |
| Disaster       | 0.057                          | 0.042**               | 0.068**                                     | 0.015**                | -0.015***                                     | -0.028***                               |
| Exposure\_i,t-8| (0.040)                        | (0.016)               | (0.026)                                     | (0.006)                | (0.003)                                       | (0.009)                                 |
| Disaster       | 0.088*                         | 0.040**               | 0.087**                                     | 0.027***               | -0.015**                                     | -0.030***                               |
| Exposure\_i,t-9| (0.049)                        | (0.018)               | (0.040)                                     | (0.008)                | (0.004)                                       | (0.010)                                 |
| Disaster       | 0.087*                         | 0.037**               | 0.105**                                     | 0.023***               | -0.014***                                     | -0.023***                               |
| Exposure\_i,t-10| (0.046)                       | (0.017)               | (0.037)                                     | (0.007)                | (0.003)                                       | (0.008)                                 |
| Disaster       | 0.093***                       | 0.017                 | 0.093**                                     | 0.020***               | -0.016***                                     | -0.027***                               |
| Exposure\_i,t-11| (0.036)                       | (0.015)               | (0.030)                                     | (0.006)                | (0.003)                                       | (0.009)                                 |
| Disaster       | 0.094**                        | 0.004                 | 0.121***                                    | 0.019**                | -0.024***                                     | -0.040***                               |
| Exposure\_i,t-12| (0.042)                       | (0.022)               | (0.035)                                     | (0.009)                | (0.004)                                       | (0.013)                                 |
| Assets\_i,t     | -0.852***                      | -0.620***             | -0.291**                                    | -0.278***              | -0.153***                                     | -0.254***                               |
| Loan Provision to Assets\_i,t | 0.712***                  | 0.390***               | 0.661***                                     | 0.212***               | 0.021***                                      | 0.123***                                |
| Federal Funds Rate\_t   | 0.567***                      | 0.421***               | 0.258***                                     | 0.679***               | 0.067***                                      | 0.306***                                |
| Constant        | 25.678***                      | 19.006***              | 13.652***                                    | 6.923***               | 3.780***                                      | 6.341***                                |

| Office Fixed Effects | Yes | Yes | Yes | Yes | Yes |
| Month Fixed Effects  | Yes | Yes | Yes | Yes | Yes |
| Observations        | 50,999 | 32,665 | 45,486 | 320,055 | 311,800 |
| Adjusted R-squared  | 0.774 | 0.826 | 0.7 | 0.9 | 0.632 |
| Disaster Exposure Coefficient Sum | 0.782 | 0.272 | 0.623 | 0.157 | -0.16 |
| F-value              | 4.18 | 2.32 | 5.58 | 5.08 | 21.25 |
| P-value              | 0.0416 | 0.1291 | 0.0188 | 0.0245 | 0.0000 |

Note: Standard errors are clustered at the bank level and presented in parentheses.
FURTHER DISCUSSION OF COMMUNITY BANKS AND NATURAL DISASTERS

We find that natural disasters have small effects on bank profitability and somewhat larger effects on the use of brokered deposits. Therefore, it is worth exploring in greater detail the reason for these smaller banks rather than bigger banks being affected by disasters. In this regard, Table 3 provides information on the number of bank headquarters and bank offices used in our analysis. As may be seen, the number of community banks far exceeds the number of non-community and, presumably, larger banks. However, the reverse is the case in terms of the average number of offices per bank. The community banks have far fewer offices per bank than all of the other three categories of bigger banks. This is consistent with the observation that community banks operate in far more limited geographical areas than the bigger banks. Therefore, one would expect natural disasters to have a stronger impact on the community banks than the bigger banks even if both have offices located in the same county experiencing a natural disaster, since community banks are less diversified, at least geographically. Bigger banks with broader geographical operations provide a greater internal "capital market" that can shift funds from areas with offices not experiencing a disaster to those with offices experiencing one. This would not be the case for the community banks with relatively few offices located in far more limited geographic areas, all of which would therefore more likely be affected by a natural disaster at the same time.

We present additional information about the relationship between community banks and natural disasters in Tables A2 – A5. Both Tables A2 and A3 show the average number of offices of banks that are headquartered in the 25 counties experiencing the most costly disasters, with Table A2 based on cumulative costs over the period 2000-2017 and Table A3 based on the most costly single disasters at the time of the disaster. These tables indicate that the average size of banks headquartered in these counties is less than $2 billion in all but three cases in Table A2 and the same in Table A3. There is also a small difference between the average number of total offices of banks with headquarters in the counties when excluding four counties\textsuperscript{12} and the number of offices located within the same counties. Specifically, the difference is 7.4 vs. 3.7. In the case of Table A3, the results are quite similar, 6.9 vs. 4.4, when one excludes counties with the three counties where the average assets for the headquartered banks were greater than $2 billion. Since the share of the total property damage due to natural disasters in the 25 counties in Tables A2 and A3 accounted for 55 percent and 52 percent of total damage, respectively. And almost all the banks in these counties are relatively small. With most offices in the same counties, one would expect the impact of natural disasters to be more pronounced on community banks. Furthermore, 91 percent of all the banks headquartered in the top 25 counties in Table A2 are community banks.

Tables A4 and A5 provide more direct information on the relationship between individual banks and natural disasters. Table A4 shows the top 25 banks located in counties experiencing natural disasters over 2000-2017, ranked by property damage, while Table A5 provides similar information but for single disasters. In Table A4, one can see that only 23 banks have average assets of less than $2 billion. Turning to Table A5, 22 banks have less than $2 billion in assets. These findings also suggest that natural disasters are more likely to affect community banks, even though the effects may be small.

CONCLUSIONS

The contribution of our paper is to examine the impact of natural disasters on the performance of banks. It is becoming ever more important as the frequency of disasters and the associated costs have

\textsuperscript{12} The three counties were those where the average assets for the headquartered banks was greater than $2 billion and Montgomery County, which had an extraordinarily large number of average offices for the headquartered banks, at 746. In the regard, one bank, Woodforest National Bank, had an average number of offices of 760.
increased over time. Yet, there have been relatively few studies of banks and disasters. We contribute to the literature by examining how banks respond to natural disasters in terms of changing both deposit and loan rates at offices located in areas affected by such disasters. In addition, unlike previous studies, we examine the extent to which banks increase their reliance on brokered deposits when such events occur. Our empirical results are consistent with banks increasing deposit rates at offices in the affected counties to attract more deposits as individuals and firms withdraw deposits to deal with reconstruction efforts following natural disasters. Banks simultaneously raise loan rates at branches at the affected counties due to an increase in the demand for loans also to deal with reconstruction efforts. The results also suggest loan rates increase more than deposit rates, which is consistent with our finding that disasters also increase net interest margin and return on assets for banks with headquarters/branches located in affected communities. At the same time, banks shift slightly toward brokered deposits due to disaster-induced liquidity shortages. Furthermore, we find that our results are driven entirely by community banks since, as we show, they are the banks with branches most concentrated in counties affected by natural disasters. Overall, the fact that natural disasters generally have relatively small effects on bank performance suggests that the affected banks do not engage in "profiteering". This is important because the bank regulatory authorities extensively scrutinize the behavior of banks. As regards bank responses to natural disasters, our findings suggest there is no need for any new regulatory policies that are warranted.
REFERENCES

Barth, J. R., Hu, Q., Sickles, R. Sun, Y. & Yu, X. (2022). Spillover effects of natural disasters on banks: A spatial framework. Working paper. https://editorialexpress.com/cgi-bin/conference/download.cgi?db_name=IYFS&paper_id=123.

Bos, J., Li, R., & Sanders, M. (2022). Hazardous Lending: The Impact of Natural Disasters on Banks' Asset Portfolio. Economic Modeling 118, 105760. https://www.sciencedirect.com/science/article/abs/pii/S0264999322000062.

Boustan, L. P., Kahn, M. E., Rhode, P. W., & Yanguas, M. L. (2020). The Effect of Natural Disasters on Economic Activity in U.S. Counties: A Century of Data. Journal of Urban Economics, 118, 103257. https://www.sciencedirect.com/science/article/abs/pii/S0094119020300280.

Cortés, K. R. (2014). Rebuilding after disaster strikes: How local lenders aid in the recovery. Federal Reserve Bank of Cleveland Working Paper No. 14-28. https://www.clevelandfed.org/en/newsroom-and-events/publications/working-papers/2014-working-papers/wp-1428-rebuilding-after-disaster-strikes-how-local-lenders-aid-in-the-recovery.aspx.

Cortés, K. R. (2017). How Small Banks Deal with Large Shocks. Economic Commentary, 2017-08. https://www.clevelandfed.org/en/newsroom-and-events/publications/economic-commentary/2017-economic-commentaries/ec-201708-how-small-banks-deal-with-large-shocks.aspx#:~:text=First%2C%20small%20banks%20that%20operate,all%20of%20their%20other%20markets.

Cortés, K. R., & Strahan, P. E. (2017). Tracing Out Capital Flows: How Financially Integrated Banks Respond to Natural Disasters. Journal of Financial Economics, 125(1), 182-199. https://www.sciencedirect.com/science/article/abs/pii/S0304405X17300806.

Deryugina, T. (2017). The Fiscal Cost of Hurricanes: Disaster Aid Versus Social Insurance. American Economic Journal: Economic Policy, 9(3), 168-98. https://www.aeaweb.org/articles?id=10.1257/pol.20140296.

Dlugosz, J., Gam, Y. K., Gopalan, R., & Skrastins, J. (2021). Decision-Making Delegation in Banks. Available at SSRN 3155683. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3155683.

Federal Deposit Insurance Corporation. (2012). FDIC Community Banking Study. Washington DC: Federal Deposit. https://www.fdic.gov/regulations/resources/cbi/report/cbsi-1.pdf.

Federal Deposit Insurance Corporation. (2005, Winter). In Focus this Quarter: A preliminary Assessment of the Effects of Recent Hurricanes on FDIC-insured Institutions, Outlook. https://www.fdic.gov/analysis/archived-research/outlook/t4q2005.pdf.

Federal Reserve Banks of Dallas, New York, Richmond, and San Francisco. (2018). 2017 Small Business Credit Survey: Report on Disaster-Affected Firms. https://www.fedsmallbusiness.org/survey/2018/report-on-disaster-affected-firms.

He, A. (2018). Real Effects of Financial Constraints: Evidence from Loans Across Bank-Firm Networks and Natural Disasters. Working Paper. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3190343.

Klomp, J. (2014). Financial Fragility and Natural Disasters: An Empirical Analysis. Journal of Financial Stability, 13, 180-192. https://www.sciencedirect.com/science/article/abs/pii/S1572380814000539.

Koetter, M., Noth, F., & Rehbep, O. (2020). Borrowers Under Water! Rare Disasters, Regional Banks, and Recovery Lending. Journal of Financial Intermediation, 43, 100811. https://www.sciencedirect.com/science/article/abs/pii/S1042957319300130.
Noth, F., & Schüwer, U. (2018). Natural Disaster and Bank Stability: Evidence from the U.S. Financial System. *Sustainable Architecture for Finance in Europe Working Paper* No. 167. [https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2921000](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2921000).

Schüwer, U., Lambert, C., & Noth, F. (2019). How Do Banks React to Catastrophic Events? Evidence from Hurricane Katrina. *Review of Finance*, 23(1), 75-116. [https://academic.oup.com/rof/article/23/1/75/4971559](https://academic.oup.com/rof/article/23/1/75/4971559).

Steindl, F. G., & Weinrobe, M. D. (1983). Natural Hazards and Deposit Behavior at Financial Institutions: A Note. *Journal of Banking & Finance*, 7(1), 111-118. [https://www.sciencedirect.com/science/article/abs/pii/0378426683900596](https://www.sciencedirect.com/science/article/abs/pii/0378426683900596).
APPENDICES

Table A1. Counties, Banks, and Disasters

| Year | Counties | Percentage of Total (%) | Number of Bank Headquarters | Number of Counties with Disasters | Percentage of Total (%) | Number of Bank Offices | Percentage of Total (%) | Counties with Disasters & Bank Offices | Percentage of Total (%) | Counties with Bank Offices | Percentage of Total (%) |
|------|----------|-------------------------|-----------------------------|----------------------------------|-------------------------|------------------------|-------------------------|----------------------------------------|-------------------------|--------------------------|-------------------------|
| 2000 | 3,141    | 13.1                    | 10,098                      | 84,909                           | 84.6                    | 356                    | 11.3                    | 3,133                                  | 99.7                    | 408                      | 13.0                    |
| 2001 | 3,141    | 12.6                    | 9,737                       | 85,478                           | 83.7                    | 355                    | 11.3                    | 3,134                                  | 99.8                    | 396                      | 12.6                    |
| 2002 | 3,141    | 17.7                    | 9,454                       | 85,990                           | 82.9                    | 490                    | 15.6                    | 3,138                                  | 99.9                    | 552                      | 17.6                    |
| 2003 | 3,140    | 23.7                    | 9,238                       | 87,178                           | 82.6                    | 613                    | 19.5                    | 3,132                                  | 99.7                    | 742                      | 23.6                    |
| 2004 | 3,140    | 28.9                    | 9,049                       | 89,187                           | 81.9                    | 795                    | 25.3                    | 3,132                                  | 99.7                    | 909                      | 28.9                    |
| 2005 | 3,141    | 34.4                    | 8,839                       | 91,436                           | 81.0                    | 924                    | 29.4                    | 3,131                                  | 99.7                    | 1,078                    | 34.3                    |
| 2006 | 3,141    | 16.6                    | 8,750                       | 94,134                           | 80.5                    | 449                    | 14.3                    | 3,129                                  | 99.6                    | 519                      | 16.5                    |
| 2007 | 3,141    | 16.8                    | 8,587                       | 96,657                           | 79.6                    | 486                    | 15.5                    | 3,130                                  | 99.6                    | 527                      | 16.8                    |
| 2008 | 3,142    | 31.2                    | 8,424                       | 98,548                           | 79.0                    | 841                    | 26.8                    | 3,123                                  | 99.4                    | 976                      | 31.1                    |
| 2009 | 3,143    | 17.0                    | 8,168                       | 98,963                           | 78.2                    | 436                    | 13.9                    | 3,122                                  | 99.3                    | 533                      | 17.0                    |
| 2010 | 3,143    | 17.9                    | 7,807                       | 97,962                           | 77.3                    | 475                    | 15.1                    | 3,122                                  | 99.3                    | 561                      | 17.8                    |
| 2011 | 3,143    | 30.7                    | 7,510                       | 97,678                           | 76.5                    | 768                    | 24.4                    | 3,121                                  | 99.3                    | 961                      | 30.6                    |
| 2012 | 3,143    | 17.8                    | 7,242                       | 96,827                           | 75.9                    | 424                    | 13.5                    | 3,121                                  | 99.3                    | 561                      | 17.8                    |
| 2013 | 3,142    | 8.9                     | 6,938                       | 95,840                           | 75.1                    | 235                    | 7.5                     | 3,121                                  | 99.3                    | 281                      | 8.9                     |
| 2014 | 3,142    | 5.9                     | 6,657                       | 94,260                           | 74.2                    | 157                    | 5.0                     | 3,118                                  | 99.2                    | 185                      | 5.9                     |
| 2015 | 3,142    | 15.1                    | 6,347                       | 92,827                           | 72.7                    | 380                    | 12.1                    | 3,117                                  | 99.2                    | 474                      | 15.1                    |
| 2016 | 3,142    | 10.7                    | 6,057                       | 91,431                           | 71.7                    | 237                    | 7.5                     | 3,114                                  | 99.1                    | 336                      | 10.7                    |
| 2017 | 3,142    | 15.6                    | 5,787                       | 89,466                           | 70.6                    | 349                    | 11.1                    | 3,115                                  | 99.1                    | 487                      | 15.5                    |

Note: Banks refer to bank headquarters, while bank offices refer to both bank headquarters and bank branches. Also, we include both counties and county-equivalents in the second column labeled "Counties". County equivalents, such as parishes in Louisiana, are geographical units within states that are the statistical equivalent of counties. Source: U.S. Census Bureau, FDIC and SHELDUS.
Table A2. Counties Ranked by Greatest Total Damage and Number and Assets of Banks, 2000-2017

| Rank | County     | State     | Property Damage | Number of Bank Headquarters | Number of Bank Offices | Average Offices for Bank Headquarters | Average Offices in County for Headquarter Banks | Average Assets for Headquarter Banks |
|------|------------|-----------|-----------------|----------------------------|------------------------|--------------------------------------|----------------------------------------------|--------------------------------------|
| 1    | Jefferson  | Louisiana | 31,729          | 11                         | 369                    | 3.8                                  | 2.2                                           | 169                                  |
| 2    | Monmouth   | New Jersey| 25,580          | 10                         | 805                    | 5.7                                  | 4.6                                           | 316                                  |
| 3    | Ocean      | New Jersey| 24,077          | 5                          | 602                    | 12.4                                 | 6.8                                           | 944                                  |
| 4    | Harris     | Texas     | 22,725          | 83                         | 2,798                  | 15.2                                 | 5.3                                           | 1,468                                |
| 5    | Galveston  | Texas     | 21,148          | 9                          | 199                    | 8.5                                  | 4.9                                           | 317                                  |
| 6    | Fort Bend  | Texas     | 16,887          | 7                          | 321                    | 4.6                                  | 2.1                                           | 201                                  |
| 7    | Orleans    | Louisiana | 15,792          | 17                         | 299                    | 63                                   | 4.5                                           | 10,200                               |
| 8    | Plaquemines| Louisiana | 15,716          | 1                          | 14                     | 2.9                                  | 2                                             | 128                                  |
| 9    | St. Tammany| Louisiana | 15,713          | 6                          | 248                    | 5.8                                  | 4                                             | 180                                  |
| 10   | Lafourche  | Louisiana | 15,657          | 3                          | 96                     | 6.5                                  | 5.2                                           | 191                                  |
| 11   | St. Bernard| Louisiana | 15,647          | 0                          | 34                     | -                                    | -                                             | -                                    |
| 12   | Montgomery | Texas     | 14,896          | 4                          | 333                    | 79.1                                 | 6                                             | 638                                  |
| 13   | Harrison   | Mississippi| 11,982         | 4                          | 155                    | 37.8                                 | 9.5                                           | 2,951                                |
| 14   | Hancock    | Mississippi| 11,980         | 0                          | 36                     | -                                    | -                                             | -                                    |
| 15   | Jackson    | Mississippi| 11,979         | 3                          | 88                     | 5.4                                  | 4.5                                           | 220                                  |
| 16   | Linn       | Iowa      | 8,693           | 22                         | 174                    | 2.8                                  | 2.1                                           | 147                                  |
| 17   | Brazoria   | Texas     | 5,079           | 9                          | 166                    | 2.3                                  | 1.9                                           | 116                                  |
| 18   | Jefferson  | Texas     | 5,042           | 3                          | 168                    | 13.8                                 | 5.6                                           | 543                                  |
| 19   | San Bernardino | California | 4,858     | 14                         | 617                    | 8.5                                  | 3.2                                           | 836                                  |
| 20   | Orange     | Texas     | 4,612           | 3                          | 46                     | 3                                    | 2                                             | 116                                  |
| 21   | San Diego  | California| 4,598           | 47                         | 1,537                  | 6.9                                  | 3.7                                           | 762                                  |
| 22   | Shelby     | Tennessee | 4,531           | 28                         | 646                    | 40.7                                 | 5.7                                           | 2,484                                |
| 23   | East Baton Rouge | Louisiana | 4,475         | 14                         | 424                    | 19.8                                 | 4.8                                           | 1,196                                |
| 24   | Los Alamos | New Mexico| 4,365           | 1                          | 8                      | 4.9                                  | 2.3                                           | 1,252                                |
| 25   | Livingston | Louisiana | 4,308           | 0                          | 59                     | -                                    | -                                             | -                                    |

Total Damage: 583,815  
Sum of 25 Counties: 322,069  
Percentage of Total: 55%

Note: Property damage and bank assets are in million dollars. Source: SHELDUS and FDIC.
Table A3. Counties Ranked by Greatest Single Damage and Number and Assets of Banks, as of Disaster Date

| Rank | County    | State    | Date    | Property Damage | Number of Bank Headquarters | Number of Bank Offices | Average Offices for Headquarter Banks | Average Assets for Headquarter Banks |
|------|-----------|----------|---------|-----------------|----------------------------|-----------------------|--------------------------------------|--------------------------------------|
| 1    | Jefferson | Louisiana| Aug-05  | 30,570          | 8                          | 132                   | 4.1                                  | 3                                    | 199                                 |
| 2    | Monmouth  | New Jersey| Oct-12 | 25,530          | 5                          | 280                   | 6.6                                  | 5                                    | 438                                 |
| 3    | Ocean     | New Jersey| Oct-12 | 23,990          | 4                          | 200                   | 8.5                                  | 7                                    | 717                                 |
| 4    | Harris    | Texas    | Aug-17 | 20,000          | 23                         | 967                   | 6.7                                  | 3.7                                  | 1,117                               |
| 5    | Galveston | Texas    | Aug-17 | 20,000          | 4                          | 74                    | 12                                   | 6.8                                  | 684                                 |
| 6    | Fort Bend | Texas    | Aug-17 | 16,000          | 0                          | 140                   | -                                    | -                                    | -                                   |
| 7    | Lafourche | Louisiana| Aug-05 | 15,290          | 3                          | 41                    | 6                                    | 5.3                                  | 128                                 |
| 8    | Orleans   | Louisiana| Aug-05 | 15,290          | 14                         | 108                   | 37.1                                 | 4.9                                  | 2,578                               |
| 9    | Plaquemines| Louisiana| Aug-05 | 15,290          | 1                          | 7                     | 3                                    | 2                                    | 107                                 |
| 10   | St. Bernard| Louisiana| Aug-05 | 15,290          | 0                          | 19                    | -                                    | -                                    | -                                   |
| 11   | St. Tammany| Louisiana| Aug-05 | 15,290          | 5                          | 76                    | 6.6                                  | 4.6                                  | 204                                 |
| 12   | Montgomery| Texas    | Aug-17 | 14,000          | 1                          | 149                   | 746                                  | 32                                   | 5,271                               |
| 13   | Hancock   | Mississippi| Aug-05 | 11,950          | 0                          | 14                    | -                                    | -                                    | -                                   |
| 14   | Harrison  | Mississippi| Aug-05 | 11,950          | 3                          | 66                    | 23.7                                 | 11.7                                 | 1,285                               |
| 15   | Jackson   | Mississippi| Aug-05 | 11,950          | 3                          | 41                    | 6.3                                  | 5.7                                  | 244                                 |
| 16   | Linn      | Iowa     | Jun-08  | 8,689           | 19                         | 81                    | 2.9                                  | 2.3                                  | 135                                 |
| 17   | Shelby    | Tennessee| May-11  | 4,436           | 13                         | 254                   | 18.5                                 | 7.2                                  | 2,191                               |
| 18   | Los Alamos| New Mexico| May-00 | 4,346           | 1                          | 5                     | 3                                    | 2                                    | 646                                 |
| 19   | St. Johns | Florida  | Oct-16  | 4,083           | 0                          | 64                    | -                                    | -                                    | -                                   |
| 20   | Brazoria  | Texas    | Aug-17 | 4,001           | 7                          | 77                    | 2.3                                  | 1.9                                  | 166                                 |
| 21   | Escambia  | Florida  | Sep-04  | 3,521           | 6                          | 78                    | 4.2                                  | 3.5                                  | 205                                 |
| 22   | Santa Rosa| Florida  | Sep-04  | 3,521           | 1                          | 34                    | 8                                    | 4                                    | 357                                 |
| 23   | Okaloosa  | Florida  | Sep-04  | 3,521           | 7                          | 78                    | 6.6                                  | 4.7                                  | 310                                 |
| 24   | Tuscaloosa| Alabama  | Apr-11  | 3,367           | 3                          | 55                    | 8                                    | 3                                    | 506                                 |
| 25   | Collier   | Florida  | Oct-05  | 3,193           | 9                          | 124                   | 5                                    | 2.3                                  | 473                                 |

Total Damage: 583,815  Sum of 25 Counties: 305,068  Percentage of Total: 52%

Note: Property damage and bank assets are in million dollars. Source: SHELDUS and FDIC.
### Table A4. Banks in Counties Ranked by Greatest Total Damage, 2000-2017

| Rank | Bank Name                          | County   | State      | Property Damage in County of Bank Headquarters | Number of Disasters | Average Bank Assets |
|------|-----------------------------------|----------|------------|------------------------------------------------|---------------------|---------------------|
| 1    | Mississippi River Bank            | Plaquemines | Louisiana | 15,716                                             | 8                   | 129                 |
| 2    | Woodforest National Bank          | Montgomery | Texas      | 14,002                                             | 4                   | 2,849               |
| 3    | OceanFirst Bank, N.A.             | Ocean     | New Jersey | 6,023                                              | 5                   | 2,315               |
| 4    | Shore Community Bank              | Ocean     | New Jersey | 6,023                                              | 5                   | 178                 |
| 5    | Harmony Bank                       | Ocean     | New Jersey | 6,023                                              | 5                   | 155                 |
| 6    | First Commerce Bank               | Ocean     | New Jersey | 6,008                                              | 3                   | 308                 |
| 7    | State Bank & Trust Company        | Lafourche | Louisiana  | 5,219                                              | 9                   | 102                 |
| 8    | United Community Bank             | Lafourche | Louisiana  | 5,219                                              | 9                   | 326                 |
| 9    | South Lafourche Bank & Trust Company | Lafourche | Louisiana  | 5,219                                              | 9                   | 121                 |
| 10   | The Moody National Bank           | Galveston | Texas      | 5,165                                              | 10                  | 842                 |
| 11   | Mainland Bank                     | Galveston | Texas      | 5,165                                              | 10                  | 88                  |
| 12   | HomeTown Bank, N.A.               | Galveston | Texas      | 5,165                                              | 10                  | 327                 |
| 13   | Texas First Bank                  | Galveston | Texas      | 5,165                                              | 10                  | 451                 |
| 14   | Manasquan Bank                    | Monmouth  | New Jersey | 5,116                                              | 4                   | 684                 |
| 15   | Freehold Savings Bank             | Monmouth  | New Jersey | 5,116                                              | 4                   | 237                 |
| 16   | Rumson-Fair Haven Bank and Trust Company | Monmouth | New Jersey | 5,116                                              | 4                   | 132                 |
| 17   | Two River Community Bank          | Monmouth  | New Jersey | 5,116                                              | 4                   | 489                 |
| 18   | New Jersey Community Bank         | Monmouth  | New Jersey | 5,116                                              | 4                   | 111                 |
| 19   | Los Alamos National Bank          | Los Alamos | New Mexico | 4,365                                              | 4                   | 1,273               |
| 20   | The First National Bank of Florida | Santa Rosa | Florida   | 4,246                                              | 6                   | 388                 |
| 21   | Metairie Bank & Trust Company     | Jefferson | Louisiana  | 4,005                                              | 11                  | 315                 |
| 22   | State-Investors Bank              | Jefferson | Louisiana  | 4,005                                              | 11                  | 196                 |
| 23   | Mutual Savings and Loan Association | Jefferson | Louisiana  | 4,005                                              | 11                  | 45                  |
| 24   | Bank of New Orleans               | Jefferson | Louisiana  | 4,005                                              | 11                  | 266                 |
| 25   | Eureka Homestead                  | Jefferson | Louisiana  | 4,005                                              | 10                  | 100                 |

**Total Damage:** 583,815  
**Sum of 25 Banks:** 144,326  
**Percentage of Total:** 25%

**Note:** Property damage and bank assets are in million dollars. Average bank assets are based on the entire period. Source: SHELDUS and FDIC.
Table A5. Banks in Counties Ranked by Greatest Single Damage, as of Disaster Date

| Rank | Bank Name                        | County        | State   | Disaster Date | Property Damage in County of Bank Headquarters | Bank Assets | Number of Offices for the Bank | Number of Offices in the County for the Bank | Number of Bank Headquarters in the County |
|------|----------------------------------|---------------|---------|---------------|-------------------------------------------------|-------------|------------------------------|---------------------------------------------|--------------------------------------------|
| 1    | Mississippi River Bank           | Plaquemines   | Louisiana | Aug-05        | 15,287                                          | 107         | 3                            | 2                                           | 1                                          |
| 2    | Woodforest National Bank         | Montgomery    | Texas    | Aug-17        | 14,000                                          | 5,271       | 746                          | 32                                          | 1                                          |
| 3    | OceanFirst Bank                  | Ocean         | New Jersey | Oct-12         | 5,997                                          | 2,272       | 24                            | 19                                          | 4                                          |
| 4    | Shore Community Bank             | Ocean         | New Jersey | Oct-12         | 5,997                                          | 224         | 5                            | 6                                           | 4                                          |
| 5    | First Commerce Bank              | Ocean         | New Jersey | Oct-12         | 5,997                                          | 226         | 2                            | 1                                           | 4                                          |
| 6    | Harmony Bank                     | Ocean         | New Jersey | Oct-12         | 5,997                                          | 147         | 2                            | 2                                           | 4                                          |
| 7    | Manasquan Savings Bank           | Monmouth      | New Jersey | Oct-12         | 5,106                                          | 843         | 8                            | 5                                           | 5                                          |
| 8    | Freehold Savings Bank            | Monmouth      | New Jersey | Oct-12         | 5,106                                          | 261         | 2                            | 2                                           | 5                                          |
| 9    | Bank and Trust Company           | Monmouth      | New Jersey | Oct-12         | 5,106                                          | 213         | 5                            | 5                                           | 5                                          |
| 10   | Two River Community Bank         | Monmouth      | New Jersey | Oct-12         | 5,106                                          | 734         | 18                           | 11                                          | 5                                          |
| 11   | New Jersey Community Bank        | Monmouth      | New Jersey | Oct-12         | 5,106                                          | 139         | 3                            | 2                                           | 5                                          |
| 12   | State Bank & Trust Company       | Lafourche     | Louisiana | Aug-05         | 5,096                                          | 85          | 5                            | 5                                           | 3                                          |
| 13   | Community Bank                   | Lafourche     | Louisiana | Aug-05         | 5,096                                          | 213         | 9                            | 7                                           | 3                                          |
| 14   | South Lafourche Bank             | Lafourche     | Louisiana | Aug-05         | 5,096                                          | 87          | 4                            | 4                                           | 3                                          |
| 15   | The Moody National Bank          | Galveston     | Texas    | Aug-17         | 5,000                                          | 999         | 16                           | 7                                           | 4                                          |
| 16   | Mainland Bank                    | Galveston     | Texas    | Aug-17         | 5,000                                          | 130         | 3                            | 2                                           | 4                                          |
| 17   | HomeTown Bank, N.A.              | Galveston     | Texas    | Aug-17         | 5,000                                          | 591         | 7                            | 5                                           | 4                                          |
| 18   | Texas First Bank                 | Galveston     | Texas    | Aug-17         | 5,000                                          | 1,014       | 22                           | 13                                          | 4                                          |
| 19   | Los Alamos National Bank         | Los Alamos    | New Mexico | May-00         | 4,346                                          | 646         | 3                            | 2                                           | 1                                          |
| 20   | The Peoples Bank, Biloxi         | Harrison      | Mississippi | Aug-05     | 3,984                                          | 766         | 17                           | 11                                          | 3                                          |
| 21   | Merchants & Marine Bank          | Jackson       | Mississippi | Aug-05 | 3,984                                          | 423         | 11                           | 10                                          | 3                                          |
| 22   | Hancock Bank                     | Harrison      | Mississippi | Aug-05 | 3,984                                          | 2,874       | 51                           | 21                                          | 3                                          |
| 23   | First National Bank of Lucedale  | Jackson       | Mississippi | Aug-05 | 3,984                                          | 80          | 3                            | 2                                           | 3                                          |
| 24   | First Federal Savings and Loan Association Bank, Coast | Jackson       | Mississippi | Aug-05 | 3,984                                          | 230         | 4                            | 5                                           | 3                                          |
| 25   | Community Bank, Coast            | Harrison      | Mississippi | Aug-05 | 3,984                                          | 215         | 4                            | 3                                           | 3                                          |

Total Damage: 583,815
Sum of 25 Banks: 142,343
Percentage of Total: 24%

Note: Property damage and bank assets are in million dollars. Source: SHEDUS and FDIC.
Table A6. Banks in Counties Ranked by Greatest Single Damage, as of Disaster Date

| Rank | Bank Name                            | County   | State    | Disaster Date | Property Damage in all Counties with Bank Offices | Bank Assets   |
|------|--------------------------------------|----------|----------|---------------|--------------------------------------------------|---------------|
| 1    | Regions Bank                         | Jefferson| Alabama  | Aug-05        | 24,638                                           | 81,275        |
| 2    | Hibernia National Bank               | Orleans  | Louisiana| Aug-05        | 21,427                                           | 23,141        |
| 3    | Whitney National Bank                | Orleans  | Louisiana| Aug-05        | 16,359                                           | 9,419         |
| 4    | Hancock Bank                         | Harrison | Mississippi| Aug-05     | 13,516                                           | 2,874         |
| 5    | JPMorgan Chase Bank, NA              | Delaware | Ohio     | Aug-05        | 13,173                                           | 1,008,000     |
| 6    | Wells Fargo Bank, NA                 | Minnehaha| South Dakota| Aug-17   | 10,721                                           | 1,738,000     |
| 7    | JPMorgan Chase Bank, NA              | Delaware | Ohio     | Aug-17        | 9,553                                            | 2,153,000     |
| 8    | Wells Fargo Bank, NA                 | Minnehaha| South Dakota| Oct-12  | 6,357                                            | 1,266,000     |
| 9    | Woodforest National Bank             | Montgomery| Texas  | Aug-17        | 6,335                                            | 5,271         |
| 10   | Bank of America, NA                  | Mecklenburg| North Carolina| Oct-12 | 5,845                                            | 1,474,000     |
| 11   | Compass Bank                         | Jefferson| Alabama  | Aug-17        | 5,774                                            | 84,701        |
| 12   | Sovereign Bank, NA                   | New Castle| Delaware| Oct-12        | 5,770                                            | 83,082        |
| 13   | AmSouth Bank                         | Jefferson| Alabama  | Aug-05        | 5,264                                            | 51,046        |
| 14   | Bank of America, NA                  | Mecklenburg| North Carolina| Aug-17 | 5,238                                            | 1,725,000     |
| 15   | The Peoples Bank, Biloxi, Mississippi| Harrison | Mississippi| Aug-05 | 5,158                                            | 766           |
| 16   | Mississippi River Bank               | Plaquemines| Louisiana| Aug-05 | 4,599                                            | 107           |
| 17   | PNC Bank, NA                         | New Castle| Delaware| Oct-12        | 4,547                                            | 295,000       |
| 18   | TD Bank, NA                          | New Castle| Delaware| Oct-12        | 4,513                                            | 204,000       |
| 19   | Prosperity Bank                      | Wharton  | Texas    | Aug-17        | 4,306                                            | 22,133        |
| 20   | First American Bank and Trust        | Saint James| Louisiana| Aug-05 | 4,257                                            | 536           |
| 21   | ZB, NA                               | Salt Lake| Utah     | Aug-17        | 3,929                                            | 65,391        |
| 22   | Texas First Bank                     | Galveston| Texas    | Aug-17        | 3,873                                            | 1,014         |
| 23   | Hancock Bank of Louisiana            | East Baton Rouge| Louisiana| Aug-05 | 3,738                                            | 2,094         |
| 24   | Gulf Coast Bank and Trust Company    | Orleans  | Louisiana| Aug-05        | 3,623                                            | 606           |
| 25   | JPMorgan Chase Bank, NA              | Delaware | Ohio     | Oct-12        | 3,452                                            | 1,897,000     |

Total Damage: $583,815  Sum of 25 Banks: 195,964  Percentage of Total: 34%

Note: Property damage and bank assets are in million dollars. The disaster exposure is calculated based on bank offices rather than bank headquarters, as in Tables A4 and A5. Source: SHELDUS and FDIC.