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Natural Disaster Impacts on U.S. Banks

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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.

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

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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.

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[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.[2] 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,[3]

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[2] SHELDUS™ was developed by the Hazards and Vulnerability Research Institute at the University of South Carolina and originally supported by grants from the National Science Foundation (Grant No. 99053252 and 0220712) and the University of South Carolina's Office of the Vice President for Research. Since 2018, the Arizona State University Center for Emergency Management and Homeland Security supports and maintains SHELDUS™.

[3] The Department of Homeland Security and its Federal Emergency Management Agency (FEMA) administer disaster assistance and emergency management in the U.S. State governors initiate requests for disaster assistance. If the President finds that a major disaster or emergency exists, FEMA activates Federal funding programs to assist in the response and recovery effort. SHELDUSTM is a source of information on the number of PDDs in different years over time.

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[4], counties on average experienced nearly five disasters during the sample period, although this masks the substantial heterogeneity across counties.
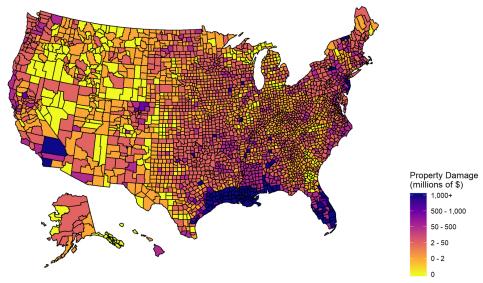

Figure 1. Property Damage in Counties, 2000-2017
Note: This figure shows the total property damage caused by natural disasters in counties throughout the U.S. over 2000 – 2017. Source: SHELDUS.

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 statical equivalent of counties.
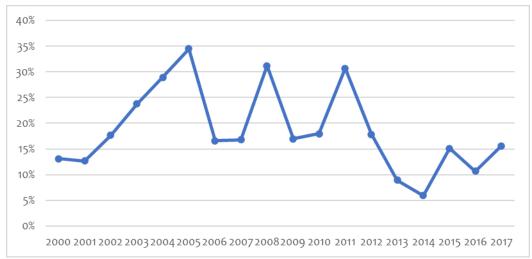
Figure 2. Percentage of Counties with Natural Disasters

Note: This figure shows the percentage of the 3,142 counties that suffered from natural disasters for each of the years 2000 to 2017. *Source: U.S. Census Bureau and SHELDUS.*

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).
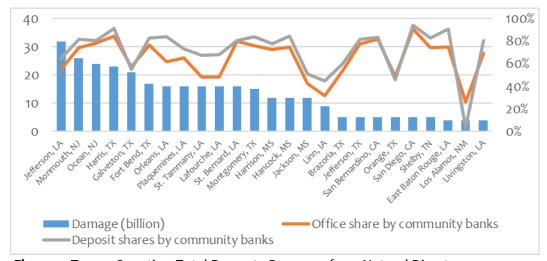

Figure 3. Top 25 Counties: Total Property Damages from Natural Disasters, 2000-2017

Note: This figure shows the top 25 counties that suffer the largest property damages from natural disasters and their property damage from 2000 to 2017. The top 25 counties account for $322 billion of the $584 billion in total damages, or 55 percent, over the entire period. On the right y-axis, the share of number of offices by community banks, and share of deposits owned by community banks are also plotted. *Source: SHELDUS, FDIC.*

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.

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.
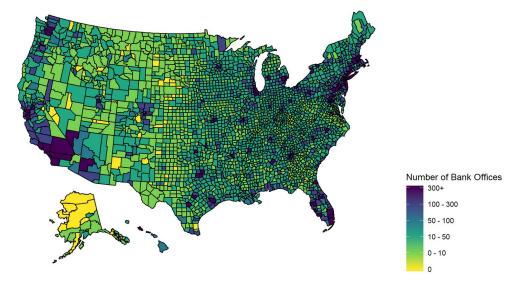

Figure 4. Number of Bank Offices in Counties, 2000-2017
Note: This figure shows the average number of bank headquarters and their branches in counties throughout the U.S. over 2000-2017. *Source: FDIC.*

Figure 5 shows the percentage of counties with natural disasters and bank headquarters and/or offices.[5] 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.
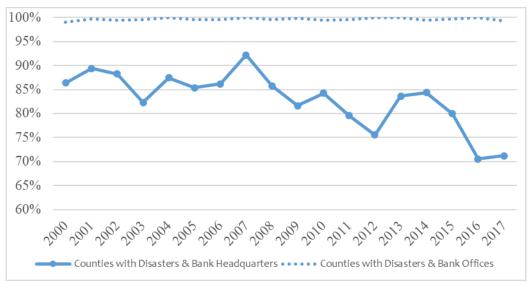

Figure 5. Percentage of Counties with Both Natural Disasters and Bank Headquarters /Offices, 2000-2017

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.
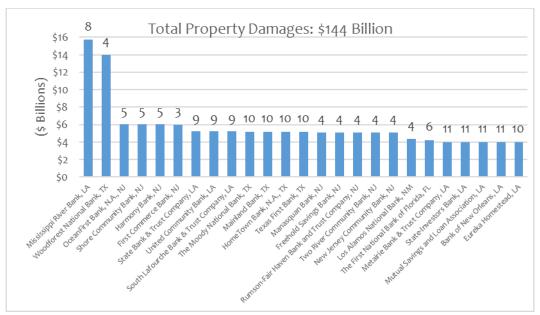
Figure 6. Top 25 Banks: Total Property Damages and Number of Natural Disasters, 2000-2017
Note: This figure shows the states in which the top 25 banks have headquarters and the total property damages from natural disasters that they had exposures to, including both the total property damages and the 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:

$$Outcome\ Variable_{i,j,t} = \alpha + \sum_{k=1}^{4} \beta_k Disaster\ Exposure_{i,t-k} + Control\ Variables_{i,t} + \gamma_i + q_t + \varepsilon_{i,j,t} \tag{1}$$

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, γ_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):

$$Disaster\ Exposure_{i,t} = ln(\sum_{j=1}^{n} Property\ Damage\ in\ Shocked\ Counties_{j,t} *$$
$$Bank\ Office\ Share_{i,j,t-1})/N_{i,t} \qquad (2)$$

where i represents banks, j represents counties, and t represents quarters for bank headquarter- 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
Brokered Deposits-to-Total Deposits (%)	576,036	3.09	15.53	0.00	0.00	1.60
Total Assets ($ Millions)	576,904	1,547	28,865	62	132	309
Ln Assets	576,904	18.84	1.40	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

Panel B. Office Deposit and Loan Rate Data, Monthly

	Obs.	Average	S.D.	P25	P50	P75
Auto Used 4 Yrs. 36-month term (%)	397,659	7.14	2.22	5.74	7.25	8.50
15 Yr. Fxd. Mtg @ 175K (%)	262,755	5.29	1.56	3.99	5.50	6.35
H.E. Loan Up to 80% LTV @ 20K - 180 Mo Term (%)	233,106	7.25	1.95	6.29	7.25	8.25
12-month CD @ $100,000 (%)	1,682,131	1.96	1.57	0.50	1.60	3.02
Interest Checking Accounts with Less Than $2,500 (%)	1,638,907	0.49	0.60	0.10	0.25	0.61
Money Market Deposit Account @ $25,000 (%)	1,630,870	1.10	1.08	0.25	0.75	1.57

Panel C. T-test for Differences Between Community Banks and Non-Community Banks

	Community Banks		Non-Community Banks		
	Obs.	Mean	Obs.	Mean	Difference
Number of offices	522,332	4.903	54,572	78.243	-73.340***
Log (office)	522,332	1.132	54,572	2.173	-1.041***
Core deposits to total assets	522,332	0.718	54,284	0.562	0.156***
Net interest income to total assets	522,332	0.022	53,924	0.021	0.001***
Small business loan to total loans	522,247	0.103	50,179	0.061	0.042***
Agricultural production loan to total loans	522,247	0.073	50,179	0.013	0.059***
Auto loan to total loans	522,247	0.007	50,179	0.004	0.003***
Real estate loan to total loans	522,247	0.700	50,179	0.634	0.066***
Commercial and industrial loan	522,247	0.135	50,179	0.158	-0.023***
Noncurrent loans to total loans	522,250	0.003	49,739	0.006	-0.003***
Equity to asset ratio	522,332	0.112	53,924	0.141	-0.030***
Total assets (in billion)	522,332	0.252	54,572	13.934	-13.681***
Log (assets in billion +1)	522,332	0.190	54,572	1.094	-0.904***

Note: Since 1993, C&I loans of $1 million or less have been used as a proxy for small business lending.

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*	*1.000*		
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 multi-collinearity 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 points[7] 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. The economic impact is 0.018% (=1.46*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			Brokered deposits to total deposits		
	All Banks	Community Banks	Non-Community Banks	All Banks	Community Banks	Non-Community Banks	All Banks	Community Banks	Non-Community Banks
Disaster Exposure$_{i,t-1}$	0.000 (0.002)	0.001 (0.001)	-0.015 (0.022)	0.000 (0.001)	0.000 (0.001)	0.004 (0.010)	0.094 (0.066)	0.021*** (0.005)	0.147** (0.062)
Disaster Exposure$_{i,t-2}$	0.002 (0.003)	0.000 (0.002)	0.026 (0.017)	0.001 (0.001)	0.001** (0.001)	0.001 (0.011)	0.018 (0.017)	0.027*** (0.005)	0.134*** (0.050)
Disaster Exposure$_{i,t-3}$	0.003* (0.002)	0.004*** (0.001)	-0.003 (0.020)	0.003 (0.002)	0.002*** (0.001)	0.027 (0.035)	0.024* (0.014)	0.030*** (0.004)	0.122** (0.058)
Disaster Exposure$_{i,t-4}$	0.007*** (0.002)	0.004** (0.002)	0.045** (0.023)	0.003 (0.002)	0.002*** (0.001)	0.021 (0.029)	0.026** (0.013)	0.029*** (0.005)	0.113* (0.066)
Log Assets$_{i,t}$	0.292** (0.124)	0.251*** (0.027)	0.178 (0.531)	-0.197*** (0.049)	-0.272*** (0.012)	-0.036 (0.226)	2.985*** (0.156)	3.087*** (0.117)	2.340*** (0.581)
Loan Loss Provisions to Assets $_{i,t}$	-0.945*** (0.021)	-1.007*** (0.013)	-0.785*** (0.051)	0.103** (0.048)	-0.019* (0.010)	0.447** (0.182)	0.716*** (0.067)	0.641*** (0.052)	0.737*** (0.199)
Federal Funds Rate$_t$	0.067*** (0.010)	0.056*** (0.003)	0.112** (0.048)	0.069*** (0.008)	0.056*** (0.002)	0.135** (0.065)	0.249*** (0.031)	0.241*** (0.013)	-0.012 (0.101)
Constant	-4.461* (2.360)	-3.693*** (0.502)	-1.922 (11.046)	7.485*** (0.945)	8.901*** (0.221)	4.135 (4.862)	-53.828*** (2.961)	-55.733*** (2.190)	-39.668*** (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.[8] 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.

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[8] These dates cover roughly the same period as the Great Recession, which the Business Cycle Dating Committee at the National Bureau of Economic Research determined began in December 2007 and ended in June 2009 (see https://www.nber.org/cycles.html).

Table 4. Bank Performance and Natural Disasters Before, During, and After Financial Crisis

	ROA			Net Interest Margin			Brokered Deposits-to-Total Deposits		
	Pre-Crisis	Crisis	Post-Crisis	Pre-Crisis	Crisis	Post-Crisis	Pre-Crisis	Crisis	Post-Crisis
Disaster Exposure$_{i,t-1}$	0.003	-0.007	-0.000	0.002	-0.004 ***	0.006 ***	0.100	-0.038 ***	0.001
	(0.002)	(0.006)	(0.004)	(0.002)	(0.001)	(0.001)	(0.098)	(0.013)	(0.007)
Disaster Exposure$_{i,t-2}$	0.004	-0.014	0.004 *	0.003	-0.003	0.005 ***	-0.049	-0.011	0.004
	(0.002)	(0.010)	(0.002)	(0.002)	(0.003)	(0.001)	(0.046)	(0.013)	(0.006)
Disaster Exposure$_{i,t-3}$	0.007 **	-0.011	0.000	0.008 *	-0.002	0.003 **	-0.045	0.001	0.008
	(0.003)	(0.010)	(0.003)	(0.005)	(0.003)	(0.001)	(0.052)	(0.013)	(0.006)
Disaster Exposure$_{i,t-4}$	0.010 ***	-0.014	0.007 ***	0.010 **	-0.003 *	0.001	-0.045	0.002	0.027 ***
	(0.003)	(0.010)	(0.003)	(0.004)	(0.002)	(0.001)	(0.050)	(0.011)	(0.007)
Ln Assets$_{i,t}$	0.405 ***	2.104 **	0.885 ***	-0.109	-0.163	-0.085	4.080 ***	4.700 ***	2.606 ***
	(0.095)	(1.069)	(0.313)	(0.174)	(0.129)	(0.090)	(0.283)	(0.933)	(0.390)
Loan Loss Provisions to Assets$_{i,t}$	-0.727 ***	-0.957 ***	-0.897 ***	0.412 **	-0.049 ***	0.039 ***	0.061	0.096 *	0.764 ***
	(0.068)	(0.033)	(0.017)	(0.179)	(0.010)	(0.010)	(0.255)	(0.058)	(0.057)
Federal Funds Rate$_t$	-0.016 **	0.162 ***	-0.191 **	0.007 **	0.055 ***	-0.043 *	0.171 ***	-0.387 ***	0.049
	(0.008)	(0.048)	(0.081)	(0.003)	(0.007)	(0.024)	(0.032)	(0.040)	(0.110)
Constant	-6.277 ***	-38.979 *	-15.829 ***	6.004 *	6.805 ***	5.339 ***	-73.992 ***	-83.202 ***	-46.757 ***
	(1.767)	(20.279)	(5.961)	(3.267)	(2.438)	(1.714)	(5.273)	(17.687)	(7.436)
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	249,777	49,180	231,796	249,770	49,177	231,770	249,707	49,172	231,752
Adjusted R-squared	0.646	0.810	0.758	0.350	0.842	0.614	0.157	0.912	0.839
Disaster Exposure Coefficient Sum	0.024	-0.046	0.011	0.023	-0.012	0.015	-0.039	-0.046	0.04
F-value	7.34	2.54	2.04	3.47	2.06	15.80	0.52	1.45	3.39
P-value	0.0068	0.1107	0.1529	0.0626	0.1512	0.0001	0.4717	0.2286	0.0655

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 auto mobile 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$_{i,t-1}$	0.031 ***	0.025 ***	0.138 **	0.004	0.008	0.095 **	0.006 **	0.005 **	0.009
	(0.010)	(0.010)	(0.053)	(0.009)	(0.009)	(0.044)	(0.002)	(0.002)	(0.013)
Disaster Exposure$_{i,t-2}$	0.039 ***	0.036 ***	0.134 **	0.009	0.014 *	0.077 *	0.008 ***	0.006 **	0.036
	(0.010)	(0.009)	(0.055)	(0.009)	(0.008)	(0.040)	(0.003)	(0.002)	(0.025)
Disaster Exposure$_{i,t-3}$	0.010	0.014	0.001	0.008	0.013	0.023	0.006 ***	0.006 ***	-0.001
	(0.009)	(0.009)	(0.053)	(0.008)	(0.008)	(0.038)	(0.002)	(0.002)	(0.007)
Disaster Exposure$_{i,t-4}$	0.043 ***	0.041 ***	0.071	0.020 **	0.023 ***	0.040	0.007 ***	0.006 ***	0.011
	(0.010)	(0.010)	(0.054)	(0.009)	(0.009)	(0.041)	(0.002)	(0.002)	(0.008)
Log Assets$_{i,t}$	3.445 ***	3.248 ***	4.588 ***	5.530 ***	6.678 ***	2.778 ***	0.002	-0.108	0.214 *
	(0.241)	(0.213)	(0.737)	(0.225)	(0.206)	(0.739)	(0.082)	(0.108)	(0.124)
Loan Loss Provisions to Assets$_{i,t}$	0.856 ***	0.577 ***	1.540 ***	0.148 ***	0.219 ***	0.110	0.036	0.064 **	-0.257
	(0.120)	(0.071)	(0.377)	(0.054)	(0.052)	(0.107)	(0.028)	(0.025)	(0.182)
Federal Funds Rate$_t$	1.183 ***	1.149 ***	1.299 ***	0.566 ***	0.593 ***	0.802 ***	-0.078 ***	-0.079 ***	0.089
	(0.026)	(0.023)	(0.112)	(0.023)	(0.021)	(0.088)	(0.019)	(0.021)	(0.088)
Constant	-2.644	2.241	-37.531 **	-59.471 ***	-79.346 ***	-19.504	1.374	3.449 *	-2.917
	(4.571)	(4.000)	(15.366)	(4.267)	(3.853)	(15.368)	(1.564)	(2.055)	(2.663)
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$_{i,t-1}$	-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$_{i,t-2}$	-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$_{i,t-3}$	-0.006	-0.012 ***	0.023	-0.041 ***	-0.040 ***	0.022	-0.015 **	-0.016 ***	-0.052
	(0.006)	(0.004)	(0.054)	(0.005)	(0.005)	(0.042)	(0.006)	(0.005)	(0.049)
Disaster Exposure$_{i,t-4}$	-0.016 ***	-0.021 ***	0.010	-0.057 ***	-0.057 ***	0.031	-0.020 ***	-0.023 ***	-0.026
	(0.006)	(0.005)	(0.056)	(0.006)	(0.005)	(0.039)	(0.006)	(0.006)	(0.051)
Log Assets$_{i,t}$	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$_{i,t}$	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.[9] 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.[10] 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.[11] 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			Deposits		
	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}$	0.019*** (0.007)	0.033*** (0.007)	0.018* (0.009)	0.013*** (0.001)	0.003*** (0.001)	0.005*** (0.001)
Disaster Exposure$_{i,t-2}$	0.017*** (0.006)	0.025*** (0.006)	0.021** (0.010)	0.012*** (0.001)	0.002*** (0.001)	0.004*** (0.001)
Disaster Exposure$_{i,t-3}$	0.022*** (0.006)	0.020*** (0.007)	0.020** (0.010)	0.014*** (0.001)	0.002*** (0.000)	0.005*** (0.001)
Disaster Exposure$_{i,t-4}$	0.027*** (0.006)	0.017** (0.008)	0.022** (0.009)	0.018*** (0.001)	0.002*** (0.000)	0.005*** (0.001)
Disaster Exposure$_{i,t-5}$	0.024*** (0.006)	0.016** (0.007)	0.015* (0.009)	0.020*** (0.001)	0.002*** (0.000)	0.006*** (0.001)
Disaster Exposure$_{i,t-6}$	0.023*** (0.006)	0.017*** (0.006)	0.014** (0.007)	0.021*** (0.001)	0.002*** (0.000)	0.006*** (0.001)
Disaster Exposure$_{i,t-7}$	0.017*** (0.006)	0.011* (0.006)	0.017** (0.008)	0.019*** (0.001)	0.001*** (0.000)	0.005*** (0.001)
Disaster Exposure$_{i,t-8}$	0.022*** (0.006)	0.014*** (0.005)	0.019*** (0.007)	0.017*** (0.001)	-0.000 (0.000)	0.003*** (0.001)
Disaster Exposure$_{i,t-9}$	0.022*** (0.006)	0.018*** (0.005)	0.014* (0.007)	0.017*** (0.001)	-0.001 (0.000)	0.003*** (0.001)
Disaster Exposure$_{i,t-10}$	0.012* (0.006)	0.014*** (0.005)	0.012 (0.008)	0.017*** (0.001)	-0.001*** (0.000)	0.002*** (0.001)
Disaster Exposure$_{i,t-11}$	0.013** (0.005)	0.006 (0.005)	0.018** (0.008)	0.017*** (0.001)	-0.002*** (0.000)	0.002** (0.001)
Disaster Exposure$_{i,t-12}$	0.021*** (0.007)	0.006 (0.007)	0.017** (0.008)	0.019*** (0.001)	-0.002*** (0.001)	0.002*** (0.001)
Assets $_{i,t}$	-0.995*** (0.075)	-0.825*** (0.079)	-0.386*** (0.086)	-0.456*** (0.032)	-0.293*** (0.018)	-0.453*** (0.027)
Loan Provision to Assets$_{i,t}$	0.567*** (0.068)	0.306*** (0.030)	0.555*** (0.106)	0.207*** (0.010)	0.041*** (0.003)	0.113*** (0.007)
Federal Funds Rate$_t$	0.440*** (0.028)	0.409*** (0.009)	0.252*** (0.027)	0.667*** (0.004)	0.109*** (0.002)	0.312*** (0.006)
Constant	26.753*** (1.609)	21.632*** (1.692)	15.130*** (1.965)	9.774*** (0.651)	6.084*** (0.359)	9.489*** (0.539)
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			Deposits		
	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}$	0.023*** (0.007)	0.024*** (0.007)	0.024*** (0.006)	0.012*** (0.001)	0.002*** (0.001)	0.004*** (0.001)
Disaster Exposure$_{i,t-2}$	0.020*** (0.006)	0.019*** (0.006)	0.018*** (0.006)	0.012*** (0.001)	0.001** (0.000)	0.003*** (0.001)
Disaster Exposure$_{i,t-3}$	0.023*** (0.006)	0.009 (0.006)	0.021*** (0.006)	0.013*** (0.001)	0.002*** (0.000)	0.004*** (0.001)
Disaster Exposure$_{i,t-4}$	0.026*** (0.006)	0.013* (0.007)	0.023*** (0.006)	0.017*** (0.001)	0.003*** (0.000)	0.006*** (0.001)
Disaster Exposure$_{i,t-5}$	0.023*** (0.006)	0.009 (0.006)	0.021*** (0.006)	0.020*** (0.001)	0.003*** (0.000)	0.007*** (0.001)
Disaster Exposure$_{i,t-6}$	0.024*** (0.006)	0.009 (0.006)	0.017*** (0.006)	0.020*** (0.001)	0.002*** (0.000)	0.006*** (0.001)
Disaster Exposure$_{i,t-7}$	0.017*** (0.006)	0.005 (0.006)	0.022*** (0.006)	0.019*** (0.001)	0.001** (0.000)	0.004*** (0.001)
Disaster Exposure$_{i,t-8}$	0.020*** (0.006)	0.009 (0.006)	0.019*** (0.006)	0.017*** (0.001)	0.001** (0.000)	0.004*** (0.001)
Disaster Exposure$_{i,t-9}$	0.020*** (0.006)	0.014** (0.006)	0.019*** (0.006)	0.017*** (0.001)	0.001 (0.000)	0.004*** (0.001)
Disaster Exposure$_{i,t-10}$	0.016*** (0.006)	0.011** (0.005)	0.018*** (0.006)	0.016*** (0.001)	-0.001 (0.000)	0.003*** (0.001)
Disaster Exposure$_{i,t-11}$	0.013** (0.005)	0.003 (0.006)	0.018*** (0.005)	0.016*** (0.001)	-0.002*** (0.000)	0.002** (0.001)
Disaster Exposure$_{i,t-12}$	0.021*** (0.006)	0.000 (0.006)	0.021*** (0.006)	0.018*** (0.001)	-0.002*** (0.001)	0.002** (0.001)
Assets $_{i,t}$	-1.276*** (0.096)	-1.382*** (0.077)	-0.923*** (0.106)	-0.605*** (0.023)	-0.388*** (0.015)	-0.589*** (0.023)
Loan Provision to Assets$_{i,t}$	0.428*** (0.053)	0.231*** (0.030)	0.263*** (0.047)	0.199*** (0.010)	0.039*** (0.003)	0.103*** (0.006)
Federal Funds Rate$_t$	0.360*** (0.011)	0.384*** (0.008)	0.229*** (0.012)	0.655*** (0.002)	0.102*** (0.001)	0.296*** (0.003)
Constant	30.861*** (1.887)	31.299*** (1.516)	24.453*** (2.096)	12.217*** (0.445)	7.624*** (0.289)	11.681*** (0.434)
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	0.856	0.562	0.680
Disaster Exposure Coefficient Sum	0.246	0.125	0.241	0.197	0.011	0.049
F-value	17.52	4.28	18.62	499.71	5.20	34.23
P-value	0.0000	0.387	0.0000	0.0000	0.0226	0.0000

Table 7c. Bank Deposit and Loan Rates and Natural Disasters: Non-Community Banks

	Loans				Deposits	
	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}$	-0.023 (0.040)	0.016 (0.013)	-0.067 (0.055)	0.012* (0.006)	-0.003 (0.002)	0.005 (0.006)
Disaster Exposure$_{i,t-2}$	-0.034 (0.025)	0.030* (0.018)	0.028 (0.101)	0.015** (0.006)	-0.004** (0.002)	0.001 (0.005)
Disaster Exposure$_{i,t-3}$	-0.016 (0.044)	0.054*** (0.016)	-0.048 (0.064)	0.021*** (0.006)	0.002 (0.003)	0.009* (0.005)
Disaster Exposure$_{i,t-4}$	-0.036 (0.047)	0.053*** (0.013)	0.026 (0.070)	0.020*** (0.007)	-0.000 (0.002)	0.007 (0.005)
Disaster Exposure$_{i,t-5}$	-0.017 (0.031)	0.021 (0.021)	-0.105** (0.045)	0.022*** (0.008)	0.003 (0.003)	0.013** (0.005)
Disaster Exposure$_{i,t-6}$	-0.003 (0.029)	-0.002 (0.024)	0.006 (0.032)	0.021*** (0.008)	-0.000 (0.003)	0.007 (0.005)
Disaster Exposure$_{i,t-7}$	-0.038 (0.032)	-0.007 (0.013)	-0.011 (0.039)	0.018** (0.008)	-0.000 (0.003)	0.005 (0.005)
Disaster Exposure$_{i,t-8}$	-0.004 (0.044)	0.011 (0.012)	0.008 (0.032)	0.015* (0.007)	-0.004* (0.002)	-0.001 (0.005)
Disaster Exposure$_{i,t-9}$	0.044 (0.031)	-0.030*** (0.011)	-0.012 (0.026)	0.019*** (0.006)	-0.002 (0.002)	0.006 (0.005)
Disaster Exposure$_{i,t-10}$	-0.010 (0.043)	-0.013 (0.015)	0.005 (0.041)	0.019*** (0.006)	-0.004* (0.002)	0.002 (0.006)
Disaster Exposure$_{i,t-11}$	0.024 (0.029)	-0.028*** (0.009)	0.026 (0.051)	0.022*** (0.006)	-0.002 (0.003)	0.003 (0.006)
Disaster Exposure$_{i,t-12}$	-0.006 (0.053)	0.055*** (0.020)	0.022 (0.039)	0.023*** (0.007)	-0.001 (0.003)	0.001 (0.006)
Assets $_{i,t}$	-0.821*** (0.120)	-0.604*** (0.052)	-0.267** (0.121)	-0.269*** (0.051)	-0.162*** (0.026)	-0.271*** (0.043)
Loan Provision to Assets$_{i,t}$	0.751*** (0.136)	0.404*** (0.053)	0.697*** (0.165)	0.216*** (0.021)	0.017*** (0.005)	0.114*** (0.014)
Federal Funds Rate$_t$	0.576*** (0.066)	0.423*** (0.023)	0.264*** (0.052)	0.681*** (0.009)	0.066*** (0.006)	0.303*** (0.024)
Constant	25.158*** (3.031)	18.694*** (1.279)	13.287*** (3.127)	6.744*** (1.207)	3.961*** (0.610)	6.654*** (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	All Banks	Community Banks	Non-Community Banks	All Banks	Community Banks	Non-Community Banks
Disaster Exposure$_{i,t-1}$	0.117 ***	0.142 ***	-0.928	0.048	0.094 ***	-2.034	1.983	-0.049	12.567 **
	(0.038)	(0.032)	(0.750)	(0.054)	(0.032)	(1.946)	(1.885)	(0.147)	(5.062)
Disaster Exposure$_{i,t-2}$	0.081 *	0.086 **	-0.230	0.108 **	0.143 ***	-2.054	-0.114	0.318 **	10.649 ***
	(0.045)	(0.041)	(0.536)	(0.051)	(0.031)	(2.052)	(0.600)	(0.146)	(3.899)
Disaster Exposure$_{i,t-3}$	0.108 **	0.127 ***	-1.373	0.102	0.125 ***	-1.049	0.028	0.352 **	7.104
	(0.044)	(0.033)	(0.999)	(0.066)	(0.029)	(2.542)	(0.481)	(0.143)	(4.320)
Disaster Exposure$_{i,t-4}$	0.113 **	0.125 ***	-0.325	0.111 **	0.152 ***	-1.143	0.279	0.479 ***	7.877 *
	(0.048)	(0.046)	(0.516)	(0.051)	(0.031)	(1.964)	(0.407)	(0.178)	(4.297)
Log Assets$_{i,t}$	0.291 **	0.251 ***	0.178	-0.198 ***	-0.272 ***	-0.036	2.974 ***	3.078 ***	2.344 ***
	(0.124)	(0.027)	(0.531)	(0.049)	(0.012)	(0.226)	(0.155)	(0.117)	(0.580)
Loan Loss Provisions to Assets $_{i,t}$	-0.945 ***	-1.007 ***	-0.785 ***	0.103 **	-0.019 *	0.447 **	0.717 ***	0.642 ***	0.735 ***
	(0.021)	(0.013)	(0.051)	(0.048)	(0.010)	(0.182)	(0.067)	(0.052)	(0.199)
Federal Funds Rate$_t$	0.067 ***	0.056 ***	0.112 **	0.069 ***	0.056 ***	0.136 **	0.252 ***	0.243 ***	-0.009
	(0.010)	(0.003)	(0.048)	(0.008)	(0.002)	(0.065)	(0.032)	(0.013)	(0.101)
Constant	-4.448 *	-3.685 ***	-1.910	7.491 ***	8.903 ***	4.160	-53.579 ***	-55.534 ***	-39.691 ***
	(2.356)	(0.507)	(11.046)	(0.942)	(0.221)	(4.860)	(2.951)	(2.190)	(12.046)
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	530979	482469	48341	530943	482469	48304	530859	482464	48234
Number of Banks	10,070	9,161	1,536	10,070	9,161	1,535	10,067	9,161	1,529
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	0.419	0.480	-2.856	0.369	0.514	-6.280	2.176	1.100	38.197
F-value	8.80	15.12	1.86	3.30	20.17	0.60	7.02	4.13	5.96
P-value	0.0030	0.0001	0.1727	0.0691	0.0000	0.4392	0.0081	0.0421	0.0147

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	
	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}$	0.082*** (0.022)	0.045** (0.017)	0.029 (0.026)	0.037*** (0.005)	-0.005 (0.003)	-0.007 (0.008)
Disaster Exposure$_{i,t-2}$	0.058*** (0.016)	0.052*** (0.012)	0.015 (0.016)	0.028*** (0.005)	-0.003 (0.002)	-0.004 (0.006)
Disaster Exposure$_{i,t-3}$	0.087*** (0.022)	0.035*** (0.013)	0.033** (0.016)	0.036*** (0.005)	-0.001 (0.002)	-0.004 (0.006)
Disaster Exposure$_{i,t-4}$	0.103*** (0.025)	0.028** (0.012)	0.051*** (0.020)	0.044*** (0.005)	-0.004* (0.002)	-0.006 (0.006)
Disaster Exposure$_{i,t-5}$	0.090*** (0.025)	0.036*** (0.011)	0.041** (0.018)	0.046*** (0.006)	-0.004* (0.002)	-0.004 (0.006)
Disaster Exposure$_{i,t-6}$	0.083*** (0.027)	0.041*** (0.014)	0.047** (0.018)	0.051*** (0.006)	-0.004* (0.002)	-0.002 (0.007)
Disaster Exposure$_{i,t-7}$	0.089*** (0.031)	0.039*** (0.013)	0.060*** (0.018)	0.048*** (0.005)	-0.007*** (0.002)	-0.005 (0.007)
Disaster Exposure$_{i,t-8}$	0.083*** (0.027)	0.046*** (0.012)	0.073*** (0.019)	0.041*** (0.005)	-0.012*** (0.003)	-0.011 (0.007)
Disaster Exposure$_{i,t-9}$	0.095*** (0.027)	0.055*** (0.013)	0.079*** (0.025)	0.049*** (0.005)	-0.012*** (0.002)	-0.010 (0.006)
Disaster Exposure$_{i,t-10}$	0.081*** (0.026)	0.043*** (0.012)	0.093*** (0.026)	0.048*** (0.005)	-0.012*** (0.002)	-0.010* (0.006)
Disaster Exposure$_{i,t-11}$	0.086*** (0.021)	0.027** (0.012)	0.089*** (0.020)	0.044*** (0.005)	-0.014*** (0.002)	-0.014** (0.007)
Disaster Exposure$_{i,t-12}$	0.100*** (0.024)	0.012 (0.017)	0.118*** (0.028)	0.051*** (0.006)	-0.019*** (0.003)	-0.018** (0.008)
Assets $_{i,t}$	-1.024*** (0.075)	-0.844*** (0.082)	-0.410*** (0.085)	-0.473*** (0.033)	-0.291*** (0.018)	-0.452*** (0.027)
Loan Provision to Assets$_{i,t}$	0.540*** (0.064)	0.297*** (0.029)	0.525*** (0.100)	0.202*** (0.009)	0.042*** (0.004)	0.115*** (0.008)
Federal Funds Rate$_t$	0.436*** (0.026)	0.407*** (0.009)	0.248*** (0.026)	0.667*** (0.004)	0.109*** (0.002)	0.313*** (0.006)
Constant	27.252*** (1.599)	21.977*** (1.738)	15.523*** (1.920)	10.087*** (0.665)	6.047*** (0.362)	9.480*** (0.542)
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

	Loans			Deposits		
	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)	0.000 (0.002)	0.013*** (0.004)
Disaster Exposure$_{i,t-2}$	0.078*** (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 (0.016)	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* (0.018)	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 (0.017)	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 (0.017)	0.014 (0.017)	0.090*** (0.004)	0.002 (0.002)	0.020*** (0.003)
Disaster Exposure$_{i,t-7}$	0.090*** (0.016)	0.026 (0.017)	0.028 (0.018)	0.083*** (0.004)	-0.001 (0.002)	0.015*** (0.003)
Disaster Exposure$_{i,t-8}$	0.091*** (0.015)	0.024 (0.016)	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** (0.017)	0.074*** (0.004)	-0.004** (0.002)	0.013*** (0.003)
Disaster Exposure$_{i,t-10}$	0.084*** (0.015)	0.028* (0.016)	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 (0.016)	0.040** (0.016)	0.069*** (0.003)	-0.014*** (0.002)	0.003 (0.003)
Disaster Exposure$_{i,t-12}$	0.098*** (0.018)	0.000 (0.017)	0.054*** (0.020)	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)	0.196*** (0.010)	0.039*** (0.003)	0.102*** (0.006)
Federal Funds Rate$_t$	0.361*** (0.011)	0.384*** (0.008)	0.229*** (0.012)	0.655*** (0.002)	0.102*** (0.001)	0.296*** (0.003)
Constant	30.799*** (1.872)	31.327*** (1.514)	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

	Loans			Deposits		
	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}$	0.039 (0.025)	0.008 (0.022)	-0.002 (0.032)	-0.001 (0.007)	-0.012*** (0.004)	-0.027** (0.013)
Disaster Exposure$_{i,t-2}$	0.013 (0.019)	0.031** (0.015)	-0.015 (0.019)	-0.005 (0.006)	-0.012*** (0.003)	-0.028*** (0.010)
Disaster Exposure$_{i,t-3}$	0.051* (0.028)	0.018 (0.016)	0.006 (0.020)	0.006 (0.006)	-0.009*** (0.003)	-0.024** (0.010)
Disaster Exposure$_{i,t-4}$	0.079** (0.037)	0.008 (0.016)	0.034 (0.028)	0.012** (0.006)	-0.011*** (0.003)	-0.025*** (0.009)
Disaster Exposure$_{i,t-5}$	0.056 (0.037)	0.015 (0.014)	0.020 (0.025)	0.007 (0.008)	-0.009*** (0.003)	-0.021*** (0.008)
Disaster Exposure$_{i,t-6}$	0.059 (0.039)	0.025 (0.019)	0.045* (0.024)	0.016** (0.007)	-0.012*** (0.003)	-0.025*** (0.009)
Disaster Exposure$_{i,t-7}$	0.066 (0.045)	0.027 (0.017)	0.061** (0.024)	0.018*** (0.006)	-0.011*** (0.004)	-0.025*** (0.009)
Disaster Exposure$_{i,t-8}$	0.057 (0.040)	0.042** (0.016)	0.068** (0.026)	0.015** (0.006)	-0.015*** (0.003)	-0.028*** (0.009)
Disaster Exposure$_{i,t-9}$	0.088* (0.049)	0.040** (0.018)	0.087** (0.040)	0.027*** (0.008)	-0.015*** (0.004)	-0.030*** (0.010)
Disaster Exposure$_{i,t-10}$	0.087* (0.046)	0.037** (0.017)	0.105*** (0.037)	0.023*** (0.007)	-0.014*** (0.003)	-0.023*** (0.008)
Disaster Exposure$_{i,t-11}$	0.093*** (0.036)	0.017 (0.015)	0.093*** (0.030)	0.020*** (0.006)	-0.016*** (0.003)	-0.027*** (0.009)
Disaster Exposure$_{i,t-12}$	0.094** (0.042)	0.004 (0.022)	0.121*** (0.035)	0.019** (0.009)	-0.024*** (0.004)	-0.040*** (0.013)
Assets $_{i,t}$	-0.852*** (0.126)	-0.620*** (0.052)	-0.291** (0.123)	-0.278*** (0.053)	-0.153*** (0.025)	-0.254*** (0.042)
Loan Provision to Assets$_{i,t}$	0.712*** (0.134)	0.390*** (0.048)	0.661*** (0.160)	0.212*** (0.020)	0.021*** (0.006)	0.123*** (0.015)
Federal Funds Rate$_t$	0.567*** (0.064)	0.421*** (0.022)	0.258*** (0.051)	0.679*** (0.009)	0.067*** (0.006)	0.306*** (0.023)
Constant	25.678*** (3.125)	19.006*** (1.278)	13.652*** (3.098)	6.923*** (1.258)	3.780*** (0.599)	6.341*** (0.986)
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	0.782	0.272	0.623	0.157	-0.16	-0.323
F-value	4.18	2.32	5.58	5.08	21.25	9.98
P-value	0.0416	0.1291	0.0188	0.0245	0.0000	0.0017

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[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

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[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/S1572308914000539

Koetter, M., Noth, F., & Rehbein, 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.

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.

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.

APPENDICES

Table A1. Counties, Banks, and Disasters

Year	Counties	Counties with Disasters	Percentage of Total (%)	Number of Bank Headquarters	Number of Bank Offices	Counties with Banks	Percentage of Total (%)	Counties with Disasters & Banks	Percentage of Total (%)	Counties with Bank Offices	Percentage of Total (%)	Counties with Disasters & Bank Offices	Percentage of Total (%)
2000	3,141	412	13.1	10,098	84,909	2,657	84.6	356	11.3	3,133	99.7	408	13.0
2001	3,141	397	12.6	9,737	85,478	2,630	83.7	355	11.3	3,134	99.8	396	12.6
2002	3,141	555	17.7	9,454	85,990	2,605	82.9	490	15.6	3,138	99.9	552	17.6
2003	3,140	745	23.7	9,238	87,178	2,595	82.6	613	19.5	3,132	99.7	742	23.6
2004	3,140	909	28.9	9,049	89,187	2,572	81.9	795	25.3	3,132	99.7	909	28.9
2005	3,141	1,082	34.4	8,839	91,436	2,545	81.0	924	29.4	3,131	99.7	1,078	34.3
2006	3,141	521	16.6	8,750	94,134	2,527	80.5	449	14.3	3,129	99.6	519	16.5
2007	3,141	527	16.8	8,587	96,657	2,501	79.6	486	15.5	3,130	99.6	527	16.8
2008	3,142	980	31.2	8,424	98,548	2,483	79.0	841	26.8	3,123	99.4	976	31.1
2009	3,143	534	17.0	8,168	98,963	2,457	78.2	436	13.9	3,122	99.3	533	17.0
2010	3,143	564	17.9	7,807	97,962	2,431	77.3	475	15.1	3,122	99.3	561	17.8
2011	3,143	965	30.7	7,510	97,678	2,404	76.5	768	24.4	3,121	99.3	961	30.6
2012	3,143	561	17.8	7,242	96,827	2,384	75.9	424	13.5	3,121	99.3	561	17.8
2013	3,142	281	8.9	6,938	95,840	2,361	75.1	235	7.5	3,121	99.3	281	8.9
2014	3,142	186	5.9	6,657	94,260	2,330	74.2	157	5.0	3,118	99.2	185	5.9
2015	3,142	475	15.1	6,347	92,827	2,284	72.7	380	12.1	3,117	99.2	474	15.1
2016	3,142	336	10.7	6,057	91,431	2,254	71.7	237	7.5	3,114	99.1	336	10.7
2017	3,142	490	15.6	5,787	89,466	2,218	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 statical 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 Headquarter Banks	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 Offices in County 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	Rumson-Fair Haven 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 & Trust Company	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	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: SHELDUS 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.*