Canary in the Coal Mine: Bank Liquidity Shortages and Local Economic Activity*

Rajkamal Iyer[†] Shohini Kundu[‡] Nikos Paltalidis[§]

September 5, 2023

Abstract

This paper investigates the relation between bank liquidity and local economic activity. We find that an increase in deposit rates offered by banks within a geographic region is associated with contractions in economic activity. As a region heads to an economic downturn, deposit growth slows down, prompting banks to increase deposit rates to support their balance sheet. This increase in deposit rates reflects the liquidity squeeze experienced by banks due to deteriorating economic conditions, which in turn serves as an indicator of an impending economic contraction.

*Acknowledgements: We thank Patrick Bolton, Andrea Eisfeldt, Valentin Haddad, Marcin Kascperczyk, Anil Kashyap, Edward Leamer, Tyler Muir, Jonathan Parker, Raghuram Rajan, Kristle Romero Cortés, Antoinette Schoar, Jeremy Stein, and Ivo Welch for helpful comments. We are also thankful to seminar and conference participants at UCLA Anderson, Imperial College Business, Chicago Booth Banking Workshop, Banco de Portugal, Temple University Fox, Federal Reserve Bank of Richmond, Federal Reserve Short-Term Funding Markets Conference, Beachside Banking Chat, Deutsche Bundesbank-Center for Advanced Studies on the Foundations of Law and Finance-Center for European Transformation-CEPR Conference on Regulating Financial Markets, Indian School of Business Summer Research Conference, European Economic Association Annual Meeting, Annual Meeting of the Swiss Society for Financial Market Research, Tehran Institute for Advanced Studies, China International Conference in Finance, Conference on Research on Economic Theory and Econometrics. This research was funded in part by the Laurence and Lori Fink Center for Finance. This paper was previously circulated as "Local Recessions: Evidence from Bank Liquidity Squeezes" and "Predicting Recessions."

†Rajkamal Iyer is at the Imperial College and CEPR. email: r.iyer@imperial.ac.uk

‡Shohini Kundu is at the Anderson School of Management, University of California, Los Angeles. email: shohini.kundu@anderson.ucla.edu

§Nikos Paltalidis is at the Durham University Business School. email: nikos.e.paltalidis@durham.ac.uk

As is often the case, we are navigating by the stars under cloudy skies.

-Jerome H. Powell, Jackson Hole Economic Symposium, August 25, 2023

1 Introduction

Economic and financial risks do not typically materialize overnight. Generally, there is a gradual and heterogeneous build-up of risks across different regions within an economy, sometimes culminating in a national recession or a crisis. For instance, during the Great Recession of 2007-2009, contraction in economic activity varied significantly across regions. 35 out of the 51 states and a federal district in the US experienced a drop in GDP of more than 2 percent while other regions experienced a smaller decline or even positive GDP growth (see Appendix Figure A.1).[1] The heterogeneity in economic growth underscores the spatial differences in the accumulation of risks. Real-time measurement of these risks is essential for both macro- and micro-prudential policy.

In this paper, we present a novel real-time measure for assessing the build-up of regional economic and financial risks, using spatial variation in bank liquidity changes. Our central idea centers around the relationship between regional economic activity and deposit growth in local banks. As there is a contraction in regional economic activity, corporate profits and household incomes decline. This, in turn, impacts the deposit growth of banks operating within the region, exerting pressure on the liability side of their balance sheet.[2] If banks expect the economic shocks to be short-lived, they will most likely use short-term funding in response to these transitory liquidity shocks.[3] However, if banks anticipate a more persistent economic decline – which directly affects their future liquidity needs – they would need to raise more long-term funding to weather the shock. Consequently, in response to a more persistent economic slowdown, banks may increase their deposit rates to attract additional deposits to manage their liquidity shortages.[4]

We capture regional variation in bank liquidity shortages using deposit rates offered by

[1]To gain a comprehensive understanding of these dynamics, we extend our analysis beyond the Great Recession and examine economic activity across different states in the U.S over the period from 2000 to 2020 (Figure 1). Our findings reveal a significant variation in economic activity, with certain regions experiencing robust growth, while others faced economic contractions. (see Figure 1).

[2]See Appendix Table A.21.

[3]Banks are supposed be better informed about the about local economy than other market participants given their lending and deposit taking activities (e.g., Petersen and Rajan (1994)). Moreover, raising deposit rates is costly as it affects a substantial part of banks balance sheet.

[4]Deposits are generally more stable than wholesale funding and priced lower. However, raising deposit rates is costly for banks, given that it impacts a significant portion of their balance sheet compared to using short-term funding markets. In addition, note that the asset side of banks tends to consists of more illiquid assets, making adjustments on this side of their operations more challenging.

local banks operating within a geography. Our findings reveal that when regional banks operating within a county increase their deposit rates, it is associated with a slowdown in economic activity in that region up to two years ahead. This relationship allows us to predict regional variation in economic activity, effectively capturing the build-up of economic risk. Specifically, we find that an increase in deposit rates at the county level serves as an early indicator of changes in economic activity across various dimensions such as lower GDP growth, reduced firm creation, and higher loan delinquencies. Even in periods without monetary policy changes, credit booms, or imminent national recessions, the increase in deposit rates at the county level remains associated with a slowdown in economic activity within those regions.

Importantly, our approach using deposit rates presents several advantages over other indicators utilized in the existing literature. Firstly, deposit rates are readily available in real-time, providing a more current assessment compared to other indicators that are measured with lags or that rely on proprietary information. Secondly, deposit rates are forward-looking, reflecting banks' expectations of future local economic conditions based on their lending and deposit-taking activities. By contrast, other indicators often tend to be backward-looking. Lastly, deposit rates are available at a more granular level which aids in our understanding of risk build-up at regional levels – an aspect that has been relatively underexplored in previous research.[5]

We begin by examining whether deposit rates offered by local banks operating within a county help predict economic activity. For this analysis, we focus on metro counties, which represent a substantial share of the national GDP and exhibit a competitive banking structure.[6] To capture regional variation in bank liquidity shortages, we measure deposit rates offered by regional, single state banks. Our results demonstrate that an increase in deposit rates offered by banks within a county is associated with lower economic activity in the future compared to counties where deposit rates do not experience a similar increase. The model's predictive power, assessed by the Area under the Receiver Operating Characteristic Curve (AUC), is 0.73.[7] Even at a cross-sectional level, we find that counties with higher deposit rates at the end of 2006 experience a more significant decline in GDP in 2008.

[5]Much of the literature is focused on measuring risk at the national level. There is very little empirical work that tries to measure risks at more granular level in real time in a parsimonious way.

[6]Our findings are robust to the inclusion of other counties in the analysis.

[7]The Area under the Receiver Operating Characteristic Curve (AUC) allows us to diagnose the accuracy of our model. An AUC of 1 indicates that a classifier can perfectly distinguish recessions from non-recessions and an AUC of 0 indicates that a classifier predicts all non-recessions as recessions and all recessions as non-recessions. To benchmark this estimate, Schularick and Taylor (2012) report that prostate cancer diagnostic tests find AUCs of about 0.75; Iyer et al. (2016) report that an AUC of 0.6 or greater indicates strong predictive value in information-scarce environments, and an AUC of 0.7 or greater indicates strong predictive value in more information-rich environments.

While monetary policy changes play an important role in deposit rates offered by banks, the results are robust to inclusion of time fixed effects. We also find that even in periods when there are virtually no changes in monetary policy rates – from 2011 through 2015 – an increase in deposit rates at the county level is associated with a decline in future economic activity. Importantly, during this period, there were no significant expansions in credit or imminent national recessions, suggesting that the predictive power of deposit rates is not merely an artifact of credit expansions or monetary policy. Lastly, it is worth noting that we do not claim that bank liquidity directly causes changes in economic activity. Our premise is simply that banks are an important channel through which economic activity is conducted and as such, local deposit rates can be used as a useful barometer of underlying economic conditions. As such, banks' deposit rates can serve as a useful aggregator of the underlying economic conditions, providing valuable insights into the state of the local economy.

To delve deeper into the underlying mechanism behind our results, we investigate whether banks that increase deposit rates experience liquidity stress. Our findings indicate that banks that increase deposit rates experience a decline in deposit growth in the preceding quarters, indicating liquidity stress. This slowdown in deposits is observed for both insured and uninsured deposits. Moreover, the effect varies based on the magnitude of the rate hike. Banks that raise rates by more experience more pronounced declines in deposit growth in the preceding quarters. To complement these findings on bank deposit growth, we also examine aggregate deposit growth at the county level. Our analysis reveals that counties that experience a more substantial decline in economic activity exhibit lower deposit growth compared to other counties. In addition, as an economic downturn approaches, banks tend to increase their reliance on insured deposits to support their balance sheets, narrowing the gap between uninsured and insured deposit rates.

We further validate the link between deposit rates offered by banks and local liquidity conditions. However, one of the challenges is that it is difficult to pin down the exact timing of the downturn. Furthermore, economic activity could be affected by other factors like monetary policy, banking structure, etc. To cleanly validate the link between deposit rates offered by banks and local economic activity, we use two quasi-natural experiments. First, we examine the impact of natural disasters, which have a negative impact on economic activity, on deposit rates. We find no evidence of an increase in deposit rates in affected regions prior to natural disasters. However, after the disaster strikes, we observe an immediate increase in deposit rates, indicating that banks adjust their rates in response to the adverse economic conditions caused by the disaster. Moreover, we find a strong association between the increase in deposit rates after a natural disaster hits, i.e., ex post deposit rates, and the subsequent degree of economic contraction. Notably, the ex ante deposit rates, before the disaster, do not predict these outcomes, which is consistent with the shock being unanticipated. We also examine the effect of the shale gas boom, which has a positive impact on economic activity, on deposit rates. We find that deposit rates decrease after the boom in affected regions. Second, we examine whether single-state banks increase deposit rates in regions that are more vulnerable to import competition. Regions with higher import competition experience more substantial economic contractions. We exploit within-bank variation and find that banks set higher rates in regions that face higher import competition. These results validate that deposit rates effectively capture the liquidity stress of banks during economic contractions.

Collectively, our results suggest that liquidity shortages in banks, resulting from underlying economic conditions, influence deposit rates. When faced with a negative economic shock, banks tend to increase their deposit rates. However, the extent of this impact varies across banks, contingent on their respective balance sheet strengths. To directly address this heterogeneity, we explore the relationship between the dispersion of deposit rates across banks within a county and liquidity squeezes. We observe that an increase in the dispersion of deposit rates offered by banks within a county is also associated with a decline in economic activity. This finding reinforces our key hypothesis that deposit rates serve as a valuable indicator of local liquidity conditions and reflect the broader economic environment.

An important question that remains is whether deposit rates demonstrate superior predictive power compared to other bank-level variables. For instance, one might consider using deposit growth directly at the county level instead of deposit rates.[8] To address this comparison, we conduct estimations using deposit growth and compute the AUCs. We find that the predictive power when using deposit growth is notably lower than that achieved by using deposit rates. Similarly, we also find the predictive power of deposit rates is higher than credit growth. In addition, we draw comparisons between deposit rates and other market indicators such as spreads on credit default swaps and equity prices for a subset of banks. Our analysis reveals that deposit rates tend to increase when banks experience a liquidity squeeze, which is sometimes followed by a rise in credit default spreads and a decline in equity prices. These findings suggest that liquidity risk tends to manifest first during economic downturns, and in certain cases, may translate into solvency risk (credit risk). By examining these associations, we gain valuable insights into the interplay between deposit rates and broader financial indicators during periods of economic stress.

[8]As discussed earlier, one of the issues with other bank variables is the frequency at which they are available and the granularity. Generally, most of the bank balance sheet variables are available at the holding company level.

Lastly, we extend our examination to the state level. We find the results estimated at the county level also hold at the state level. Moreover, at the state level, we investigate whether liquidity squeezes, as indicated by deposit rates, are associated with a higher risk of bank failures.[9] Our analysis reveals that a higher level of deposit rates in 2006 is indeed linked to an increased number of bank failures in the subsequent crisis period. Overall, the findings underscore the significance of deposit rates offered by banks in a region as a valuable measure of liquidity squeezes, providing insight into the buildup of economic and financial risk at the regional level. By examining the association between deposit rates and bank failures at the state level, we further strengthen the case for deposit rates being informative of local liquidity conditions and an indicator of regional economic stability.

1.1 Related Literature

Our results contribute to several strands of the literature. There is a large body of work which documents that the slope of the Treasury yield curve (term premium) and corporate bond spreads can predict the likelihood of a recession in the very near term (e.g., Estrella and Hardouvelis (1991), Estrella and Mishkin (1998), Ang et al. (2006), Rudebusch and Williams (2009), and Engstrom and Sharpe (2019)).[10] We add to this literature in several ways. First, we focus on the measurement of economic risks across counties and states, exploiting variation in economic activity. There has been very little empirical work that focuses on measuring economic risks at the local level. Second, our results suggest that a simple model that uses bank deposit rates has power to predict regional economic and financial risks with a high degree of accuracy. This provides a useful measure to incorporate in existing forecasting models. Finally, our work also adds to the recent literature that emphasizes the importance of real-time measures of economic activity (Chetty et al. (2020)). Deposit rates are easily available in real time and provide a reliable barometer of future economic activity.

Our paper also speaks to the literature that studies the prediction of financial crises. Recent empirical research indicates that excessive credit expansion by financial intermediaries may result in financial crises, and thus in severe economic recessions (e.g., Mian and Sufi (2009), Schularick and Taylor (2012), Jordà et al. (2013), Jordà et al. (2016), Mian et al. (2017), López-Salido et al. (2017), Baron and Xiong (2017), Bordalo et al. (2018), Mian et al. (2019), Krishnamurthy and Muir (2017), Müller and Verner (2021), and Greenwood et al. (2022)). In contrast to the extant literature that focuses on credit, our paper finds that the deposit rates

[9]Due to the scarcity of bank failures at the county level, this particular analysis is conducted at the state level.

[10]Several papers use financial indicators such as stock returns, stock price volatility, and stock market liquidity to predict economic growth. See Fama (1990), Schwert (1990), Campbell et al. (2001), Levine and Zervos (1998).

offered by banks increases at the onset of a downturn – irrespective of whether a downturn is preceded by a credit boom. In comparison to credit growth, which exhibits strong predictive power for financial crises (large recessions), deposit rates also demonstrate the ability to predict smaller economic contractions that are challenging to anticipate using credit growth alone.[11] This is because deposit rates are a forward-looking variable that aggregates information from both the slowdown in money growth (as proxied by deposit growth) and the credit positions across banks in an economy, unlike credit growth which is a backward-looking variable.

Our results also speak to the literature on money growth and recessions. Several papers have argued that money growth plays an important role in the dynamics of a business cycle. Following the seminal work by Friedman and Schwartz (1963), several papers have highlighted the association between a decrease in money growth and recessions. Our results are consistent with this literature, especially the work that relates banks to business cycles (King and Plosser (1984); Morgan et al. (2004)). Our paper adds to this literature by showing that the deposits rates offered by banks help aggregate information about money growth. Given the difficulties in measuring money supply growth at the regional level, our results suggest that deposit rates could be a valuable measure that captures money growth dynamics.

Our paper contributes to the literature on the role of bank liquidity in local economic activity. Previous studies have shown that bank liquidity can affect real economic activity (e.g., Jayaratne and Strahan (1996); Morgan et al. (2004); Gilje et al. (2016); Cortés and Strahan (2017); Kundu et al. (2021)). We add to this literature by showing that deposit rates, which capture local liquidity conditions of banks, can be a useful indicator of regional economic activity. While we do not claim that our findings are causal, they are consistent with the hypothesis that bank liquidity shortages can contribute to economic contractions.

Finally, our paper also contributes to the literature which finds banks increase their deposit rate in response to liquidity shocks to shore up funding (e.g., Acharya and Mora (2015); Cortés and Strahan (2017); Egan et al. (2017)). This literature mainly focuses on shocks to bank liquidity during crises and shows that banks respond to these shocks by increasing deposit rates. We complement these findings by showing that deposit rates offered by banks in a region can be used as a proxy for the liquidity position of banks in that region, in turn, reflecting local economic conditions. In addition, our findings also highlight that banks increase their reliance on insured deposits at the onset of a downturn. This relates to the literature that highlights the importance of the proper design of deposit insurance schemes and the need to

[11] Boissay et al. (2016) point out that it is difficult for the literature predicting financial crises to predict other types of recessions that are not accompanied by an expansion in credit. See also Muir (2017).

regulate banks due to moral hazard concerns (e.g., Laeven (1983), Demirgüç-Kunt et al. (2008), Calomiris and Jaremski (2019)).

The rest of this paper is organized as follows. Section 2 presents an overview of the datasets used in this study. In Section 3, we demonstrate that local deposit rates are a significant predictor of local economic activity. Section 4 delves into the heterogeneous effects based on the extent of bank liquidity shortages and validate the relationship through two quasi-natural experiments. Section 5 explains the link between bank liquidity shortages and deposit rates. Section 6 conducts the analysis at the state level to investigate the out-of-sample predictive power of deposit rates and establish that deposit rates can also predict financial risk as measured by the incidence of bank failures. Section 7 compares the predictive power of bank deposit rates to other variables, including measures of credit and deposit growth. Finally, Section 8 concludes.

2 Data

This project employs several datasets. We describe the datasets below.

Deposit Rates We use data on deposit rates from S&P Ratewatch. S&P Ratewatch provides depository interest rate coverage on banks and credit unions in the US for more than 70 standard retail banking products, ranging from deposit products to consumer loan and mortgages at the weekly frequency. Deposit rates are available at a granular geographic level with zip code, county, and state identifiers. We focus on the deposit rates for 12-month certificates of deposit ($10K 12-month CDs) with a minimum account size of $10,000 because this is the most common deposit product. Our sample period is 2001 through 2020. Our dataset covers 8,361 distinct banks and 2,897 distinct counties (approximately 90% of all US counties).

Gross Domestic Product We obtain Gross Domestic Product (GDP) data from the Bureau of Economic Analysis (BEA) at the county, state, and national levels. GDP is the BEA's National Income and Product Accounts signature piece, measuring the value of the nation's output across various dimensions. The BEA estimates GDP at the national level for each quarter-year from 1947Q1. This data is reported at annual rates, for ease of comparison and is seasonally adjusted to remove the effects of yearly patterns such as holidays, inclement weather or factory production schedules. The BEA estimates the value of goods and services produced in each state (and DC), county, metropolitan areas and other statistical areas. State GDP data is available at the quarterly frequency from 2005Q1. County GDP data is available at the annual frequency from 2001. The BEA provides a breakdown of industries' contributions to each of the economies.

Business Formation We use data on on annual new business applications by county from the US Census Business Formation Statistics (BFS). The BFS measures business initiation activity as indicated by applications for an employee identification number (EIN). All requests for an EIN are accounted for except for those related to tax liens, estates, trusts, certain financial filings, applications lacking state-county geocodes, applications with specific NAICS codes in sectors 11 (agriculture, forestry, fishing and hunting) or 92 (public administration) that have low transition rates, and applications in particular industries such as private households and civic and social organizations. The county BFS data starts from 2005 at an annual frequency.

Mortgage Delinquency We collect data on early stage delinquencies at the county level from the National Mortgage Database, conducted in collaboration with the Federal Housing Finance Agency (FHFA). The 30-89 day mortgage delinquency rate serves as an early indicator of the overall health of the mortgage market, capturing borrowers who have missed one or two payments. According to the Consumer Financial Protection Bureau (CFPB), this rate is sensitive to temporary economic shocks. To add to our analysis, we supplement this data with data on the 90-day delinquency rate, which measures serious delinquencies, capturing borrowers who have missed three or more payments. This particular measure reflects more severe economic distress.

Bank Failures We retrieve the list of failed banks from the Federal Deposit Insurance Corporation (FDIC). The Failed Bank List includes banks which have failed since October 1, 2000. The dataset reports the bank name, location, acquiring institution, closing date, and insurance fund number. A bank failure refers to the closure of a bank by a federal or state banking regulatory authority. Typically, a bank is closed down when it becomes incapable of fulfilling its obligations to depositors and other stakeholders. We examine bank failures from 2008 to 2012, during which there were 25 bank failures in 2008, 140 in 2009, 157 in 2010, 92 in 2011, and 51 in 2012.

Bank Balance Sheet and Income Statements We extract bank balance sheet and income statement information from the Reports of Condition and Income (Call Reports) sourced from the Federal Reserve Bank of Chicago. This data is provided for most FDIC-insured institutions and is reported at the quarterly frequency. The data of all bank filings are regulated by the Federal Reserve System, FDIC, and the Comptroller of the Currency. We use this data from 2001 through 2020 and merge our S&P RateWatch dataset based on the FDIC Certificate ID.

Bank Regulatory Data We supplement data from the call reports using bank regulatory data from S&P Market Intelligence. Specifically, we use data on risk-weighted assets, tier 1 capital, tier 2 capital, and non-performing loans from S&P Market Intelligence. This data is reported at the quarterly frequency. We use this data from 2001 through 2020 and merge our S&P RateWatch dataset based on the FDIC Certificate ID.

Insured and Uninsured Deposits We use data on banks' insured and uninsured deposits from the FDIC Statistics on Depository Institutions (SDI). The FDIC SDI reports the total volume of insured and uninsured deposits and insured deposits for all FDIC insured banks. This data is reported at the quarterly frequency. We use this data from 2001 through 2020 and merge our S&P RateWatch dataset based on the FDIC Certificate ID.

Small Business Lending We use data on small business lending, collected under the Community Reinvestment Act (CRA). The CRA is intended to demonstrate whether depository institutions to meet the credit needs of communities in which they operate, including low- and moderate-income neighborhoods. A small business loan is defined as a commercial & industrial loan of $1 million or less. All FDIC- and Federal Reserve-supervised financial institutions are subject to CRA requirements if they have assets above a prespecified threshold in two of the previous calendar years. Banks report the number and dollar amounts of lending across loan, applicant, and geographic characteristics. We aggregate the CRA data to the bank $\times$ county $\times$ year level between 2001 and 2020.

Mortgage Lending We use data on mortgage lending, collected under the Home Mortgage Disclosure Act (HMDA). The HMDA is intended to demonstrate whether lenders are serving the housing needs of their communities. Financial institutions are required to collect, record, and report any HMDA data on closed-end mortgage loans or open-end lines of credit above prespecified thresholds in two of the previous calendar years. Banks report the number and dollar amounts of lending across loan, applicant, and geographic characteristics. We aggregate the HMDA data to the bank $\times$ county $\times$ year level between 2001 and 2020.

Rural-Urban Continuum Codes We use data on Rural-Urban continuum codes from the US Department of Agriculture Economic Research Service (USDA ERS). The Rural-Urban Continuum Codes are a classification scheme that distinguishes metropolitan counties by population size of their metropolitan area and non-metropolitan counties by the degree of urbanization and adjacency to a metropolitan county. There are three categories of metropolitan counties and six categories of non-metropolitan counties. The Rural-Urban Continuum Codes were developed in 1974 and have been updated each decennial (1983, 1993, 2003, 2013) with a slight revision in 1988. We use the 1993 Rural-Urban Codes and identify metro counties as counties that report a Rural-Urban Code of 0 or 1.

Natural Disaster Data We use data on natural disasters from the Spatial Hazard Events and Losses Database for the United States (SHELDUS). The dataset spans from 2001 through 2018. SHELDUS provides detailed data on losses at the county level. SHELDUS sources information on natural disasters from the "Storm Data and Unusual Weather Phenomena" published by the National Climatic Data Center (NCDC). We restrict our sample to large natural disasters that last less than 31 days with total damages above $1 bn 2018 dollars.

Fracking Data We use data on horizontal wells from Enverus (DrillingInfo), which offers comprehensive analytics on oil and gas. The database includes historical and current information on various well-related data, such as well type, well construction, active rig locations, well-level production, leases, units, permits, completions, and well logs, for a wide range of wells, including oil, gas, and geothermal wells.

Branch Deposits Data We utilize data on branch-level bank deposits sourced from the FDIC. The FDIC conducts an annual survey, covering all FDIC-insured institutions. The *Summary of Deposits* gathers branch-specific information, including total deposits and parent bank details as of June 30th of each year.

Unemployment Rate We use data on unemployment rates across counties from the Bureau of Labor Statistics (BLS). The BLS provides monthly estimates of total employment and unemployment for over 7,600 areas. We use annual unemployment rate data at the county level as an alternative measure of local economic conditions to GDP growth.

Consumer Price Index We use data on the consumer price index (CPI) for metro areas from the Bureau of Labor Statistics (BLS). The BLS reports the monthly estimates of CPI for 23 metro areas. We use the annual CPI data for these metro counties.

Other Financial Data We use data on spreads on credit default swaps and equity prices for a subset of banks. The high-frequency data on CDS spreads is obtained from Markit, while equity returns are sourced from CRSP. To combine these datasets and identify the common set of banks present in both the CDS and equity data, we perform a manual merge.

Business Cycle Expansions and Contractions We use data on business cycles from the National Bureau of Economic Research (NBER) US Business Cycle Expansions and Contractions. The NBER's Business Cycle Dating Committee maintains a chronology of US business cycles, identifying the peak and trough months of economic activity. The NBER defines a recession as a decline in economic activity that is spread across the economy and lasts more than a few months. There are three criteria used to determine a recession – depth, diffusion, and duration, albeit, exceptional circumstances in one criteria can partially offset weaker indications from other criteria. We highlight recessions between 2001 and 2020 throughout our analysis.

3 Bank Deposit Rates and Economic Activity

This section examines bank deposit rates and economic activity across geographies. We primarily focus our analysis on banks which offer the 12-month certificate of deposit (CD) with a minimum account size of $10,000 – the most common deposit product.[12] We examine the number of such banks that operate in each county from 2001 through 2020. Appendix Figure A.2 presents a heatmap of the average number of banks per county between 2001 and 2020. On average, three to four banks operate in each county while 83% of counties report more than one bank.

3.1 Deposit Rates and Economic Activity

We begin our analysis by examining the variation in economic activity across different counties and states. For simplicity, we define a county to be in a recession if its GDP growth between two consecutive years is below -2%. The percent of counties in recession increased from 16% in 2005 to 50% in 2009. Figure 1b presents a density probability plot of the percent of years in the sample period (2001-2020) that a county was in a recession. On average, counties were in reces-

[12] As discussed later, the results are robust to using other deposit contracts.

sions 25% of the sample period with a standard deviation of 12.45%. Similarly, we present figures for state level recessions. A state is defined to be in a recession if its GDP growth between two consecutive quarters is below -2%. Figure 2 presents the timing and duration of recessions at the state level. Figure 2b shows that states were in recessions 5.05% of quarters in the sample period (2005-2020) with a standard deviation of 3.12% The statistics reported above highlight that the occurrence of economic contractions exhibits wide heterogeneity across counties and states.[13] A similar pattern emerges when examining economic expansions.

Next, we investigate the relation between the local deposit rates and local recessions. To measure local deposit rates, we exploit the geographic variation in deposit rates across banks, with a particular focus on single-state banks primarily operating regionally. The advantage of using single-state banks is that their deposit base and lending is more local, thereby mirroring the local economic conditions.[14] Berger and Udell (1995) and Petersen and Rajan (1994) find that local banks are more efficient in collecting and processing "soft information" in the local economy. Moreover, the differences in local economic conditions are reflected in the deposit rates of single-state banks; Heitfield (1999), Biehl (2002), and Heitfield and Prager (2004) find that small banks compete locally and therefore exhibit substantial heterogeneity in deposit rates across regions.

Figure 3 presents a heatmap of the average deposit rates per county between 2001 and 2020. We construct the measure of the dispersion of deposit rates by exploiting the geographic variation in deposit rates across banks. First, we create a panel at the bank $\times$ county $\times$ month-year level, using the deposits rate data. Then, we compute the average deposit rate across banks for each county in each month. The annual county deposit rates are computed by averaging across the monthly county deposit rates in each year. Figure 4 and Figure 5 display heatmaps of the deposit rates for metro counties and states, respectively, for the years 2006, 2009, and 2017. These heatmaps reveal significant variation in deposit rates across different regions at any given point in time. We observe that deposit rates offered by banks exhibit regional variation at both the county and state levels at any given point in time. Interestingly, there is also temporal variation in regions with higher deposit rates. For instance, in 2006, banks in North Dakota offered higher deposit rates, which was not the case in 2009 or 2017. These heatmaps emphasize two key findings: (1) there is meaningful variation in deposit rates

[13]The onset and duration of regional recessions depend on factors that differ in each business cycle such as the industrial composition of the region or idiosyncratic shocks (e.g., Hamilton and Owyang (2012); Brown et al. (2017)).

[14]The results are robust to using national banks. However, national banks have the ability to smooth liquidity shocks due to their multi-state presence, making them less sensitive to local economic conditions. (e.g., Granja and Paixao (2019); Morgan et al. (2004)).

across regions, and (2) the variation in deposit rates is unlikely to be driven solely by banking structures, as different regions have higher rates at different points in time despite little change in bank concentration.

Given the spatial and temporal variation in economic activity and deposit rates across geographic regions, we further investigate the relationship between deposit rates and county economic activity. Specifically, we examine whether higher deposit rates in 2006 are associated with lower GDP growth two years ahead in 2008. As shown in Figure 6a and Figure 6b, there is a clear association between deposit rates and future GDP growth at the county and state levels, respectively. We find that higher deposit rates offered by banks are associated with lower GDP growth at both the county and state levels. Moreover, in Figure 7a and Figure 7b, we sort regions into quintiles based on the deposit rate offered by banks in 2006 and explore whether recession risk is higher in counties and states with higher deposit rates.[15] Again, we observe a meaningful association between deposit rates and recession risk, where higher quintiles of deposit rates in 2006 are linked to a higher risk a county or state experiences a larger than 2% drop in GDP in 2008. This robust pattern demonstrates the relation between deposit rates and economic activity cross-sectionally.

4 Heterogeneity in Bank Deposit Rates

In this section, we document a significant relation between bank liquidity and local economic activity. We find that an increase in deposit rates offered by banks within a region is associated with contractions in economic activity in that region. We argue that an increase in deposit rates reflects liquidity shortages and substantiate this relationship through two quasi-natural experiments.

4.1 Main Results

Table 1 provides summary statistics for the main variables of interest from 2001 through 2020. Average annual county GDP growth is 1.25% with a standard deviation of 7.80%. Average quarterly state GDP growth is 0.31% with a standard deviation of 1.79%. We compute the average deposit rate as well as the dispersion (standard deviation) of deposit rates at the county and state levels. We find that across these measures, the average county deposit rate is 1.63% with a standard deviation of 1.30% across the sample. The dispersion of county deposit rates is 0.20% with a standard deviation of 0.23%.

[15] The lowest quintile represents regions with the lowest deposit rates, while the highest quintile includes regions offering the highest rates.

We start our empirical framework with the most basic geographic unit. We begin our analysis by focusing on metropolitan (metro) counties as these regions exhibit a competitive banking structure.[16] Moreover, metro counties comprise nearly 60% of the national GDP. In the final reporting month of every year, we calculate the average deposit rate for each county.[17] Using this data, we estimate a OLS model of the change in economic activity in county c in year $t + k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity.

$$Y_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t} \tag{1}$$

where Y denotes the measure of economic activity, such as GDP growth, business formation, or county delinquency rate in our baseline specification, and *Rate* denotes the average bank deposit rate. We report Conley (1999) standard errors, adjusted for spatial dependence within 100 kilometers, throughout our analysis.

Our key empirical finding is that the deposit rate within a county is a salient indicator of economic activity. In Table 2, we examine the association between the change in economic activity and deposit rate. In columns (1)-(3), we account for the time-invariant heterogeneity associated with counties through county fixed effects. The dependent variables in columns (1)-(3), represent economic activity one year ahead, two years ahead, and three years ahead, respectively. The independent variables are standardized for ease of interpretation. In Panel A, we examine the association between GDP growth and the deposit rate. Our findings indicate that there is a larger contraction in economic activity following increases in deposit rates. Our point estimates remain economically meaningful and statistically significant across all forecasting horizons. Column (1) indicates that a one standard deviation increase in deposit rates is associated with a 0.1 percentage points lower GDP growth one year ahead. Column (2) indicates that a one standard deviation increase in deposit rates is associated with a 0.4 percentage points lower GDP growth two years ahead. Column (3) indicates that a one standard deviation increase in deposit rates is associated with a 0.3 percentage points lower GDP growth three years ahead.[18] While in any forecasting exercise, one should not include time fixed ef-

[16] Note that for metro regions, banking concentration remains stable over the entire sample period. Later, we report the results for all counties and also conduct the analysis at state level.

[17] Our empirical findings are robust to alternate methods of constructing the average deposit rate, such as averaging over different time horizons and using a variety of deposit rates. However, we focus on the deposit rates for 12-month certificates of deposit ($10K 12-month CDs) with a minimum account size of $10,000 because this is the most common deposit product that is uniformly observable across banks and years. For example, data on $250K 12-month CDs begins in 2004. Coverage of $250K 12-month CDs is sparse in 2004 but increases over time.

[18] We also estimate the regressions using the 1-month certificates of deposit ($10K 1-month CDs) with a minimum account size of $10,000 month deposit rate and we find similar statistical results as reported in Appendix Table

fects, one could be concerned that the relation between economic activity and deposit rates is mainly driven by some time varying factors at the aggregate level. As a robustness exercise, in columns (4)-(6), we introduce time fixed effects. As can be seen, we find the results are similar to the estimates in columns (1)-(3). In fact, the estimated magnitudes are slightly higher. Furthermore, we use the unemployment rate as an alternate measure of economic activity and show robustness in Appendix Table A.2.

In Panel B of Table 2, we explore a different measure of economic activity by focusing on new business formation. We investigate the relationship between the log-transformed number of new businesses and the deposit rate.[19] Consistent with our earlier findings, which show a negative association between the deposit rate and economic activity. We observe that an increase in the deposit rate is linked to a decline in new business formation. In Panel C of Table 2, we use a measure of consumer financial health as a proxy for economic activity: mortgage delinquency. The 30-89 day mortgage delinquency rate serves as an early indicator of the overall health of the mortgage market, capturing borrowers who have missed one or two payments. A higher delinquency rate may indicate household financial stress and reduced spending capacity. In line with our previous results that demonstrate an association between increased deposit rates and a contraction in economic activity, we find that higher deposit rates are correlated with a heightened risk of higher credit losses. We further utilize data on the 90-day delinquency rate, which reflects more severe economic distress and find similar results, reported in Appendix Table A.3. Lastly, for a subset of counties with available data on CPI growth, our analysis reveals a significant, negative relation between deposit rates and the CPI growth rate in Appendix Table A.4. Overall, the findings from various measures of economic activity consistently indicate that higher deposit rates are associated with a future contraction in economic activity. Note that these results do not imply a causal relationship between deposit rates and economic activity.[20] The central premise of our analysis is that deposit rates capture fluctuations in local economic conditions and thus are an early indicator of economic activity.

An important question that arises is whether the results are mainly driven by monetary policy changes (Drechsler et al. (2017); Drechsler et al. (2022); Jiménez et al. (2022)). As discussed earlier, we have established that the results remain robust when considering time fixed effects, which account for monetary policy changes at the national level. However, to further

A.1. The economic magnitudes are larger with the 1-month certificates of deposit, suggesting that these higher-frequency rates may better capture real-time liquidity stress.

[19] The number of new businesses is measured as the number of applications for an employee identification number in the US Census Business Formation Statistics.

[20] A large body of research has shown that bank lending can influence economic activity, hence, it is plausible that a portion of the contraction may be attributed to this channel (e.g., Jayaratne and Strahan (1996); Schnabl (2012); Iyer et al. (2014)).

ensure that our findings are not solely influenced by monetary policy, we conduct an analysis over the period of 2010-2015, a time when short-term interest rates remained relatively stable. In Table 3, we replicate the results reported in Table 2 for this specific period. We find similar results even in the absence of any monetary policy changes. In fact, the estimated magnitudes of the relation between deposit rates and changes in economic activity are even higher. Table 3, Panel A, reveals that a one standard deviation increase in deposit rates is associated with a 3 percentage points decrease in GDP growth two years ahead.[21] The estimated magnitudes are also larger for changes in business formation and credit losses, though the statistical significance is somewhat weaker in some specifications (Table 3, Panels B and C).[22]

The results from the period between 2010-2015 also help us address another issue as to whether forecasting power of deposit rates are mainly a result of credit booms. The extant literature on credit booms highlights that periods of excessive credit growth are followed by periods of large contraction in economic activity Schularick and Taylor (2012). While the period just before the global financial crisis in 2008 experienced a high credit growth phase, the period between 2010-2015 experienced stagnant credit growth. Therefore, the association between deposit rates and economic activity during the period from 2010-2015 suggests that the forecasting power of deposit rates extends beyond periods of expansionary credit. In Table 4, we include different measures of credit growth in the estimation and find that higher credit growth is positively associated with GDP growth. More, importantly, the inclusion of credit growth in the estimation does not alter the results on deposit rates. This estimation also highlights that the results are not primarily driven by the global financial crisis in 2008.

Our estimation, so far, captures a temporal element as our analysis is conducted over several years. To understand whether deposit rates can predict GDP growth in the cross-section, we estimate the relation between deposit rates in 2006 and GDP growth one year ahead, two year ahead and three year ahead respectively. The results are reported in Appendix Table A.7. We find that at the one year horizon, there is positive relationship between GDP growth at deposit rates, however this relationship flips and turns negative at a two year horizon. This indicates that high deposit rates captures a contraction in economic activity in the future, at a longer horizon and not short term fluctuations in economic activity. This intuition also bears out when examining the relationship between deposit rates in 2006 and CPI growth in 2008, as presented in Appendix Table A.8. The predictive power is higher at longer horizons as com-

[21] We use the unemployment rate as an alternate measure of economic activity and show robustness during the 2010-2015 period in Appendix Table A.5.

[22] Appendix Table A.6 uses a complementary definition of credit losses and demonstrates robustness in the 2010-2015 period.

pared to shorter horizons.[23] Overall, the results of the cross-sectional analysis are consistent with the results reported in Table 2, which also suggest that the predictive power of deposit rates is stronger at a two-year horizon than at a one-year horizon.

To further understand the predictive value of deposit rates, we estimate the Receiver Operating Characteristic (ROC) curve. We use an efficient, rank-based algorithm known as the Area under the ROC Curve (AUC) which measures the model's predictions.[24] An AUC of 1 indicates that a classifier can perfectly distinguish recessions from non-recessions points; an AUC of 0 indicates that a classifier predicts all non-recessions as recessions and all recessions as non-recessions. An AUC between 0.5 and 1 suggests that the classifier has greater predictive value than a coin toss. There is no "gold-standard" for the AUC benchmark because it is context-specific. As Iyer et al. (2016) note, an AUC of 0.6 or greater indicates strong predictive value in information-scarce environments, and an AUC of 0.7 or greater indicates strong predictive value in more information-rich environments.

To this end, we estimate the relation between deposit rates and county recessions using a logit model in Table 5. We define a county to be in a recession if its GDP growth between two consecutive years is below -2%.[25] The unconditional probability of a county recession is 14.45% over the sample period. We estimate the likelihood of a recession in county c in year $t+k$ as a function of the average deposit rate within a county in year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity.

$$logit(p_{c,t+k}) = \beta_0 + \beta_1 Rate_{c,t} + \alpha_c + \epsilon_{c,t} \tag{2}$$

where $logit(p) = ln(\frac{p}{1-p})$ denotes the log of the odds ratio, $Rate$ denotes the average bank deposit rate. We assume that $\epsilon_{c,t}$ is well-behaved.

Our findings indicate that there is a greater probability of a recession following an increase in deposit rates. Our point estimates remain economically meaningful and statistically significant at the 1% level across all forecasting horizons. Column (1) indicates that a one standard deviation increase in the deposit rate increases the likelihood of a recession one year

[23]Precautionary savings increase at the onset of recessions. This can make the deposit rate a weaker indicator of contractions in economic activity over shorter time horizons (closer to a recession), as deposit inflows at the onset of a recession can be driven by precautionary savings rather than by changes in economic activity. Levine et al. (2021) find that deposit inflows in the initial months of the COVID-19 pandemic were triggered by a surge in the supply of precautionary savings.

[24]The AUC measures the ability of a classifier to distinguish between positive and negative points. It is a diagnostic test of accuracy and discrimination that represents the probability that a randomly chosen recession case is ranked as more likely to be in a recession than a randomly chosen non-recession case. Essentially, the separation between the distributions of recessions and non-recessions give a prediction model its classification ability, as assessed by the AUC.

[25]The results are robust to using other thresholds.

ahead by 16.05%. Column (2) indicates that a one standard deviation increase in the deposit rate increases the likelihood of a recession two years ahead by 37.44%. Column (3) indicates that a one standard deviation increase in the deposit rate increases the likelihood of a recession three years ahead by 32.80%. These estimates are economically meaningful. Moreover, the diagnostic tests indicate that the covariates are jointly statistically significant. The two-year forecast classifier yields an AUC of 0.73 – above the random coin toss classifier. In addition, we estimate the regression using the rate on uninsured deposits in Appendix Table A.9 and find stronger results; a one standard deviation increase in the uninsured deposit rate is associated with a 7.59 percentage point two years ahead with an AUC of 0.74.[26] These relationships are economically meaningful, statistically significant, and stable. Overall, our findings suggest that the model has high predictive value.

4.2 Heterogeneous Effects of Bank Liquidity Shortages

We propose that the deposit rates offered by banks within a county increase when certain banks face liquidity shortages. This conjecture is built on two assumptions: (1) there is competition for deposits among banks within a county, and (2) there is variation in liquidity needs among banks within a county. To delve deeper into the impact of these cross-sectional dimensions of heterogeneity, we first examine whether these effects are more pronounced in regions with a higher concentration of banks.

While the preceding estimation focused on metropolitan counties, in Appendix Table A.10, we present the estimation results for rural and urban counties. We find that the point estimate attenuates the AUC is lower in the sample of rural and urban counties, relative to metro counties.[27] Thus, deposit rates exhibit higher predictive value in settings with increased competition for funds.

Another dimension that the analysis has hitherto disregarded is the variation in banks' balance sheets. While economic contraction within a county, is associated with an average increase in deposit rates in banks operating in the county, the composition and strength of banks' balance sheets may differ, potentially leaving some banks more exposed to liquidity shortages than others. Consequently, within a county, we may witness varying responses in the deposit rates among banks, depending on their respective balance sheet strength. Some banks might respond to these conditions by increasing their deposit rates by a larger margin, while others may not experience the same magnitude of rate adjustment. These divergent responses are influenced by the individual balance sheet conditions of each bank. In Appendix Table

[26]Note that the sample in which we can observe rates on uninsured deposits is limited.

[27]Note that in the Appendix Table A.11, we also report the results across all counties and find similar results.

A.12, we demonstrate that banks that face greater constraints tend to increase their rates by a larger margin. Specifically, banks with higher rate increases are smaller in size, have a higher credit-to-deposit ratio, lower income, and higher loan loss provisions. These findings clearly indicate that the magnitude of the increase in deposit rates is contingent upon the balance sheet conditions of banks.

To capture this differential response, we examine whether increase in dispersion of deposit rates across banks operating within a county, is associated with a contraction in economic activity. In Appendix Table A.13, we present the results of this analysis. Similar to the results obtained with deposit rates, we find that the dispersion of deposit rates within a county is linked to a contraction in economic activity. Furthermore, the AUC associated with the dispersion of deposit rates is 0.76, as reported in Appendix Table A.14.

4.3 Validation from Two Quasi-Natural Experiments

The preceding analysis indicates that higher deposit rates are associated with a contraction of economic activity. To further substantiate the relationship between deposit rates and economic activity, we employ two quasi-natural experiments. Our key hypothesis is that the predictive power of deposit rates reflects the gradual build-up of liquidity shortages. We test this hypothesis in two experiments. In the first experiment, we directly examine how bank liquidity varies around natural disasters and unexpected shale gas discoveries. In the second experiment, we turn to micro evidence and test whether single-state banks differentially respond to local economic conditions, as measured by the degree of import competition, through their deposit rate-setting behavior. The results of these tests validate that deposit rates effectively capture the liquidity stress of banks during economic contractions.

4.3.1 Natural Disasters and Fracking on Bank Liquidity

Natural disasters are unforeseen occurrences that signal the onset of economic downturns. Unlike other economic downturns, which can be difficult to predict, the timing of natural disasters is more certain. In addition, these shocks are orthogonal to monetary policy shocks, precautionary savings motives or credit booms. Hence, they provide a clean setting to identify the relation between bank liquidity shortages and deposit rates. Therefore, we hypothesize that deposit rates should only increase *after* a natural disaster hits. Conversely, a positive shock to economic activity resulting from fracking discoveries should lead to a reduction in deposit rates in regions after the fracking boom.[28]

We begin by examining deposit rates around natural disasters. We follow the methodology of Barrot and Sauvagnat (2016) and restrict our sample to disasters that last less than 31 days with total estimated damages above one billion 2018 constant dollars. Figure 8 plots the evolution of deposit rates offered in county c in the years from the natural disaster. Specifically, we plot the δ_{t+d} coefficient estimates from a regression of deposit rates in county c at year t on binary variables that indicate the number of years from the natural disaster which occurs in year d.

$$Rate_{c,t} = \beta_0 + \sum_{k=-5}^{5} \delta_{t+d} + \alpha_c + \epsilon_{c,t}$$

Consistent with our hypothesis, we find that the deposit rates increases only after the natural disaster and remains elevated for almost two years before declining. We further test whether the increase in deposit rates reflects liquidity constraints by examining deposit growth around natural disasters. We use a within bank-county estimator in Appendix Table A.15 to show that following natural disasters, counties experience a 5.21 percentage points decline in deposit growth. This finding further supports our key hypothesis that deposit growth declines when an economy enters a contractionary phase, straining bank liquidity and prompting banks to increase deposit rates.

Since natural disasters are unexpected shocks that signal the start of economic downturns, the ex ante deposit rate is expected to have limited predictive ability in forecasting recessions triggered by such disasters. We present empirical support for this hypothesis and demonstrate that ex ante deposit rates cannot forecast economic contractions stemming from unforeseen shocks such as natural disasters (refer to Appendix Table A.16). In contrast, our findings reveal a robust correlation between the ex post deposit rate changes and subsequent GDP growth. Specifically, we find that counties that increase their deposit rates after natural disasters experience worse economic contractions two years later, as illustrated in Figure 9. A one percentage point increase in the deposit rate is associated with a 0.024 percentage point decline in GDP growth. This relationship is statistically significant at the 1% level.

To further illustrate that deposit rates reflect liquidity conditions, we examine the impact of shale gas discoveries during the fracking boom between 2003 and 2009 on deposit rates. We contend that unexpected technological breakthroughs enabled counties to substantially boost

[28]Notably, Kundu et al. (2021) has established a strong negative relationship between local natural disasters and deposit growth; Gilje et al. (2016) has established a strong positive relation between bank fracking boom exposure and bank deposit growth.

their oil and natural gas production from 2003 through 2009, as demonstrated by Gilje (2019). The resulting unexpected wealth windfalls increased bank liquidity. We use a within-county estimator, while accounting for aggregate economic conditions through year fixed effects to study how the deposit rate varies with shale gas production during the fracking boom. Appendix Table A.17 shows that an increase in shale gas production reduces deposit rates.[29]

Overall, these findings significantly bolster our central hypothesis: an increase in deposit rates effectively captures economic contractions. It also highlights that the mechanism operates via the liquidity stress experienced by banks during economic contractions, which necessitates an increase in deposit rates.

4.3.2 Import Competition on Bank Liquidity

We further investigate the key mechanism that links bank deposit rates to regional economic activity using an instrumental variable strategy. Our analysis builds on the findings of Autor et al. (2013), Autor et al. (2014), Acemoglu et al. (2016), Pierce and Schott (2016) among others, which demonstrate the adverse effects of import competition on US local labor market and household balance sheets; rising import penetration is associated with lower domestic output, value-added, higher unemployment, lower labor force participation, and reduced wages in local labor markets. Overall, regions with higher import competition experience more substantial economic contractions. As a result, we hypothesize that banks increase deposit rates in these regions that are more vulnerable to import competition as these regions experience higher economic contraction.

We use data on shipping costs from Barrot et al. (2022) to identify the link between regional economic activity and deposit rates. The unit of analysis is the commuting zone (CZ), which are clusters of counties characterized by strong commuting connections within the cluster and weaker connections between clusters. These CZs serve as representations of local labor markets. Within this context, local labor markets can be seen as subeconomies that experience varying trade shocks based on their specialization in different industries (Autor et al. (2013)). Barrot et al. (2022) measure the exposure of an industry to import competition using the 1998 physical shipping costs obtained from import data. A CZ's exposure to import competition is

[29]We also explore the causal relationship between bank liquidity and economic activity using fracking shocks (results not reported here). Similar to Gilje (2019), we investigate the impact of a sudden increase in liquidity within bank branches located in regions with fracking exposure on the economic activity in regions without fracking exposure where these banks have branches. Our findings reveal significant effects of bank liquidity on the GDP of counties without fracking exposure, but these effects are only observed in cases where the liquidity shock is substantial.

constructed by combining the industry shipping costs with the industry composition in each commuting zone, expressed in labor share.

We examine the effect of import competition on deposit rates within-bank. Specifically, we investigate whether banks exhibit varying rates across regions with differential exposure to import competition. We begin by demonstrating that there is substantial variation in bank deposit rates within-bank in Appendix Figure A.3. Our findings are consistent with previous research by Heitfield (1999), Biehl (2002), and Heitfield and Prager (2004), which find that smaller banks set deposit rates based on the competitive environment in their metropolitan statistical area (MSA), in contrast to large banks which are more likely to set uniform rates across regions. Appendix Figure A.3 presents heatmaps of deposit rates for several single-state banks in 2007 including the Bank of Colorado, Colony Bank, Citizens National Bank of Meridian Bank Seacoast National Bank, BancFirst, and Limestone Bank.

Based on this finding, we test whether banks set higher deposit rates in regions that face greater import competition between 2001 and 2007, according to the following regression specification:

$$\text{Deposit Rate}_{b,z,t} = \beta_1 \cdot \text{Shipping Costs}_z + X_z + \alpha_{b,s,t} + \epsilon_{b,z,t} \tag{3}$$

where Rate denotes bank b's deposit rate at the commuting zone level z of state s measured in month-year t, Shipping Costs denotes the shipping costs at the commuting zone level, and X is a vector of controls including total employment, the share of manufacturing employment, total income, logarithm of total debt, the 1991-1999 change in loan originations, and the 1991-1999 change in net Chinese import penetration, as well as quintiles of the change in house prices between 1999 and 2007. We measure deposit rates at the CZ level by collapsing the bank $\times$ county $\times$ month-year panel data on deposit rates to the bank $\times$ CZ $\times$ month-year level using county GDP weights.[30]

Table 6 reports our results. Our estimation includes bank $\times$ month-year $\times$ state fixed effects, allowing us to identify how banks differentially set deposit rates within in the same state and time period, by exploiting variation in shipping costs across commuting zones. We find that a one standard deviation increase in shipping costs is associated with up to a 0.03 pp increase in the deposit rate (see column (1)). This coefficient is economically meaningful as a bank that operates in a region with shipping costs at the 95$^{\text{th}}$ percentile is estimated to report a deposit rate that is 0.07 pp higher than a bank that operates in a region with shipping costs at the 5$^{\text{th}}$ percentile. This difference corresponds to 0.06 standard deviations of the deposit rate.

[30] The result is robust to alternate weights such as equal weights, employment weights, and population weights.

The point estimate remains stable and statistically significant at the 1% level even after saturating the model with control variables and fixed effects. Overall, our findings indicate that banks set higher deposit rates in regions that face stiffer import competition (lower shipping costs). We further show that these findings are robust at the commuting zone level in Appendix Table A.18; greater import competition (lower shipping costs) is associated with higher deposit rates at the commuting zone level. Overall, our findings demonstrate that the deposit rate serves as a useful barometer of local economic conditions. Banks set higher rates in regions in response to liquidity shortages in regions that face greater economic headwinds, such as those that are experiencing increased import competition.

5 Explaining the Link Between Liquidity Shortages and Deposit Rates

In the previous section, we demonstrated the association between an increase in deposit rates and the contraction of economic activity. Now, in this section, we delve into the mechanism underlying these findings. This section explores the mechanism behind these findings.

At the core of our analysis lies the premise that banks experience liquidity squeezes during economic contractions, prompting them to increase deposit rates in response to funding pressure. Building upon this premise, we explore the relationship between changes in deposit rates and the growth of insured and uninsured deposits. To achieve this, we sort banks into quartiles each quarter, based on the quarterly changes in their deposit rates. The computation of deposit rate changes is done on a quarterly basis, aligning with the availability of call report data. First, we calculate the average deposit rate for banks in each quarter across all counties. Then, we determine the quarterly changes in banks' deposit rates, enabling us to gain valuable insights into their dynamic adjustments over time.

Our empirical framework regresses bank b's outcome variable on quartile indicators for banks' quarterly changes in the deposit rate at time t (quarter-year).

$$\begin{aligned}\Delta ln(Y)_{b,t+k} = \beta_0 + \beta_1 \mathbb{1}_{P25<\text{Dep Rate Change}\leq P50,b,t} + \beta_2 \mathbb{1}_{P50<\text{Dep Rate Change}\leq P75,b,t} \\ + \beta_3 \mathbb{1}_{\text{Dep Rate Change}>P75,b,t} + \alpha_t + \epsilon_{b,t}\end{aligned} \quad (4)$$

where $\Delta ln(Y)$ denotes growth in the outcome variable, $\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$, $\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$, $\mathbb{1}_{\text{Dep Rate Change}>P75}$ denote the second, third, or fourth quartile of a bank's deposit rate change between two consecutive quarters, respectively, and k denotes the lead/lag of the dependent variable and ranges from -3 to +3 quarters. Our regression specification includes quarter-year fixed effects to control for aggregate shocks.

Table 7 presents the dynamics of the relation between the deposit growth rates for insured and uninsured deposits and the quarterly change in banks' deposit rates. In Panel A, the dependent variable is the growth in banks' insured deposits. In Panel B, the dependent variable is the growth in banks' uninsured deposits. It is worth noting that the vast majority of depositor households maintain deposits below the insured limit, with more than 99 percent of deposit accounts falling under the $250,000 deposit insurance limit (Federal Deposit Insurance Corporation (2023)). Uninsured depositors typically encompass large depositors, such as nonfinancial or financial corporations, along with wealthy individuals or entities exceeding the deposit insurance limit.

Our analysis yields several noteworthy observations. Firstly, we discover a decline in the growth of insured deposits in the quarters leading up to rate changes. This decline is observed across all banks, irrespective of their specific deposit rate adjustments. Similarly, we observe a slowdown in the growth of uninsured deposits during this period. Interestingly, our findings unveil that banks, which eventually raise rates to a greater extent, also experience a more substantial decline in the growth of uninsured deposits. In simpler terms, banks facing significant withdrawals of uninsured deposits tend to raise their deposit rates by a larger margin in the subsequent quarter. Unsurprisingly, we also find higher growth in both insured and uninsured deposits in the quarter immediately following the rate increases.[31]

In Table 8, we directly investigate the growth in the ratio of insured to uninsured deposits to gain insights into the funding composition dynamics surrounding deposit rate changes. Overall, we find that the growth in the ratio of insured to uninsured deposits shows limited variation in the quarters before and after deposit rate changes, regardless of banks' risk profiles. However, consistent with our findings in Table 7, we observe a noteworthy increase in the growth of insured to uninsured deposits for banks in the fourth quartile (of rate changes) during the quarter preceding rate increases. This increase is primarily driven by a decline in uninsured deposits.

To further understand whether the change in the ratio of insured to uninsured deposits is a mechanical response or a deliberate choice by banks to adjust their deposit composition, we explore the gap between uninsured and insured deposit rates at the county level in Appendix Table A.19. Our analysis reveals that the gap between uninsured and insured deposit rates narrows as banks move closer to a county recession. This suggests that, on average, banks actively increase their insured deposit rates to a greater extent compared to their uninsured deposit rates as they approach a county recession, thereby attracting more insured deposit

[31] Unreported, these banks also increase the rate on uninsured deposits.

funding. Further, we note a substantial increase in the dispersion of deposit rates before country recessions, consistent with our findings in Section 4.2.

We also examine the relation between the growth in lending with changes in deposit rates to understand the assets side adjustments of banks' balance sheet. Table 9 presents our findings regarding lending growth. Notably, we observe that higher lending growth precedes higher rate changes. Specifically, banks in the fourth quartile exhibit higher lending growth in the quarters leading up to rate changes. However, after the rate changes, lending growth slows down. Additionally, the differential lending growth among banks in different quartiles starts to converge after the rate change. This suggests that banks that raise their rates by a larger margin do so primarily to strengthen their balance sheets rather than to expand their lending activities. Further, in Appendix Table A.20, we examine the growth rates of non-performing loans (NPL). We do not find much in terms of significant differentials across banks in terms of higher NPL growth quarters following rate changes.

Overall, our findings suggest the following channel at work. As a county approaches an economic downturn, insured deposit growth decreases across all banks. In addition, uninsured depositors decrease their deposits more for riskier banks. We further support this evidence at the bank level with results on deposit growth at the county level. As illustrated in Appendix Table A.21, we observe a decrease in total deposit growth at the county level one year before a recession. To offset the funding shortfall and support their balance sheets, banks respond by raising deposit rates to attract funds from insured depositors. However, the magnitude of the increase in deposit rates is contingent on the level of competition for bank deposits and the balance sheet conditions of banks within a county as discussed earlier in Section 4.2.

Considering the aforementioned mechanism, it becomes crucial to ascertain whether the results stem from informed depositors withdrawing from risky banks prior to a recession or if the slower deposit growth primarily originates from the overall economic slowdown preceding the downturn. Our findings strongly support the latter explanation, as we observe a deceleration in insured deposit growth. Insured deposits, by their nature, are not influenced by bank riskiness and therefore are less sensitive to recession risk.

Furthermore, we explore credit default swap spreads and equity returns in Appendix Figure A.4. Interestingly, we do not find any significant spikes in CDS spreads or declines in bank equity prices until after recessions occur. In contrast, we observe an increase in the deposit rate years in advance. This suggests that it is less likely that "smart money" had anticipated the recession in advance, as such expectations would likely be reflected in other tradable instruments as well.

6 State Level Economic and Financial Risks

This section examines whether bank deposit rates can predict changes in economic activity at the state level.

Data on state GDP is available at the quarterly frequency since 2005, allowing us to analyze whether deposit rates can predict economic activity at the quarterly frequency at the state level. We calculate the average deposit rate for each state, through aggregation of county characteristics. We construct the state deposit rate by taking a weighted average of the county deposit rate for each state in the last reporting month of each quarter, weighted by the 2004 county GDP.[32]

Table 10 reports the relation between deposit rates and economic activity at the state level. As before, the independent variables are standardized for ease of interpretation. We account for the time-invariant heterogeneity associated with states through state fixed effects. The dependent variables in columns (1) through (3) are the changes in state GDP four quarters ahead, eight quarters ahead, and twelve quarters ahead, respectively.

Consistent with the findings in Table 2, our results demonstrate that deposit rates play a significant role as a predictor of economic recessions at the state level. Column (1) shows that a one standard deviation increase in deposit rates is associated with a 0.1 percentage point reduction in state-level GDP growth. Similar magnitudes are observed for deposit rates and economic activity eight quarters ahead and twelve quarters ahead. Furthermore, in columns (3)-(6), we present the results with the inclusion of time fixed effects. We find similar results to those estimated in columns (1) through (3). Thus, an increase in deposit rates offered by banks within a state is associated with a decline in economic activity.

In Table 11, we present the results of a logit analysis that examines the association between deposit rates and larger than 2% drops in state GDP. The unconditional probability of a larger than 2% drop in state GDP is 5.02% over the sample period. The dependent variable in columns (1) through (3) indicates whether a larger than 2% drop in state GDP is observed four quarters ahead, eight quarters ahead, and twelve quarters ahead, respectively. Consistent with the findings reported at the county level, our results indicate that an increase in deposit rates is linked to a higher likelihood of experiencing a larger than 2% drop in state GDP. Specifically, in column (2), we observe that a one standard deviation increase in deposit rates increases the

[32] Unreported, we verify that our findings are robust to alternate measures of state deposit rates, using alternative weights: *Equal-Weight*, *Emp-Weight*, and *Pop-Weight*. The Equal-Weight measure calculates the state deposit rate by taking an equal-weighted average of the county deposit rate for the last reporting month of each quarter. The Emp-, and Pop-Weight measures are similarly constructed by taking an average of the county deposit rate, weighted by the 2004 county GDP, employment, and population, respectively, in each state for the last reporting month of each quarter.

likelihood of a larger than 2% drop in GDP two years ahead by 49.98%. Additionally, the estimated AUC (Area Under the Curve) reported in column (2) is 0.73, indicative of the model's predictive accuracy.

We also evaluate the predictive value of our model through k-fold cross validation. Specifically, our dataset is partitioned into k subsamples of equal size. $k-1$ subsamples are used as the training set while one subsample is retained as the validation or testing set in which we evaluate the predictive performance (AUC). We estimate the AUC iteratively k times, so that each of the k subsamples is used as the testing set once. We plot the k-fold ROC curves and estimate the average AUC across the k-folds and bootstrapping the cross-validated AUC for statistical inference. Our default number for k is 10. k-fold cross-validation is a powerful tool that tests a model's ability to generalize to new cases that were not used in the estimation process. This allows us to flag issues such as overfitting and selection bias and produce realistic estimates of predictive value.

Appendix Figure A.5 in the appendix reports the k-fold ROC curves and summarizes the cross-validated AUC at the state level. We find that our predictive model generalizes well to independent datasets and reports a high model prediction performance. Specifically, we find that at the state level, the cross-validated AUC is 0.66 for recessions eight quarters ahead. The predictive accuracy is lower, at 0.55, for recessions twelve quarters ahead.[33]

To gain further insights into the out-of-sample predictive power of deposit rates, we analyze the relation between the deposit rates prevailing in the last quarter of 2020 for each state and the corresponding GDP growth in the last quarter of 2022. The results are presented in Figure 10. We find that higher deposit rates in the last quarter of 2020 are associated with a larger decline in GDP growth in the last quarter of 2022.

The results presented above indicate a strong relation between deposit rates and the build-up of economic risk at the state level. This build up of economic risk also carries implications for the risk of financial institution failures. To explore this further, we delve into the relationship between deposit rates and financial risk at the state level. Specifically, we examine the association between state deposit rates in 2006 and bank failures between 2008 and 2012.[34] Our findings reveal a clear pattern where higher deposit rates at the state level correspond to greater incidence of bank failures, both on the extensive and intensive margin as presented in Figure 11. On the extensive margin, Figure 11a illustrates a positive association between state deposit rates in 2006 and the likelihood of a state experiencing any bank failures during the cri-

[33] The cross-validated AUC at the county level is 0.63 for recessions two years ahead. The predictive accuracy is lower at 0.60 for county recessions three years ahead.

[34] Most bank failures between 2001 and 2023 occurred in the crisis period defined between 2008 and 2012.

sis period of 2008-2012. Additionally, on the intensive margin, Figure 11b presents a binscatter plot that demonstrates a strong positive relationship between quantiles of state deposit rates in 2006 and the percentage of bank failures in each quantile during the 2008-2012 period.[35]

These relationships are not only statistically significant but also economically meaningful. Specifically, a one standard deviation increase in state deposit rates in 2006 is associated with an 18.5 percentage points increase in the likelihood that a state experiences any bank failure during the crisis period. Moreover, it corresponds to a 0.66 percentage points increase in the share of failed banks in a state, equivalent to 0.43 standard deviations in the share of failed banks across states. These findings demonstrate that deposit rates reflect financial risk, as evidenced by the likelihood and severity of bank failures during the 2008-2012 crisis period. However, it is important to note that liquidity shortages of banks do not always lead to solvency risk. The association between increased liquidity risk and solvency risk is observed only in certain instances.[36] Therefore, while our analysis reveals that deposit rates of banks tend to increase in response to liquidity shortages, this association with bank failures is limited to extreme cases.

7 Deposit Rates vs. Other Indicators

An important question that arises is how the predictive power of bank deposit rates compares to that of other variables. Specifically, does the information aggregated in deposit rates capture underlying economic conditions that may not be accounted for by other variables? To answer this, we assess and compare the predictive power of deposit rates against other variables.

In Appendix Table A.22, we begin by examining the relationship between different measures of credit growth and county recessions. Panel A presents the results for growth in small business loans, Panel B for growth in mortgage credit, and Panel C for growth in total credit. The estimated AUC across these panels is approximately 0.69, which is lower than the 0.73 obtained with deposit rates in Table 5.[37] Moreover, we find no statistically or economically robust relationship between the different measures of credit growth and county recessions across the panels or forecast horizons. Only the estimated coefficients of mortgage growth on county recessions two years ahead and small business lending growth on county recessions three years ahead are statistically significant. However, it is important to note that the p-values for the tests of joint significance associated with these specifications are high.

[35]The percentage of bank failures is computed as the ratio of the number of failed banks to the total number of banks in each quantile.

[36]See Goldstein and Pauzner (2005) for a related theoretical model.

[37]Note that a 0.04 improvement in the AUC is substantial.

In Appendix Table A.23, we run a horse-race between county deposit rates and measures of credit growth. Panel A includes the growth in small business loans, Panel B for growth in mortgage credit, and Panel C for growth in total credit, in addition to the deposit rate. The point estimate associated with deposit rates is larger in magnitude than the baseline estimate and remains economically meaningful and statistically significant at the 1% level, even with the inclusion of credit growth variables across panels and forecast horizons. Specifically, we find that a one standard deviation increase in the deposit rate increases the likelihood of a recession two years ahead by 41.59% to 42.15%, after accounting for credit growth. Importantly, neither the addition of mortgage growth nor total lending growth adds explanatory power, as evidenced by the change in the pseudo R^2, nor substantially improves the predictive value, as evidenced by the change in the AUC. The inclusion of credit growth measures does not quantitatively or qualitatively affect the precision of our baseline point estimates reported in Table 5.

Similarly, in Table 12, we test the predictive power of deposit growth directly. Panel A examines the predictive power of deposit growth alone on county recessions, while Panel B adds the deposit rate. Panel A indicates that the AUC obtained with deposit growth alone is 0.69. In Panel B, we see that the point estimates associated with the deposit rates remain statistically and economically significant – quite similar to the estimates produced in the baseline Table 5 – and the predictive power of the model is enhanced with the inclusion of deposit rates.[38]

Deposit rates may exhibit better predictive power compared to other variables, as they are forward-looking rather than backward-looking. Overall, these results underscore the comparative predictive power of deposit rates as a valuable indicator of economic downturns, outperforming other measures in this context.

8 Conclusion

This paper examines the association between deposit rates offered by banks within a region and local economic activity. We find that higher deposit rates are associated with a contraction in economic activity.

We examine the mechanism behind the predictive power of deposit rates and find that banks which experience an outflow of uninsured deposits and a slower growth rate of insured deposits increase deposit rates in the following quarter. These banks raise deposit rates to

[38]We show that these findings are robust under an OLS specification that examines the relation between deposit growth and deposit rates on GDP growth in Appendix Table A.24.

attract deposits and support their balance sheets when funding becomes scarce. Consequently, our results indicate that, at the onset of an economic contraction, banks increase their deposit rates in response to a slowdown of deposit growth, particularly among uninsured deposits. As a result, an increase in deposit rates can serve as a predictive signal for an impending economic contraction.

The granularity of our indicator – the deposit rates – allows for prediction of localized downturns at regional levels. Our market-based measure is both easy to construct and utilize, providing a valuable early warning signal of impending downturns that complements existing metrics. Furthermore, our finding that banks rely more on insured deposits as they approach a downturn raises concerns about moral hazard arising from deposit insurance schemes.

References

Acemoglu, Daron, David Autor, David Dorn, Gordon H Hanson, and Brendan Price. 2016. "Import competition and the great US employment sag of the 2000s." *Journal of Labor Economics*, 34(S1): S141–S198.

Acharya, Viral V, and Nada Mora. 2015. "A crisis of banks as liquidity providers." *The Journal of Finance*, 70(1): 1–43.

Ang, Andrew, Monika Piazzesi, and Min Wei. 2006. "What does the yield curve tell us about GDP growth?" *Journal of Econometrics*, 131(1-2): 359–403.

Autor, David H, David Dorn, and Gordon H Hanson. 2013. "The China syndrome: Local labor market effects of import competition in the United States." *American economic review*, 103(6): 2121–2168.

Autor, David H, David Dorn, Gordon H Hanson, and Jae Song. 2014. "Trade adjustment: Worker-level evidence." *The Quarterly Journal of Economics*, 129(4): 1799–1860.

Baron, Matthew, and Wei Xiong. 2017. "Credit expansion and neglected crash risk." *The Quarterly Journal of Economics*, 132(2): 713–764.

Barrot, Jean-Noël, and Julien Sauvagnat. 2016. "Input specificity and the propagation of idiosyncratic shocks in production networks." *The Quarterly Journal of Economics*, 131(3): 1543–1592.

Barrot, Jean-Noël, Erik Loualiche, Matthew Plosser, and Julien Sauvagnat. 2022. "Import competition and household debt." *The Journal of Finance*, 77(6): 3037–3091.

Berger, Allen N, and Gregory F Udell. 1995. "Relationship lending and lines of credit in small firm finance." *Journal of business*, 351–381.

Biehl, Andrew R. 2002. "The extent of the market for retail banking deposits." *The Antitrust Bulletin*, 47(1): 91–106.

Boissay, Frédéric, Fabrice Collard, and Frank Smets. 2016. "Booms and banking crises." *Journal of Political Economy*, 124(2): 489–538.

Bordalo, Pedro, Nicola Gennaioli, and Andrei Shleifer. 2018. "Diagnostic expectations and credit cycles." *The Journal of Finance*, 73(1): 199–227.

Brown, Jason P, et al. 2017. "Identifying state-level recessions." *Economic Review*, 102(1): 85–108.

Calomiris, Charles W, and Matthew Jaremski. 2019. "Stealing deposits: Deposit insurance, risk-taking, and the removal of market discipline in early 20th-century banks." *The Journal of Finance*, 74(2): 711–754.

Campbell, John Y, Martin Lettau, Burton G Malkiel, and Yexiao Xu. 2001. "Have individual stocks become more volatile? An empirical exploration of idiosyncratic risk." *The Journal of Finance*, 56(1): 1–43.

Chetty, Raj, John N Friedman, Michael Stepner, et al. 2020. "The economic impacts of COVID-19: Evidence from a new public database built using private sector data." national Bureau of economic research.

Conley, Timothy G. 1999. "GMM estimation with cross sectional dependence." *Journal of econometrics*, 92(1): 1–45.

Cortés, Kristle Romero, and Philip E Strahan. 2017. "Tracing out capital flows: How financially integrated banks respond to natural disasters." *Journal of Financial Economics*, 125(1): 182–199.

Demirgüç-Kunt, Aslı, Edward James Kane, and Luc Laeven. 2008. *Deposit insurance around the world: issues of design and implementation.* MIT press.

Drechsler, Itamar, Alexi Savov, and Philipp Schnabl. 2017. "The deposits channel of monetary policy." *The Quarterly Journal of Economics*, 132(4): 1819–1876.

Drechsler, Itamar, Alexi Savov, and Philipp Schnabl. 2022. "How monetary policy shaped the housing boom." *Journal of Financial Economics*, 144(3): 992–1021.

Egan, Mark, Ali Hortaçsu, and Gregor Matvos. 2017. "Deposit competition and financial fragility: Evidence from the us banking sector." *American Economic Review*, 107(1): 169–216.

Engstrom, Eric C, and Steven A Sharpe. 2019. "The near-term forward yield spread as a leading indicator: A less distorted mirror." *Financial Analysts Journal*, 75(4): 37–49.

Estrella, Arturo, and Frederic S Mishkin. 1998. "Predicting US recessions: Financial variables as leading indicators." *Review of Economics and Statistics*, 80(1): 45–61.

Estrella, Arturo, and Gikas A Hardouvelis. 1991. "The term structure as a predictor of real economic activity." *The Journal of Finance*, 46(2): 555–576.

Fama, Eugene F. 1990. "Stock returns, expected returns, and real activity." *The Journal of Finance*, 45(4): 1089–1108.

Federal Deposit Insurance Corporation. 2023. "Options for Deposit Insurance Reform." Federal Deposit Insurance Corporation.

Friedman, Milton, and Anna J Schwartz. 1963. "A Monetary History of the united states, 1867–1960." *National Bureau of Economic Research*.

Gilje, Erik P. 2019. "Does local access to finance matter? Evidence from US oil and natural gas shale booms." *Management Science*, 65(1): 1–18.

Gilje, Erik P, Elena Loutskina, and Philip E Strahan. 2016. "Exporting liquidity: Branch banking and financial integration." *The Journal of Finance*, 71(3): 1159–1184.

Goldstein, Itay, and Ady Pauzner. 2005. "Demand–deposit contracts and the probability of bank runs." *the Journal of Finance*, 60(3): 1293–1327.

Granja, João, and Nuno Paixao. 2019. "Market Concentration and Uniform Pricing: Evidence from Bank Mergers." *Available at SSRN 3488035*.

Greenwood, Robin, Samuel G Hanson, Andrei Shleifer, and Jakob Ahm Sørensen. 2022. "Predictable financial crises." *The Journal of Finance*, 77(2): 863–921.

Hamilton, James D, and Michael T Owyang. 2012. "The propagation of regional recessions." *Review of Economics and Statistics*, 94(4): 935–947.

Heitfield, Erik A. 1999. "What do interest rate data say about the geography of retail banking markets?" *The Antitrust Bulletin*, 44(2): 333–347.

Heitfield, Erik, and Robin A Prager. 2004. "The geographic scope of retail deposit markets." *Journal of Financial Services Research*, 25(1): 37–55.

Iyer, Rajkamal, Asim Ijaz Khwaja, Erzo FP Luttmer, and Kelly Shue. 2016. "Screening peers softly: Inferring the quality of small borrowers." *Management Science*, 62(6): 1554–1577.

Iyer, Rajkamal, José-Luis Peydró, Samuel da Rocha-Lopes, and Antoinette Schoar. 2014. "Interbank liquidity crunch and the firm credit crunch: Evidence from the 2007–2009 crisis." *The Review of Financial Studies*, 27(1): 347–372.

Jayaratne, Jith, and Philip E Strahan. 1996. "The finance-growth nexus: Evidence from bank branch deregulation." *The Quarterly Journal of Economics*, 111(3): 639–670.

Jiménez, Gabriel, Dmitry Kuvshinov, José-Luis Peydró, and Björn Richter. 2022. "Monetary policy, inflation, and crises: New evidence from history and administrative data." *Inflation, and Crises: New Evidence From History and Administrative Data (December 16, 2022)*.

Jordà, Òscar, Moritz Schularick, and Alan M Taylor. 2013. "When credit bites back." *Journal of Money, Credit and Banking*, 45(s2): 3–28.

Jordà, Òscar, Moritz Schularick, and Alan M Taylor. 2016. "The great mortgaging: housing finance, crises and business cycles." *Economic Policy*, 31(85): 107–152.

King, Robert G, and Charles I Plosser. 1984. "Money, credit, and prices in a real business cycle." *The American Economic Review*, 74(3): 363–380.

Krishnamurthy, Arvind, and Tyler Muir. 2017. "How credit cycles across a financial crisis." National Bureau of Economic Research.

Kundu, Shohini, Seongjin Park, and Nishant Vats. 2021. "The geography of bank deposits and the origins of aggregate fluctuations." *Available at SSRN 3883605*.

Laeven, Luc. 1983. *Pricing of deposit insurance.* Vol. 2871, World Bank Publications.

Levine, Ross, and Sara Zervos. 1998. "Stock markets, banks, and economic growth." *The American Economic Review*, 537–558.

Levine, Ross, Chen Lin, Mingzhu Tai, and Wensi Xie. 2021. "How did depositors respond to COVID-19?" *The Review of Financial Studies*, 34(11): 5438–5473.

López-Salido, David, Jeremy C Stein, and Egon Zakrajšek. 2017. "Credit-market sentiment and the business cycle." *The Quarterly Journal of Economics*, 132(3): 1373–1426.

Mian, Atif, Amir Sufi, and Emil Verner. 2017. "Household debt and business cycles worldwide." *The Quarterly Journal of Economics*, 132(4): 1755–1817.

Mian, Atif, Amir Sufi, and Emil Verner. 2019. "How Do Credit Supply Shocks Affect the Real Economy? The Productive Capacity and Household Demand Channels." *The Journal of Finance*.

Mian, Atif, and Amir Sufi. 2009. "The consequences of mortgage credit expansion: Evidence from the US mortgage default crisis." *The Quarterly Journal of Economics*, 124(4): 1449–1496.

Morgan, Donald P, Bertrand Rime, and Philip E Strahan. 2004. "Bank integration and state business cycles." *The Quarterly Journal of Economics*, 119(4): 1555–1584.

Muir, Tyler. 2017. "Financial crises and risk premia." *The Quarterly Journal of Economics*, 132(2): 765–809.

Müller, Karsten, and Emil Verner. 2021. "Credit allocation and macroeconomic fluctuations." *Available at SSRN 3781981*.

Petersen, Mitchell A, and Raghuram G Rajan. 1994. "The benefits of lending relationships: Evidence from small business data." *The journal of finance*, 49(1): 3–37.

Pierce, Justin R, and Peter K Schott. 2016. "The surprisingly swift decline of US manufacturing employment." *American Economic Review*, 106(7): 1632–1662.

Rudebusch, Glenn D, and John C Williams. 2009. "Forecasting recessions: the puzzle of the enduring power of the yield curve." *Journal of Business & Economic Statistics*, 27(4): 492–503.

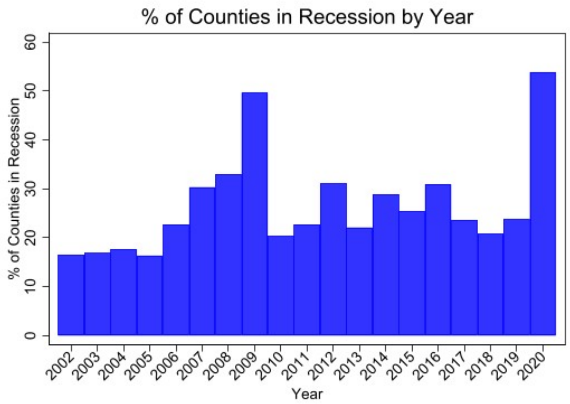
Schnabl, Philipp. 2012. "The international transmission of bank liquidity shocks: Evidence from an emerging market." *The Journal of Finance*, 67(3): 897–932.

Schularick, Moritz, and Alan M Taylor. 2012. "Credit booms gone bust: Monetary policy, leverage cycles, and financial crises, 1870-2008." *The American Economic Review*, 102(2): 1029–61.

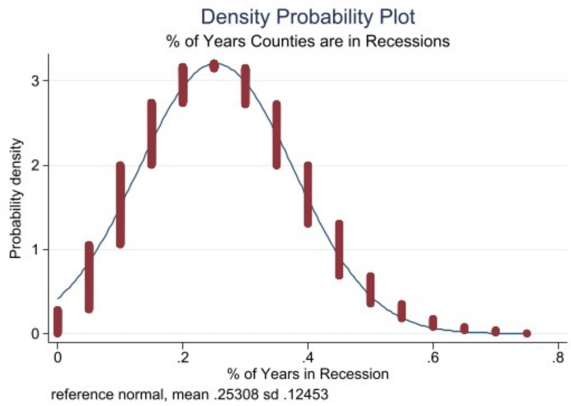
Schwert, G William. 1990. "Stock returns and real activity: A century of evidence." *The Journal of Finance*, 45(4): 1237–1257.

9 Figures and Tables

Figure 1: Recessions Across Counties and Time



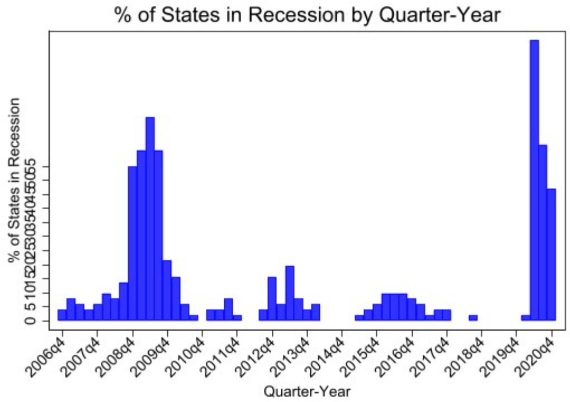
(a) % of Counties in Recession



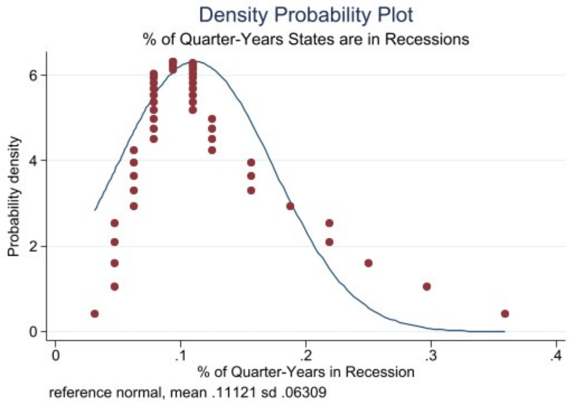
(b) % of Recessions within Counties

Notes: This figure presents the percentage of counties in recessions by year in Figure 1a, and a density probability plot of the percent of year counties are in recessions in Figure 1b based on county GDP data. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). A county is in a recession if its GDP growth between two consecutive years is below -2%.

Figure 2: Recessions Across States and Time



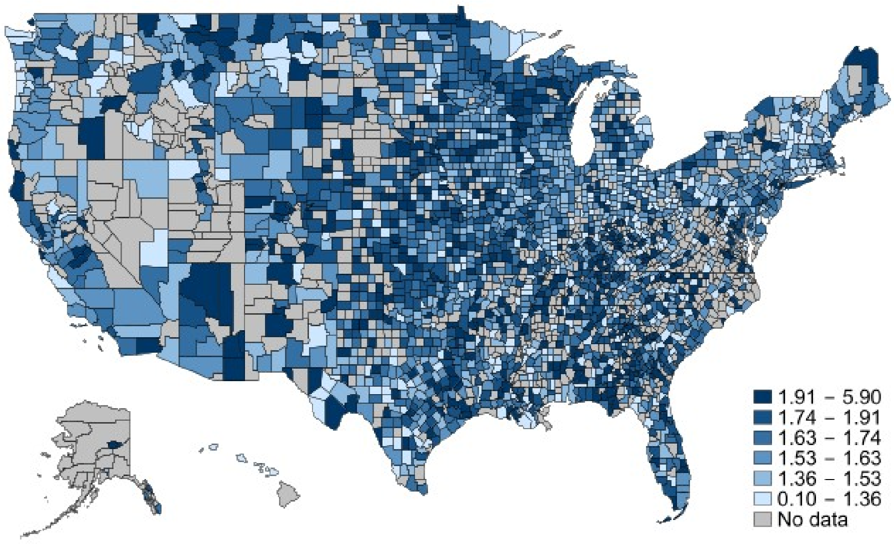
(a) % of States in Recession



(b) % of Recessions within States

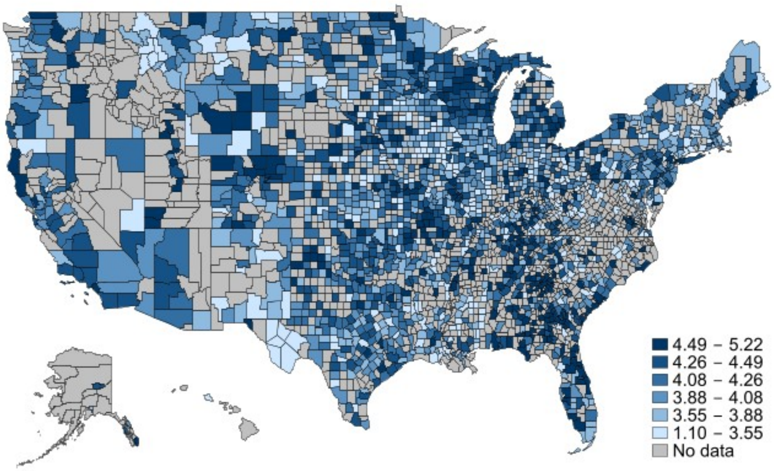
Notes: This figure presents the percentage of states in recessions by quarter-year in Figure 1a, and a density probability plot of the percent of quarter-years states are in recessions in Figure 1b based on state GDP data. State GDP data is available at the quarterly frequency from 20015Q1 from the Bureau of Economic Analysis (BEA). A state is in a recession if its GDP growth between two consecutive quarters is below -2%.

Figure 3: Deposit Rates by County (2001-2020)

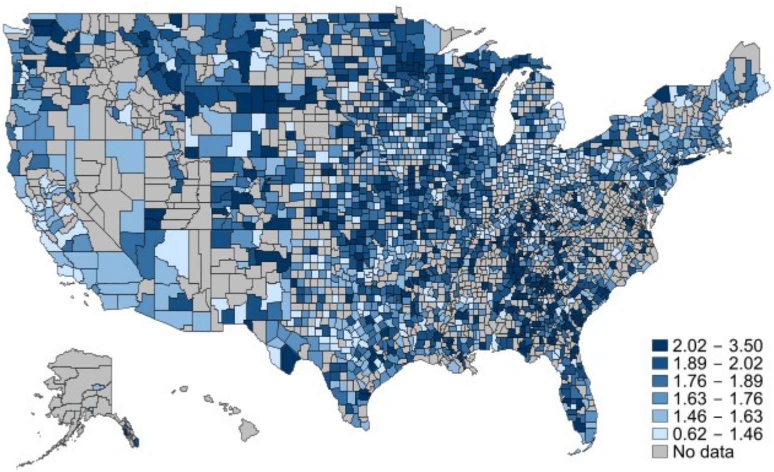


Notes: This figure uses RateWatch data to present a heatmap of the average deposit rate (12-month, \$10K CDs) in each county from 2001 to 2020. The deposit rate is the rate on the 12-month certificate of deposit of at least \$10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is computed as the average of the monthly county deposit rates in each year. We present the time-series average of these annual county deposit rates. The analysis is restricted to single-state banks. The intensity of the blue shading represents the quantile range of the deposit rate.

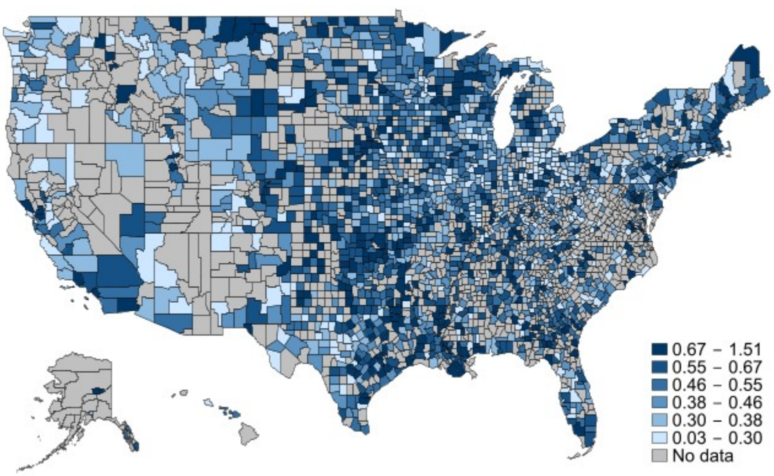
Figure 4: Deposit Rate Across Counties and Time



(a) 2006



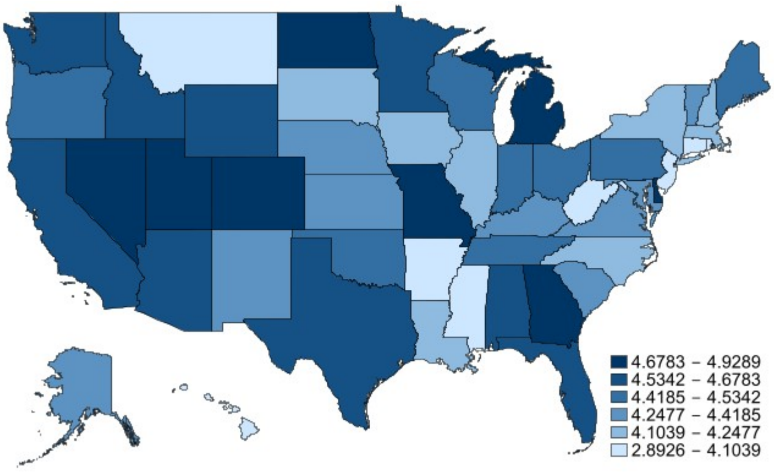
(b) 2009



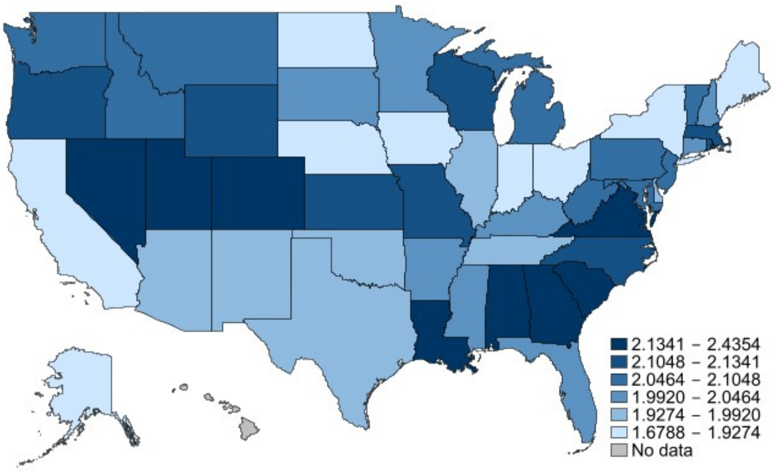
(c) 2017

Notes: This figure uses RateWatch data to present a heatmap of county deposit rates (12-month, \$10K CDs). Figure 4a presents county deposit rates in 2006; Figure 4b presents county deposit rates in 2009; Figure 4c presents county deposit rates in 2017. The deposit rate is the rate on the 12-month certificate of deposit of at least \$10,000. The intensity of the blue shading represents the quantile range of the deposit rate. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is computed as the average of the monthly county deposit rates in each year. The analysis is restricted to single-state banks. The intensity of the blue shading represents the quantile range of the deposit rate.

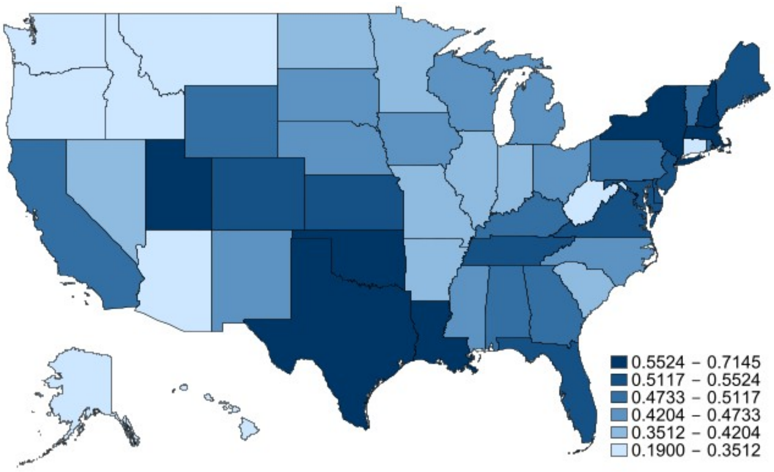
Figure 5: Deposit Rate Across States and Time



(a) 2006Q4



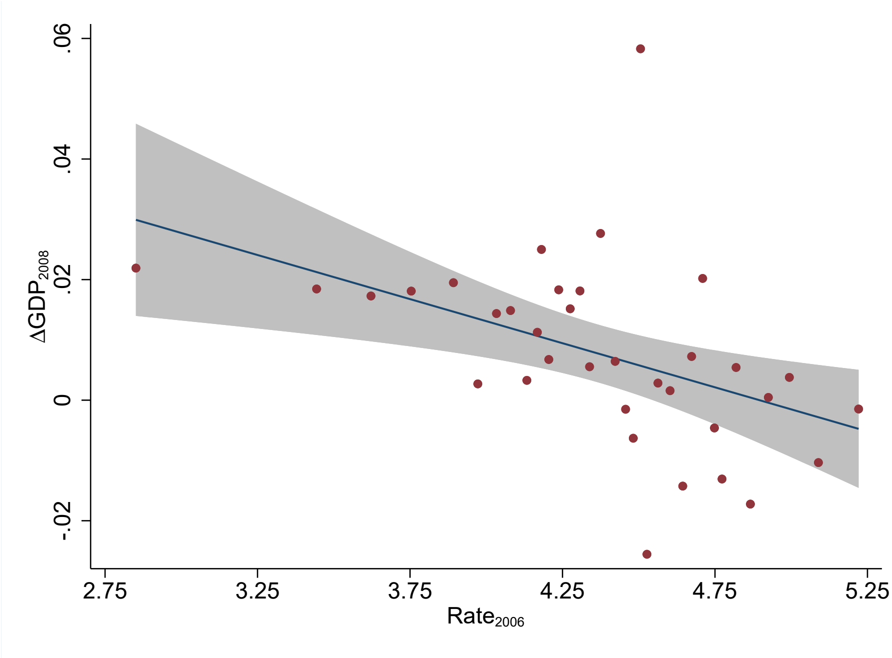
(b) 2009Q1



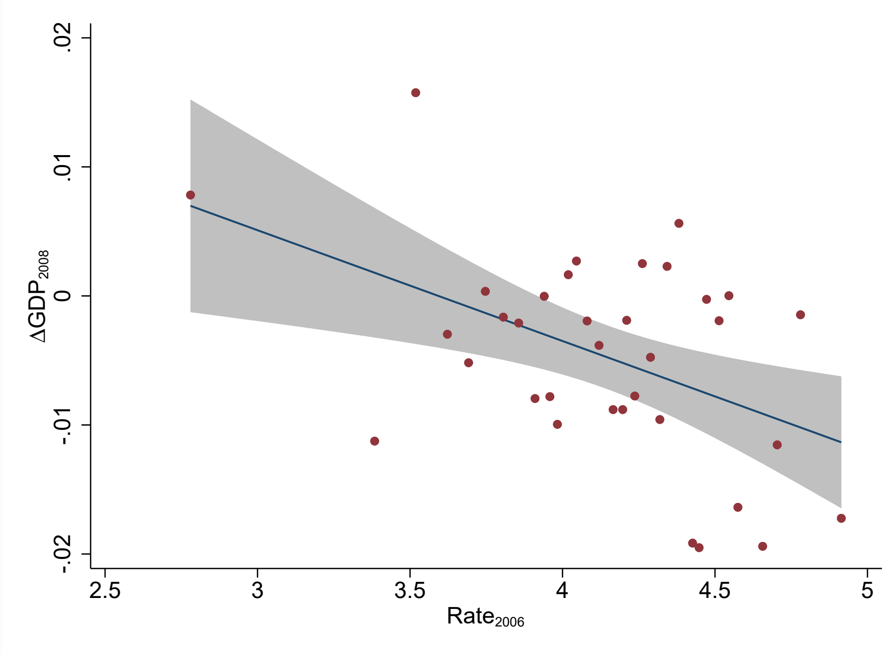
(c) 2017Q1

Notes: This figure uses RateWatch data to present a heatmap of state deposit rates (12-month, $10K CDs). Figure 5a presents state deposit rates in 2006Q4; Figure 5b presents state deposit rates in 2009Q1; Figure 5c presents state deposit rates in 2017Q1. The deposit rate is the rate on the 12-month certificate of deposit of at least $10,000. The intensity of the blue shading represents the quantile range of the deposit rate. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is computed as the average of the monthly county deposit rates in each year. The state deposit rate is then constructed as the weighted average of the county deposit rate for each state in the last reporting month of each quarter, weighted by the 2004 county GDP. The analysis is restricted to single-state banks. The intensity of the blue shading represents the quantile range of the deposit rate.

Figure 6: 2006 Deposit Rates Predict 2008 GDP Growth



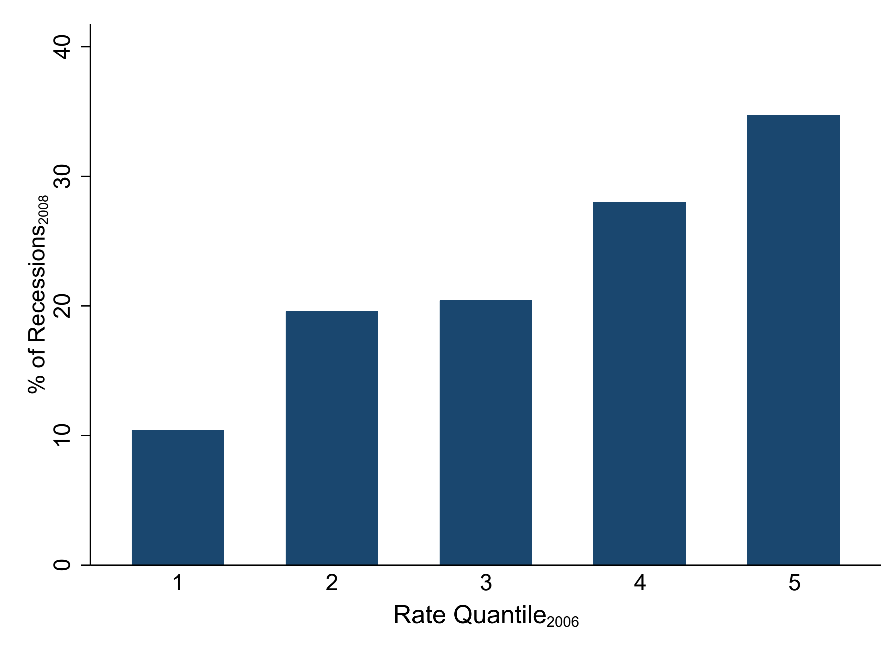
(a) County



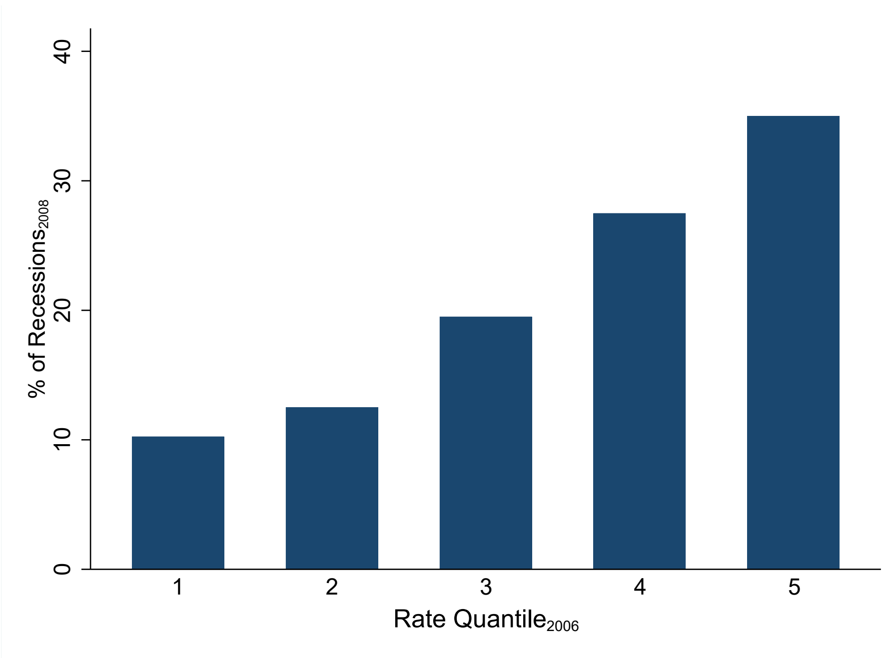
(b) State

Notes: This figure illustrates the binned bivariate averages ("binscatter") of the 2008 GDP growth rates at the county and state levels plotted against the 2006 deposit rates at the county and state levels. Figure 6a presents the binscatter (35 bins) of the annual county GDP growth in 2008 against the annual county deposit rates in 2006. Figure 6b presents the binscatter (35 bins) of the quarterly state GDP growth in 2008 against the quarterly state deposit rates in 2006. The red dots represent the bins, the blue line graph the predicted 2008 GDP growth rates from a linear regression, as well as the confidence interval interval (gray shading). The deposit rate is the rate on the 12-month certificate of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. The state deposit rate is then constructed as the weighted average of the county deposit rate for each state in the last reporting month of each quarter, weighted by the 2004 county GDP. The analysis is restricted to single-state banks. County (state) GDP data is available at the annual (quarterly) frequency from 2001 (2005Q1) from the Bureau of Economic Analysis (BEA).

Figure 7: 2006 Deposit Rates Predict 2008 Recessions



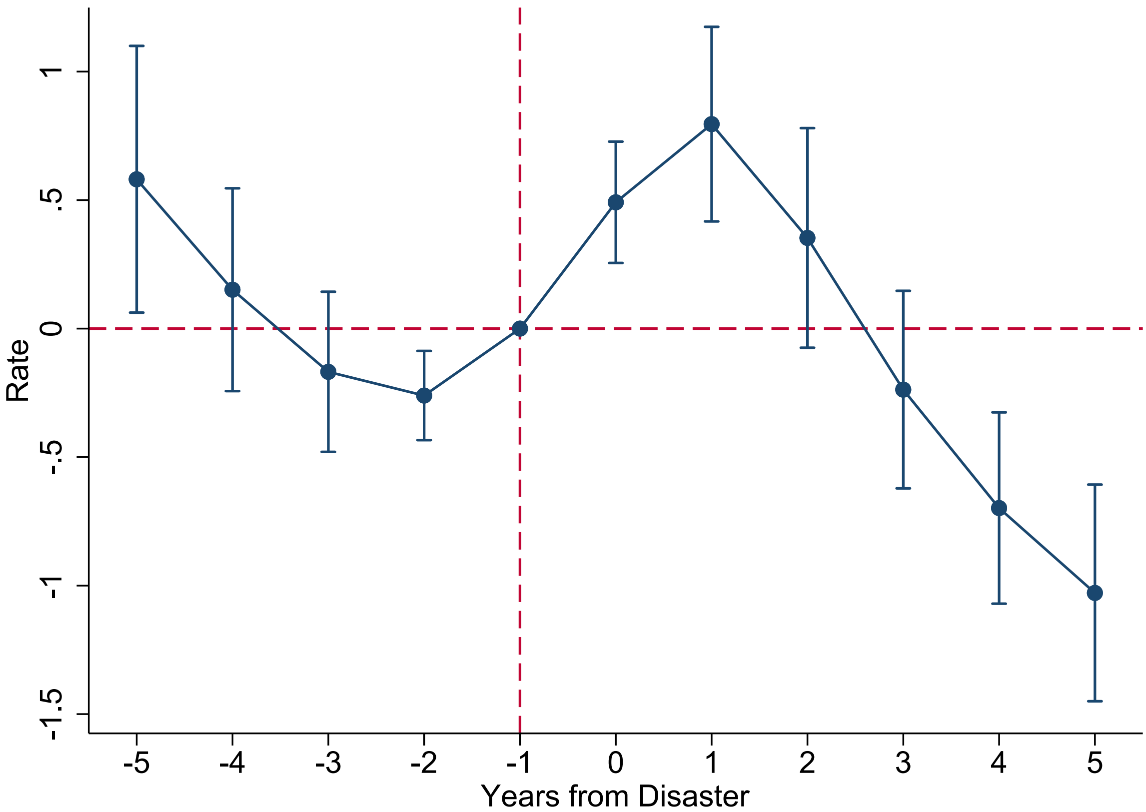
(a) County



(b) State

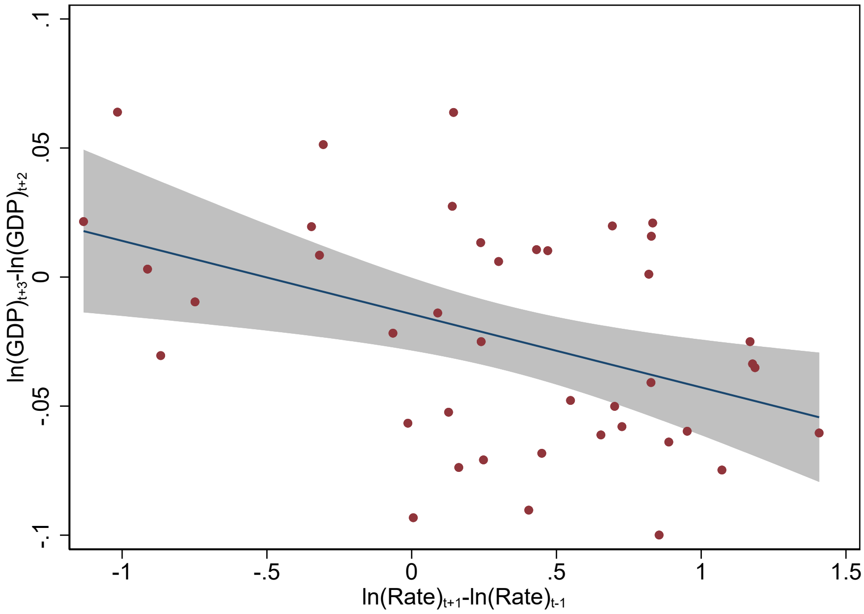
Notes: This figure presents bar graphs of the percent of county-years (state-quarters) in recession in 2008, categorized by the rate quintile of deposit rates across county-years (state-quarters) in 2006 in Figure 7a and Figure 7b, respectively. The deposit rate is the rate on the 12-month certificate of deposit of at least \$10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. The state deposit rate is then constructed as the weighted average of the county deposit rate for each state in the last reporting month of each quarter, weighted by the 2004 county GDP. The analysis is restricted to single-state banks. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). State GDP data is available at the quarterly frequency from 2005Q1 from the Bureau of Economic Analysis (BEA). A state is in a recession if its GDP growth between two consecutive quarters is below -2%.

Figure 8: Deposit Rates around Natural Disasters



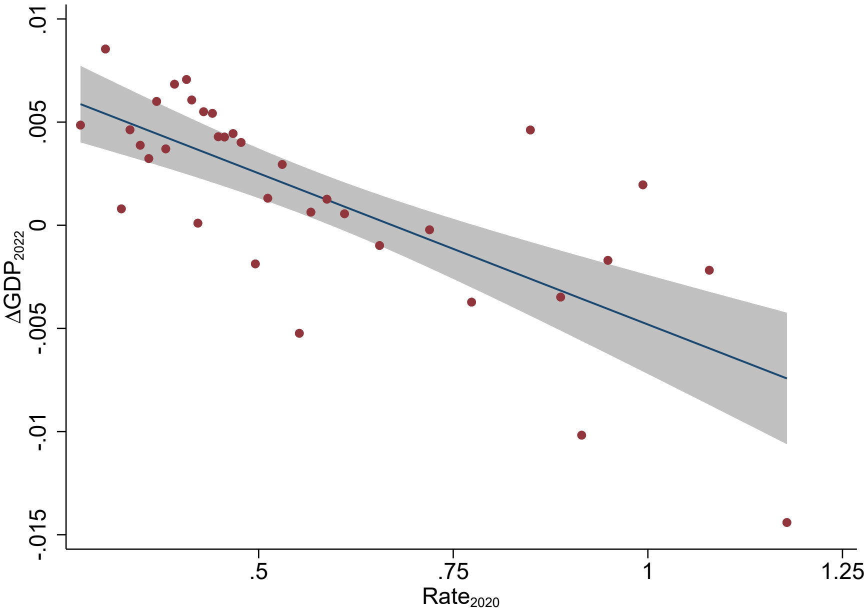
Notes: This figure presents the deposit rates around natural disasters. The figure plots the δ_{t+d} coefficients in the following regression specification of $Rate_{c,t} = \beta_0 + \sum_{k=-5}^{5} \delta_{t+d} + \alpha_c + \epsilon_{c,t}$ where d denotes to the year of the natural disaster, c denotes the county, t denotes the current year, and *Rate* denotes the deposit rate. The base year is -1 years from the disaster. We restrict our sample to disasters that last less than 31 days with total estimated damages above one billion 2018 constant dollars, following Barrot and Sauvagnat (2016). Data on natural disasters comes from the Spatial Hazard Events and Losses Database for the United States (SHELDUS). The deposit rate is the rate on the 12-month certificate of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). Standard errors are clustered by county FIPS.

Figure 9: Ex Post Deposit Rate Change around Disasters Predicts Future GDP Growth



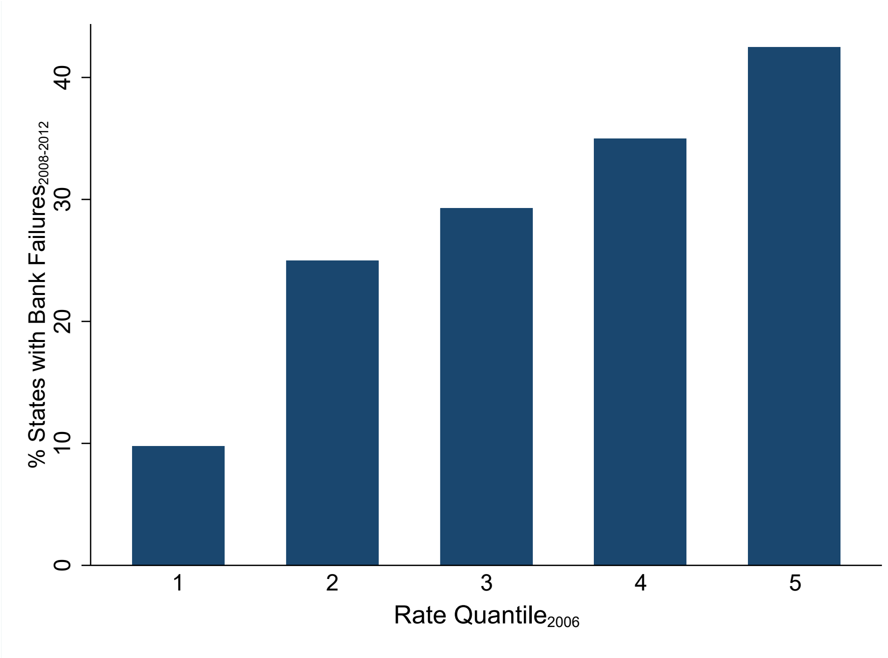
Notes: This figure illustrates the binned bivariate averages ("binscatter") of county-level GDP growth rate against the change in deposit rates after a natural disaster. The figure presents the binscatter (35 bins) of the annual county GDP growth, three years after a natural disaster, against the change in the deposit rate one year following a natural disaster. The red dots represent the bins, the blue line graph the predicted GDP growth rates from a linear regression, as well as the confidence interval interval (gray shading). The deposit rate is the rate on the 12-month certificate of deposit of at least \$10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. The change in the deposit rate (x-axis) is computed as the log difference of the deposit rate one year after a natural disaster, relative to one year before. The annual change in the deposit rate three years after a natural disaster (y-axis) is computed as the log difference in GDP. The sample is restricted to natural disasters that last less than 31 days with total damages above \$1 bn 2018 dollars. Data on natural disasters comes from the Spatial Hazard Events and Losses Database for the United States (SHELDUS). County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis. The sample period is 2001 through 2020. The analysis is restricted to single-state banks.

Figure 10: 2020 State Deposit Rates Predict 2022 State GDP Growth

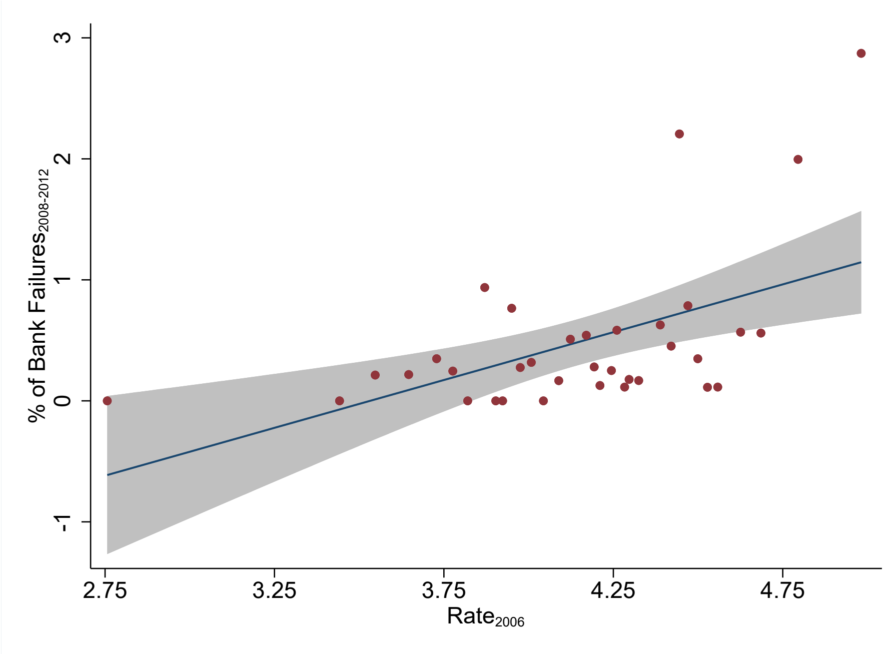


Notes: This figure illustrates the binned bivariate averages ("binscatter") of the 2022 quarterly state GDP growth rate against the 2020 quarterly deposit rate at the state level. The figure presents the binscatter (35 bins) of the quarterly state GDP growth in 2022 against the quarterly state deposit rates in 2020. The red dots represent the bins, the blue line graph the predicted 2020 GDP growth rates from a linear regression, as well as the confidence interval interval (gray shading). The deposit rate is the rate on the 12-month certificate of deposit of at least \$10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. The state deposit rate is then constructed as the weighted average of the county deposit rate for each state in the last reporting month of each quarter, weighted by the 2004 county GDP. The analysis is restricted to single-state banks. State GDP data is available at the quarterly frequency from 2005Q1 from the Bureau of Economic Analysis (BEA).

Figure 11: Deposit Rates Predict Bank Failures



(a) Extensive Margin



(b) Intensive Margin

Notes: The figures present the relation between deposit rates and financial risk at the state level. Figure 11a and Figure 11b present the association between state deposit rates in 2006 and bank failures between 2008 and 2012. Figure 11a presents a bar graph of the percent of states that experienced a bank failure between 2008 and 2012, categorized by the rate quintile of deposit rates across state-quarters in 2006. Figure 11b illustrates the binned bivariate averages ("binscatter") of the percent of banks that fail between 2008 and 2012 against the quarterly deposit rate at the state level. The figure presents the binscatter (35 bins) of the percent of banks that experienced failure between 2008 and 2012 against the quarterly state deposit rates in 2006. The red dots represent the bins, the blue line graph the predicted 2020 GDP growth rates from a linear regression, as well as the confidence interval interval (gray shading). The deposit rate is the rate on the 12-month certificate of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. The state deposit rate is then constructed as the weighted average of the county deposit rate for each state in the last reporting month of each quarter, weighted by the 2004 county GDP. The analysis is restricted to single-state banks. Bank failure data comes from the Federal Deposit Insurance Corporation (FDIC).

Table 1: Summary Statistics (2001-2020)

	N	P25	Median	P75	Mean	SD
Monthly Bank Deposit Rate	464,467	0.4900	1.1875	2.4800	1.6288	1.3670
Monthly Bank Dep. Rate SD	263,575	0.0859	0.1768	0.3246	0.2353	0.2060
Annual Deposit Rate	39,732	0.5000	1.1914	2.5436	1.6333	1.3416
Annual County Dep. Rate SD	39,428	0.0348	0.1399	0.2874	0.2036	0.2270
Annual County GDP Growth	59,127	-2.2974	1.2247	4.5548	1.2544	7.8028
Quarterly State Deposit Rate	3,247	0.3859	0.6785	1.9781	1.3265	1.3075
Quarterly State Dep. Rate SD	3,247	0.1959	0.3067	0.4862	0.3517	0.1813
Quarterly State GDP Growth	3,197	-0.2554	0.4171	1.0521	0.3084	1.7906

Notes: The table summarizes the key measures of the level and dispersion of bank deposit rates, as well as GDP growth. The columns, left to right, denote the variable of interest, number of observations, 25^{th} percentile value, median, 75^{th} percentile value, mean, and standard deviation in Columns 2-7. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. The state deposit rate is then constructed as the weighted average of the county deposit rate for each state in the last reporting month of each quarter, weighted by the 2004 county GDP. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. County (state) GDP data is available at the annual (quarterly) frequency from 2001 (2005Q1) from the Bureau of Economic Analysis (BEA).

Table 2: Economic Activity and Deposit Rate

Panel A: GDP Growth						
Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0012	-0.0044***	-0.0037***	-0.0032	-0.0075*	-0.0136***
	(0.0013)	(0.0013)	(0.0011)	(0.0040)	(0.0044)	(0.0049)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE				✓	✓	✓
N	4,545	4,268	4,008	4,545	4,268	4,008
R^2	0.0009	0.0116	0.0083	0.0003	0.0016	0.0049

Panel B: Business Formation						
ln(Applications)	1 Year Ahead	2 Years Ahead	3 Years Ahead	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0489***	-0.0541***	-0.0755***	0.0062	-0.0103	-0.0275
	(0.0045)	(0.0052)	(0.0061)	(0.0172)	(0.0188)	(0.0182)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE				✓	✓	✓
N	3,894	3,615	3,357	3,894	3,615	3,357
R^2	0.0589	0.0718	0.1430	0.0001	0.0003	0.0022

Panel C: Delinquency Rate						
Delinquency Rate (30-89 days)	1 Year Ahead	2 Years Ahead	3 Years Ahead	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.4069***	0.3458***	0.2812***	0.0575	0.0848*	0.0791*
	(0.0243)	(0.0259)	(0.0251)	(0.0419)	(0.0444)	(0.0452)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE				✓	✓	✓
N	2,329	2,312	2,126	2,329	2,312	2,126
R^2	0.1964	0.1527	0.1235	0.0027	0.0062	0.0061

Notes: This table presents the relation between county deposit rates and economic activity in metro counties. The table presents the results from estimating an OLS model of the change in economic activity in county c in year $t + k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity. The regression specification is the following: $Y_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t}$ where Y denotes GDP growth in Panel A, natural-log of the number of new business applications in Panel B, and the 30-89 day mortgage delinquency rate in Panel C. *Rate* denotes the average bank deposit rate. The deposit rate is the rate on 12-month certificates of deposit of at least \$10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). County new business applications, beginning in 2005, comes from the US Census Business Formation Statistics (BFS). County 30-89 day mortgage delinquency rate data, beginning in 2008, comes from the National Mortgage Database, conducted in collaboration with the Federal Housing Finance Agency (FHFA). The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table 3: Economic Activity and Deposit Rate: 2010-2015

Panel A: GDP Growth						
Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0144	-0.0306***	-0.0097	0.0158	-0.0505***	-0.0198
	(0.0095)	(0.0076)	(0.0115)	(0.0241)	(0.0153)	(0.0202)
County FIPS FE	✓	✓	✓			
Year FE				✓	✓	✓
N	1,456	1,436	1,423	1,456	1,436	1,423
R^2	0.0029	0.0143	0.0019	0.0007	0.0082	0.0016

Panel B: Business Formation						
ln(Applications)	1 Year Ahead	2 Years Ahead	3 Years Ahead	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.1251***	-0.2568***	-0.4099***	0.0444	-0.0127	-0.1247**
	(0.0223)	(0.0298)	(0.0388)	(0.0364)	(0.0521)	(0.0627)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE				✓	✓	✓
N	1,478	1,456	1,441	1,478	1,456	1,441
R^2	0.0579	0.1528	0.2633	0.0022	0.0002	0.0134

Panel C: Delinquency Rate						
Delinquency Rate (30-89 days)	1 Year Ahead	2 Years Ahead	3 Years Ahead	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	1.2526***	1.3158***	0.8789***	0.1335	0.0800	0.0119
	(0.0575)	(0.0662)	(0.0552)	(0.0960)	(0.1044)	(0.0876)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE				✓	✓	✓
N	1,085	1,073	1,067	1,085	1,073	1,067
R^2	0.4521	0.5956	0.5176	0.0067	0.0027	0.0001

Notes: This table presents the relation between county deposit rates and economic activity in metro counties. The table presents the results from estimating an OLS model of the change in economic activity in county c in year $t+k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity. The regression specification is the following: $Y_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t}$ where Y denotes GDP growth in Panel A, natural-log transformed number of new business applications in Panel B, and the 30-89 day mortgage delinquency rate in Panel C. *Rate* denotes the average bank deposit rate. The deposit rate is the rate on 12-month certificates of deposit of at least \$10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). County new business applications, beginning in 2005, comes from the US Census Business Formation Statistics (BFS). County 30-89 day mortgage delinquency rate data, beginning in 2008, comes from the National Mortgage Database, conducted in collaboration with the Federal Housing Finance Agency (FHFA). The sample period is 2010 through 2015. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table 4: Economic Activity and Deposit Rates after Accounting for Credit

Panel A: Small Business Lending Growth

$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0023	-0.0059***	-0.0058***
	(0.0015)	(0.0014)	(0.0014)
Δ ln(SBL)	0.0022**	0.0019	-0.0012
	(0.0010)	(0.0012)	(0.0020)
County FIPS FE	✓	✓	✓
N	4,299	4,027	3,767
R^2	0.0041	0.0187	0.0122

Panel B: Mortgage Growth

$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0021	-0.0059***	-0.0060***
	(0.0015)	(0.0014)	(0.0015)
Δ ln(Mortgages)	0.0007	0.0029***	0.0022**
	(0.0006)	(0.0007)	(0.0009)
County FIPS FE	✓	✓	✓
N	4,299	4,027	3,767
R^2	0.0023	0.0210	0.0133

Panel C: Total Credit Growth

$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0021	-0.0059***	-0.0060***
	(0.0015)	(0.0014)	(0.0015)
Δ ln(Total)	0.0004	0.0028***	0.0009
	(0.0006)	(0.0008)	(0.0013)
County FIPS FE	✓	✓	✓
N	4,299	4,027	3,767
R^2	0.0022	0.0209	0.0121

Notes: This table presents the relation between county deposit rates and economic activity in metro counties. The table presents the results from estimating an OLS model of the change in economic activity in county c in year $t+k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity. The regression specification is the following: $\Delta ln(GDP)_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \beta_2 \cdot \Delta ln(Credit)_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t}$ where $\Delta ln(GDP)$ denotes GDP growth, $Rate$ denotes the average bank deposit rate, and $\Delta ln(Credit)$ denotes credit growth. Credit growth is measured as the natural-log difference of small business lending in Panel A, natural-log difference of mortgages in Panel B, and natural-log difference of total lending (small business lending and mortgages) in Panel C. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). Data on small business lending is collected under the Community Reinvestment Act (CRA). Mortgage lending data is collected under the Home Mortgage Disclosure Act (HMDA). The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table 5: Deposit Rates Predict County Recessions

$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0232***	0.0541***	0.0474***
	(0.0049)	(0.0053)	(0.0058)
County FIPS FE	✓	✓	✓
N	4,337	4,037	3,793
pseudo R^2	0.0780	0.1022	0.0949
AUC	0.7016	0.7302	0.7231
Overall test statistic, χ^2	284.8578	382.0780	313.1834
p-value	0.0492	0.0000	0.0009

Notes: The table presents the average marginal effects of the covariates estimated from the following logit model of a county recession in county c at time (year) $t+k$ in metro counties: $logit(p_{c,t+k}) = \beta_0 + \beta_1 Rate_{c,t} + \beta_2 Rate_{c,t} + \alpha_c + \epsilon_{c,t+k}$ where $logit(p) = ln(\frac{p}{1-p})$ denotes the log of the odds ratio, *Rate* denotes the average bank deposit rate, t denotes the current year, and k denotes the number of leading years ($k = 1, 2, 3$). A county is in a recession if its GDP growth between two consecutive years is below -2%. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). The independent variable is standardized. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Heteroskedacticity-robust standard errors are reported in parentheses.

Table 6: Instrumental Variable Regression: Shipping Costs and Bank Deposit Rates

Rate	(1)	(2)	(3)	(4)	(5)	(6)
Shipping Costs	-0.0264***	-0.0205***	-0.0207***	-0.0181***	-0.0166***	-0.0130***
	(0.0055)	(0.0047)	(0.0047)	(0.0045)	(0.0045)	(0.0047)
log Employment						0.0085
						(0.0131)
Manufacturing Employment (%)						-0.0121*
						(0.0063)
log Income						0.0288*
						(0.0158)
log Debt						-0.0098
						(0.0142)
Δ_{91-99}HMDA Loan Orig.					-0.0090	0.0064
					(0.0062)	(0.0075)
Δ_{91-99} Net CH Import		-0.0045	-0.0048	-0.0038	-0.0033	0.0014
		(0.0053)	(0.0052)	(0.0051)	(0.0051)	(0.0052)
Bank × Month-Year FE	✓	✓	✓			
State FE		✓				
State × Month-Year FE			✓			
Bank × Month-Year × State FE				✓	✓	✓
Quintiles HP Growth						✓
N	350,251	350,250	350,187	263,644	263,644	263,644
R^2	0.9070	0.9114	0.9141	0.9345	0.9345	0.9348

Notes: This table presents the relation between shipping costs and bank deposit rates. The table presents regressions of bank deposit rates from 2001 to 2007 on shipping costs at the commuting zone level. The regression specification is the following: $\text{Deposit Rate}_{b,z,t} = \beta_1 \cdot \text{Shipping Costs}_z + X_z + \alpha_{b,s,t} + \epsilon_{b,z,t}$ where Rate denotes bank b's deposit rate at the commuting zone level z of state s measured in month-year t, Shipping Costs denotes the shipping costs at the commuting zone level, and X is a vector of controls including total employment, the share of manufacturing employment, total income, logarithm of total debt, the 1991-1999 change in loan originations, and the 1991-1999 change in net Chinese import penetration, as well as quintiles of the change in house prices between 1999 and 2007. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the Rate is constructed at the commuting level by taking a weighted average of the bank deposit data, weighted by a county's share of a commuting zone's GDP. The independent variables used in this regression come from Barrot et al. (2022). We refer readers to Barrot et al. (2022) for construction of the independent variables. Independent variables are standardized for ease of interpretation. The sample period is 2001 through 2007. The analysis is restricted to single-state banks. Two-way commuting zone and month-year clustered standard errors are reported in parentheses.

Table 7: Insured and Uninsured Deposit Growth and Bank Rate Changes

Panel A: Insured Deposit Growth							
$\Delta ln(\text{Insured})$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	t-3	t-2	t-1	t	t+1	t+2	t+3
$\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$	0.0010	-0.0001	-0.0014*	0.0005	0.0035***	0.0019***	0.0020***
	(0.0007)	(0.0007)	(0.0008)	(0.0007)	(0.0007)	(0.0006)	(0.0006)
$\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$	0.0009	-0.0013	-0.0033***	0.0013*	0.0061***	0.0032***	0.0012
	(0.0006)	(0.0008)	(0.0009)	(0.0007)	(0.0006)	(0.0005)	(0.0009)
$\mathbb{1}_{\text{Dep Rate Change}>P75}$	0.0015**	0.0001	-0.0033***	0.0052***	0.0080***	0.0045***	0.0017**
	(0.0007)	(0.0008)	(0.0008)	(0.0008)	(0.0009)	(0.0006)	(0.0007)
Quarter-Year FE	✓	✓	✓	✓	✓	✓	✓
N	234,296	238,782	243,571	243,714	238,978	234,508	230,172
R^2	0.0484	0.0548	0.0533	0.0535	0.0568	0.0597	0.0611

Panel B: Uninsured Deposit Growth							
$\Delta ln(\text{Uninsured})$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	t-3	t-2	t-1	t	t+1	t+2	t+3
$\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$	-0.0005	0.0017	-0.0034	0.0023	0.0044	-0.0015	-0.0050
	(0.0028)	(0.0035)	(0.0029)	(0.0031)	(0.0028)	(0.0027)	(0.0031)
$\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$	0.0048*	0.0019	-0.0065**	-0.0035	0.0082**	0.0011	-0.0061
	(0.0026)	(0.0030)	(0.0032)	(0.0028)	(0.0032)	(0.0031)	(0.0042)
$\mathbb{1}_{\text{Dep Rate Change}>P75}$	0.0014	0.0028	-0.0125***	-0.0004	0.0093***	0.0019	-0.0018
	(0.0027)	(0.0026)	(0.0030)	(0.0034)	(0.0026)	(0.0033)	(0.0031)
Quarter-Year FE	✓	✓	✓	✓	✓	✓	✓
N	233,084	237,548	242,312	242,464	240,887	239,551	238,319
R^2	0.0689	0.0703	0.0700	0.0703	0.0703	0.0706	0.0708

Notes: The table presents the coefficients estimated from the following regression for bank b at time t (quarter-year): $\Delta ln(Y)_{b,t+k} = \beta_0 + \beta_1 \mathbb{1}_{P25<\text{Dep Rate Change}\leq P50,b,t} + \beta_2 \mathbb{1}_{P50<\text{Dep Rate Change}\leq P75,b,t}$ $+ \beta_3 \mathbb{1}_{\text{Dep Rate Change}>P75,b,t} + \alpha_t + \epsilon_{b,t}$ where $\Delta ln(Deposits)_{b,t+k}$ denotes growth in insured deposits (Panel A) and uninsured deposits (Panel B), $\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$, $\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$, $\mathbb{1}_{\text{Dep Rate Change}>P75}$ denote the second, third, or fourth quartile of a bank's deposit rate change between two consecutive quarters, respectively. k denotes the number of lead/lag quarters. The deposit rate is the rate on 12-month certificates of deposit of at least \$10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across counties for each bank in each month is computed. The quarterly bank deposit rate is the bank deposit rate in the last reporting month of quarter. This rate is used to compute the quarterly change in banks' deposit rates. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Data on insured and uninsured deposits comes from the FDIC's Quarterly Financial Reports-Statistics on Depository Institutions. Two-way bank and quarter-year clustered standard errors are reported in parentheses.

Table 8: Ratio of Insured to Uninsured Deposit Growth and Bank Rate Changes

$\Delta ln(\frac{\text{Insured}}{\text{Uninsured}})$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	t-3	t-2	t-1	t	t+1	t+2	t+3
$\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$	0.0016	-0.0012	0.0019	-0.0018	-0.0010	0.0031	0.0071**
	(0.0029)	(0.0036)	(0.0031)	(0.0031)	(0.0029)	(0.0029)	(0.0032)
$\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$	-0.0033	-0.0028	0.0031	0.0047*	-0.0021	0.0019	0.0076*
	(0.0028)	(0.0032)	(0.0034)	(0.0028)	(0.0032)	(0.0032)	(0.0042)
$\mathbb{1}_{\text{Dep Rate Change}>P75}$	0.0001	-0.0024	0.0094***	0.0055	-0.0015	0.0025	0.0038
	(0.0027)	(0.0028)	(0.0030)	(0.0033)	(0.0026)	(0.0035)	(0.0033)
Quarter-Year FE	✓	✓	✓	✓	✓	✓	✓
N	228,690	233,080	237,696	242,462	240,885	239,376	238,072
R^2	0.0825	0.0828	0.0822	0.0819	0.0810	0.0813	0.0815

Notes: The table presents the coefficients estimated from the following regression for bank b at time t (quarter-year): $\Delta ln(\frac{Insured}{Uninsured})_{b,t+k} = \beta_0 + \beta_1 \mathbb{1}_{P25<\text{Dep Rate Change}\leq P50,b,t} + \beta_2 \mathbb{1}_{P50<\text{Dep Rate Change}\leq P75,b,t}$ $+ \beta_3 \mathbb{1}_{\text{Dep Rate Change}>P75,b,t} + \alpha_t + \epsilon_{b,t}$ where $\Delta ln(\frac{Uninsured}{Insured})_{b,t+k}$ denotes growth in the ratio of insured to uninsured deposits, $\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$, $\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$, $\mathbb{1}_{\text{Dep Rate Change}>P75}$ denote the second, third, or fourth quartile of a bank's deposit rate change between two consecutive quarters, respectively. k denotes the number of lead/lag quarters. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the average deposit rate across counties for each bank in each month is computed. The quarterly bank deposit rate is the bank deposit rate in the last reporting month of quarter. This rate is used to compute the quarterly change in banks' deposit rates. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Data on insured and uninsured deposits comes from the FDIC's Quarterly Financial Reports-Statistics on Depository Institutions. Two-way bank and quarter-year clustered standard errors are reported in parentheses.

Table 9: Loan Growth and Bank Rate Changes

Δln(Loans)	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	t-3	t-2	t-1	t	t+1	t+2	t+3
$\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$	-0.0002	0.0013*	0.0016**	0.0022***	-0.0002	0.0011*	0.0013**
	(0.0007)	(0.0007)	(0.0007)	(0.0008)	(0.0006)	(0.0006)	(0.0005)
$\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$	-0.0017**	0.0009	0.0029***	0.0018**	0.0004	0.0012**	0.0014**
	(0.0008)	(0.0008)	(0.0008)	(0.0007)	(0.0007)	(0.0006)	(0.0005)
$\mathbb{1}_{\text{Dep Rate Change}>P75}$	0.0018**	0.0028***	0.0061***	0.0054***	0.0019***	0.0019***	0.0022***
	(0.0009)	(0.0008)	(0.0009)	(0.0008)	(0.0006)	(0.0006)	(0.0005)
Quarter-Year FE	✓	✓	✓	✓	✓	✓	✓
N	212,897	217,267	221,913	222,368	218,083	213,718	209,460
R^2	0.0226	0.0223	0.0221	0.0229	0.0262	0.0307	0.0317

Notes: The table presents the coefficients estimated from the following regression for bank b at time t (quarter-year): $\Delta ln(Loans)_{b,t+k} = \beta_0 + \beta_1 \mathbb{1}_{P25<\text{Dep Rate Change}\leq P50,b,t} + \beta_2 \mathbb{1}_{P50<\text{Dep Rate Change}\leq P75,b,t} + \beta_3 \mathbb{1}_{\text{Dep Rate Change}>P75,b,t} + \alpha_t + \epsilon_{b,t}$ where $\Delta ln(Loans)_{b,t+k}$ denotes lending growth, $\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$, $\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$, $\mathbb{1}_{\text{Dep Rate Change}>P75}$ denote the second, third, or fourth quartile of a bank's deposit rate change between two consecutive quarters, respectively. k denotes the number of lead/lag quarters. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across counties for each bank in each month is computed. The quarterly bank deposit rate is the bank deposit rate in the last reporting month of quarter. This rate is used to compute the quarterly change in banks' deposit rates. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Data on bank lending comes from the Call Reports. Two-way bank and quarter-year clustered standard errors are reported in parentheses.

Table 10: GDP Growth and State Deposit Rate

Δln(GDP)	4 Qtrs Ahead	8 Qtrs Ahead	12 Qtrs Ahead	4 Qtrs Ahead	8 Qtrs Ahead	12 Qtrs Ahead
Rate	-0.0010***	-0.0011***	-0.0005**	-0.0031*	-0.0047***	-0.0069***
	(0.0002)	(0.0002)	(0.0002)	(0.0017)	(0.0018)	(0.0020)
State FE	✓	✓	✓	✓	✓	✓
Quarter-Year FE				✓	✓	✓
N	3,040	2,836	2,632	3,040	2,836	2,632
R^2	0.0043	0.0052	0.0012	0.0013	0.0030	0.0065

Notes: This table presents the relation between state deposit rates and economic activity. The table presents the results from estimating an OLS model of the change in economic activity in county s in quarter-year $t+k$ as a function of the average deposit rate within a county at quarter-year t. We consider up to twelve-quarter (k = 4, 8, 12) lead indicators of economic activity. The regression specification is the following: $\Delta ln(GDP)_{s,t+k} = \beta_1 \cdot Rate_{s,t} + \alpha_s + \alpha_t + \epsilon_{s,t}$ where $\Delta ln(GDP)$ denotes GDP growth. *Rate* denotes the average bank deposit rate. The deposit rate is the rate on 12-month certificates of deposit of at least \$10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. The state deposit rate is then constructed as the weighted average of the county deposit rate for each state in the last reporting month of each quarter, weighted by the 2004 county GDP. The independent variable is standardized. The sample period is 2005Q1 through 2020Q4. The analysis is restricted to single-state banks. State GDP data is available at the quarterly frequency from 2005Q1 from the Bureau of Economic Analysis (BEA). Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table 11: Deposit Rates Predict State Recessions

$\mathbb{1}_{Recession}$	(1)	(2)	(3)
	4 Qtrs Ahead	8 Qtrs Ahead	12 Qtrs Ahead
Rate	0.0240***	0.0250***	0.0146***
	(0.0034)	(0.0039)	(0.0037)
State FE	✓	✓	✓
N	3,040	2,836	2,632
pseudo R^2	0.0829	0.0849	0.0562
AUC	0.7393	0.7291	0.6864
Overall test statistic, χ^2	126.0803	97.2976	60.8829
p-value	0.0000	0.0001	0.1619

Notes: The table presents the average marginal effects of the covariates estimated from the following logit model of a state recession in state s at time (quarter-year) $t+k$: $logit(p_{s,t+k}) = \beta_0 + \beta_1 Rate_{s,t} + \beta_2 Rate_{s,t} + \alpha_c + \epsilon_{s,t+k}$ where $logit(p) = ln(\frac{p}{1-p})$ denotes the log of the odds ratio, *Rate* denotes the average bank deposit rate, t denotes the current year, and k denotes the number of leading quarters ($k = 4, 8, 12$). A state is in a recession if its GDP growth between two consecutive quarters is below -2%. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. The state deposit rate is then constructed as the weighted average of the county deposit rate for each state in the last reporting month of each quarter, weighted by the 2004 county GDP. The independent variable is standardized. The sample period is 2005Q1 through 2020Q4. The analysis is restricted to single-state banks. State GDP data is available at the quarterly frequency from 2005Q1 from the Bureau of Economic Analysis (BEA). Heteroskedacticity-robust standard errors are reported in parentheses.

Table 12: Deposit Rate Predicts Recessions after Accounting for Deposit Growth

Panel A: Deposit Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(Deposit)	-0.1467***	0.0043	0.0986*
	(0.0504)	(0.0505)	(0.0515)
County FIPS FE	✓	✓	✓
N	4,337	4,037	3,793
pseudo R^2	0.0750	0.0724	0.0738
AUC	0.6981	0.6823	0.6913
Overall test statistic, χ^2	267.6699	240.1727	236.2742
p-value	0.1749	0.5029	0.5377

Panel B: Deposit Rate and Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0242***	0.0544***	0.0469***
	(0.0049)	(0.0053)	(0.0058)
Δ ln(Deposit)	-0.0200***	-0.0051	0.0078
	(0.0063)	(0.0060)	(0.0062)
County FIPS FE	✓	✓	✓
N	4,337	4,037	3,793
pseudo R^2	0.0805	0.1023	0.0952
AUC	0.7037	0.7302	0.7229
Overall test statistic, χ^2	301.1634	384.4420	314.1366
p-value	0.0118	0.0000	0.0009

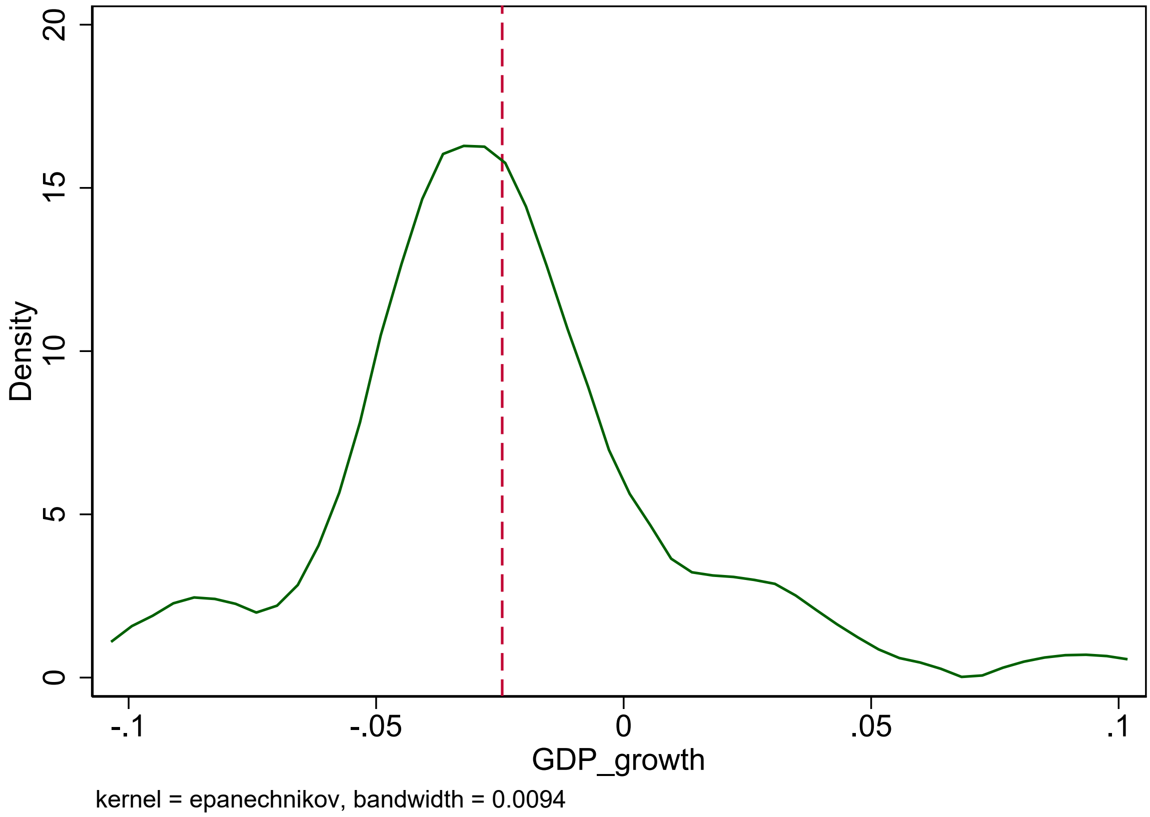
Notes: The table presents the average marginal effects of the covariates estimated from the following logit models of a county recession in county c at time (year) $t+k$ in metro counties. In Panel A, we estimate $logit(p_{c,t+k}) = \beta_0 + \beta_1 \cdot \Delta ln(Deposit)_{c,t} + \alpha_c + \epsilon_{c,t+k}$ where $logit(p) = ln(\frac{p}{1-p})$. In Panel B, we estimate $logit(p_{c,t+k}) = \beta_0 + \beta_1 \cdot \Delta Rate_{c,t} + \beta_2 \cdot \Delta ln(Deposit)_{c,t} + \alpha_c + \epsilon_{c,t+k}$. $logit(p) = ln(\frac{p}{1-p})$ denotes the log of the odds ratio, $\Delta ln(Deposits)$ denotes deposit growth, t denotes the current year, and k denotes the number of leading years ($k = 1, 2, 3$). A county is in a recession if its GDP growth between two consecutive years is below -2%. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). County deposit data comes from the FDIC Summary of Deposits database. The independent variables are standardized. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Heteroskedacticity-robust standard errors are reported in parentheses.

Online Appendix for:

Canary in the Coal Mine: Bank Liquidity Shortages and Local Economic Activity

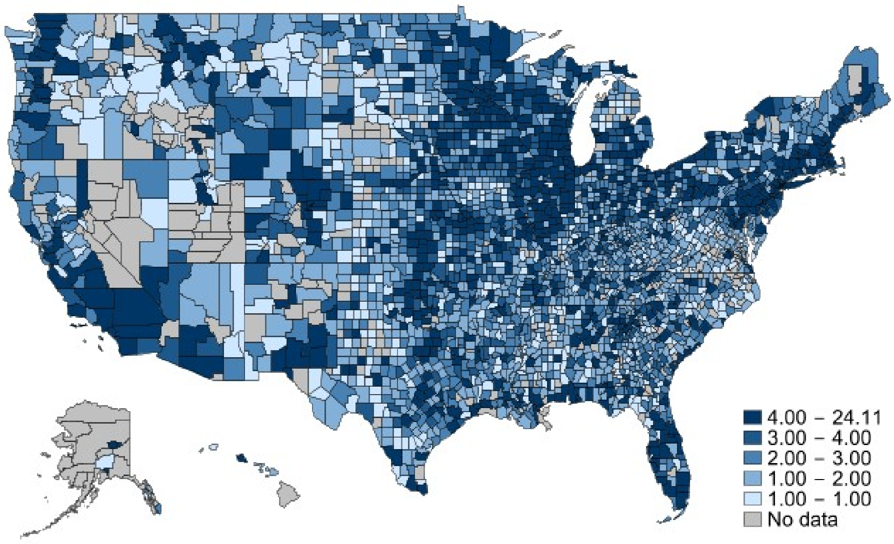
Appendix A Figures and Tables

Figure A.1: Density of State GDP Growth in 2009



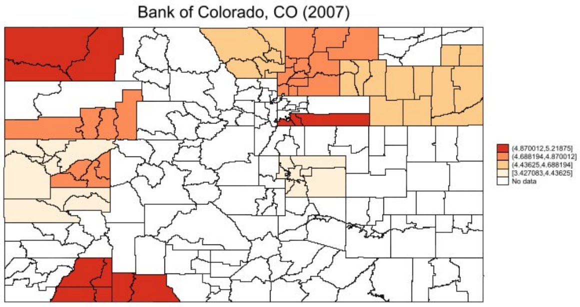
Notes: This figure presents the kernel density of state GDP growth in 2009. State GDP data comes from the Bureau of Economic Analysis (BEA). The average state GDP growth was -2.45%, as demarcated by the dashed, red line.

Figure A.2: Number of Banks per County (2001-2020)

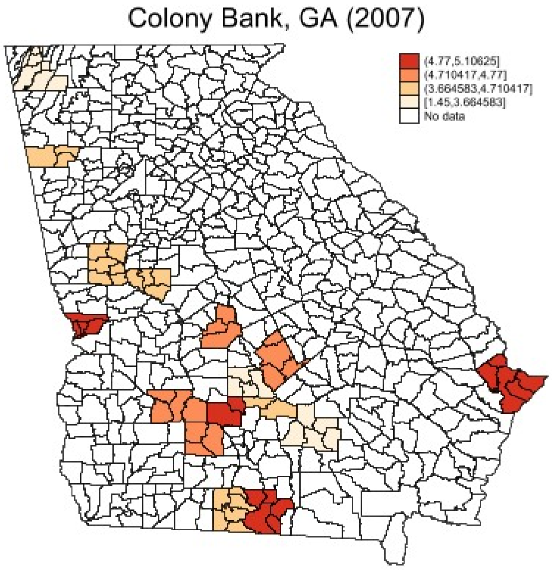


Notes: This figure presents a heatmap of the average number of banks that offer 12-month certificates of deposit of at least $10,000 in each county from 2001 to 2020. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the total number of banks in each county for each month is computed. Then, the mean number of banks is computed across the sample period. The intensity of the blue shading represents the number of banks operating in a particular county.

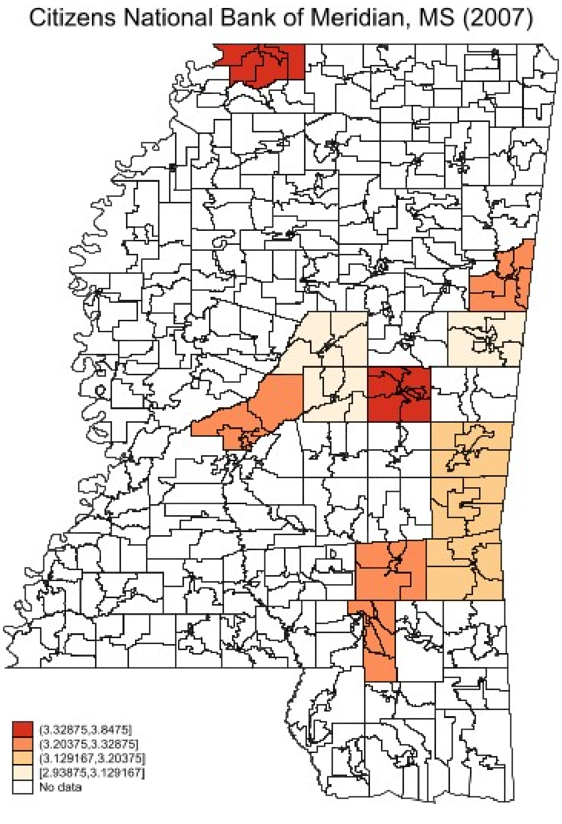
Figure A.3: Bank Deposit Rates: 2007



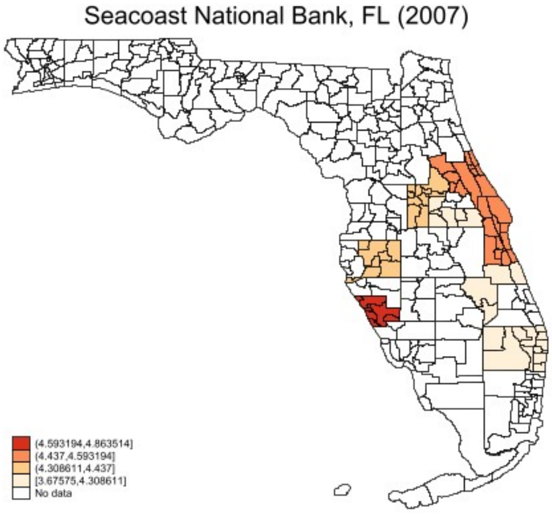
(a) Bank of Colorado



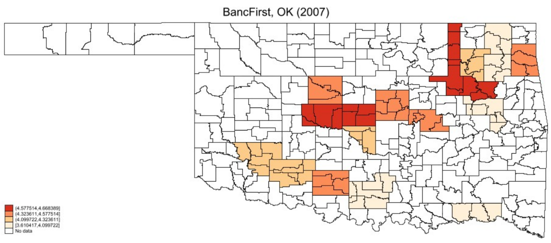
(b) Colony Bank



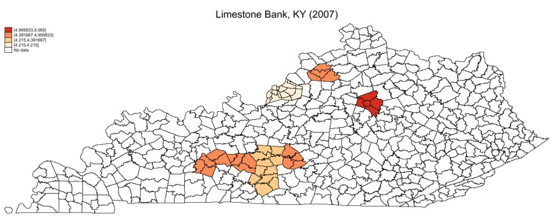
(c) Citizens National Bank of Meridian



(d) Seacoast National Bank



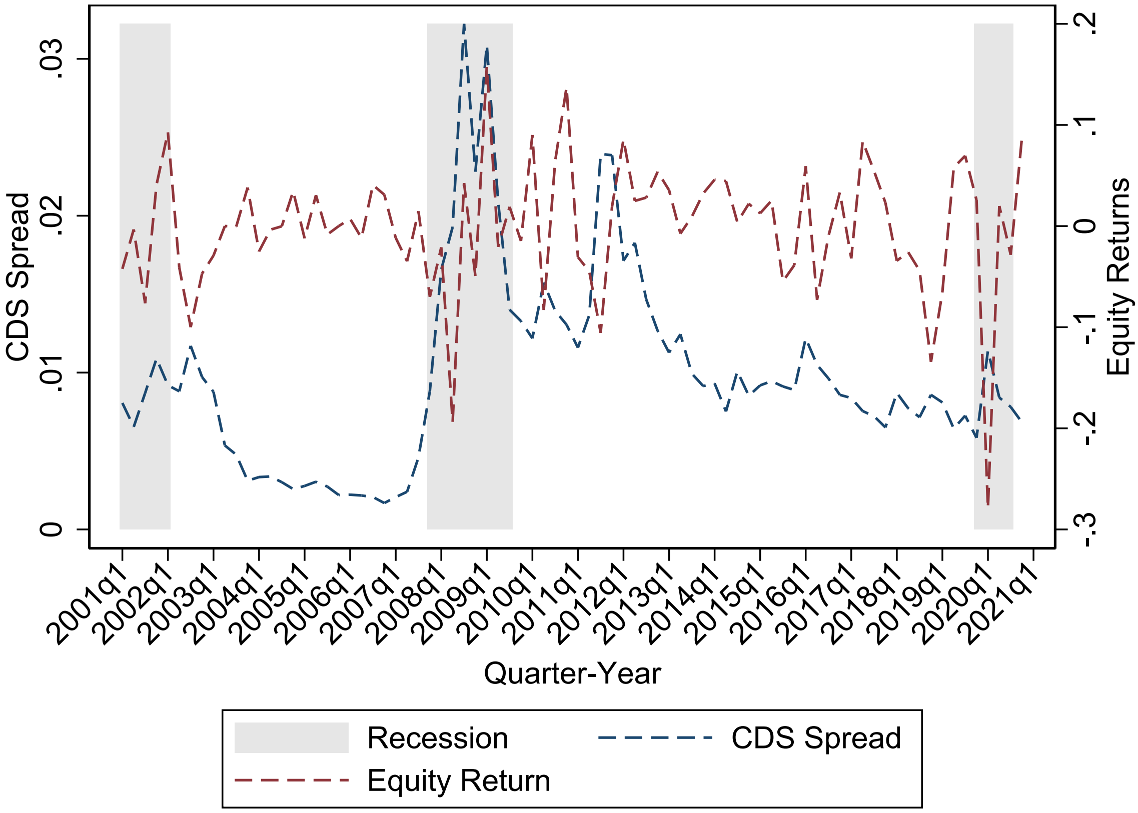
(e) BancFirst (OK)



(f) Limestone Bank

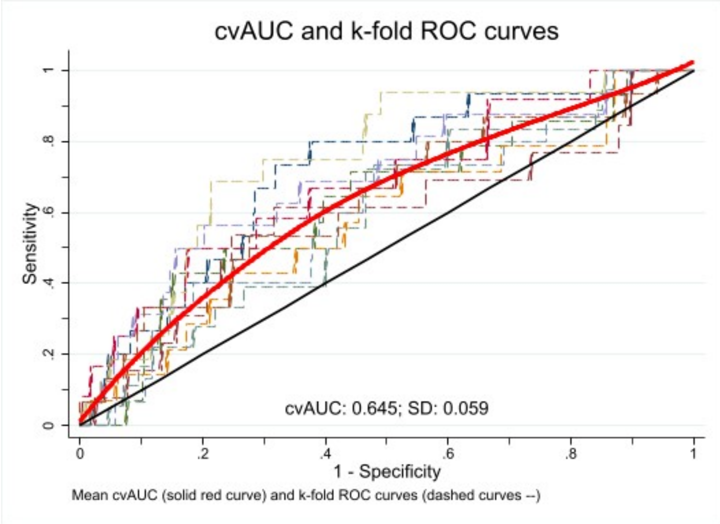
Notes: This figure uses RateWatch data to present a heatmap of county deposit rates (12-month, $10K CDs) in 2007. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the annual bank deposit rate in each county is computed as the average of the monthly bank-county deposit rates in each year. Heatmaps of the deposit rates are presented for the following banks in 2007: Bank of Colorado (Appendix Figure A.3a), Colony Bank (Appendix Figure A.3b), Citizens National Bank of Meridian Bank (Appendix Figure A.3c), Seacoast National Bank (Appendix Figure A.3d), BancFirst (Appendix Figure A.3e), and Limestone Bank (Appendix Figure A.3f). The deposit rate is the rate on the 12-month certificate of deposit of at least $10,000. The intensity of the blue shading represents the quantile range of the deposit rate.

Figure A.4: CDS Spreads and Equity Returns

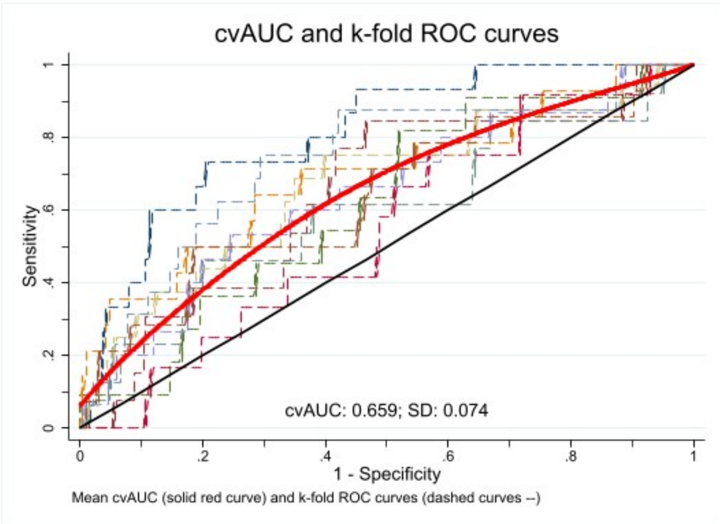


Notes: This figure presents a time-series plot of the quarterly average credit default swap spread and quarterly equity returns for a subset of banks that issue both equity and credit default swaps. The left y-axis indicates CDS spreads. The rigth y-axis indicates equity returns. The gray bars indicate national recessions, according the NBER Business Cycle Dating Committee. The data is at the quarterly frequency and spans from 2001Q1 through 2020Q4. The analysis is restricted to single-state banks. Credit default swap data comes from Markit. Equity returns come from CRSP.

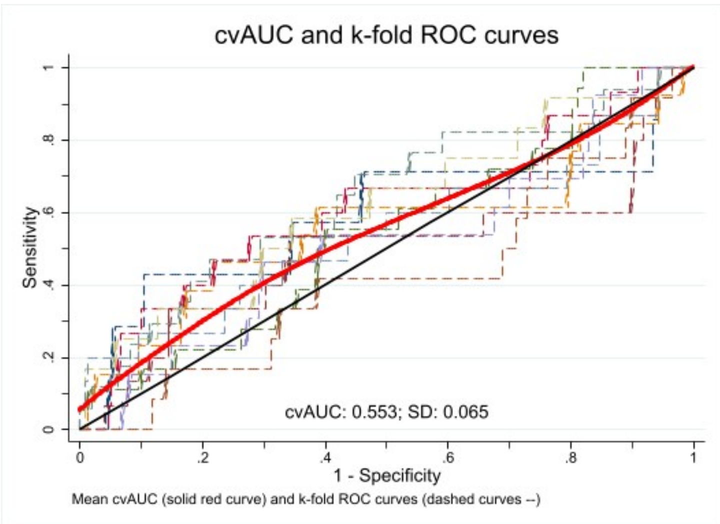
Figure A.5: Out-of-Sample Estimation: Deposit Rates Predict State Recessions



(a) Recession in 4 Quarters



(b) Recession in 8 Quarters



(c) Recession in 12 Quarters

Notes: This figure presents the k-fold cross-validated ROC curves and AUC. The dataset is partitioned into k subsamples of equal size. $k-1$ subsamples are used as the training set while one subsample is retained as the validation or testing set in the AUC is evaluated. The AUC iteratively k times, so that each of the k subsamples is used as the testing set once. Each fold is analyzed using the following logistic regression: $logit(p_{c,t+k}) = \beta_0 + \beta_1 Rate_{c,t} + \alpha_c + \epsilon_{c,t}$ where $logit(p) = ln(\frac{p}{1-p})$ denotes the log of the odds ratio, *Rate* denotes the average bank deposit rate. We assume that $\epsilon_{c,t}$ is well-behaved. We consider up to 12-quarter (k = 4, 8, 12) lead indicators of economic activity. The cross-validated AUCs are averaged from each fold. 10 folds are used to produce these figures. Figure A.5a, Figure A.5b, and Figure A.5c reports the cross-validated AUCs using the 4-quarter, 8-quarter, 12-quarter forecast classifiers. The sample period is 2001 through 2020. The analysis is restricted to single-state banks.

Table A.1: Economic Activity and Deposit Rate: 1-Month CD

Panel A: GDP Growth			
Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0047	-0.0070**	-0.0023**
	(0.0041)	(0.0029)	(0.0011)
County FIPS FE	✓	✓	✓
N	1,251	1,100	966
R^2	0.0125	0.0291	0.0032
Panel B: Business Formation			
ln(Applications)	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0493***	-0.0444***	-0.0585***
	(0.0056)	(0.0077)	(0.0066)
County FIPS FE	✓	✓	✓
N	1,344	1,183	1,050
R^2	0.0465	0.0390	0.0734
Panel C: Delinquency Rate			
Delinquency Rate (30-89 days)	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.4292***	0.3703***	0.3651***
	(0.0417)	(0.0412)	(0.0392)
County FIPS FE	✓	✓	✓
N	1,059	1,000	883
R^2	0.1951	0.1592	0.1783

Notes: This table presents the relation between county deposit rates and economic activity in metro counties. The table presents the results from estimating an OLS model of the change in economic activity in county c in year $t+k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity. The regression specification is the following: $Y_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \alpha_c + \epsilon_{c,t}$ where Y denotes GDP growth in Panel A, natural-log transformed number of new business applications in Panel B, and the 30-89 day mortgage delinquency rate in Panel C. *Rate* denotes the average bank deposit rate. The deposit rate is the rate on 1-month certificate of deposit of at least \$10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). County new business applications, beginning in 2005, comes from the US Census Business Formation Statistics (BFS). County 30-89 day mortgage delinquency rate data, beginning in 2008, comes from the National Mortgage Database, conducted in collaboration with the Federal Housing Finance Agency (FHFA). The independent variable is standardized. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table A.2: Unemployment Rate and Deposit Rate

Unemp. Rate	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0943*	0.5304***	1.0448***
	(0.0539)	(0.0535)	(0.0599)
County FIPS FE	✓	✓	✓
N	4,830	4,542	4,278
R^2	0.0025	0.0775	0.3006

Notes: This table presents the relation between county deposit rates and unemployment rates in metro counties. The table presents the results from estimating an OLS model of the change in economic activity in county c in year $t+k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity. The regression specification is the following: $Unemp_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \alpha_c + \epsilon_{c,t}$ where $Unemp$ denotes the unemployment rate. $Rate$ denotes the average bank deposit rate. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County unemployment rate data comes from the Bureau of Labor Statistics (BLS). The independent variable is standardized. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table A.3: Late Stage Delinquency Rate and Deposit Rate

Delinquency Rate (90+ days)	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.4478***	0.6718***	0.6402***
	(0.0577)	(0.0556)	(0.0461)
County FIPS FE	✓	✓	✓
N	2,329	2,312	2,126
R^2	0.0914	0.2114	0.2458

Notes: This table presents the relation between county deposit rates and late stage delinquency rates in metro counties. The table presents the results from estimating an OLS model of the change in economic activity in county c in year $t+k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity. The regression specification is the following: $Delinquency_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \alpha_c + \epsilon_{c,t}$ where *Delinquency* denotes 90+ day mortgage delinquency rate. *Rate* denotes the average bank deposit rate. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County 90+ day mortgage delinquency rate data, beginning in 2008, comes from the National Mortgage Database, conducted in collaboration with the Federal Housing Finance Agency (FHFA). The independent variable is standardized. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table A.4: CPI Growth and Deposit Rate

CPI (% Chg.)	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.1878***	-0.2053***	-0.1123
	(0.0588)	(0.0707)	(0.0812)
County FIPS FE	✓	✓	✓
N	2,570	2,559	2,426
R^2	0.0208	0.0118	0.0034

Notes: This table presents the relation between county deposit rates and inflation in metro counties. The table presents the results from estimating an OLS model of the change in economic activity in county c in year $t + k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity. The regression specification is the following: $CPI_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \alpha_c + \epsilon_{c,t}$ where CPI denotes the annual percentage change in CPI. *Rate* denotes the average bank deposit rate. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. Metro area CPI data for 23 metro areas comes from the Bureau of Labor Statistics (BLS). The independent variable is standardized. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table A.5: Unemployment Rate and Deposit Rate: 2010-2015

Unemp. Rate	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	7.2292***	6.9339***	6.4179***
	(0.3908)	(0.4469)	(0.3838)
County FIPS FE	✓	✓	✓
N	1,478	1,456	1,441
R^2	0.4602	0.5109	0.5745

Notes: This table presents the relation between county deposit rates and unemployment rates in metro counties. The table presents the results from estimating an OLS model of the change in economic activity in county c in year $t+k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity. The regression specification is the following: $Unemp_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \alpha_c + \epsilon_{c,t}$ where $Unemp$ denotes the unemployment rate. $Rate$ denotes the average bank deposit rate. The deposit rate is the rate on 12-month certificates of deposit of at least \$10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County unemployment rate data comes from the Bureau of Labor Statistics (BLS). The independent variable is standardized. The sample period is 2010 through 2015. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table A.6: Late Stage Delinquency Rate and Deposit Rate: 2010-2015

Delinquency Rate (90+ days)	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	2.2212***	2.4753***	2.0014***
	(0.1648)	(0.1909)	(0.1968)
County FIPS FE	✓	✓	✓
N	1,085	1,073	1,067
R^2	0.3467	0.4628	0.4526

Notes: This table presents the relation between county deposit rates and late stage delinquency rates in metro counties. The table presents the results from estimating an OLS model of the change in economic activity in county c in year $t + k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity. The regression specification is the following: $Delinquency_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \alpha_c + \epsilon_{c,t}$ where *Delinquency* denotes 90+ day mortgage delinquency rate. *Rate* denotes the average bank deposit rate. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County 90+ day mortgage delinquency rate data, beginning in 2008, comes from the National Mortgage Database, conducted in collaboration with the Federal Housing Finance Agency (FHFA). The independent variable is standardized. The sample period is 2010 through 2015. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table A.7: GDP Growth and Deposit Rate: 2006

$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0162**	-0.0158**	-0.0025
	(0.0068)	(0.0071)	(0.0060)
N	240	241	238
R^2	0.0169	0.0181	0.0005

Notes: This table presents the relation between county deposit rates in 2006 and economic activity in metro counties. The table presents the results from estimating an OLS model of the change in economic activity in county c in year $t+k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity. The regression specification is the following: $GDP_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \epsilon_{c,t}$ where GDP denotes GDP growth. $Rate$ denotes the average bank deposit rate. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. The independent variable is standardized. The analysis is restricted to single-state banks. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table A.8: CPI Growth and Deposit Rate: 2006

CPI (% Chg.)	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0668	-0.3187**	-0.6433*
	(0.1991)	(0.1537)	(0.3371)
N	124	123	124
R^2	0.0011	0.0498	0.0820

Notes: This table presents the relation between county deposit rates in 2006 and inflation in metro counties. The table presents the results from estimating an OLS model of the change in economic activity in county c in year $t+k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity. The regression specification is the following: $CPI_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \epsilon_{c,t}$ where CPI denotes the annual percentage change in CPI. *Rate* denotes the average bank deposit rate. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. Metro area CPI data for 23 metro areas comes from the Bureau of Labor Statistics (BLS). Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. The independent variable is standardized. The analysis is restricted to single-state banks. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table A.9: Uninsured Deposit Rates Predict County Recessions

$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0453***	0.0759***	0.0385***
	(0.0087)	(0.0108)	(0.0127)
County FIPS FE	✓	✓	✓
N	1,979	1,677	1,500
pseudo R^2	0.1026	0.1119	0.0868
AUC	0.7317	0.7403	0.7086
Overall test statistic, χ^2	180.4015	171.1807	114.3634
p-value	0.7656	0.8051	1.0000

Notes: The table presents the average marginal effects of the covariates estimated from the following logit model of a county recession in county c at time (year) $t+k$ in metro counties: $logit(p_{c,t+k}) = \beta_0 + \beta_1 Rate_{c,t} + \alpha_c + \epsilon_{c,t+k}$ where $logit(p) = ln(\frac{p}{1-p})$ denotes the log of the odds ratio, *Rate* denotes the average bank deposit rate, t denotes the current year, and k denotes the number of leading years ($k = 1, 2, 3$). A county is in a recession if its GDP growth between two consecutive years is below -2%. The deposit rate is the rate on uninsured 12-month certificates of deposit of at least $100,000 from 2001 through September of 2008, and at least $250,000 thereafter. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). The independent variable is standardized. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Heteroskedacticity-robust standard errors are reported in parentheses.

Table A.10: Deposit Rates Predict County Recessions: Urban and Rural

$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0051**	0.0226***	0.0096***
	(0.0025)	(0.0026)	(0.0027)
County FIPS FE	✓	✓	✓
N	31,082	28,983	27,044
pseudo R^2	0.0741	0.0754	0.0740
AUC	0.6828	0.6844	0.6814
Overall test statistic, χ^2	2254.0163	2226.0640	2014.4377
p-value	0.0000	0.0000	0.0001

Notes: The table presents the average marginal effects of the covariates estimated from the following logit model of a county recession in county c at time (year) $t+k$ in metro counties: $logit(p_{c,t+k}) = \beta_0 + \beta_1 Rate_{c,t} + \alpha_c + \epsilon_{c,t+k}$ where $logit(p) = ln(\frac{p}{1-p})$ denotes the log of the odds ratio, *Rate* denotes the average bank deposit rate, t denotes the current year, and k denotes the number of leading years ($k = 1, 2, 3$). A county is in a recession if its GDP growth between two consecutive years is below -2%. The deposit rate is the rate on 12-month certificates of deposit of at least \$10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). The independent variable is standardized. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Rural and urban counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes greater than 1. Heteroskedacticity-robust standard errors are reported in parentheses.

Table A.11: Deposit Rates Predict County Recessions: All Counties

$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0076***	0.0272***	0.0150***
	(0.0023)	(0.0024)	(0.0025)
County FIPS FE	✓	✓	✓
N	35,438	33,038	30,854
pseudo R^2	0.0800	0.0825	0.0803
AUC	0.6919	0.6944	0.6908
Overall test statistic, χ^2	2705.3303	2744.4082	2460.0860
p-value	0.0000	0.0000	0.0000

Notes: The table presents the average marginal effects of the covariates estimated from the following logit model of a county recession in county c at time (year) $t+k$ for all counties: $logit(p_{c,t+k}) = \beta_0 + \beta_1 Rate_{c,t} + \alpha_c + \epsilon_{c,t+k}$ where $logit(p) = ln(\frac{p}{1-p})$ denotes the log of the odds ratio, *Rate* denotes the average bank deposit rate, t denotes the current year, and k denotes the number of leading years ($k = 1, 2, 3$). A county is in a recession if its GDP growth between two consecutive years is below -2%. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). The independent variable is standardized. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Heteroskedacticity-robust standard errors are reported in parentheses.

Table A.12: Change in Deposit Rate and Bank Characteristics in 2007 and 2008

Δ ln(Rate)	(1)	(2)
	2007	2008
ln(Assets)	-0.0100***	-0.0128***
	(0.0019)	(0.0037)
Equity/Assets	-0.0024	0.0081***
	(0.0016)	(0.0026)
Cash/Assets	0.0100***	-0.0042
	(0.0035)	(0.0061)
Deposits/Assets	-0.0035*	-0.0314***
	(0.0021)	(0.0045)
Loan/Assets	0.0130***	0.0286***
	(0.0045)	(0.0089)
Hedging/Assets	0.0003	0.0035
	(0.0013)	(0.0037)
Dividends/Assets	-0.0020	-0.0166***
	(0.0014)	(0.0027)
Income/Assets	-0.0090***	-0.0238***
	(0.0028)	(0.0050)
Securities/Assets	0.0146***	0.0148*
	(0.0043)	(0.0086)
LLLP/Assets	0.0146***	0.0148*
	(0.0043)	(0.0086)
Constant	-0.0603***	-0.4946***
	(0.0037)	(0.0073)
N	5,255	5,325
R^2	0.0149	0.0481

Notes: The dependent variable is the change in the average bank deposit rate between 2006 and 2007 in column (1): $ln(\text{Dep. Rate})_{b,2007}$. The dependent variable is the change in the average bank deposit rate between 2007 and 2008 in column 2: $ln(\text{Dep. Rate})_{b,2008}$. The independent variables are Bank Characteristics$_b$ reported in 2006 in column 1 and Bank Characteristics$_b$ reported in 2007. These variables include the natural-log of total bank assets, the average loan balance divided by total assets, the total equity divided by total assets, the total cash holdings divided by total bank assets, the total deposits divided by total assets, the net derivatives contracts held for hedging divided by total assets, the total dividend on common stocks divided by total assets, the operating income divided by total assets, the total securities divided by total assets, the total loan lease loss provisions divided by total assets. Column (1) uses all the bank characteristics mentioned above. All independent variables are standardized. The analysis is restricted to single-state banks. Heteroskedacticity-robust standard errors are reported in parentheses.

Table A.13: GDP Growth and the Dispersion of Deposit Rates

Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead
Dispersion	-0.0040***	-0.0051***	-0.0050***
	(0.0008)	(0.0009)	(0.0007)
County FIPS FE	✓	✓	✓
N	3,364	3,181	3,004
R^2	0.0094	0.0145	0.0121

Notes: This table presents the relation between the dispersion of county deposit rates and economic activity in metro counties. The table presents the results from estimating an OLS model of the change in economic activity in county c in year $t+k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity. The regression specification is the following: $Y_{c,t+k} = \beta_1 \cdot SD_{c,t} + \alpha_c + \epsilon_{c,t}$ where Y denotes GDP growth in Panel A, new business formation in Panel B, and the delinquency rate in Panel C. SD denotes the dispersion of county deposit rates. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the dispersion (standard deviation) of deposit rates across banks for each county in each month is computed. The annual county dispersion of deposit rates is the county dispersion in the last reporting month of year. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table A.14: Dispersion of Deposit Rates Predicts County Recessions

$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Dispersion	0.0447***	0.0729***	0.0604***
	(0.0063)	(0.0072)	(0.0074)
County FIPS FE	✓	✓	✓
N	3,170	2,959	2,801
pseudo R^2	0.0864	0.1180	0.0979
AUC	0.7145	0.7579	0.7294
Overall test statistic, χ^2	252.0311	288.2553	243.8795
p-value	0.0492	0.0000	0.0009

Notes: The table presents the average marginal effects of the covariates estimated from the following logit model of a county recession in county c at time (year) $t+k$ in metro counties: $logit(p_{c,t+k}) = \beta_0 + \beta_1 SD_{c,t} + \alpha_c + \epsilon_{c,t+k}$ where $logit(p) = ln(\frac{p}{1-p})$ denotes the log of the odds ratio, SD denotes the standard deviation of bank deposit rates, t denotes the current year, and k denotes the number of leading years ($k = 1, 2, 3$). A county is in a recession if its GDP growth between two consecutive years is below -2%. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the dispersion (standard deviation) of deposit rates across banks for each county in each month is computed. The county dispersion of deposit rates is the county dispersion in the last reporting month of year. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). The independent variable is standardized. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Heteroskedacticity-robust standard errors are reported in parentheses.

Table A.15: County Deposit Growth Declines after Natural Disasters

Δ ln(Dep Amt)	t-3	t-2	t-1	t	t+1	t+2	t+3
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
$\mathbb{1}_{Disaster}$	0.0010	-0.0129	0.0031	0.0223	-0.0521***	-0.0084	-0.0035
	(0.0165)	(0.0167)	(0.0176)	(0.0213)	(0.0132)	(0.0116)	(0.0109)
Bank $\times$ County FE	✓	✓	✓	✓	✓	✓	✓
N	402,770	453,031	510,636	578,629	598,952	548,604	488,958
R^2	0.2202	0.2183	0.2110	0.2062	0.2072	0.1604	0.1478

Notes: This table presents the relation between bank b's deposit growth in county c at time (year) $t+k$ and an indicator for a county recession. The regression specification is the following: $\Delta ln(\text{Dep Amt})_{b,c,t+k} = \beta_0 + \delta_0 \mathbb{1}_{Disaster,c,t} + \alpha_c + \alpha_{b,c} + \epsilon_{b,c,t+k}$ where $\Delta ln(DepAmt)_{b,c,t+k}$ is the change in the total amount of deposits, and k denotes the number of years around the county natural disaster ($k = -3, -2, \ldots, 2, 3$). The sample is restricted to natural disasters that last less than 31 days with total damages above \$1 bn 2018 dollars. Bank x County deposit data comes from the FDIC Summary of Deposits database. Data on natural disasters comes from the Spatial Hazard Events and Losses Database for the United States (SHELDUS). The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Two-way county and bank clustered standard errors are reported in parentheses.

Table A.16: Ex Ante Deposit Rate Cannot Predict Disaster-Induced Recessions

$\mathbb{1}_{Recession}$	(1)	(2)	(3)
	1 Year Ahead	2 Years Ahead	3 Years Ahead
$\mathbb{1}_{\text{Disaster}} \times$ Rate $\times$ Shock	-0.1256	0.0173	0.0274
	(0.0869)	(0.0682)	(0.0739)
$\mathbb{1}_{\text{Disaster}} \times$ Rate	0.0963***	0.0806***	0.0520***
	(0.0157)	(0.0166)	(0.0165)
Rate	0.0250***	0.0133***	-0.0071***
	(0.0024)	(0.0025)	(0.0026)
Shock	-0.0500	0.0948	0.3429***
	(0.0729)	(0.0634)	(0.0626)
County FIPS FE	✓	✓	✓
N	32950	30743	28594
pseudo R^2	0.0836	0.0812	0.0795
AUC	0.6957	0.6921	0.6899
Overall test statistic, χ^2	2764.9614	2472.5013	2235.2807
p-value	0.0000	0.0000	0.0001

Notes: The table presents the average marginal effects of the covariates estimated from the following logit model of a county recession in county c at time (year) $t+k$ in metro counties: $logit(p_{c,t+k}) = \beta_0 + \beta_1 \mathbb{1}_{Disasterc} \times Rate_{c,t} \times Shock_{c,t} + \beta_2 \mathbb{1}_{Disasterc} \times Rate_{c,t} + \beta_3 Rate_{c,t} + \beta_4 Shock_{c,t} + \alpha_c + \epsilon_{c,t+k}$ where $logit(p) = ln(\frac{p}{1-p})$ denotes the log of the odds ratio, *Rate* denotes the average bank deposit rate, *Disaster* denotes whether the county has experienced any natural disaster in the sample period, *Shock* takes a value of 1 when the disaster hits the county and 0 otherwise. t denotes the current year, and k denotes the number of leading years ($k = 1, 2, 3$). The deposit rate is the rate on 12-month certificates of deposit of at least \$10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). The sample is restricted to natural disasters that last less than 31 days with total damages above \$1 bn 2018 dollars. Data on natural disasters comes from the Spatial Hazard Events and Losses Database for the United States (SHELDUS). The *Rate* variable is standardized. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Rural and urban counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes greater than 1. Heteroskedacticity-robust standard errors are reported in parentheses.

Table A.17: Fracking and Deposit Rates around Recessions

Rate	(1)	(2)	(3)	(4)
	Current Year	1 Year Ahead	2 Years Ahead	3 Years Ahead
ln(Shale Gas) × Boom	-0.0408	-0.0301*	-0.0255*	-0.0229*
	(0.0261)	(0.0171)	(0.0151)	(0.0135)
ln(Shale Gas)	0.0068	0.0024	0.0048	0.0067
	(0.0142)	(0.0105)	(0.0098)	(0.0096)
County FIPS FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
N	6,068	5,946	5,858	5,463
R^2	0.0014	0.0014	0.0011	0.0010

Notes: This table presents the relation between county deposit rates and economic activity. The table presents the results from estimating an OLS model of the change in economic activity in county c in year $t+k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 0, 1, 2, 3) annual lead indicators of economic activity. The regression specification is the following: $Rate_{c,t+k} = \beta_1 \cdot ln(\text{Shale Gas})_{c,t} \times \text{Boom}_t + \beta_2 \cdot ln(\text{Shale Gas})_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t}$ where $Rate$ denotes the average bank deposit rate, $ln(\text{Shale Gas})$ denotes the natural log of gas production from horizontal wells, and Boom denotes the fracking boom from 2003 through 2009. The deposit rate is the rate on 12-month certificates of deposit of at least \$10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. Data on horizontal well production comes from Enverus (DrillingInfo). The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table A.18: Instrumental Variable Regression: Shipping Costs and Regional Deposit Rates

Rate	(1)	(2)	(3)
Shipping Costs	-0.0343***	-0.0238**	-0.0260***
	(0.0088)	(0.0096)	(0.0093)
log Employment			0.0098
			(0.0121)
Manufacturing Employment (%)			-0.0157**
			(0.0077)
log Income			0.0192
			(0.0129)
log Debt			-0.0414***
			(0.0153)
Δ_{91-99}HMDA Loan Orig.			-0.0205**
			(0.0091)
Δ_{91-99} Net CH Import		-0.0013	-0.0007
		(0.0068)	(0.0060)
Month-Year FE	✓	✓	
State FE		✓	
State-Month-Year FE			✓
N	51,982	51,982	51,663
R^2	0.9374	0.9481	0.9574

Notes: This table presents the relation between shipping costs and commuting zone deposit rates. The table presents regressions of deposit rates from 2001 to 2007 on shipping costs at the commuting zone level. The regression specification is the following: Deposit $\text{Rate}_{z,t} = \beta_1 \cdot \text{Shipping Costs}_z + X_z + \alpha_{s,t} + \epsilon_{z,t}$ where Rate denotes the deposit rate at the commuting zone level z of state s measured in month-year t, Shipping Costs denotes the shipping costs at the commuting zone level, and X is a vector of controls including total employment, the share of manufacturing employment, total income, logarithm of total debt, the 1991-1999 change in loan originations, and the 1991-1999 change in net Chinese import penetration, as well as quintiles of the change in house prices between 1999 and 2007. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across banks for each commuting zone in each month is computed. The independent variables used in this regression come from Barrot et al. (2022). We refer readers to Barrot et al. (2022) for construction of the independent variables. Independent variables are standardized for ease of interpretation. The sample period is 2001 through 2007. The analysis is restricted to single-state banks. Two-way commuting zone and month-year clustered standard errors are reported in parentheses.

Table A.19: Gap Between Uninsured and Insured Rate by Years from County Recession

	N	P25	Median	P75	Mean	SD
L3.Gap	4,168	-0.1345	0.0481	0.2192	0.0452	0.3202
L2.Gap	4,645	-0.1583	0.0400	0.2414	0.0377	0.4177
L1.Gap	5,416	-0.1716	0.0381	0.2500	0.0388	0.4199
Gap	6,164	-0.13	0.0663	0.2664	0.0744	0.3904
F1.Gap	4,654	-0.1333	0.055	0.2575	0.0714	0.3921
F2.Gap	3,924	-0.1424	0.0583	0.2800	0.0796	0.4143
F3.Gap	3,637	-0.145	0.0620	0.2875	0.0718	0.4189

Notes: This table summarizes the gap between uninsured and insured deposit rates by years from county recessions. The uninsured deposit rate is the rate on uninsured 12-month certificates of deposit of at least $100,000 from 2001 through September of 2008, and at least $250,000 thereafter. The insured deposit rate is the rate on 12-month certificates of deposit of at least $10,000. The table reports the gap (uninsured rate-insured rate) at the county level in the three years before and after a county recession. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average uninsured and insured deposit rates across banks for each county in each month are computed. The annual uninsured and insured county deposit rates are the county deposit rates in the last reporting month of each year. A county is in a recession if its GDP growth between two consecutive years is below -2%. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). The sample period is 2001 through 2020. The analysis is restricted to single-state banks.

Table A.20: NPL Growth and Bank Rate Changes

$\Delta ln(\text{NPL})$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	t-3	t-2	t-1	t	t+1	t+2	t+3
$\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$	-0.0005	-0.0037	0.0094	-0.0015	-0.0032	0.0080	-0.0085
	(0.0065)	(0.0061)	(0.0073)	(0.0058)	(0.0062)	(0.0050)	(0.0062)
$\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$	-0.0042	-0.0083	0.0063	-0.0022	0.0101*	0.0089	0.0036
	(0.0068)	(0.0072)	(0.0062)	(0.0060)	(0.0059)	(0.0061)	(0.0057)
$\mathbb{1}_{\text{Dep Rate Change}>P75}$	0.0041	-0.0016	-0.0056	0.0041	0.0094	-0.0058	0.0038
	(0.0065)	(0.0058)	(0.0068)	(0.0064)	(0.0059)	(0.0054)	(0.0052)
Quarter-Year FE	✓	✓	✓	✓	✓	✓	✓
N	165,314	168,233	171,285	171,690	169,033	166,507	164,031
R^2	0.0064	0.0063	0.0063	0.0062	0.0063	0.0064	0.0064

Notes: The table presents the coefficients estimated from the following regression for bank b at time t (quarter-year): $\Delta ln(NPL)_{b,t+k} = \beta_0 + \beta_1 \mathbb{1}_{P25<\text{Dep Rate Change}\leq P50,b,t} + \beta_2 \mathbb{1}_{P50<\text{Dep Rate Change}\leq P75,b,t} + \beta_3 \mathbb{1}_{\text{Dep Rate Change}>P75,b,t} + \alpha_t + \epsilon_{b,t}$ where $\Delta ln(NPL)_{b,t+k}$ denotes non-performing loans growth, $\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$, $\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$, $\mathbb{1}_{\text{Dep Rate Change}>P75}$ denote the second, third, or fourth quartile of a bank's deposit rate change between two consecutive quarters, respectively. k denotes the number of lead/lag quarters. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across counties for each bank in each month is computed. The quarterly bank deposit rate is the bank deposit rate in the last reporting month of quarter. This rate is used to compute the quarterly change in banks' deposit rates. Data on non-performing loans comes from S&P Market Intelligence. Two-way bank and quarter-year clustered standard errors are reported in parentheses. The sample period is 2001 through 2020. The analysis is restricted to single-state banks.

Table A.21: Deposit Growth and County Recessions

Δ ln(Deposits)	(1)	(2)	(3)
F1.Recession	-0.0038***		
	(0.0008)		
F2.Recession		0.0000	
		(0.0008)	
F3.Recession			0.0028***
			(0.0008)
County FIPS FE	✓	✓	✓
Year FE	✓	✓	✓
N	57,896	54,838	51,782
R^2	0.0005	0.0000	0.0003

Notes: This table presents the relation between recessions and deposit growth. The regression specification is the following: $\Delta ln(\text{Dep Amt})_{c,t} = \beta_0 + \delta_0 \mathbb{1}_{Recession,c,t+k} + \alpha_c + \alpha_t + \epsilon_{c,t}$ where $\mathbb{1}_{Recession,c,t+k}$ indicates whether county c is in recession at time $t+k$ and k denotes the number of years after t ($k = 1,2,3$). A county is in a recession if its GDP growth between two consecutive years is below -2%. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). County deposit data comes from the FDIC Summary of Deposits database. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.

Table A.22: Credit Growth and Recessions

Panel A: Small Business Lending Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(SBL)	-0.0072	0.0085	0.0148**
	(0.0058)	(0.0059)	(0.0063)
County FIPS FE	✓	✓	✓
N	4,072	3,809	3,566
pseudo R^2	0.0741	0.0740	0.0749
AUC	0.6928	0.6938	0.6899
Overall test statistic, χ^2	248.1919	238.7799	232.8698
p-value	0.4311	0.5101	0.5817
Panel B: Mortgage Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(Mortgages)	0.0015	-0.0127**	-0.0085
	(0.0057)	(0.0053)	(0.0055)
County FIPS FE	✓	✓	✓
N	4,072	3,809	3,566
pseudo R^2	0.0737	0.0747	0.0738
AUC	0.6918	0.6938	0.6943
Overall test statistic, χ^2	249.4026	239.6547	227.4217
p-value	0.4099	0.4941	0.6778
Panel C: Total Credit Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(Total)	0.0044	-0.0061	-0.0040
	(0.0058)	(0.0054)	(0.0056)
County FIPS FE	✓	✓	✓
N	4,072	3,809	3,566
pseudo R^2	0.0738	0.0738	0.0734
AUC	0.6910	0.6920	0.6954
Overall test statistic, χ^2	250.7341	236.1117	225.9201
p-value	0.3870	0.5588	0.7029

Notes: The table presents the average marginal effects of the covariates estimated from the following logit model of a county recession in county c at time (year) $t+k$ in metro counties: $logit(p_{c,t+k}) = \beta_0 + \beta_1 \cdot \Delta ln(Credit)_{c,t} + \alpha_c + \epsilon_{c,t+k}$ where $logit(p) = ln(\frac{p}{1-p})$ denotes the log of the odds ratio, $\Delta ln(Credit)$ denotes credit growth, t denotes the current year, and k denotes the number of leading years ($k = 1, 2, 3$). A county is in a recession if its GDP growth between two consecutive years is below -2%. Credit growth is measured as the natural-log difference of small business lending in Panel A, natural-log difference of mortgages in Panel B, and natural-log difference of total lending (small business lending and mortgages) in Panel C. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). Data on small business lending is collected under the Community Reinvestment Act (CRA). Mortgage lending data is collected under the Home Mortgage Disclosure Act (HMDA). The independent variables are standardized. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Heteroskedacticity-robust standard errors are reported in parentheses.

Table A.23: Deposit Rates Predict County Recessions Even After Accounting for Credit Growth

Panel A: Small Business Lending Growth

$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0289***	0.0601***	0.0531***
	(0.0051)	(0.0053)	(0.0057)
Δ ln(SBL)	-0.0097*	0.0014	0.0079
	(0.0059)	(0.0059)	(0.0062)
County FIPS FE	✓	✓	✓
N	4,072	3,809	3,566
pseudo R^2	0.0817	0.1104	0.1019
AUC	0.7040	0.7382	0.7294
Overall test statistic, χ^2	288.3356	400.8888	324.5189
p-value	0.0330	0.0000	0.0002

Panel B: Mortgage Lending Growth

$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0281***	0.0609***	0.0543***
	(0.0050)	(0.0053)	(0.0057)
Δ ln(Mortgages)	0.0013	-0.0158***	-0.0108*
	(0.0059)	(0.0056)	(0.0057)
County FIPS FE	✓	✓	✓
N	4,072	3,809	3,566
pseudo R^2	0.0809	0.1122	0.1023
AUC	0.7051	0.7394	0.7306
Overall test statistic, χ^2	295.3578	406.3929	338.6055
p-value	0.0169	0.0000	0.0000

Panel C: All Credit Growth

$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0280***	0.0608***	0.0544***
	(0.0050)	(0.0053)	(0.0057)
Δ ln(Total)	0.0034	-0.0105*	-0.0076
	(0.0060)	(0.0058)	(0.0059)
County FIPS FE	✓	✓	✓
N	4,072	3,809	3,566
pseudo R^2	0.0810	0.1112	0.1019
AUC	0.7051	0.7386	0.7309
Overall test statistic, χ^2	295.5007	402.9462	335.3096
p-value	0.0167	0.0000	0.0000

Notes: The table presents the average marginal effects of the covariates estimated from the following logit model of a county recession in county c at time (year) $t+k$ in metro counties: $logit(p_{c,t+k}) = \beta_0 + \beta_1 Rate_{c,t} + \beta_2 \cdot \Delta ln(Credit)_{c,t} + \alpha_c + \epsilon_{c,t+k}$ where $logit(p) = ln(\frac{p}{1-p})$ denotes the log of the odds ratio, *Rate* denotes the average bank deposit rate, $\Delta ln(Credit)$ denotes credit growth, t denotes the current year, and k denotes the number of leading years ($k = 1, 2, 3$). A county is in a recession if its GDP growth between two consecutive years is below -2%. Credit growth is measured as the natural-log difference of small business lending in Panel A, natural-log difference of mortgages in Panel B, and natural-log difference of total lending (small business lending and mortgages) in Panel C. The deposit rate is the rate on 12-month certificates of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). Data on small business lending is collected under the Community Reinvestment Act (CRA). Mortgage lending data is collected under the Home Mortgage Disclosure Act (HMDA). The independent variables are standardized. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Heteroskedacticity-robust standard errors are reported in parentheses.

Table A.24: GDP Growth and Deposit Growth

Panel A: Deposit Growth			
Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(Deposits)	0.0018	-0.0001	-0.0004
	(0.0013)	(0.0007)	(0.0008)
County FIPS FE	✓	✓	✓
N	4,545	4268	4008
R^2	0.0008	0.0000	0.0000

Panel B: Deposit Rate and Growth			
Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0013	-0.0048***	-0.0045***
	(0.0013)	(0.0014)	(0.0013)
Δ ln(Deposits)	0.0020	0.0005	0.0001
	(0.0013)	(0.0007)	(0.0008)
County FIPS FE	✓	✓	✓
N	4,545	4,268	4,008
R^2	0.0013	0.0109	0.0066

Notes: This table presents the relation between county deposit rates and economic activity in metro counties. The table presents the results from estimating an OLS model of the change in economic activity in county c in year $t + k$ as a function of the average deposit rate within a county at year t. We consider up to three-year (k = 1, 2, 3) annual lead indicators of economic activity. The regression specification in Panel A is $\Delta ln(GDP)_{c,t+k} = \beta_1 \cdot \Delta ln(Deposits)_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t}$. The regression specification in Panel B is $\Delta ln(GDP)_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \beta_2 \cdot \Delta ln(Deposits)_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t}$. $\Delta ln(GDP)$ denotes GDP growth, *Rate* denotes the average bank deposit rate, and $\Delta ln(Deposits)$ denotes deposit growth. The deposit rate is the rate on 12-month certificates of deposit of at least \$10,000. Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. Then, the average deposit rate across banks for each county in each month is computed. The annual county deposit rate is the county deposit rate in the last reporting month of year. County GDP data is available at the annual frequency from 2001 from the Bureau of Economic Analysis (BEA). County deposit data comes from the FDIC Summary of Deposits database. The sample period is 2001 through 2020. The analysis is restricted to single-state banks. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1. Conley (1999) standard errors adjusted for spatial dependence within 100 km are reported in parentheses.