Deposit Shortages and Local Economic Activity*

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Abstract

This paper examines the role of deposit rates as a key indicator of deposit shortages that precede economic downturns. We argue that deposit rates, reflecting the balance between deposit supply and demand, serve as a sufficient statistic for deposit conditions. Higher deposit rates signal deposit scarcity, which constrains credit expansion and dampen economic growth. Our findings reveal that these rising deposit rates not only indicate tightening liquidity but also serve as a forward-looking measure with strong predictive power for regional economic contractions, outperforming other indicators.

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1 Introduction

Deposits account for nearly 70% of banks' total liabilities, making them a core element of the banking system and a key driver of credit creation. Given their substantial share, shifts in the availability and cost of deposits have significant implications for broader economic activity (e.g., Kashyap and Stein, 2000). Shortages in the supply of deposits by households can limit credit availability for banks, as deposits are not fully substitutable at market prices, unlike other funding sources. A combination of factors – including the market return on safe assets, the competitiveness of the banking sector, and the existence of deposit insurance – enables banks to attract deposits at below-market rates. This structural pricing advantage means that when deposit supply tightens, banks cannot easily replace lost funding with wholesale borrowing or other liabilities without facing higher costs. Consequently, deposit shortages can limit credit expansion and exacerbate economic downturns.

Despite their central role in bank balance sheets, deposit cycles have been largely overlooked in the literature on business cycles. Traditional narratives focus on credit booms as the primary precursor to downturns, neglecting the impact of deposit constraints on the liability side of banks' balance sheets.[1] This paper emphasizes how deposit shortages – reflected by rising deposit rates – can act as an early indicator of tightening deposit conditions, providing a new lens on how financial stress is transmitted to the real economy. In doing so, we shed light on a key challenge identified by Friedman and Schwartz (1963): understanding how fluctuations in money and credit affect real economic outcomes.

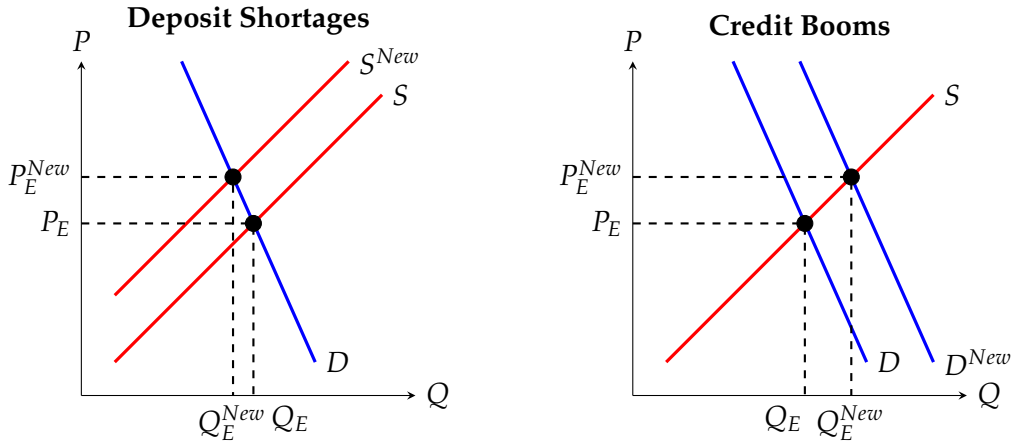
Thus, we shift the focus from credit to deposits, emphasizing the pivotal role of deposit cycles in driving credit cycles and economic activity. We position deposit rates as a sufficient statistic of deposit shortages within the banking system. Unlike traditional measures of credit growth, deposit rates capture the balance between the supply of savings and the demand for deposits. In this context, deposit rates act as an asset pricing measure of the scarcity of deposits. Higher rates indicate a scarcity of deposits relative to loan demand, constraining banks' capacity to expand credit through the money multiplier effect. This slowdown in credit can dampen economic growth. Importantly, deposit rates provide insights into deposit shortages that are not immediately apparent through deposit growth alone.[2] As a result, deposit rates serve as

[1] Several recent studies provide empirical support for the hypothesis that credit growth predicts financial crises (Schularick and Taylor, 2012; Mian and Sufi, 2016), the combination of credit growth and asset prices predict financial crises (e.g., Jordà et al., 2016; Greenwood et al., 2022). Other papers have documented that credit sentiment predicts economic contractions (López-Salido et al., 2017), yield share forecasts low corporate bond spreads (Greenwood and Hanson, 2013), and the interaction of credit spreads and credit growth predicts financial crises (Muir, 2017).

[2] This asymmetry arises from the relatively inelastic demand for deposits among banks, which rely on them to meet reserve requirements, fund loans, and manage liquidity, with few substitutes available (e.g., Diamond and Dybvig,

a forward-looking indicator of deposit stress, revealing vulnerabilities that traditional metrics often overlook.

Our findings highlight the pivotal role of deposit shortages in precipitating local recessions. Rising deposit rates can signal either increased credit demand or tightening deposit conditions. While heightened credit demand often corresponds to inefficient credit booms, deposit shortages point to an impending credit crunch. The figure below illustrates the supply and demand dynamics of deposit funding, showing how an increase in deposit rates can signal either deposit shortages (left) or credit booms (right). Deposit shortages arise when the supply of deposits shifts leftward, while demand remains unchanged, resulting in higher deposit rates and a decrease in the quantity of deposits in equilibrium. In contrast, credit booms occur when the demand for deposits shifts rightward, leaving supply unchanged, which leads to higher deposit rates and an increase in the quantity of deposits in equilibrium.



The challenge in understanding the full impact of deposit shortages lies in the aggregated nature of national-level data, where macroeconomic policies and broad economic trends can obscure localized effects. To overcome this, we focus our analysis to county-level data, offering a more granular view of how regional deposit shortages manifest and influence economic outcomes. This localized perspective allows us to control for confounding factors such as varying legal and regulatory environments, providing clearer insights into the causal mechanisms at play.

Our findings support the view that deposit shortages are a key mechanism underlying economic downturns. We show that nearly half of all recessions are preceded by a contraction in credit growth, challenging the traditional emphasis on credit-driven explanations. More importantly, we observe that local recessions are frequently preceded by a slowdown in de-

1983; Bernanke and Blinder, 1988; Kashyap et al., 2002). In contrast, deposit supply is more elastic: households and businesses can shift savings to higher-yielding alternatives, such as mutual funds or equities, when deposit returns are less competitive (e.g., Hannan and Berger, 1997; Amromin and Sharpe, 2014).

posit growth, suggesting that deposit shortages act as an early warning signal of impending economic contractions. To isolate this mechanism, we use a quasi-natural experiment that controls for other potential factors, which we discuss in detail below. This approach allows us to more clearly identify the role of deposit dynamics in triggering recessions.

We begin by demonstrating the substantial spatial and temporal heterogeneity in business cycle fluctuations at the local level. We then examine the geographic variation in deposit rates and economic activity across different banks, with a particular focus on single-state banks operating in distinct regional markets. Our analysis reveals that these banks set deposit rates that vary across regions, reflecting local economic conditions, consistent with the findings of previous studies (Heitfield, 1999; Biehl, 2002; Heitfield and Prager, 2004).

Our findings reveal that when regional banks in a county raise their deposit rates, it is associated with a future slowdown in economic activity in that region. Specifically, we find that an increase in county deposit rates acts as an early indicator of forthcoming economic changes, including lower GDP growth, reduced employment growth, less business formation, and slower wage growth. Overall, the model's ability to predict future GDP growth, as measured by the Area Under the Receiver Operating Characteristic Curve (AUC), is 0.73.[3] These relationships remain robust even after controlling for historical economic growth trends, excluding failed banks, and across various marginal and average deposit rates.[4] While our findings highlight the importance of deposit rates offered by banks in a region as a key indicator of local economic vulnerability, we also show that the extent to which deposit rates respond to deposit shortages is influenced by market conditions and bank-specific factors.[5]

Importantly, the relationship between deposit rates and economic activity operates independently of monetary policy changes. Our baseline results include time fixed effects, accounting for monetary policy changes at the national level. Additionally, we find that even during periods of virtually no changes in monetary policy rates – from 2011 through 2015 – increases in county-level deposit rates are linked to declines in future county economic activity.

[3]The Area Under the Receiver Operating Characteristic Curve (AUC) allows us to assess the accuracy of our model. An AUC of 1 indicates perfect classification of recessions versus non-recessions, while an AUC of 0 suggests that the classifier predicts all recessions as non-recessions and vice versa. For context, Schularick and Taylor (2012) report AUCs around 0.75 for prostate cancer diagnostic tests; Iyer et al. (2016) note that AUCs of 0.6 or greater suggest strong predictive value in information-scarce environments, and AUCs of 0.7 or greater indicate strong predictive value in more information-rich contexts.

[4]Furthermore, we demonstrate that these patterns hold at the state level, where higher deposit rates are also linked to an increased risk of bank failures. Due to the infrequency of bank failures at the county level, this analysis is conducted at the state level.

[5]The magnitude of deposit rate increases depends on the level of competition for bank deposits and the balance sheet conditions of banks within the county. We show that in regions with higher bank competition, such as large metropolitan areas, deposit rates are more responsive to deposit stress and better predict economic downturns. Moreover, banks with weaker balance sheets – those with higher credit-to-deposit ratios, lower liquidity, or a smaller share of securities – tend to raise deposit rates more significantly.

Notably, there were no significant credit expansions or impending national recessions during this period, suggesting that the predictive power of deposit rates is not merely an artifact of these factors – a pattern we validate through additional analyses.

To validate the underlying mechanism, we leverage the Wells Fargo regulatory enforcement as a quasi-natural experiment to analyze the relationship between deposit shortages and economic contractions. This regulatory intervention, enforced by the Office of the Comptroller of the Currency following the 2016 fake accounts scandal, imposed a binding constraint on Wells Fargo's total assets, capping them at their 2017 levels. The Wells Fargo regulatory enforcement cap served as a negative shock to households' trust in banks in affected areas, even for those not directly involved, as demonstrated by Yang (2023). Thus it creates an exogenous shock to deposit supply without altering loan demand. By comparing counties with significant Wells Fargo presence to those without, before and after the asset cap's implementation, we isolate the impact of this deposit supply shock on regional economic outcomes.

Using a difference-in-differences framework, we find that the asset cap led to a contraction in deposit growth and a subsequent rise in deposit rates in affected counties. These higher deposit rates, indicative of tightening deposit conditions, were associated with reduced small business lending and a decline in GDP growth. This analysis provides direct evidence that regulatory-induced deposit shortages can amplify local economic stress, reinforcing deposit rates as a key signal of underlying economic vulnerabilities. To further illustrate how changes in deposit supply influence economic activity, we use also the COVID stimulus payments as another quasi-natural experiment, showing how a positive deposit shock – reflected in lower deposit rates – translates into broader economic effects at the local level.

At the bank level, we also show that deposit shortages are, indeed, the primary driver of deposit rate increases. As banks experience deposit stress, both insured and uninsured deposit growth decline, triggering a leftward shift in deposit supply and raising deposit rates. Notably, banks that raise deposit rates most aggressively also experience sharper declines in uninsured deposits, further straining deposits. These rate hikes do not appear to be driven by informed depositors withdrawing from risky banks ahead of a downturn; neither credit default swap (CDS) spreads nor bank equity returns spike until after recessions begin. This reinforces that deposit rate increases primarily reflect deposit stress rather than anticipatory market responses to bank risk.

A potential alternative explanation is that rising deposit rates signal higher loan demand rather than deposit shortages. If this were the case, we would expect banks to expand lending after raising rates. Instead, we find the opposite – loan growth *declines* following deposit rate

hikes. This suggests that banks raise rates not to support increased lending but to stabilize their funding base in response to deposit constraints. Moreover, we show that banks raising rates more aggressively neither have weaker capital positions nor higher non-performing loan share, suggesting that deposit shortages – not impaired bank capital or excessive lending – are the primary driver of rate hikes.

To further distinguish deposit rates from credit conditions, we compare their predictive power for economic growth. Our analysis reveals that deposit rates have a stronger relationship with economic growth than various measures of credit growth. In a series of horse races between deposit rates and credit growth measures, we find that deposit rates consistently demonstrate a more robust and stable relation with future economic activity, even after controlling for credit dynamics.

Finally, we establish that deposit rates are a reliable leading indicator of regional business cycles, outperforming not only credit growth but also deposit growth and traditional economic indicators such as auto sales, unemployment insurance claims, and job openings. Unlike these lagging measures, deposit rates capture real-time shifts in bank deposits, making them a more timely and accurate predictor of regional economic downturns.

1.1 Related Literature

Our results contribute to several strands of the literature.

First, we highlight the predictive power of deposit rates, bridging the money view and credit view of business cycles. While the money view posits that a decrease in money growth heralds economic contractions (Friedman and Schwartz (1963)), the credit view stresses the significance of credit growth in explaining economic fluctuations (Mishkin (1978)).[6] Unlike credit growth, which primarily focuses on forecasting financial crises, deposit rates offer broader predictive capabilities for economic downturns, including those not preceded by credit booms. Our findings align with Jiménez et al. (2023), who show that non-crisis recessions are often preceded by monetary policy rate hikes, which increase the cost of external funding for banks.[7] As borrowing becomes more expensive, banks' ability to substitute deposits with outside funding declines, making deposit rates an even more critical indicator of deposit conditions. By capturing shifts in both money growth and credit conditions, deposit rates serve as a forward-

[6] Following the seminal work by Friedman and Schwartz (1963), several papers have highlighted the association between a decrease in money growth and recessions including Romer et al. (1990), King and Plosser (1984), Baker et al. (2018). Other papers in support of the credit view include Bernanke (1983), Gertler (1988), Schularick and Taylor (2012)

[7] Monetary policy hikes also lead to a flow of deposits out of the banking sector (e.g., Drechsler et al., 2017), directly reducing the supply of deposits to banks.

looking measure of deposit stress, particularly at the regional level where tracking money supply growth is more challenging.[8] This contribution extends the literature on financial crisis prediction, which has largely focused on credit-related indicators (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).

Second, we address a significant gap by focusing on the measurement of economic risks at the regional level through the use of deposit rates. While much of the existing literature highlights national indicators like the Treasury yield curve and corporate bond spreads (e.g., Estrella and Hardouvelis, 1991; Estrella and Mishkin, 1998; Ang et al., 2006; Rudebusch and Williams, 2009; Engstrom and Sharpe, 2019), our research emphasizes the predictive power of regional deposit rates in forecasting localized economic downturns.[9] This perspective enhances the understanding of regional economic dynamics and offers a valuable tool for regional forecasting models. Our contribution is threefold: first, we examine the measurement of economic risks across counties and states by leveraging regional variations in economic activity. Second, our findings establish that deposit rates serve as a sufficient statistic for accurately predicting regional economic and financial risks, making them a vital addition to existing forecasting models. Finally, our research aligns with the growing emphasis on real-time economic indicators (Chetty et al. (2020)), demonstrating that deposit rates are a readily available and reliable predictor of future economic activity.

Third, we contribute to the literature on bank deposits and its impact on economic activity. Previous studies have demonstrated that bank deposits 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 reflect deposit shortages of banks, can be a useful indicator of regional economic activity. Our findings suggest that deposit shortages, signaled by rising deposit rates, can constrain credit supply and amplify economic contractions. Relatedly, our research complements studies on banks' responses to deposit shocks (e.g., Acharya and Mora, 2015; Cortés and Strahan, 2017; Egan et al., 2017), demonstrating that deposit rates act as a proxy for banks' deposit positions at the regional level. This literature primarily focuses on shocks to bank deposits during crises. We complement these findings by showing that deposit rates offered by banks in a region can

[8]Our findings complement the literature on the relationship between banks and business cycles, e.g., King and Plosser, 1984; Morgan et al., 2004.

[9]Several studies also utilize 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).

be used as a proxy for the deposit position of banks in that region, in turn, reflecting economic conditions.

The paper is organized as follows. Section 2 provides an overview of the datasets used in this study. Section 3 examines the relationship between bank deposit rates and economic activity. Section 4 presents our main findings. Section 5 validates the impact of deposit cycles on credit cycles and economic activity, using the enforcement of the Wells Fargo asset cap as a shock to deposit supply. Section 6 explains the mechanism linking bank deposit shortages to deposit rates and demonstrates that information embedded in deposit rates reflects underlying economic factors not captured by other credit, deposit, or leading indicators of economic activity. Finally, Section 7 concludes the paper.

2 Data

This project employs several datasets, which are described below. Further details about the data can be found in Appendix Section A.

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. State GDP is available at the quarterly frequency from 2005Q1. County GDP data is available at the annual frequency from 2001.

Shipping Costs We use data on shipping costs and a vector of control variables at the commuting zone level from Barrot et al. (2022). The authors measure the exposure of an industry to import competition using the 1998 physical shipping costs obtained from import data. A commuting zone's exposure to import competition is constructed by combining the

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

Employment and Wage We use data on employment activity and wages from the Quarterly Census of Employment and Wages (QCEW), produced by the Bureau of Labor Statistics (BLS).

Business Formation We use data on annual new business applications by county from the US Census Business Formation Statistics (BFS).

Supplementary Measure of Economic Activity We use unemployment rate data across counties from the Bureau of Labor Statistics (BLS). Additionally, we incorporate data on the number of establishments and payroll from the County Business Patterns (CBP) dataset. For an early indicator of the overall health of the mortgage market, we utilize 30-89 day mortgage delinquency rate data from the National Mortgage Database, which is conducted in collaboration with the Federal Housing Finance Agency (FHFA). This data captures borrowers who have missed one or two mortgage payments and is available annually from 2008 onward. We also include data on the consumer price index (CPI) for metropolitan areas, sourced from the BLS. The BLS reports monthly CPI estimates for 23 metro areas, and we use the annual CPI data for these metro counties.

Bank Balance Sheet, Income Statements and Deposits Data 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. We supplement data from the call reports using quarterly 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, at the bank level, for all FDIC insured banks. We also utilize data on branch-level bank deposits sourced from the FDIC. This data is from the annual survey conducted by the FDIC, covering all FDIC-insured institutions. In addition, we use quarterly data on non-performing loans from S&P Market Intelligence.

Small Business Lending and Mortgage Lending We use data on small business lending, collected under the Community Reinvestment Act (CRA). We use data on mortgage lending, collected under the Home Mortgage Disclosure Act (HMDA). We aggregate the CRA and HMDA data to the bank $\times$ county $\times$ year level from 2001 and 2020.

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.

Other Leading Economic Indicators We supplement our baseline analysis with other leading indicators of local business cycle fluctuations at the state level. These indicators include state auto sales, unemployment claims, and job openings. Data on auto sales comes from from RL Polk, which reports zip code-monthly data. Data on state monthly unemployment claims comes from the Department of Labor. Data on state job openings comes from the BLS.

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. Metro counties are counties with a 1993 USDA ERS Rural-Urban Continuum Codes of 0 or 1.

Bank Failures We retrieve the list of failed banks from the Federal Deposit Insurance Corporation (FDIC). We examine bank failures from 2008 to 2012; there were 25 bank failures in 2008, 140 in 2009, 157 in 2010, 92 in 2011, and 51 in 2012.

Shipping Costs We use data on shipping costs and a vector of control variables at the commuting zone level from Barrot et al. (2022). The authors measure the exposure of an industry to import competition using the 1998 physical shipping costs obtained from import data. A commuting zone's exposure to import competition is constructed by combining the industry shipping costs with the industry composition in each commuting zone, expressed in labor share.

COVID Stimulus We use the 5-year 2019 American Community Survey (ACS) administered by the U.S. Census Bureau. The ACS provides comprehensive data on social, economic, housing, and demographic characteristics of the U.S. population at the national, state, and local levels, including for all 50 states, the District of Columbia, Puerto Rico, every congressional

district, metropolitan area, county, city or town, and census tracts and block groups. The share of households eligible for the Economic Impact Payments (EIP) under the CARES Act is measured at the county level, representing the proportion of households eligible for the full EIP. We supplement this with first-round EIP data at the state level, sourced from the Statistics of Income (SOI) dataset of the Internal Revenue Service (IRS).

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. We highlight recessions between 2001 and 2020 throughout our analysis.

3 Local Economic Activity and Bank Deposit Rates

3.1 Local Recessions

We begin by showing that there is substantial spatial and temporal heterogeneity in recessions at the local level. Figure 1 presents the timing and duration of recessions at the county level. For simplicity, we define a county to be in a recession if its GDP growth between two consecutive years is below -2%. Figure 1a indicates that 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 recessions 25% of the sample period with a standard deviation of 12.45%. Similarly, we examine the timing and duration of recessions at the state level in Appendix Figure B.2.[10] The statistics reported above highlight that the occurrence of economic contractions exhibits wide heterogeneity across counties and states.[11] A similar pattern emerges when examining economic expansions.

Next, we examine the deposit dynamics surrounding recessions. We plot the regression coefficients from regressions of annual deposit growth (Figure 2a) and deposit rates (Figure 2b) on a recession indicator at the county level. To control for time-invariant, county-specific factors and time-varying macroeconomic conditions, we include county and year fixed effects. Our results show a gradual decline in deposit growth in the years leading up to a recession, reaching its lowest point during the recession itself. In the years that follow, deposit growth remains low but slowly returns to its typical level. This cumulative decline in deposit growth

[10] Appendix Figure B.2a presents the percentage of states in recession by quarter. Appendix Figure B.2b shows that states were in recessions 5.18% of quarters in the sample period (2005-2020) with a standard deviation of 3.10%.

[11] The onset and duration of local 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, 2017).

around recessions is significant. Additionally, deposit rates are notably higher before a recession, stabilizing to their typical levels once the recession begins.

To investigate whether the increase in deposit rates is driven by changes in demand or supply, we analyze credit growth in the three years leading up to a recession. If the average credit growth over this period is negative, it is classified as a contraction; if positive, it is classified as an expansion. We find that 48% of county recessions are preceded by credit contractions.[12] This suggests that a significant portion of recessions are not caused by large credit expansions.

This finding prompts us to further explore recessions induced by deposit shortages and to assess whether deposit rates can predict economic contractions, especially those not driven by credit growth.

3.2 Deposit Rates and Economic Activity

This section explores the spatial disparities in bank deposit rates and economic activity across different regions. By examining these geographic variations, we shed light on how deposit rates and economic conditions differ across banks and regions.

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 frequently updated deposit product in the RateWatch database. However, our findings are robust to other types of deposit accounts as well as other maturities of CDs. We examine the number of such banks that operate in each county from 2001 through 2020. Appendix Figure B.3 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.

To examine the relationship between regional deposit rates and regional economic downturns, we leverage the geographic variation in deposit rates across banks, focusing on single-state banks that operate across distinct regional markets. The advantage of using single-state banks is that their deposit base and lending are more regional (Berger and Udell (1995); Petersen and Rajan (1994)), mirroring regional economic conditions.

Differences in regional economic conditions are reflected in the deposit rates of single-state banks. For illustration, Appendix Figure B.4 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. These heatmaps reveal that at the same point in time, these banks offered higher rates in certain areas

[12] This result holds across various measures of credit growth, including total mortgage lending, small business lending, and the combined total of both.

and lower rates in others. This intrastate variation in deposit rates is consistent with previous research by Heitfield (1999), Biehl (2002), and Heitfield and Prager (2004), which finds that smaller banks, unlike larger ones, set deposit rates based on regional competitive conditions. This suggests that regional market dynamics play a significant role in shaping deposit rates at single-state banks.

Variation in average deposit rates across regions can stem from differences in the composition of banks or from within-bank variation in deposit pricing across locations. To better understand these sources, we examine whether differences in branch deposit rates are primarily driven by time-invariant bank-specific factors, county-specific factors, or time-varying interactions between bank- and county-level conditions.

In Appendix Table B.1, we report R^2 values from regressions of branch deposit rates for single-state banks that report rates for at least five banks each year, using various fixed effect specifications. Bank fixed effects (column 1) explain a modest share of the variation (R^2 = 0.1920), indicating that while banks have persistent differences in pricing strategies, they do not set uniform deposit rates across all branches over time. County fixed effects (column 2) explain slightly more variation (R^2 = 0.2096), suggesting that local economic conditions and liquidity constraints play a meaningful role in deposit pricing. However, county-year fixed effects (column 3) account for a substantially larger share of the variation (R^2 = 0.9497), highlighting that deposit rates are highly sensitive to local conditions over time. Comparing bank-year fixed effects (column 4) with county-year fixed effects shows that while bank-wide funding conditions influence deposit rates (R^2 = 0.9277), local liquidity constraints have a stronger explanatory power. Notably, adding bank fixed effects (column 5) and bank-year fixed effects (column 6) marginally increases the R^2 from column (3) by 0.5% and 1%, respectively. Furthermore, we find that only 13% of single-state banks report no variation in deposit rates across their branches within a given month, and on an annual basis, this number falls to just 0.5%. This suggests that nearly all single-state banks adjust deposit rates across different geographies, further emphasizing the role of local market conditions in driving deposit pricing.

To understand where the variation in single-state bank deposit rates come from, we employ data from the American Community Survey (ACS) to examine the relationship between county-specific demographic and economic characteristics and bank deposit rates. The granularity of the survey data allows us to include high-dimensional fixed effects, enabling comparisons of deposit rates across counties within the same month and year, in the same state. Appendix Table B.2 presents the results. Our findings show that regions with a higher share of unemployed individuals and a larger proportion of the population employed in the ser-

vices industry tend to have higher deposit rates. To further explore the connection between regional economic activity and deposit rates, we use data from Barrot et al. (2022) and implement an instrumental variable strategy, which combines regional industry composition with industry-specific shipping costs as a proxy for import competition. Our results, detailed in Appendix Section C, indicate that banks, indeed, set higher deposit rates in regions projected to experience greater economic contraction. In Section 4, we examine the relationship between deposit rates and banks' balance sheet conditions, showing that banks facing greater liquidity constraints – indicated by a higher credit-to-deposits ratio – tend to raise their deposit rates.

We aggregate branch deposit rates at the county level and then at the state level to demonstrate their effectiveness as indicators of local economic activity. Figure 3 presents a heatmap of the average deposit rates by county between 2001 and 2020. We construct the average 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 rate is computed by averaging across the monthly county deposit rates in each year. Figure 4 presents heatmaps of county deposit rates in 2006, 2009, and 2017.[13] We observe that deposit rates offered by banks exhibit regional variation at any given point in time. Interestingly, there is also temporal variation in regions with higher deposit rates. These heatmaps emphasize two key findings: (1) there is meaningful variation in deposit rates 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. We start by examining whether higher deposit rates in 2006 are associated with lower GDP growth two years ahead in 2008. As shown in Figure 5, there is a clear association between deposit rates and future GDP growth. We find that higher deposit rates offered by banks are associated with lower GDP growth. Moreover, in Figure 6, we sort regions into quintiles based on the deposit rate offered by banks in 2006 and explore whether recession risk is higher in regions with higher deposit rates.[14] 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 that a region experiences a larger than 2% drop in GDP in 2008.

[13] Appendix Figure B.5 presents heatmaps of state deposit rates in 2006, 2009, and 2017.

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

Importantly, these patterns extend beyond the Great Financial Crisis. As shown in Figure 7, the significant negative relationship between deposit rates and future GDP growth persists throughout the entire sample. This holds true even after accounting for county and year fixed effects in Figure 7a, and state and quarter-year fixed effects in Figure 7b.

4 Main Results

In this section, we rigorously examine the relationship between our deposit rates and regional economic activity.

4.1 Baseline Effects

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 state GDP growth at the quarterly frequency is 0.37% with a standard deviation of 1.75%. We compute the average deposit rate as well as the standard deviation of deposit rates at the county and state levels. We find that across these measures, the average county deposit rate is 1.52% with a standard deviation of 1.27% across the sample.

We start our empirical framework with the most basic geographic unit: the county-level. We begin our analysis by focusing on metropolitan (metro) counties as these regions exhibit a competitive banking structure.[15] 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.[16] 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 six-year (k = 1, 2, 3, 4, 5, 6) 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, employment growth, business formation, or wage growth in our baseline specification, and $Rate$ denotes the average bank deposit rate. We report county clustered standard errors.[17]

[15] Note that for metro regions, banking concentration remains stable over the entire sample period. However, our findings are robust when expanding the sample to all counties as shown in Appendix Table B.3.

[16] 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.

[17] Our findings are also robust to Conley (1999) standard errors, adjusted for spatial dependence within 100 kilometers.

Our key empirical finding, presented in Table 2, is that the deposit rate within a county serves as a significant indicator of economic activity. To address time-invariant county-specific factors, we include county fixed effects, and we incorporate time fixed effects to control for the possibility that the observed relationship between economic activity and deposit rates is driven by unobserved, time-varying aggregate factors. In columns (1)-(6), the dependent variables represent economic activity one through six years ahead, respectively. The independent variables are standardized for ease interpretation.

We explore the relationship between future GDP growth and deposit rates in Panel A. Our findings show that larger increases in deposit rates are followed by larger contractions in economic activity. While higher deposit rates are linked to declines in economic growth over a period of 1-6 years, the strongest association is observed two to three years ahead. Specifically, we find that higher deposit rates are associated with a contraction in economic growth two to three years in the future. Column (2) shows that a one standard deviation increase in deposit rates is associated with a 0.69 percentage point decrease in GDP growth two years later. Column (3) shows that a one standard deviation increase in deposit rates is linked to a 1.35 percentage point decline in GDP growth three years ahead.

4.2 Addressing Reverse Causality and Other Economic Indicators

Although our findings suggest that there is a strong relation between deposit rates and future economic growth, it is unclear whether the effect may be reverse causal. That is, one may be concerned that there is autocorrelation in GDP growth, and that changes in deposit rates *lag* changes in economic conditions rather than lead. To mitigate this concern and establish that the effect between deposit rates and future GDP growth are not confounded by past economic growth, we incorporate several lags of economic growth into our baseline analysis in Table 3. By including these lagged variables, we aim to control for the influence of past economic growth on the current and future state of the economy. Our results demonstrate that even after accounting for the historical trajectory of economic growth, deposit rates continue to exhibit a significant predictive power for future economic growth. The point estimates presented in Table 3 are remarkably similar to our baseline estimates in Table 2, further reinforcing the notion that deposit rates are a reliable indicator of future economic trends, independent of historical economic performance.[18]

While GDP growth measures the value of goods and services produced, it can be influenced by external factors like trade and may not fully reflect how the benefits are distributed.

[18] It is worth noting that our analysis also reveals that higher past economic growth is associated with lower future economic growth.

For example, increased productivity or investment can boost GDP without necessarily creating more jobs. To capture a more direct measure of economic growth, we turn to employment growth in Panel B of Table 2. Employment growth provides insight into job creation and destruction within the economy. Our findings show that local labor markets tend to tighten following larger increases in deposit rates over a 1-6 year horizon. Specifically, a one standard deviation increase in deposit rates is associated with a 0.55 to 0.94 percentage point decline in employment growth two to five years ahead. The effects on employment are strongest three years ahead, mirroring the effects on GDP growth: a one standard deviation increase in deposit rates is linked to a 0.94 percentage point decline in employment growth three years later. These magnitudes are substantial, especially when compared to the average county employment growth of 0.71%. We also use the unemployment rate and payroll growth as alternative measures of economic activity and find consistent results in Panels A and B of Appendix Table B.4.

To further investigate the relationship between deposit rates and economic activity, we explore additional measures of economic conditions. In Panel C of Table 2, we focus on future new business formation, measured as the natural-log transformed number of new businesses.[19] Consistent with our earlier findings, which show a negative association between deposit rates and economic activity, we observe that an increase in deposit rates is linked to a decline in new business formation. While the number of applications provides direct insight into the creation of new businesses each year, a limitation of this measure is that the dataset begins in 2005. For completeness, we show that the results are robust in Panel C of Appendix Table B.4.

We supplement this measure of business activity with a measure of household income, specifically wage growth, in Panel D of Table 2. Wage growth directly reflects household income, which in turn affects the overall supply of deposits and potential deposit shortages. Our findings indicate that higher deposit rates are associated with lower wage growth, particularly two to four years later, with the strongest effects observed three years ahead. We further supplement this analysis with the mortgage delinquency rate—an indicator of consumer financial health—in Panel D of Appendix Table B.4. The 30-89 day mortgage delinquency rate serves as an early signal of the health of the mortgage market, capturing borrowers who have missed one or two payments. Our results show that higher deposit rates are associated with an increased risk of credit losses.

Lastly, for a subset of counties with available data on inflation, our analysis reveals a

[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.

significant negative relationship between deposit rates and the CPI growth rate, as shown in Panel E of Appendix Table B.4. Overall, the findings from various measures of economic activity consistently indicate that higher deposit rates are linked to a future contraction in economic activity.

One key observation is that while the effects of higher deposit rates on employment growth and GDP are relatively quick to materialize, other outcomes, such as business formation and delinquencies, take longer to adjust. This difference can be attributed to the nature of the variables involved: GDP and employment are flow variables that respond swiftly to changes in credit conditions. In contrast, business formation and delinquency rates, for example, are stock-driven outcomes, which are more influenced by sustained credit conditions and prolonged economic stress rather than by short-term fluctuations.

4.3 Local Deposit Rates Reflect Local Deposit Shortages

4.3.1 Are the results driven by bank composition or within-bank effects?

A central premise of our analysis is that deposit rates reflect localized liquidity shortages rather than broader bank-wide or national funding constraints. County-level deposit rates, averaged across banks, capture two distinct components: (1) a bank composition effect, which accounts for differences in the types of banks operating in each county, and (2) a within-bank effect, which reflects how individual banks adjust their deposit rates in response to local supply-demand imbalances. To isolate the role of local liquidity conditions, we conduct two placebo tests that strip out regional variation from deposit rates.

In the first test, we replace each bank's deposit rate in metropolitan counties with its average deposit rate across all non-metro counties where they operate. We then compute the county-level deposit rate using these reassigned values. If deposit rates primarily capture bank-wide funding conditions, this constructed non-metro average should still predict economic outcomes in metro areas. However, if local deposit conditions are the primary driver, this reassignment should significantly weaken the predictive relationship.

The results, reported in Appendix Table B.5, confirm that the reassigned deposit rates fail to predict metro-area economic activity. The coefficients are insignificant across multiple indicators, including GDP growth, employment growth, business formation, and wage growth. This suggests that deposit rates embed local information about deposit stress—information that is lost when local variation is removed. If deposit rates were merely proxies for broader banking conditions, we would still observe predictive power when applying non-metro de-

posit rates to metro counties. The disappearance of this effect demonstrates that deposit rates capture localized deposit constraints that directly shape economic outcomes.

We conduct a second test by reversing the approach – assigning each bank's metro-wide average deposit rate to its branches in non-metro counties. If deposit rates primarily reflect bank-wide factors, we would expect these reassigned metro rates to still predict economic conditions in non-metro counties. However, if deposit rates are predominantly shaped by local deposit conditions, their predictive power should again disappear. As shown in Appendix Table B.6, the reassigned metro deposit rates fail to predict economic activity in non-metro areas. The results mirror those from the first placebo test: across multiple economic indicators, the coefficients remain insignificant. This further reinforces that deposit rates are not simply a function of bank-wide funding conditions but instead reflect county-level deposit conditions.

These placebo tests provide strong evidence that deposit rates are shaped by localized deposit shortages rather than broader banking trends. If deposit rates were purely driven by bank-wide funding constraints, reassigned rates from non-metro to metro areas (and vice versa) would still exhibit predictive power. The fact that these effects vanish confirms that deposit rates capture local deposit stress, which in turn influences regional economic activity. By ruling out the possibility that our findings are driven purely by bank-level factors, these tests strengthen the case that deposit shortages at the county level are a key driver of deposit pricing and economic fluctuations.

4.3.2 Are single-state banks unique?

The predictive power of deposit rates is closely tied to the behavior of single-state banks, which lack the extensive internal capital markets of large national banks. Without the ability to reallocate liquidity across multiple regions, these banks must adjust deposit rates more directly in response to local funding pressures. As a result, their deposit rate movements provide a more precise signal of regional economic dynamics.

In contrast, multi-state banks typically exhibit lower variation in deposit rates across branches. With access to internal capital markets, these banks can smooth localized funding shocks, reducing the need for region-specific deposit rate adjustments (e.g., Stein, 1997; Granja and Paixao, 2019; Morgan et al., 2004). Consequently, we expect that deposit rates at multi-state banks – where spatial heterogeneity in rates is minimal – will have weaker predictive power for local economic conditions.

To test this, we measure the standard deviation in deposit rates across branches for each multi-state bank within a given year and then average these deviations over time. We then

replicate our baseline analysis for this subset of banks that exhibit low geographic variability in deposit rates (standard deviation below the 25^{th} percentile for the sample) in Appendix Table B.7. The results confirm that deposit rates at large multi-state banks are significantly less predictive of future local economic activity. This finding demonstrates that spatial variation in deposit rates – prevalent among single-state banks – is a key channel through which deposit rates reflect local liquidity conditions and economic stress.

4.3.3 Does the presence of multi-state banks matter?

Thus far, our analysis has focused on local banks. An important question is whether our baseline findings hold in areas where large, multi-state banks play a dominant role. We hypothesize that local banks may face increased competition in areas with a greater presence of larger banks, which could influence the relationship between deposit rates and future economic activity.

To examine this, we define a bank as "large" if it operates in more than one state.[20] We then test whether the share of large banks in a county affects the relationship between single-state bank deposit rates and future GDP growth. Appendix Table B.8 shows that the coefficient associated with the county average deposit rate remains quantitatively and statistically similar to our baseline findings in Table 2, regardless of the share of large banks. However, the interaction between the deposit rate and the quartile of the share of large banks suggests that this relationship is stronger in counties with a larger presence of multi-state banks.[21] This suggests that in areas with greater competition for deposits, deposit rates become a stronger indicator of future economic growth.

In counties dominated by large, multi-state banks, we find that the deposit rates set by single-state banks remain a significant predictor of lower future GDP growth. This finding is important for two reasons. First, it demonstrates the relevance of single-state bank deposit rates as indicators of regional liquidity conditions, even in markets with large banks. Second, it suggests that the relationship between deposit rates and GDP growth operates independently of credit growth, reinforcing the notion that deposit shortages – rather than excessive credit expansion—can drive economic downturns.

Later, in Section 4.5.2, we compare the predictive power of deposit rates across varying levels of market competition. Specifically, we find that deposit rates are most predictive in

[20] Large banks are likely to use uniform rate-setting policies – see Appendix Figure B.1 (Begenau and Stafford, 2022).

[21] See Supera (2021) for how market power affects the transmission of monetary policy to business lending via time deposits.

highly competitive large, metropolitan counties and least predictive in rural counties with lower competition.

4.4 Robustness and Alternative Explanations

In this section, we investigate potential alternative explanations and identification concerns that could affect the robustness of our baseline findings. Through these additional analyses, we further confirm the robustness and validity of our main results.

4.4.1 Are the findings driven by failed banks?

A potential concern is that the observed relationships between economic indicators and bank lending are driven by the behavior of banks that eventually fail. To address this concern, we investigate whether our findings are influenced by the rate-setting behavior of failed banks. Appendix Table B.9 shows that our results are robust to the exclusion of failed banks. Hence, the relationships we document are not driven by the anomalous behavior of banks that ultimately fail.

4.4.2 Are the findings driven by the choice of deposit product?

To assess whether our results are driven by the choice of deposit product, we examine the term structure of CDs and alternative deposit instruments, particularly money market accounts.

First, we investigate whether banks primarily raise short-term or long-term deposits in response to liquidity stress. In Appendix Table B.12, we analyze the relationship between deposit rates on 1-month, 3-month, 6-month, 12-month, 24-month, 36-month, and 60-month CDs and GDP growth three years ahead. The results indicate that banks tend to adjust short- to medium-term CDs (6-month and 12-month) more aggressively than either shorter-term (1-month and 3-month) or longer-term (24-month and beyond) CDs. The coefficient on 1-month CDs is statistically insignificant, suggesting that banks do not heavily rely on extremely short-term deposits to address liquidity pressures, possibly due to their frequent rollover requirements and the administrative burden associated with continuously renewing such deposits. This pattern suggests that banks balance their need for stable funding with the flexibility to adjust rates dynamically as conditions evolve, relying on short- to medium-term deposits rather than committing to either very short-term or very long-term funding sources in response to liquidity stress.

Second, we validate the predictive power of deposit rates by exploring alternative deposit products. In Appendix Table B.10, we reproduce our baseline analysis using the deposit

rate for money market accounts with a $10,000 minimum balance requirement. The results confirm that money market rates are also significant predictors of future economic activity, though the economic magnitudes are somewhat smaller compared to CDs. This aligns with prior findings that time deposits are more sensitive to bank liquidity conditions than other deposit instruments (Martin et al. (2018); Supera (2021)). Moreover, in Appendix Table B.11, we extend this analysis across money market accounts with different minimum balance requirements ($25,000, $50,000, and $100,000) and find that the predictive relationship remains robust across minimum account balances. The fact that deposit rates on money market accounts – despite their more liquid nature – still forecast economic downturns demonstrates the broader informativeness of deposit pricing as a measure of local liquidity conditions.

Third, we examine whether banks experiencing liquidity stress turn to large-denomination uninsured deposits. In Appendix Table B.12, Panel B, we analyze CDs with a minimum account size of $100,000 and find no statistically significant relationship with future GDP growth. If banks were primarily concerned with locking in long-term funding during stress periods, we would expect to see a stronger relationship for large uninsured deposits. Instead, the lack of a significant response suggests that banks prioritize funding flexibility over securing large-denomination, long-term commitments. This aligns with our broader conclusion that banks manage liquidity shortages dynamically by frequently adjusting short-term deposit rates rather than making a strategic shift toward longer-term liabilities.

Lastly, in Appendix Table 4.6, we replace the marginal deposit rate with the average deposit rate for single-state banks, derived from Call Reports, to demonstrate that the average deposit interest expense of these banks can predict future GDP growth at the state level. This approach mitigates potential concerns about selection bias in RateWatch coverage and confirms that the predictive power of deposit rates extends beyond specific deposit products to broader measures of bank funding costs. The consistency of these results further reinforces the interpretation that deposit rates capture localized funding shortages rather than idiosyncratic features of particular deposit products.

Overall, these findings reinforce that deposit pricing serves as a key indicator of bank liquidity conditions and broader economic stress. The stronger response of short-term CDs to liquidity shortages suggests that banks dynamically manage funding pressures rather than preemptively locking in long-term funding. The predictive power of money market accounts and the consistency of results at the state level further support the argument that deposit rates reflect shifts in funding conditions rather than product-specific characteristics. This distinction is important in understanding why deposit rates – particularly those on time deposits – serve

as a leading indicator of economic downturns, capturing shifts in bank liquidity that are not fully reflected in credit growth or other financial indicators.

4.4.3 Are the findings driven by monetary policy changes?

An important question is whether the relationship between regional deposit rates and regional economic activity is primarily driven by monetary policy changes (Drechsler et al. (2017); Drechsler et al. (2022); Jiménez et al. (2022)). So far, our results have been shown to be robust to the inclusion of time fixed effects, which absorb national-level monetary policy shocks. However, to further ensure that our findings are not solely influenced by monetary policy, we conduct two additional tests.

First, we perform a subsample analysis over the period from 2010 through 2015, a time when short-term interest rates remained relatively stable. This period provides a useful test because monetary policy-driven changes in deposit rates should be minimal, allowing us to isolate the role of local liquidity conditions. In Appendix Table B.13, we replicate the results reported in Table 2 for this period. We find qualitatively similar results, suggesting that the predictive power of deposit rates holds even in a setting where monetary policy is unlikely to be the driving factor.[22] The estimated magnitudes are, if anything, larger than in the full sample. Panel A of Table B.13 shows that a one standard deviation increase in deposit rates is associated with a 5.49 percentage point decline in GDP growth two years ahead. We observe similarly strong effects for employment growth, business formation, and wage growth.

Second, we test whether the predictive power of deposit rates depends on how responsive deposit growth is to monetary policy. If monetary policy transmission plays a dominant role, we would expect the relationship between deposit rates and economic activity to be stronger in areas where banks exhibit a greater sensitivity of deposit growth to changes in the Fed Funds rate. To test this, we construct bank-level deposit betas, measuring how each bank's deposit growth responds to changes in the Fed Funds rate. We then aggregate these betas to the county level, weighting by each bank's average deposit share over the sample period. This allows us to assess whether deposit rates are more predictive of economic downturns in areas where banks have more (or less) responsive deposit growth.

The results, reported in Appendix Table B.14, show that the interaction between deposit rates and deposit betas is not significant, while the deposit rate itself remains strongly predictive of economic downturns. This suggests that the predictive power of deposit rates does not

[22] Moreover, we show that the regional deposit rate remains a strong predictor of regional economic activity in this period, even after accounting for changes in deposit rates due to monetary policy and market power. This finding is corroborated in unreported regressions controlling for the Fed Funds rate and deposit spreads.

depend on how responsive deposit growth is to monetary policy, reinforcing the idea that local liquidity conditions – rather than monetary policy-driven deposit shifts – are the key driver of the observed relationship. If monetary transmission effects were the dominant mechanism, we would expect the interaction term to be significant, with deposit rates having stronger predictive power in counties where banks' deposit growth is highly responsive to interest rate changes. Instead, the lack of significance in the interaction term suggests that deposit rates capture localized liquidity shortages that are distinct from broader monetary policy effects.

Taken together, these results indicate that the relationship between deposit rates and economic activity is not purely a byproduct of monetary policy transmission. Even in periods of stable short-term rates, deposit rates remain a strong predictor of economic downturns. Moreover, the predictive power of deposit rates does not vary systematically with banks' sensitivity to monetary policy, suggesting that local deposit market conditions, rather than monetary transmission effects, are the primary channel through which deposit rates reflect economic stress.

4.4.4 Can deposit rates predict in the cross-section?

The baseline estimation incorporates a temporal element, as our analysis spans several years. To assess whether deposit rates have predictive value in a cross-sectional context, we estimate the relationship between deposit rates in 2006 and GDP growth one, two, and three years ahead. The results are reported in Panel A of Appendix Table B.15. We find that the relationship between deposit rates and GDP growth reverses at the two-year horizon, becoming negative. This suggests that high deposit rates are associated with a contraction in economic activity over the longer term, rather than reflecting short-term fluctuations.

This intuition is further supported when we examine the relationship between 2006 deposit rates and future employment growth (Panel B of Appendix Table B.15) and inflation (Panel C of Appendix Table B.15). In both cases, the predictive value of deposit rates tends to be stronger at longer horizons.[23]

Overall, these cross-sectional findings align with those reported in Table 2, which also suggest that the predictive value of deposit rates is stronger at a two-year horizon compared to a one-year horizon.

[23] Precautionary savings typically rise at the onset of recessions, which may weaken the predictive power of deposit rates for short-term contractions. Specifically, during the early stages of a recession, deposit inflows may be driven more by precautionary savings than by changes in economic activity. For example, Levine et al. (2021) find that the surge in precautionary savings during the initial months of the COVID-19 pandemic led to increased deposit inflows.

4.5 Predictive Value of Deposit Rates

4.5.1 Can deposit rates predict recessions?

To further understand the predictive value of deposit rates, we estimate a 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. 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.

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

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 results in Panel A of Table B.16 demonstrate that an increase in the deposit rate within a county significantly raises the probability of a recession. Specifically, Column (1) shows that a one standard deviation increase in the deposit rate raises the likelihood of a recession occurring one year ahead by 12%. In Column (2), a one standard deviation increase in deposit rate raises the probability of a recession occurring two years ahead by 34%. Column (3) indicates that a one standard deviation increase in the deposit rate raises the likelihood of a recession occurring three years ahead by 29%. These estimates are both economically mean-

[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.

ingful and statistically significant at the 1% level across all forecasting horizons. Additionally, diagnostic tests confirm that the covariates are jointly statistically significant. The two-year forecast model yields an AUC of 0.61, outperforming a random coin toss classifier.

We contrast these findings with a naive logit model that uses lagged GDP growth to predict county recessions in Panel B. We find that lagged GDP growth does not predict the likelihood of a recession one to two years ahead. In Column (3), we observe an unexpected result – higher past GDP growth is associated with an increased likelihood of a recession, suggesting a reversal rather than the expected serial correlation in economic activity. The naive classifier yields AUC values ranging from 0.50 to 0.56 across Columns (1) through (3).

In Panel C, we conduct a horse-race between deposit rates and lagged GDP growth. Our analysis yields two key takeaways. First, deposit rates remain a significant predictor of future recessions. Column (2) in Panel C shows that a one standard deviation increase in the deposit rate raises the likelihood of a recession occurring two years ahead by 40%, with the AUC improving to 0.66 from 0.61. Second, lagged GDP growth loses its predictive power in the three-year classifier.

In Appendix Table B.17, we include county fixed effects. Our results remain consistent with those in Appendix Table B.16. Deposit rates continue to be a significant predictor of recessions and outperform lagged GDP growth. The two-year forecast model with county fixed effects produces an AUC of 0.74, which indicates a strong predictive value.

4.5.2 Are deposit rates better predictors in competitive markets?

We hypothesize that deposit rates offered by banks within a county tend to rise when certain banks experience deposit shortages. This conjecture is based on the assumption that competition for deposits among banks within a county drives banks to adjust their rates in response to their individual deposit needs.

To assess whether deposit rates are better predictors in more competitive markets, we first examine whether the predictive power of deposit rates increases in regions with higher bank concentration. In competitive markets, banks cannot afford to keep deposit rates static or uncompetitive without risking the loss of depositors to other institutions. This competitive pressure ensures that deposit rates reflect real-time market dynamics and underlying economic conditions. To test this hypothesis, we examine whether deposit rates predict county recessions more effectively in concentrated markets, as shown in Appendix Table B.21. We find that in large metropolitan counties, a one standard deviation increase in deposit rates is associated with a 17% to 19% increase in the likelihood of a recession two years ahead. In contrast,

this effect is much smaller in small urban counties (5% to 6%), and deposit rates do not predict recessions in rural counties. We observe a monotonic decline in both the point estimate and the AUC as we move from large metro counties to rural counties. The AUC is 0.73 for large metro counties, compared to 0.64 for rural counties, as shown in Panel B.

4.5.3 Are weaker banks more sensitive to deposit stress?

We next explore whether banks with weaker balance sheets are more sensitive to deposit stress, and consequently, whether they raise their deposit rates more in response to economic downturns. While economic contraction within a county is generally associated with an increase in the average deposit rates of banks operating in the area, the composition and strength of banks' balance sheets can vary significantly. This variability can leave certain banks more vulnerable to deposit shortages, leading to divergent responses in their deposit rates. In Appendix Table B.22, we show that banks facing greater constraints tend to increase their rates more significantly. Specifically, we find that banks with overstretched balance sheets – such as those with higher credit-to-deposit ratio – raise their rates more in the subsequent period. Additionally, banks with lower liquidity, as indicated by ratios like cash-to-assets and dividends-to-assets, also tend to raise their rates more. Furthermore, banks with a smaller share of securities in their portfolios report higher deposit rates, consistent with findings from Kundu et al. (2024). These results highlight that the magnitude of deposit rate increases is closely linked to the balance sheet strength and liquidity conditions of the banks.

4.6 Generalizability and Out-of-Sample Fit using State-Level Data

4.6.1 State-level analysis

To assess the generalizability of our findings beyond the county level, we conduct a parallel analysis at the state level and explore the out-of-sample predictive performance of deposit rates. The findings of this analysis further help validate deposit rates as a useful heuristic for assessing regional economic risks.

State GDP data is available at the quarterly frequency from 2005, allowing us to investigate whether deposit rates can forecast economic activity on a quarterly basis at the state level. We calculate the average deposit rate for each state, through aggregation of county characteristics. That is, we construct the state deposit rate by taking an average of the county deposit rate in the last reporting month of each quarter.

Appendix Table B.18 reports the relation between deposit rates and economic activity at the state level. Consistent with our baseline findings at the county level, our results demon-

strate that deposit rates are a salient indicator of future economic activity at the state level. This build-up of economic risk also carries implications for the risk of financial institution failures.[26] We evaluate the predictive value of state deposit rates in Appendix Table B.19, using a logit specification and find that a one standard deviation increase in deposit rates raises the likelihood of a GDP drop greater than 2% eight quarters ahead by nearly 50%, both with and without state fixed effects. Furthermore, the estimated AUC (Area Under the Curve) at the two-year horizon is 0.68 without fixed effects and 0.72 with state fixed effects.

4.6.2 Out-of-sample forecasting

We further assess the predictive performance of deposit rates out-of-sample using k-fold cross-validation, examining how well the model generalizes to independent datasets. 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 cross-validated AUC across the k-folds 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 B.6 in the appendix reports the k-fold ROC curves and summarizes the cross-validated AUC from the logit model used in Panel A of Appendix Table B.19. We find that our predictive model generalizes well to independent datasets and reports a high model prediction performance. Specifically, we find that the cross-validated AUC is 0.68 for recessions, eight quarters ahead.[27]

4.6.3 Comparison of marginal deposit rates and average deposit rates

To ensure that our findings are not driven by potential mismeasurement of the marginal deposit rate, we compute the average deposit rate across all deposits from the Call Reports. The advantage of using Call Reports data is that it provides the deposit rate at the bank level, rather than for a specific deposit product. This measure captures both the reliance on different deposit types and the associated rates. Additionally, using Call Reports data mitigates potential bias from RateWatch coverage, particularly in areas experiencing economic decline. We apply

[26] We find that state deposit rates in 2006 correspond to greater incidence of bank failures between 2008 and 2012, both on the extensive and intensive margins as presented in Appendix Figure 8.

[27] The cross-validated AUC at the county level is 0.60 for recessions two years ahead.

this measure to single-state banks and demonstrate that it can predict future GDP growth at the state level in Appendix Table B.20. Specifically, we find that a one standard deviation increase in the average deposit interest expense of single-state banks is associated with a decline in future GDP growth of 0.46 to 0.48 percentage points one to two years ahead.

5 Validation from the Wells Fargo Regulatory Enforcement

A core challenge in evaluating the relationship between deposit shortages and economic activity is establishing causality. To address this, we leverage the enforcement of the Wells Fargo asset cap by the Office of the Comptroller of the Currency, which was implemented in response to the 2016 fake accounts scandal. This unprecedented regulatory action restricted Wells Fargo's total assets to their year-end 2017 level, effectively capping the bank's ability to expand its balance sheet. By limiting its capacity to absorb deposits, the asset cap created a shock to deposit supply that was exogenous to local economic conditions, allowing us to isolate the impact of deposit shortages on regional economic outcomes.

This setting provides a unique natural laboratory to test our hypothesis that deposit shortages drive increases in deposit rates, which in turn affect credit availability and economic growth. If deposit constraints meaningfully shape credit cycles, we would expect counties with a significant Wells Fargo presence to experience higher deposit rates, lower small business lending, and weaker GDP growth following the enforcement of the cap.

The Wells Fargo regulatory enforcement represents a plausibly exogenous shock to deposit supply for three key reasons. First, it was imposed as a regulatory penalty for bank misconduct, rather than as a response to local economic conditions. Second, its impact on deposit rates stemmed directly from the binding constraint on Wells Fargo's balance sheet, which not only limited its ability to retain deposits but also eroded trust in banks in affected counties—including those not directly subject to the cap (Yang (2023)). Third, the regulatory action was unrelated to broader economic factors such as monetary policy shifts, changes in precautionary savings, banking structure differences, or credit booms. This allows us to disentangle the effects of deposit shortages from other macroeconomic trends.

The existing research has utilized the Wells Fargo regulatory enforcement to study a variety of financial and economic outcomes, including fintech adoption driven by mistrust of banks (Yang (2023)), the fragility of small banks during the SVB crisis (Ruan and Vij (2024)), and employment outcomes during the Paycheck Protection Program (PPP) (Granja et al. (2022)). We add to this literature by using the regulatory action to examine how deposit supply con-

straints propagate through local economies via deposit rates, credit supply, and economic growth.

To further validate the exogeneity of the cap, we compare deposit and asset growth trends for Wells Fargo against those of other large banks – Bank of America, JPMorgan Chase, and Citibank—following the methodology of Ruan and Vij (2024). Appendix Figures D.1a and D.1b scale total deposits and total assets by their respective 2017 values. The results reveal a stark contrast: while the other three major banks experienced substantial deposit and asset growth after 2017, Wells Fargo's ability to attract and retain deposits remained severely constrained, limiting its balance sheet expansion relative to its peers.

Our central hypothesis is that deposit rates effectively reflect deposit shortages. We argue that counties with a significant Wells Fargo presence prior to the regulatory enforcement experienced a contraction in deposit supply after its enforcement. Beyond directly limiting Wells Fargo's ability to absorb deposits, the regulatory enforcement also undermines household trust across banking institutions within affected counties, amplifying the local deposit shortage (Yang (2023)). This contraction in deposit supply leads to an increase in deposit rates, which in turn restricts credit availability, particularly for small businesses that rely heavily on local banks for financing. Appendix Figure D.2 illustrates Wells Fargo's share of deposits across U.S. counties in 2017, highlighting substantial variation in its presence.

To quantify the effects of deposit shortages on local economies, we implement a difference-in-differences approach, comparing economic outcomes in counties with a significant Wells Fargo presence to those without, before and after the regulatory enforcement was imposed. This method allows us to isolate the causal impact of deposit shortages while controlling for time-invariant county characteristics and broader macroeconomic trends. Our model is specified as follows:

$$Y_{c,t} = \beta_1 \cdot \mathbb{1}_{\text{WF County},c} \times Post_t + \alpha_c + \alpha_t + \epsilon_{c,t} \tag{3}$$

where Y refers to outcome variables including deposit growth, deposit rate, credit growth, and GDP growth. The indicator variable, $\mathbb{1}_{\text{WF County}}$, identifies counties with a Wells Fargo presence in 2017, while *Post* marks the post-enforcement period (2018 onward). The sample period spans 2012 through 2023.

To confirm the parallel trends assumption, Appendix Figure D.3 examines pre- and post-trend behavior of deposit growth and deposit rates across treated and control counties. Prior to the regulatory enforcement, both groups followed similar trends. However, after enforcement, deposit growth in affected counties declined sharply (Appendix Figure D.3a), except for a

temporary increase during COVID. Similarly, deposit rates (Appendix Figure D.3b) spiked post-enforcement, declined briefly during COVID, and rose again after 2021. These patterns support the validity of our empirical design by demonstrating that counties with and without Wells Fargo presence were on parallel trajectories prior to the enforcement action.

Next, we examine the impact of the regulatory enforcement on county deposit growth in Panel A of Table 4. Column (1) presents the results without any fixed effects, while Column (2) includes county fixed effects, Column (3) includes year fixed effects, and Column (4) includes both county and year fixed effects. We find that county deposit growth declines by up to 1.08 percentage point in counties with a Wells Fargo presence after the regulatory enforcement, indicating that the supply of deposits contracted and that substitution effects are imperfect. This decline represents approximately 27% of the average deposit growth.[28] Turning to the county deposit rate in Panel B, we observe that the deposit rate increases by 5.7 basis points in counties with a Wells Fargo presence following the regulatory enforcement, which accounts for up to 9% of the deposit rate in these counties. These results suggest that the regulatory enforcement significantly affected both deposit growth and deposit rates in counties where Wells Fargo had a strong presence.

Our key conjecture is that the regulatory-induced deposit shortages have real economic consequences through the bank lending channel. Specifically, we hypothesize that resulting from the regulatory enforcement translates into lower small business lending in these counties. Panel C of Table 4 compares small business lending in counties with a Wells Fargo presence before and after the regulatory enforcement.[29] We find that these counties experience a decline in small business lending ranging from 6.49% to 8.78%.

This reduction in lending is accompanied by a significant decline in GDP growth. This natural experiment allows us to employ an instrumental variable design. To establish a causal link, we employ an instrumental variable (IV) strategy using the Wells Fargo enforcement as an instrument for deposit shortages. The first-stage regression instruments county deposit rates using the interaction term $\mathbb{1}_{\text{WF County}_c} \times Post_t$, along with county and time fixed effects:

$$Rate_{c,t} = \beta_1 \cdot \mathbb{1}_{\text{WF County},c} \times Post_t + \alpha_c + \alpha_t + \epsilon_{c,t}.$$

[28] Note that the decline in deposit growth is not solely driven by the closure of Wells Fargo branches. Even after excluding Wells Fargo from the calculation, we observe a decline at the county level.

[29] Small businesses typically rely on local bank branches for financing (see Petersen and Rajan (1994)), hence, they are more likely to local liquidity conditions.

The second-stage regression examines the effect of deposit rates on GDP growth:

$$\Delta ln(GDP)_{c,t} = \beta_1 \widehat{\text{Rate}} + \alpha_c + \alpha_t + \epsilon_{c,t}.$$

Columns (1)–(4) of Table 5 report the reduced-form relationship, while Columns (5) and (6) present the 2SLS estimates. We find that counties affected by the regulatory enforcement experienced a drop of up to 0.43 percentage points in GDP growth. Additionally, our IV estimates show that a 1 percentage point increase in deposit rates is associated with a 7.31 percentage point decline in GDP growth – comparable to the 5.49 percentage point decline estimated for the 2010–2015 period in Table B.13. This 2SLS design provides support for our proposed mechanism: the relation between the regulatory enforcement and economic outcomes is mediated through the increase in deposit rates, reflecting the tightening deposit conditions. Importantly, this finding suggests that our findings are not driven by alternative mechanisms.[30]

To further explore the timing and transmission of deposit shortages to real economic outcomes, we examine the impulse responses of deposit growth, deposit rates, small business lending, and GDP growth at the county level in Appendix Figure D.4. The results show that deposit growth declines immediately following the asset cap, while deposit rates rise contemporaneously. Small business lending contracts with a slight delay, followed by a subsequent decline in GDP growth. These dynamics support our proposed mechanism: deposit shortages lead to higher deposit rates, restricting credit availability and ultimately dampening economic activity.

A potential concern is that the regulatory enforcement directly constrained Wells Fargo's lending, rather than affecting the local economy through deposit shortages. However, this would not explain the observed rise in deposit rates across other banks in affected counties. If the effects were driven solely by Wells Fargo's reduced lending capacity, deposit rates in those counties should have remained unchanged. Instead, as shown in Appendix Table D.1, we find that banks not subject to the cap also increased deposit rates, indicating a broader market-wide liquidity tightening.

Furthermore, in counties where Wells Fargo accounted for less than 15% of total lending, the real effects remain significant, as shown in Appendix Table D.2. This suggests that

[30] A potential concern is that the regulatory enforcement may have affected local economies through channels other than deposit availability, such as a reduction in Wells Fargo's lending. However, this does not violate the exclusion restriction, as any lending reductions should operate through the deposit supply channel: a decline in Wells Fargo's lending capacity would stem from an inability to retain deposits, which reinforces our mechanism. Indeed, in additional unreported regressions, we find that the second-stage result remains significant when the dependent variable is small business lending. Furthermore, we control for local economic shocks with county fixed effects and account for nationwide trends through time fixed effects, which further mitigates the risk of confounding factors.

bank-specific lending frictions, such as stickiness in bank-borrower relationships, are not the sole driver of our findings. These results support our conclusion that deposit shortages, as indicated by rising deposit rates, play a crucial role in driving local economic downturns.

Overall, these findings show how economic contractions can be driven by deposit stress experienced by banks in response to economic shocks, leading to higher deposit rates. Consequently, deposit rates serve as a key indicator for assessing regional economic risks, emphasizing the real-world impact of deposit shortages. Another significant shock that led to cross-sectional variation in deposit shocks occurred during COVID-19 due to stimulus payments. We replicate this analysis by examining county-level exposure to economic impact payments during the pandemic to assess how a positive deposit shock affects the local economy. Our findings remain robust, further supporting our conclusions. A detailed discussion is available in Appendix Section E.

6 How do Deposit Shortages Affect Deposit Rates?

Thus far, we have demonstrated that deposit rates possess significant predictive power for local economic activity. In this section, we provide evidence of the mechanism that links deposit rates to local economic conditions. Specifically, we show that rising deposit rates reflect underlying deposit shortages. Further, we show that the information embedded in deposit rates uncovers economic factors not captured by deposit growth, credit growth variables, or leading real indicators of economic activity.

6.1 Mechanism

At the core of our analysis is the premise that a shock to bank deposits can trigger a leftward shift in the supply of deposits, which subsequently results in an increase in deposit rates. Building on this premise, we first investigate the relationship between changes in deposit rates and the growth of both insured and uninsured deposits. We analyze both linear and non-linear relationships between changes in deposit growth and fluctuations in deposit rates around the quarter of the rate change.

Our baseline empirical framework regresses bank b's outcome variable on the quarterly change in the deposit rate at time t (quarter-year).

$$\Delta ln(Y)_{b,t+k} = \beta_0 + \beta_1 \Delta Rate + \alpha_t + \epsilon_{b,t}$$

where $\Delta ln(Y)$ denotes growth in the outcome variable, $\Delta Rate$ is the quarterly change in the

deposit rate, and k denotes the lead/lag of the dependent variable and ranges from -3 to +3 quarters. We include quarter-year fixed effects to control for aggregate shocks.

We supplement this linear model with a non-linear approach by sorting banks into quartiles based on their quarterly changes in deposit rates, as banks with different levels of constraints may adjust their rates in distinct ways. We start by calculating the average deposit rate for banks in each quarter across all counties and then analyze the quarterly changes in these deposit rates to capture their dynamic adjustments over time. The regression specification is as follows:

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

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, and fourth quartile of the change in bank's deposit rates 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 6 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 non-financial or financial corporations, along with wealthy individuals or entities exceeding the deposit insurance limit.

Our analysis yields several noteworthy observations. First, we observe a decline in the growth of insured deposits in the quarters leading up to rate changes. Panel A of Appendix Table B.23 indicates that this decline is observed across all banks, irrespective of the magnitude of deposit rate adjustments. Similarly, we also observe a slowdown in the growth of uninsured deposits during this period. However, our findings in Panel B of Appendix Table B.23 indicate that banks, which eventually raise rates to a greater extent, also experience a more substantial decline in the growth of uninsured deposits, shown in Panel B. 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 change.

To assess whether the dynamics in insured and 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 B.24. Our analysis reveals that the gap between uninsured and insured deposit rates narrows as banks approach a county recession. This suggests that, on average, banks tend to raise their insured deposit rates more significantly compared to their uninsured deposit rates as they approach a county recession, thereby, attracting more insured deposit funding.

To understand the asset-side adjustments in banks' balance sheets, we examine the relationship between lending growth and changes in deposit rates. Table 7 presents our findings, where we observe that higher lending growth typically precedes rate increases. Specifically, Appendix Table B.25 reveals that banks in the fourth quartile experience higher lending growth in the quarters leading up to rate changes. However, after the rate change, lending growth slows, and the differences across quartiles begin to converge. This suggests that banks raising rates by larger margins are primarily doing so to bolster liquidity, rather than to expand lending. Our findings are unlikely to be driven by loan demand, as we would expect lending to increase following higher rate hikes if that were the case.

One possible alternative explanation is that deposit rate increases reflect excessive credit booms rather than liquidity shortages. To rule this out, we examine whether banks raising rates more aggressively have weaker capital positions or deteriorating asset quality. If rate hikes were driven by excessive risk-taking, we would expect a link between deposit rate increases and worsening capital adequacy or rising non-performing loan (NPL) share. However, in Appendix Table B.26, we find no significant relationship between deposit rate changes and changes in Tier 1 capital ratios or NPL share, suggesting that deposit shortages – not impaired bank capital or excessive lending – are the primary driver of rate hikes.

Overall, our findings suggest the following channel at work: as a county nears an economic downturn, insured deposit growth decreases across all banks, while uninsured depositors reduce their deposits more at riskier banks. Consequently, county-level deposit growth declines and deposit rates increase (see Figure 2). This leftward shift in the supply of bank deposits leads to an increase in deposit rates. Greater deposit shortages result in reduced lending. However, the magnitude of the increase in deposit rates depends on the level of competition for bank deposits and the balance sheet conditions of banks within the county, as discussed earlier in Section 4.

Considering the aforementioned mechanism, it is necessary to ascertain whether the re-

sults stem from informed depositors withdrawing from risky banks prior to a downturn or if the slower deposit growth primarily originates from an overall slowdown in economic activity 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 are, therefore, less sensitive to recession risk. Moreover, Appendix Table B.9 shows that our baseline findings are not driven by the rate-setting policies of failed banks. Nevertheless, we explore bank credit default swap spreads and equity returns over several business cycles to gauge bank risk in Appendix Figure B.7. Interestingly, we do not find any significant spikes in CDS spreads or declines in bank equity prices until after national 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 the prices of other tradable instruments as well.

6.2 Deposit rates vs. deposit growth

Our primary conjecture is that deposit rates serve as an asset pricing measure of deposit scarcity, reflecting the balance between deposit supply and demand. In this context, deposit rates act as a sufficient statistic for bank deposit conditions. We demonstrate that this pricing measure of deposit shortages captures underlying economic conditions not directly accounted for by deposit growth alone, due to the relative inelasticity of deposit demand and the greater elasticity of deposit supply. Banks rely on deposits to meet reserve requirements, fund loans, and manage liquidity, and they face limited substitutes for deposit funding. This makes their demand for deposits relatively inelastic (e.g., Diamond and Dybvig, 1983; Bernanke and Blinder, 1988; Kashyap et al., 2002). In contrast, households and businesses can more easily substitute deposits with alternative investment options, such as mutual funds or equities, making deposit supply more elastic (Hannan and Berger (1997); Amromin and Sharpe (2014)).

Panel A of Table 9 demonstrates the relative inelasticity of deposit growth; the relationship between deposit growth and future GDP growth is negative, suggesting that higher deposit growth is associated with lower future GDP growth. Importantly, Panel B shows that deposit rates can predict future economic activity even after accounting for deposit growth. Our findings indicate that deposit rates offer valuable information beyond deposit growth alone. We further compare the predictive value of a model with deposit growth alone with a model that includes both deposit growth and deposit rates in Appendix Tables B.27. Specifically, the results show that deposit growth alone yields an AUC of 0.55 in Panel A, which is lower than the 0.61 obtained when deposit rates are added in Panel B at the two-year fore-

casting horizon in Appendix Table B.27 – a significant difference.[31] The point estimates associated with deposit growth are unstable, exhibiting fluctuating signs and varying statistical significance across Panels A and B. In contrast, the point estimates associated with deposit rates remain consistently statistically and economically significant, even after controlling for deposit growth. Notably, the predictive value, as measured by the AUC, remains largely unchanged with the addition of deposit growth, demonstrating the robustness of deposit rates as a predictor of future economic conditions.

6.3 Deposit rates vs. credit growth

The extant literature on credit booms highlights that periods of excessive credit growth are often followed by periods of large contractions in economic activity (Schularick and Taylor (2012)). Our evidence suggests that the forecasting power of deposit rates operates independently of credit booms. First, our results from 2010-2015 show that deposit rates predict economic activity even during periods of stagnant credit growth, extending their forecasting power beyond expansionary credit phases. Second, our quasi-natural experimental design, which leverages the timing of regulatory enforcement unrelated to credit booms, demonstrates that counties affected by regulatory enforcement experience deposit shortages, signaling impending economic contractions. Building on these findings, we further explore how the predictive value of deposit rates compares to various credit growth measures.

We compare the economic significance of county deposit rates with various measures of credit growth – small business lending growth in Panel A, mortgage lending growth in Panel B, and total lending growth in Panel C – by conducting a horse race in Table 8. Deposit rates remain an economically meaningful and statistically significant indicator of economic contractions. Specifically, we find that even after accounting for various measures of credit growth, a one standard deviation increase in the deposit rate is associated with a decline in future economic growth by 0.76 percentage points. Notably, we find that higher credit growth is *positively* associated with GDP growth.[32]

We further compare the predictive value of credit growth with deposit rates in Appendix Table B.31. The inclusion of credit growth measures does not alter the relationship between deposit rates and economic growth, as indicated by the coefficient, does not add explanatory power, as indicated by the change in the pseudo R^2, nor does it substantially improve the

[31] Appendix Table B.28 adds fixed effects; the results show that deposit growth alone yields an AUC of 0.68 in Panel A, which is lower than the 0.73 obtained when deposit rates are added in Panel B at the two-year forecasting horizon in Appendix Tables B.28.

[32] Appendix Table B.30 presents the results with credit growth alone and finds similar results.

predictive value, as evidenced by the change in the AUC in Appendix Table B.31.[33][34] In comparison, the results in Appendix Table B.33 indicate that the predictive value of credit growth measures are only marginally better than a random coin toss while the pseudo R^2 is virtually nil.[35]

To complement these comparisons between the predictive value of deposit rates and measures of credit growth, we conduct two additional tests. The findings of these tests rule out the possibility that our proposed channel of deposit shortages operates through the credit channel.

First, to isolate the deposit shortage channel and demonstrate the predictive power of deposit rates independent of credit supply, we compare the predictive power of deposit rates in regions more likely to experience recessions due to deposit shortages to those more likely to experience recessions during a credit boom. Motivated by our earlier findings that 48% of county recessions are preceded by credit contractions, we identify a subset of counties where the average total credit growth in the three years preceding a county recession was in the bottom quartile. These counties, characterized by weak credit growth, are more likely to experience recessions triggered by deposit shortages. By focusing on these areas, we aim to isolate the specific role of deposit rates in forecasting recessions driven by deposit constraints. This comparison helps us better understand how deposit rates can serve as an early indicator of economic stress resulting from deposit shortages.

Appendix Table B.29 reports the results. We find that the predictive value of deposit rates is driven primarily in areas less likely to experience credit boom-driven contractions. The coefficient on the deposit rate (Rate) is only significant at the three-year time horizon and becomes insignificant at other forecasting horizons. However, it turns positive when predicting GDP growth beyond four years. In contrast, deposit rates consistently predict lower GDP growth across all time horizons, with the point estimate remaining remarkably stable. Specifically, we find that a one standard deviation increase in the deposit rate in low credit growth areas is associated with a decline in GDP growth of 0.31 to 0.38 percentage points. Thus, the baseline table (Table 2), which does not differentiate between high and low credit growth areas, masks this heterogeneity at longer time horizons. This finding suggests that deposit rates are a reliable indicator of deposit stress experienced by banks. Moreover, it demonstrates that deposit rates have the most predictive power for forecasting economic activity during periods of de-

[33] It is important to note that the relationship between credit growth and the likelihood of recessions is significant in these logit specifications. However, the coefficient fluctuates in sign across the different panels and time horizons.
[34] Appendix Table B.32 reports the estimation results for this model, after including county fixed effects.
[35] Appendix Table B.34 reports the estimation results for this model, after including county fixed effects.

posit shortages, highlighting their role as an early signal of economic downturns driven by financial constraints rather than credit booms.

Second, to further establish the predictive power of deposit rates, we employ a residual analysis that controls for the effects of fluctuations in credit supply. This approach allows us to isolate the unique information embedded in deposit rates about economic activity, independent of credit supply. We first regress deposit rates on contemporaneous and lagged measures of credit growth. The resulting residual deposit rates, purged of credit supply influences, are then used to predict future economic growth. The results, presented across Panels A, B, and C of Appendix Table B.35, reveal a statistically and economically significant relationship between the residual deposit rates and GDP growth. This indicates that the predictive power of deposit rates increases after accounting for credit supply. The findings suggest that credit supply does not drive the deposit rate-GDP growth relationship; instead, deposit rates capture unique information about economic activity beyond credit supply fluctuations. This reinforces our previous conclusions, highlighting the potential of deposit rates as an independent indicator of economic activity. Section 6 examines the interplay between rate hikes and lending growth, revealing that banks that raise rates more substantially do so to strengthen their balance sheets, rather than expand lending.

6.4 Deposit rates vs. other leading indicators

While our findings suggest that deposit rates offer valuable insights compared to other bank measures, a key question remains: do they outperform established leading indicators of regional business cycle fluctuations? This comparison is important to validate deposit rates as a reliable forecasting tool for regional business cycles. To this end, we compare the predictive value of deposit rates (column (1)) to other leading economic indicators of recessions including the natural-log transformed number of auto sales (column (2)), unemployment insurance claims (column (3)), and job openings (column (4)) at the state level.[36] We study the relation between each of these indicators and future economic growth, twelve quarters ahead in Panel A of Table 10. Using a within-state estimator, we find no statistically significant relationship between unemployment insurance claims and future economic growth. Interestingly, while job openings show a strong correlation with future growth, the relationship is negative, suggesting that an increase in job openings is associated with weaker future economic growth, potentially due to mean reversion. To assess predictive value, we compare the R^2 values across all four

[36] Due to data availability limitations at the county level, we conduct this analysis at the state level.

specifications, noting that deposit rates explain as much variation as auto sales, unemployment claims, and job openings combined.[37]

We further validate that state deposit rates are a robust leading indicator of regional business cycles by running a horse-race analysis between our measure of state deposit rates and other leading economic indicators of regional business cycle activity in Panel B of Table 10. 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. Using a within-state estimator, we find that the state deposit rate robustly predicts future state GDP growth. Furthermore, the combined inclusion of the natural-log transformed number of auto sales, unemployment insurance claims, and job openings adds only an additional 1% to the R^2, beyond the 25.30% explained by the deposit rate alone in Panel A.

Appendix Table B.36 further compares the predictive value of these real indicators against deposit rates for predicting GDP growth twelve quarters ahead. Panel A shows that deposit rates significantly outperform all other real indicators individually, with an AUC of 0.72 compared to 0.57 to 0.58 for other indicators. Additionally, the pseudo R^2 for deposit rates alone is 0.07, compared to 0.01, at best, for the others. Panel B confirms these relationships are robust even after including state fixed effects. Appendix Table B.37 extends the horse-race analysis across various forecasting horizons, revealing that the addition of all other real indicators contributes minimal explanatory power, as indicated by the minor changes in R^2 and AUC. Importantly, deposit rates remain statistically significant and economically meaningful across all forecasting horizons, demonstrating their superior predictive capacity.

Deposit rates may exhibit better predictive value compared to other variables, as they are forward-looking rather than backward-looking. Additionally, deposit rates are readily available in the public domain in real time, unlike many other variables. Overall, these results demonstrate the comparative predictive value of deposit rates as a valuable indicator of economic downturns, outperforming other measures in this context.

7 Conclusion

This paper underscores the critical role of deposit rates as a powerful indicator of bank deposit shortages. Unlike traditional measures of credit growth, deposit rates provide a direct reflection of the balance between deposit supply and demand, acting as a sufficient statistic for banks' deposit positions. Elevated deposit rates signal deposit scarcity, which constrains credit

[37] Relatedly, Khan and Ozel (2016) show that bank accounting measures are associated with changes in the state coincident index.

expansion and subsequently dampens economic growth. Through detailed county-level data, we reveal that rising deposit rates often serve as an early indicator of economic contractions, capturing dimensions of deposit stress that conventional metrics fail to detect.

Leveraging the Wells Fargo asset cap as a quasi-natural experiment, we demonstrate how regulatory-induced deposit shortages exacerbate local economic vulnerabilities. Our findings show that increases in deposit rates, driven by deposit shortages, are linked to significant reductions in lending and declines in GDP growth. At the bank level, we observe that deposit shortages lead to a decline in both insured and uninsured deposit growth rates, prompting a leftward shift in the deposit supply curve and resulting in higher deposit rates.

The granularity and predictive capability of deposit rates offer a valuable tool for identifying localized economic vulnerabilities. This market-based measure is straightforward to construct and implement, providing an effective early warning signal of regional economic stress that complements existing economic indicators.

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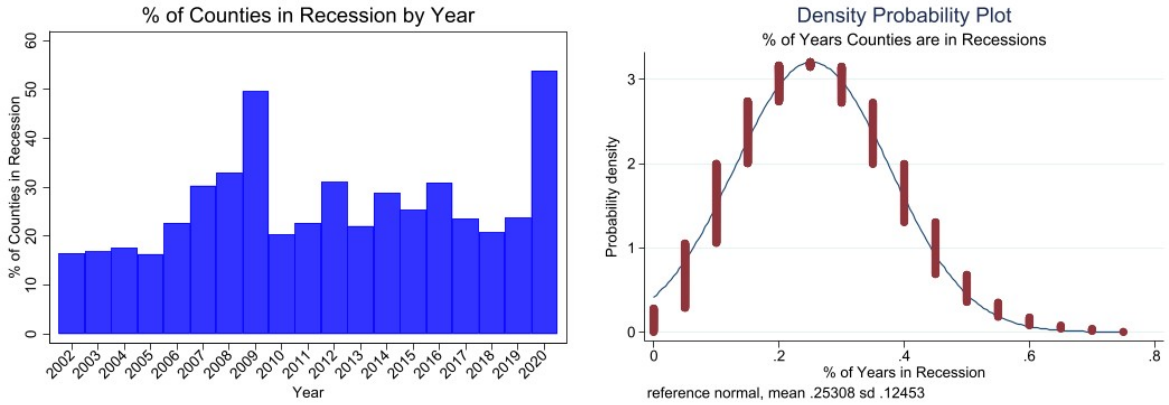
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8 Figures and Tables

Figure 1: Recessions Across Counties and Time

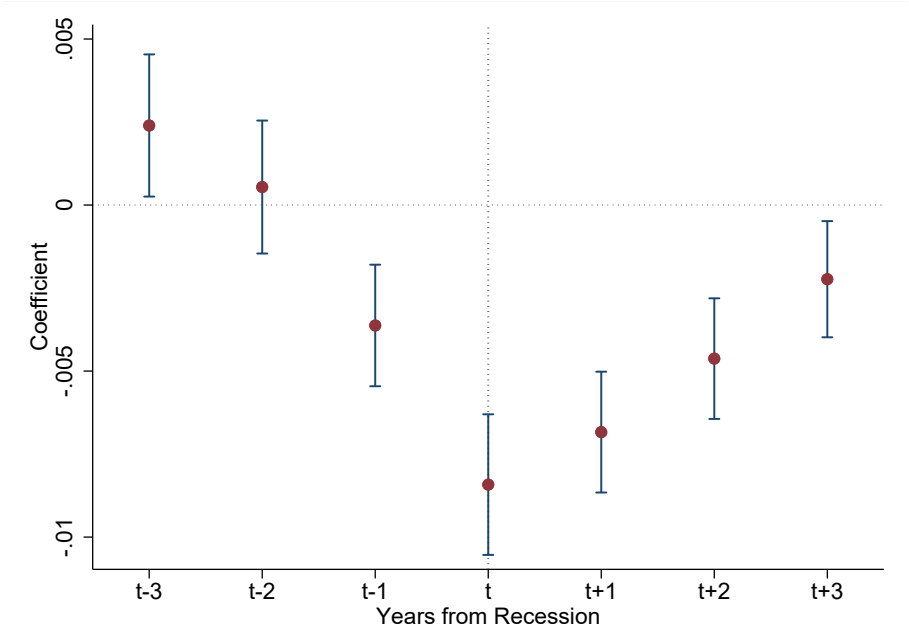


(a) % of Counties in Recession

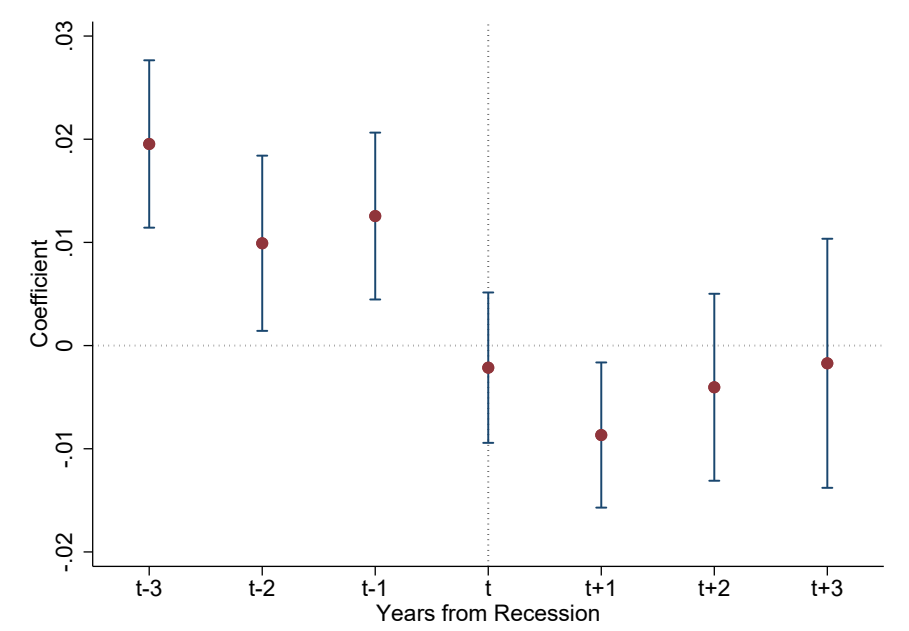
(b) % of Recessions within Counties

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. A county is in a recession if its GDP growth between two consecutive years is below -2%.

Figure 2: Dynamics around Recessions



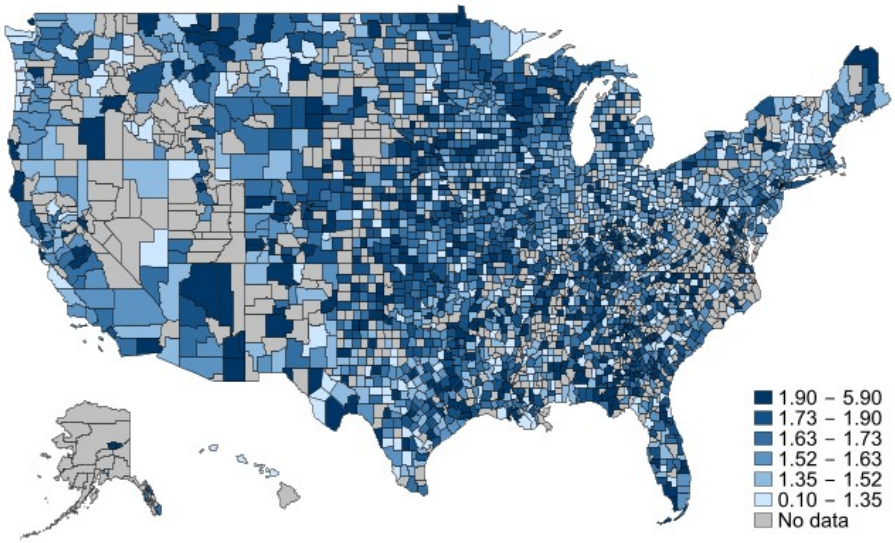
(a) Δln(Deposits)



(b) Deposit Rate

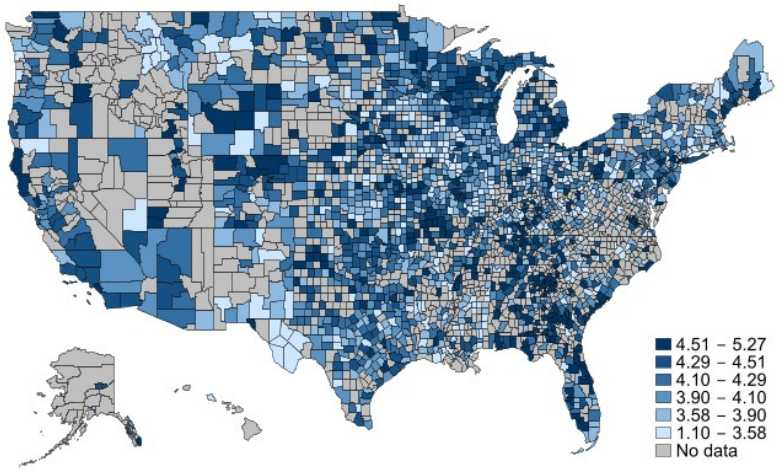
Notes: This figure plots the dynamics for deposit growth and deposit growth. The figures plot the coefficients from estimating the following regression: $Y_{c,t+k} = \beta \mathbb{1}[Recession]_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t}$ where Y is deposit growth in Panel 2a and deposit rate among single-state banks in Panel 2b. $\mathbb{1}[Recession]$ is an indicator for a county-recession, t denotes the current year, and k denotes the number of years before/after recession, ranging from -3 to +3. A county is in a recession if its GDP growth between two consecutive quarters is below -2%. The sample period is from 2001 through 2020. County-clustered standard errors are reported in parentheses.

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

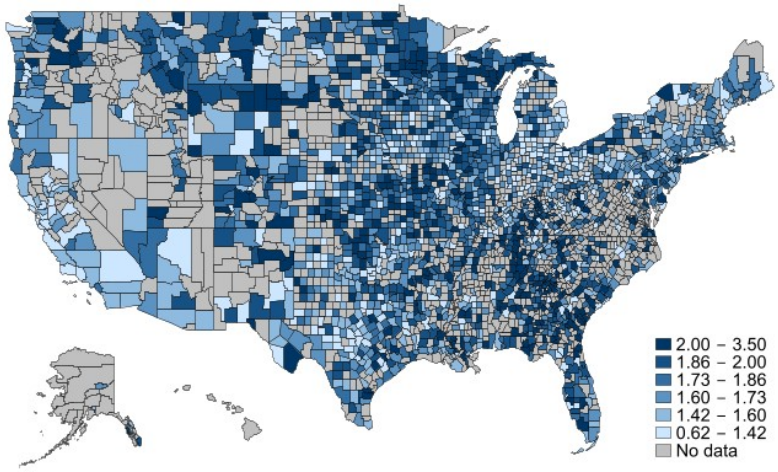


Notes: This figure uses RateWatch data to present a heatmap of the average deposit rate (12-month, $10K CDs) in each county from 2001 to 2020. The deposit rate is the rate on the 12-month certificate of deposit of at least $10,000. Using the deposits rate data from RateWatch, we construct a panel at 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.

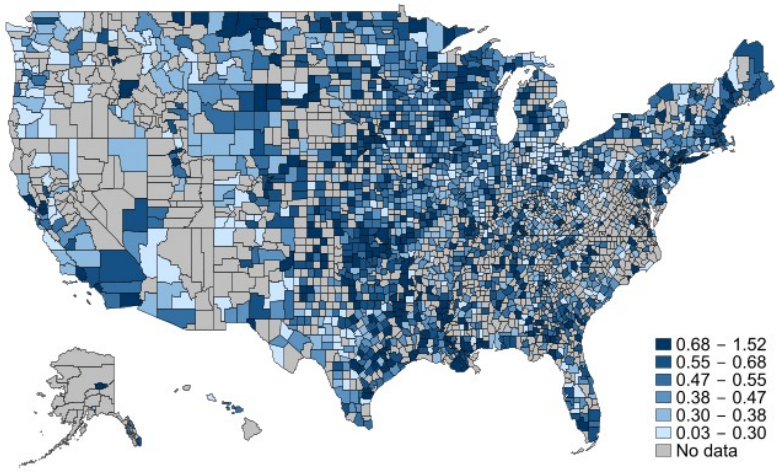
Figure 4: Deposit Rate Across Counties and Time



(a) 2006



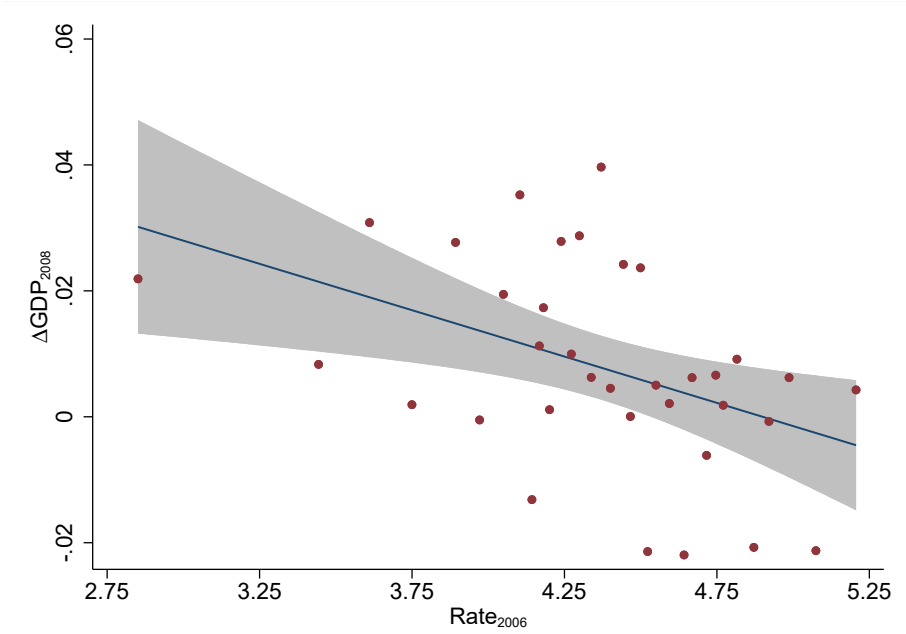
(b) 2009



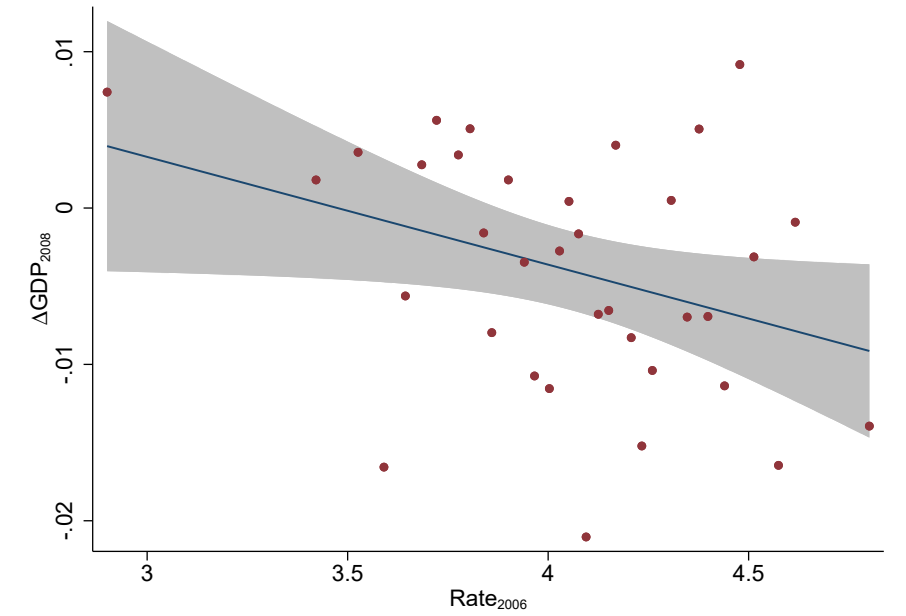
(c) 2017

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: 2006 Deposit Rates Predict 2008 GDP Growth



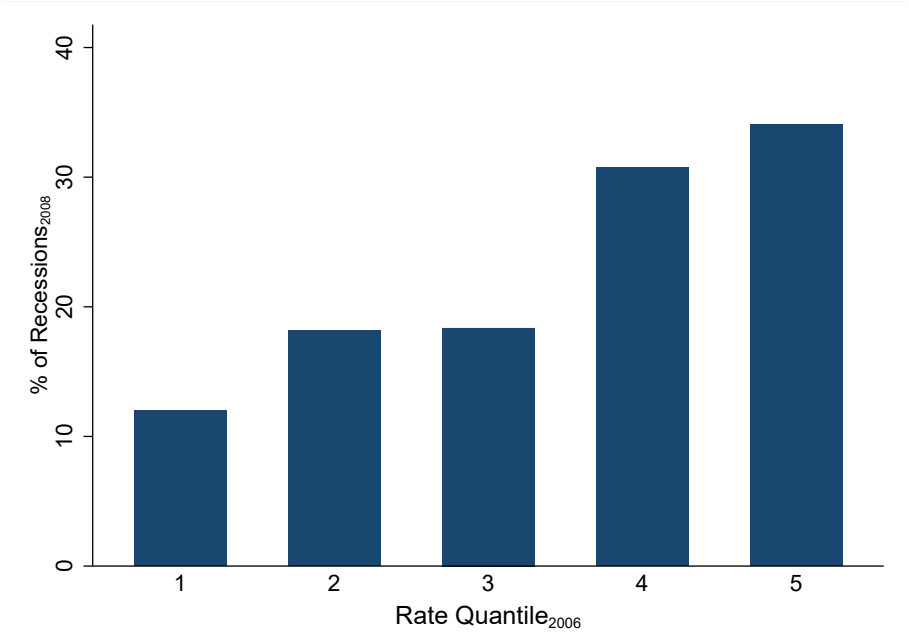
(a) County



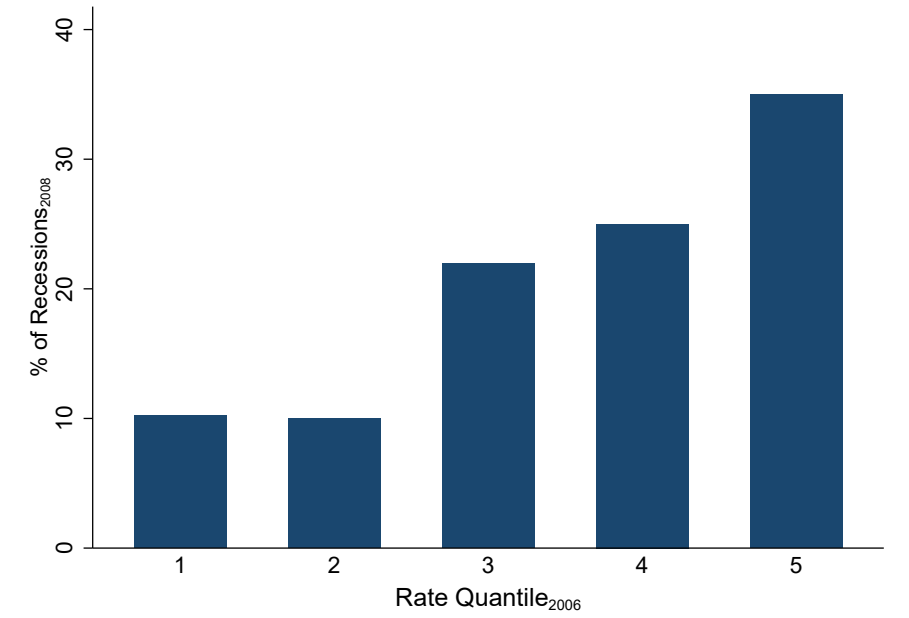
(b) State

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 5a presents the binscatter (35 bins) of the annual county GDP growth in 2008 against the annual county deposit rates in 2006 for metro counties. Figure 5b 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 graphs the 2008 GDP growth against rates, as well as the confidence 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 analysis is restricted to single-state banks.

Figure 6: 2006 Deposit Rates Predict 2008 Recessions



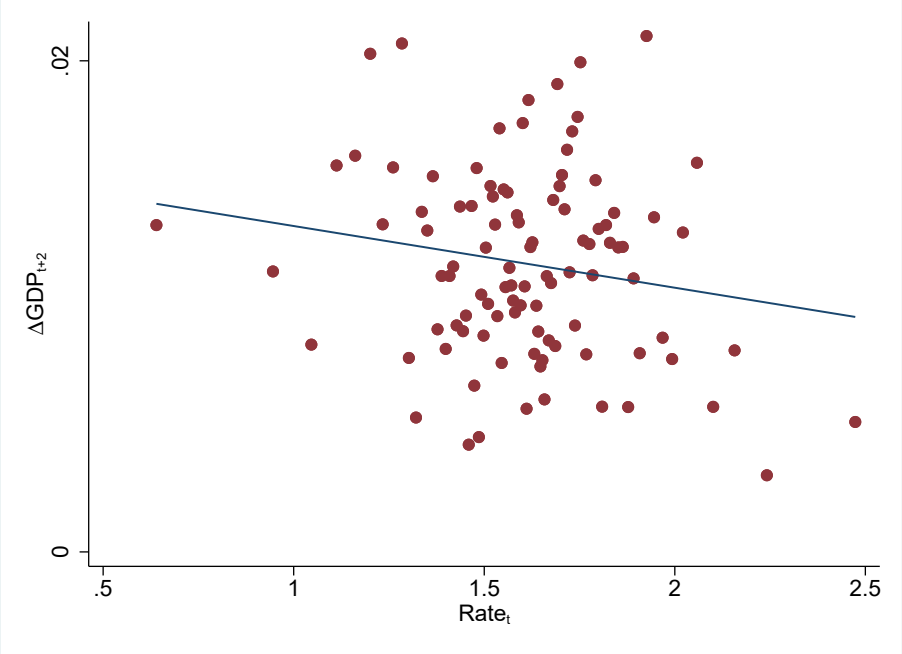
(a) County



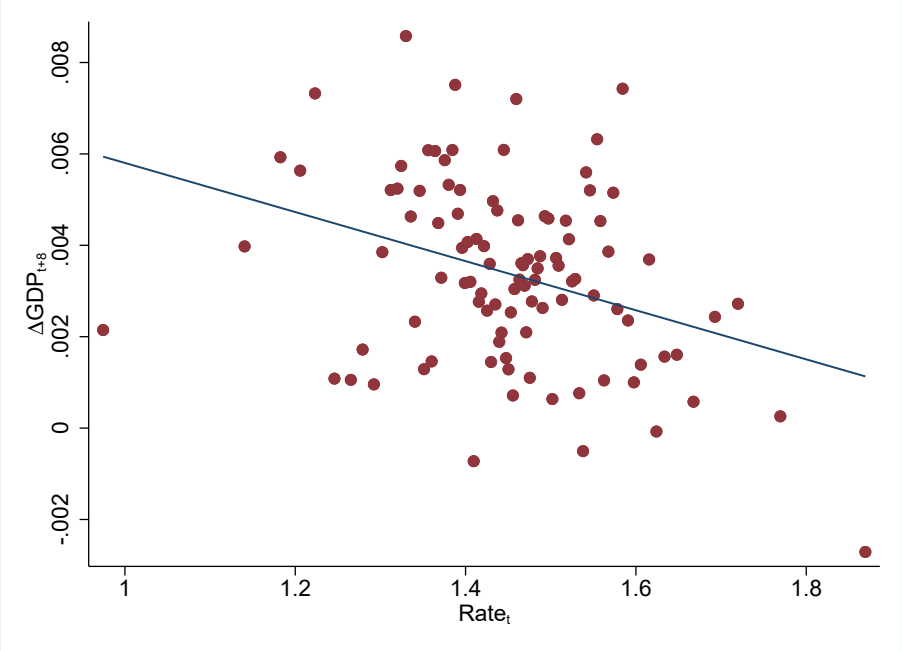
(b) State

Notes: This figure presents bar graphs of the percent of metro 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 6a and Figure 6b, 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 × 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 each year. The analysis is restricted to single-state banks. A state is in a recession if its GDP growth between two consecutive quarters is below -2%.

Figure 7: Deposit Rates Predict Future GDP Growth



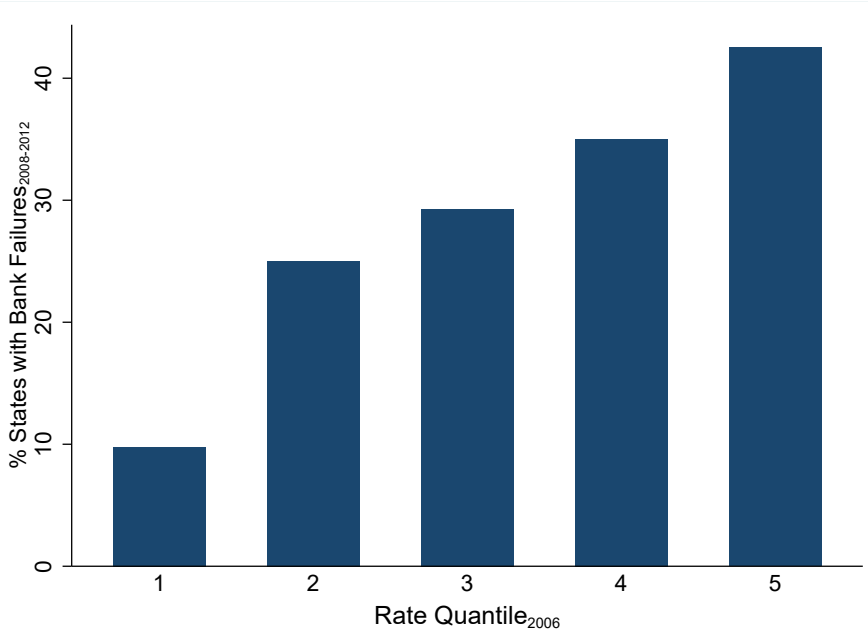
(a) County



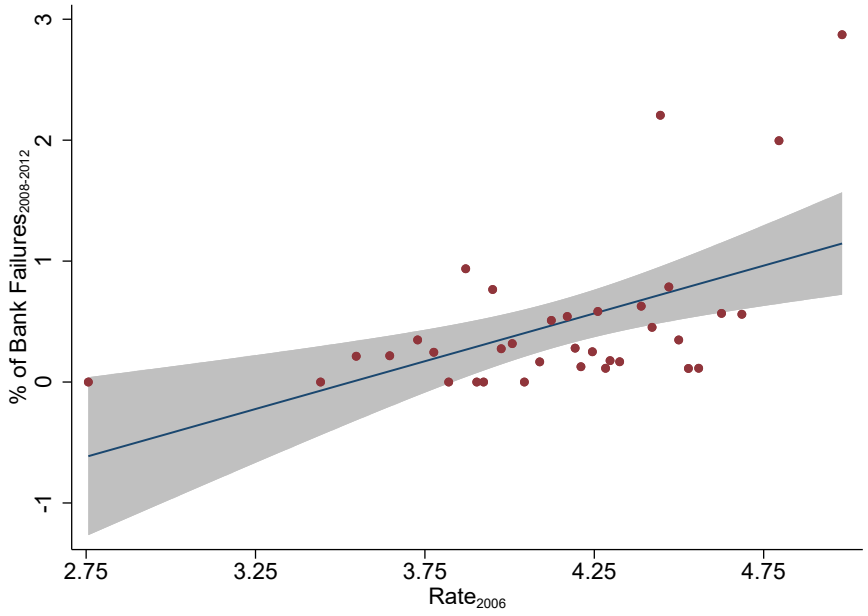
(b) State

Notes: This figure illustrates the binned bivariate averages ("binscatter") of GDP growth rates at the county and state levels plotted against the deposit rates at the county and state levels. Figure 7a presents the binscatter (1000) of the annual county GDP growth in year $t+2$ against the annual county deposit rates in t, after absorbing county and year fixed effects. Figure 7b presents the binscatter (35 bins) of the quarterly state GDP growth in quarter-year $t+8$ against the quarterly state deposit rates in quarter-year t after absorbing state and quarter-year fixed effects. The red dots represent the bins, the blue line graphs the GDP growth. 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 each year. The analysis is restricted to single-state banks.

Figure 8: 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 8a and Figure 8b present the association between state deposit rates in 2006 and bank failures between 2008 and 2012. Figure 8a 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 8b 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 (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 each year. The analysis is restricted to single-state banks.

Table 1: Summary Statistics (2001-2020)

	N	P25	Median	P75	Mean	SD
Monthly Bank Deposit Rate	464,467	0.4875	1.1750	2.4750	1.6203	1.3603
Annual Deposit Rate	39,732	0.4500	1.0815	2.2500	1.5194	1.2744
Annual GDP Growth	59,127	-2.2974	1.2247	4.5548	1.2544	7.8028
Quarterly State Deposit Rate	4,135	0.4610	1.0281	2.4228	1.5497	1.3008
Quarterly State GDP Growth	3,213	-0.2359	0.4504	1.1118	0.3694	1.7483

Notes: The table summarizes the key measures 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 each year. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks.

Table 2: County Economic Activity and Deposit Rate

Panel A: GDP Growth						
Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0026	-0.0069**	-0.0135***	-0.0048	-0.0035	0.0000
	(0.0032)	(0.0034)	(0.0042)	(0.0038)	(0.0036)	(0.0043)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,578	4,292	4,029	3,775	3,513	3,258
R^2	0.2668	0.2757	0.2795	0.2711	0.2687	0.2739
Panel B: Employment Growth						
Δln(Employment)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0023	-0.0055***	-0.0094***	-0.0088***	-0.0059***	-0.0025
	(0.0016)	(0.0016)	(0.0018)	(0.0017)	(0.0017)	(0.0016)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,638	4,347	4,079	3,820	3,553	3,291
R^2	0.6299	0.6468	0.6648	0.6743	0.6870	0.6964
Panel C: Business Formation						
ln(Applications)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0018	-0.0160	-0.0320*	-0.0359**	-0.0341*	-0.0377*
	(0.0144)	(0.0162)	(0.0164)	(0.0181)	(0.0189)	(0.0202)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	3,923	3,640	3,378	3,112	2,851	2,591
R^2	0.9933	0.9935	0.9935	0.9935	0.9938	0.9937
Panel D: Wage Growth						
Δln(Annual Wages)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0012	-0.0064***	-0.0116***	-0.0098***	-0.0037	-0.0003
	(0.0025)	(0.0023)	(0.0024)	(0.0025)	(0.0026)	(0.0027)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,638	4,330	4,056	3,795	3,533	3,271
R^2	0.4836	0.5104	0.5244	0.5252	0.5290	0.5177

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 six-year (k = 1, 2, 3, 4, 5, 6) 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, employment growth in Panel B, natural-log of the number of new business applications in Panel C, and the wage growth in Panel D. *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 each year. Average GDP growth is 1.71%, average employment growth is 0.71%, average log-transformed # of applications is 3.23%, and average wage growth of 3.53% for metro counties from 2001 through 2020. The independent variable is standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table 3: County Economic Activity and Deposit Rate with GDP Lags

$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0057	-0.0092***	-0.0142***
	(0.0035)	(0.0035)	(0.0041)
Δ ln(GDP)$_{t-1}$	-0.0060***	-0.0090***	-0.0094***
	(0.0023)	(0.0027)	(0.0020)
Δ ln(GDP)$_{t-2}$	-0.0089***	-0.0085***	-0.0024
	(0.0026)	(0.0019)	(0.0019)
Δ ln(GDP)$_{t-3}$	-0.1365***	-0.0614***	-0.0345
	(0.0316)	(0.0207)	(0.0314)
County FIPS FE	✓	✓	✓
Year FE	✓	✓	✓
N	3,488	3,231	2,980
R^2	0.3055	0.3018	0.3038

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 six-year (k = 1, 2, 3, 4, 5, 6) annual lead indicators of economic activity. The regression specification is the following: $\Delta ln(GDP)_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \beta_2 \cdot \Delta ln(GDP)_{c,t-1} + \beta_3 \cdot \Delta ln(GDP)_{c,t-2} + \beta_4 \cdot \Delta ln(GDP)_{c,t-3} + \alpha_c + \alpha_t + \epsilon_{c,t}$ 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 each year. Average GDP growth is 1.52% from 2001 through 2020. The independent variables are standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table 4: County Deposit and Lending Activity around Wells Fargo Active Enforcement

Panel A: Deposit Growth				
$\Delta ln(\text{Deposits})$	(1)	(2)	(3)	(4)
WF County × Post	-0.0108***	-0.0108***	-0.0106***	-0.0104***
	(0.0017)	(0.0018)	(0.0017)	(0.0018)
WF County	0.0153***		0.0153***	
	(0.0014)		(0.0014)	
Post	0.0313***	0.0309***		
	(0.0009)	(0.0009)		
County FIPS FE		✓		✓
Year FE			✓	✓
N	22,833	22,833	22,833	22,833
R^2	0.0422	0.1216	0.2914	0.3703
Panel B: Deposit Rate				
Rate	(1)	(2)	(3)	(4)
WF County × Post	0.0641***	0.0642***	0.0588***	0.0570***
	(0.0196)	(0.0196)	(0.0195)	(0.0194)
WF County	0.0050		0.0048	
	(0.0074)		(0.0074)	
Post	0.6209***	0.6185***		
	(0.0114)	(0.0113)		
County FIPS FE		✓		✓
Year FE			✓	✓
N	22,833	22,833	22,833	22,833
R^2	0.1689	0.2917	0.5877	0.7086
Panel C: Small Business Lending				
$ln(\text{SBL})$	(1)	(2)	(3)	(4)
WF County × Post	-0.0877***	-0.0656***	-0.0872***	-0.0649***
	(0.0215)	(0.0141)	(0.0216)	(0.0141)
WF County	1.9952***		1.9950***	
	(0.0806)		(0.0806)	
Post	0.3675***	0.3337***		
	(0.0143)	(0.0102)		
County FIPS FE		✓		✓
Year FE			✓	✓
N	22,833	22,833	22,833	22,833
R^2	0.2328	0.9723	0.2371	0.9763

Notes: This table presents the relation between deposit activity in counties with a Wells Fargo around the Wells Fargo Active Enforcement. The table presents the results from estimating following model: $Y_{c,t} = \beta_1 \cdot \mathbb{1}_{\text{WF County},c} \times Post_t + \alpha_c + \alpha_t + \epsilon_{c,t}$ where Y is deposit growth in Panel A and deposit rate in Panel B, log-small business lending in Panel C, $\mathbb{1}_{\text{WF County}}$ is an indicator for whether the county had a Wells Fargo in 2017, and *Post* is an indicator for the post-enforcement period, after 2017. 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 single-state 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 each year. The sample period is from 2012 through 2023. County clustered standard errors are reported in parentheses.

Table 5: County Economic Activity around Wells Fargo Active Enforcement

Δln(GDP)	(1)	(2)	(3)	(4)	(5)	(6)
	OLS				**2SLS**	
					Second Stage	First Stage [Rate]
$\widehat{\text{Rate}}$					-0.0731*	
					(0.0406)	
WF County × Post	-0.0042**	-0.0041**	-0.0043**	-0.0042**		0.0570***
	(0.0018)	(0.0019)	(0.0018)	(0.0019)		(0.0194)
WF County	0.0115***		0.0115***			
	(0.0016)		(0.0016)			
Post	0.0072***	0.0073***				
	(0.0012)	(0.0013)				
County FIPS FE		✓		✓	✓	✓
Year FE			✓	✓	✓	✓
N	22,833	22,833	22,833	22,833	22,833	22,833
R^2	0.0048	0.0989	0.0440	0.1380		0.9763
KP LM Statistic						8.553
KP Wald F Statistic						2.872

Notes: This table presents the relation between log-small business lending, and GDP growth in counties with a Wells Fargo around the Wells Fargo Active Enforcement. The table presents the results from estimating following 2SLS model:

$$Rate_{c,t} = \beta_1 \cdot \mathbb{1}_{\text{WF County},c} \times Post_t + \alpha_c + \alpha_t + \epsilon_{c,t}$$

$$\Delta ln(GDP)_{c,t} = \beta_1 \widehat{\text{Rate}} + \alpha_c + \alpha_t + \epsilon_{c,t}$$

where $\Delta ln(GDP)$ is GDP growth, $\widehat{\text{Rate}}$ is the estimated deposit rate, $\mathbb{1}_{\text{WF County}}$ is an indicator for whether the county had a Wells Fargo in 2017, and *Post* is an indicator for the post-enforcement period, after 2017. 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 single-state 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 each year. The sample period is from 2012 through 2023. County clustered standard errors are reported in parentheses.

Table 6: 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
Δ Rate$_t$	-0.0007	-0.0054**	-0.0118***	0.0049***	0.0149***	0.0071***	0.0019
	(0.0015)	(0.0022)	(0.0020)	(0.0017)	(0.0021)	(0.0013)	(0.0016)
Quarter-Year FE	✓	✓	✓	✓	✓	✓	✓
N	234,296	238,782	243,571	243,714	238,978	234,508	230,172
R^2	0.0484	0.0549	0.0537	0.0533	0.0568	0.0596	0.0610

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
Δ Rate$_t$	0.0031	0.0070	-0.0219***	-0.0044	0.0162***	0.0044	-0.0048
	(0.0041)	(0.0052)	(0.0048)	(0.0052)	(0.0046)	(0.0055)	(0.0068)
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): $\Delta ln(Y)_{b,t+k} = \beta_0 + \beta_1 \Delta \text{Rate}_{b,t} + \alpha_t + \epsilon_{b,t}$ where $\Delta ln(Deposits)_{b,t+k}$ denotes growth in insured deposits (Panel A) and uninsured deposits (Panel B), and ΔRate denotes the change in the deposit rate. 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 from 2001 through 2020. The analysis is restricted to single-state banks. Two-way bank and quarter-year clustered standard errors are reported in parentheses.

Table 7: Loan Growth and Bank Rate Changes

$\Delta ln(\text{Loans})$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	t-3	t-2	t-1	t	t+1	t+2	t+3
Δ Rate$_t$	-0.0029	-0.0004	0.0067***	0.0062***	0.0015	0.0016	0.0018*
	(0.0020)	(0.0022)	(0.0021)	(0.0017)	(0.0013)	(0.0010)	(0.0011)
Quarter-Year FE	✓	✓	✓	✓	✓	✓	✓
N	212,897	217,267	221,913	222,368	218,083	213,718	209,460
R^2	0.0225	0.0222	0.0217	0.0226	0.0261	0.0306	0.0316

Notes: The table presents the coefficients estimated from the following regression for bank b at time t (quarter-year): $Y_{b,t+k} = \beta_0 + \beta_1 \Delta\text{Rate}_{b,t} + \alpha_t + \epsilon_{b,t}$
where Y is $\Delta ln(Loans)_{b,t+k}$, denoting lending growth, ΔRate denotes the change in the deposit rate. 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 from 2001 through 2020. The analysis is restricted to single-state banks. Two-way bank and quarter-year clustered standard errors are reported in parentheses.

Table 8: County 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	-0.0032	-0.0076*	-0.0198**
	(0.0037)	(0.0039)	(0.0084)
Δ ln(SBL)	0.0054*	0.0029*	-0.0023
	(0.0029)	(0.0016)	(0.0021)
County FIPS FE	✓	✓	✓
Year FE	✓	✓	✓
N	4,578	4,292	4,029
R^2	0.1619	0.2506	0.1966
Panel B: Mortgage Lending Growth			
$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0031	-0.0076*	-0.0197**
	(0.0037)	(0.0039)	(0.0084)
Δ ln(Mortgages)	0.0060*	0.0027	0.0012
	(0.0032)	(0.0021)	(0.0022)
County FIPS FE	✓	✓	✓
Year FE	✓	✓	✓
N	4,578	4,292	4,029
R^2	0.1604	0.2498	0.1961
Panel C: Total Lending Growth			
$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0032	-0.0076*	-0.0198**
	(0.0037)	(0.0039)	(0.0084)
Δ ln(Total)	0.0067**	0.0033*	0.0008
	(0.0033)	(0.0019)	(0.0018)
County FIPS FE	✓	✓	✓
Year FE	✓	✓	✓
N	4,578	4,292	4,029
R^2	0.1608	0.2501	0.1961

Notes: This table presents the relation between county deposit rates and economic activity in metro counties, after controlling for credit growth. 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+mortgage) 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 each year. Average GDP growth is 1.71% for metro counties from 2001 through 2020. The independent variables are standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table 9: GDP Growth and Deposit Growth

Panel A: Deposit Growth

$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(Deposits)	-0.0004	-0.0020***	-0.0000
	(0.0012)	(0.0007)	(0.0008)
County FIPS FE	✓	✓	✓
Year FE	✓	✓	✓
N	4,578	4,292	4,029
R^2	0.1589	0.2496	0.1918

Panel B: Deposit Rate and Growth

$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	-0.0032	-0.0074*	-0.0199**
	(0.0037)	(0.0039)	(0.0085)
Δ ln(Deposits)	-0.0004	-0.0019***	0.0001
	(0.0012)	(0.0007)	(0.0008)
County FIPS FE	✓	✓	✓
Year FE	✓	✓	✓
N	4,578	4,292	4,029
R^2	0.1590	0.2506	0.1961

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 $\times$ 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 each year. Average GDP growth is 1.71% for metro counties from 2001 through 2020. The independent variables are standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table 10: Horse Race: State Deposit Rate vs. Other Leading Indicators

Panel A: Univariate				
$\Delta ln(\text{GDP})$	12 Qtrs Ahead	12 Qtrs Ahead	12 Qtrs Ahead	12 Qtrs Ahead
Rate	-0.0081***			
	(0.0024)			
ln(Auto Sales)		-0.0117**		
		(0.0057)		
ln(UI Claims)			0.0036	
			(0.0021)	
ln(Job Openings)				-0.0108***
				(0.0037)
State FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
N	2,020	2,020	2,020	2,020
R^2	0.2530	0.2542	0.2498	0.2562

Panel B: Multivariate			
$\Delta ln(\text{GDP})$	4 Qtrs Ahead	8 Qtrs Ahead	12 Qtrs Ahead
Rate	-0.0024	-0.0063*	-0.0077***
	(0.0030)	(0.0033)	(0.0024)
ln(Auto Sales)	-0.0020	-0.0037	-0.0067
	(0.0036)	(0.0036)	(0.0045)
ln(UI Claims)	-0.0031	-0.0004	0.0017
	(0.0022)	(0.0020)	(0.0020)
ln(Job Openings)	-0.0038	-0.0093***	-0.0087***
	(0.0033)	(0.0031)	(0.0027)
State FE	✓	✓	✓
Year FE	✓	✓	✓
N	2,428	2,224	2,020
R^2	0.2279	0.2477	0.2630

Notes: This table presents the relation between state deposit rates and economic activity. Panel A presents the results from estimating an OLS model of the change in economic activity in state s in quarter-year $t+12$ as a function of the average deposit rate within a county at quarter-year t. We consider twelve-quarter lead indicators of economic activity. The regression specification is the following: $\Delta ln(GDP)_{s,t+12} = \beta_1 \cdot X_{s,t} + \alpha_s + \alpha_t + \epsilon_{s,t}$ where $\Delta ln(GDP)$ denotes GDP growth. X denotes the independent variable at the state-quarterly frequency - the average deposit rate in column 1, natural-log of auto sales in column 2, natural-log of the number of unemployment insurance claims in column 3, and natural-log of the number of job openings in column 4. Panel B presents the results from estimating an OLS model of the change in economic activity in state 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: $\Delta ln(GDP)_{s,t+k} = \beta_1 \cdot Rate_{s,t} + \beta_2 \cdot ln(\text{Auto Sales})_{s,t} + \beta_3 \cdot ln(\text{UI Claims})_{s,t}) + \beta_4 \cdot ln(\text{Job Openings})_{s,t} + \alpha_s + \alpha_t + \alpha_t + \epsilon_{s,t}$ where $\Delta ln(GDP)$ denotes GDP growth. *Rate* denotes the average bank deposit rate. $ln(\text{Auto Sales})$ denotes the natural-log of auto sales. $ln(\text{UI Claims})$ denotes the natural-log of the number of unemployment insurance claims. $ln(\text{Job Openings})$ denotes the natural-log of the number of job openings. Average GDP growth is 0.37% for states from 2005Q1 through 2017Q4. The independent variables are standardized. The sample period is from 2005Q1 through 2017Q4. State clustered standard errors are reported in parentheses.

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Appendix A Data Appendix

This project employs several datasets. We describe the sources in detail 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.

Business Formation We use data 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 is available at the annual frequency from 2005.

Employment and Wage We use data on employment activity and wages from the Quarterly Census of Employment and Wages (QCEW), produced by the Bureau of Labor Statistics (BLS). At the national level, the program publishes data for nearly every North American Industry Classification System (NAICS) industry. At the state, county, and Metropolitan Statistical Area (MSA) levels, the QCEW program offers more granular data, publishing establishment, employment, and wage information down to the 6-digit NAICS industry level. Specifically, this includes quarterly and annual establishment counts and wage data, as well as monthly and annual employment data. Additionally, the QCEW program produces data on establishments, employment, and wages stratified by establishment size for the first quarter of each year. This richly detailed information enables in-depth analysis of local economies and industry trends. QCEW reports data, starting at the 6-digit NAICs level to higher industry levels and to the county, MSA, State, and national levels. We collapse the data to create a panel at the county *times* industry $\times$ year level.

Supplementary Measure of Economic Activity We use four additional data series covering:

(1) unemployment; (2) payroll; (3) # of establishments; (4) delinquency; and (5) inflation.

We 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.

We collect data on payroll and number of establishments from the County Business Patterns (CBP). CBP is an annual series that provides subnational economic data for establishments with paid employees by industry and employment size. This series includes the number of establishments, employment during the week of March 12, first quarter payroll, and annual payroll.

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. Mortgage delinquency data is available at the annual frequency from 2008.

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.

Bank Balance Sheet, Income Statements and Deposits Data 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 from 1976. The data of all bank filings are regulated by the Federal Reserve System, FDIC, and the Comptroller of the Currency. We supplement data from the call reports using quarterly 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. We also 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. In addition, we use quarterly data on non-performing loans from S&P Market Intelligence. Our sample ranges from 2001 through 2020.

Small Business Lending and Mortgage 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 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 CRA and HMDA data to the bank × county × year level between 2001 and 2020.

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.

Other Leading Economic Indicators We supplement our baseline analysis with other leading indicators of local business cycle fluctuations at the state level. These indicators include state auto sales, unemployment claims, and job openings. Data on auto sales comes from from RL Polk, which reports zip code-monthly data. Data on state monthly unemployment claims comes from the Department of Labor. Data on state job openings comes from the Bureau of Labor Statistics.

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.

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; there were 25 bank failures in 2008, 140 in 2009, 157 in 2010, 92 in 2011, and 51 in 2012.

Shipping Costs We use data on shipping costs and a vector of control variables at the commuting zone level from Barrot et al. (2022). The authors 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 constructed by combining the industry shipping costs with the industry composition in each commuting zone, expressed in labor share. Controls include 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. The sample period for our analysis is 2001 through 2007.

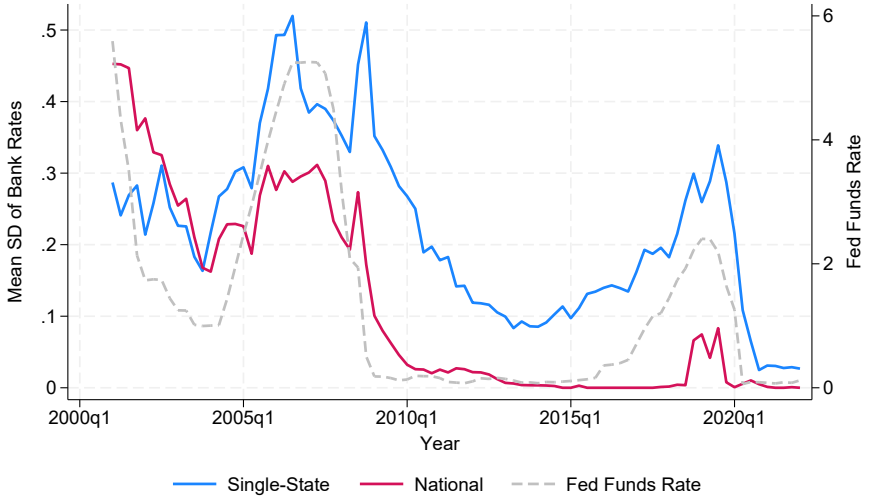
COVID Stimulus We use the 5-year 2019 American Community Survey (ACS) administered by the U.S. Census Bureau. The ACS provides comprehensive data on social, economic, housing, and demographic characteristics of the U.S. population at the national, state, and local levels, including for all 50 states, the District of Columbia, Puerto Rico, every congressional district, metropolitan area, county, city or town, and census tracts and block groups. The share of households eligible for the Economic Impact Payments (EIP) under the CARES Act is measured at the county level, representing the proportion of households eligible for the full EIP. We supplement this with first-round EIP data at the state level, sourced from the Statistics

of Income (SOI) dataset of the Internal Revenue Service (IRS).

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.

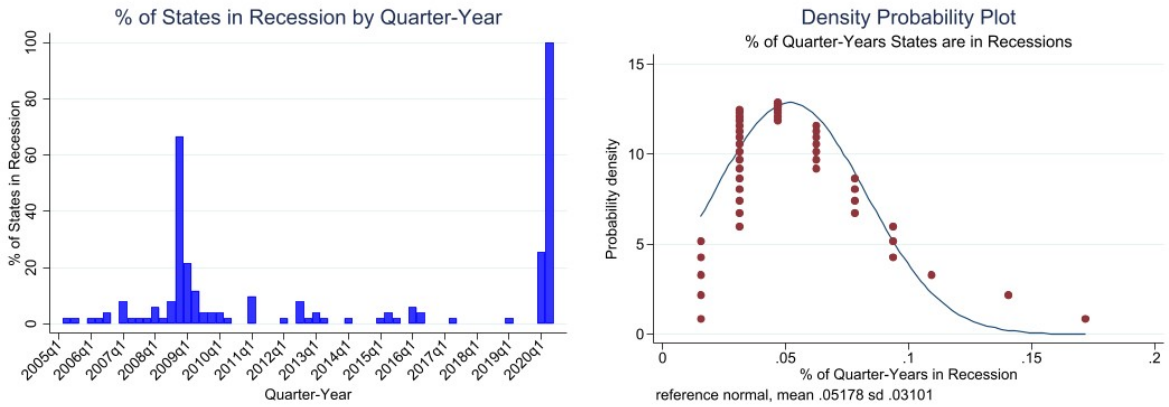
Appendix B Additional Figures and Tables

Figure B.1: Time-Series of Dispersion of Deposit Rates



Notes: This figure compares the dispersion (standard deviation) of deposit rates for the four largest banks—Bank of America, Wells Fargo, JPMorgan Chase, and Citibank – with that of single-state banks. For each bank, we compute the quarterly dispersion in deposit rates and then average this dispersion across state banks (blue) and national banks (top 4 banks) to generate a time series. The Federal Funds Rate is plotted in grey.

Figure B.2: Recessions Across States and Time

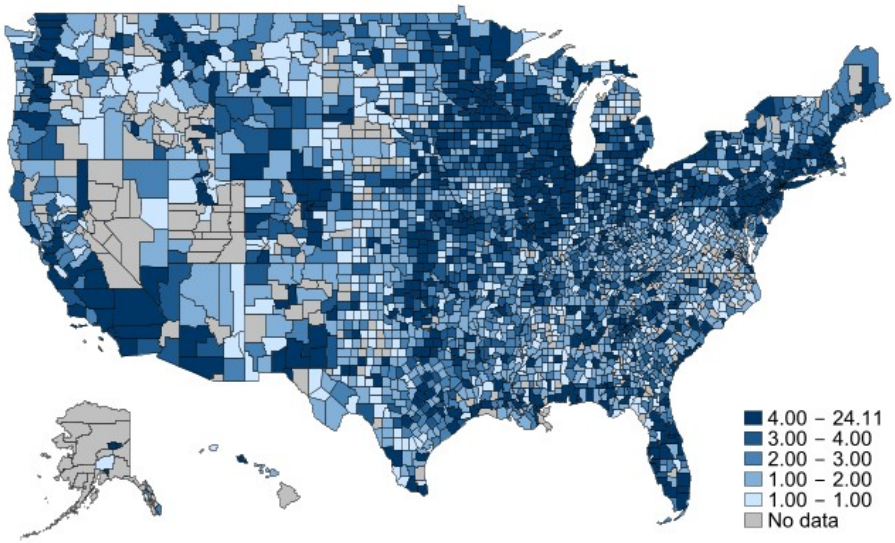


(a) % of States in Recession

(b) % of Recessions within States

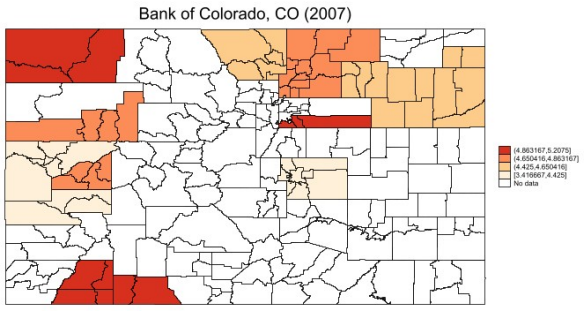
Notes: This figure presents the percentage of states in recessions by quarter-year in Figure B.2a, and a density probability plot of the percent of quarter-years states are in recessions in Figure B.2b based on state GDP data. A state is in a recession if its GDP growth between two consecutive quarters is below -2%.

Figure B.3: Number of Banks per County (2001-2020)

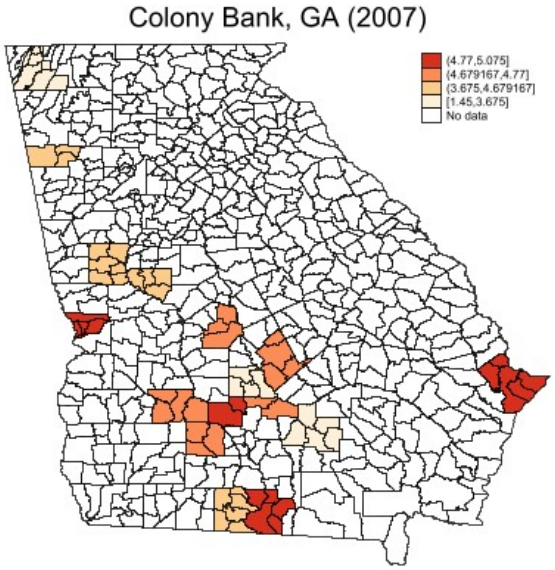


Notes: This figure presents a heatmap of the average number of banks that offer 12-month certificates of deposit of at least $10,000 in each county from 2001 to 2020. Using the deposits rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the total 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.

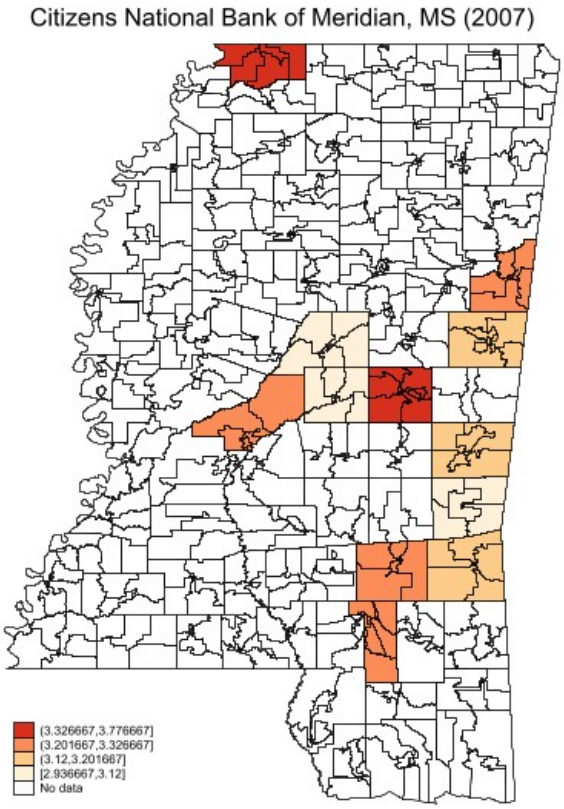
Figure B.4: Bank Deposit Rates: 2007



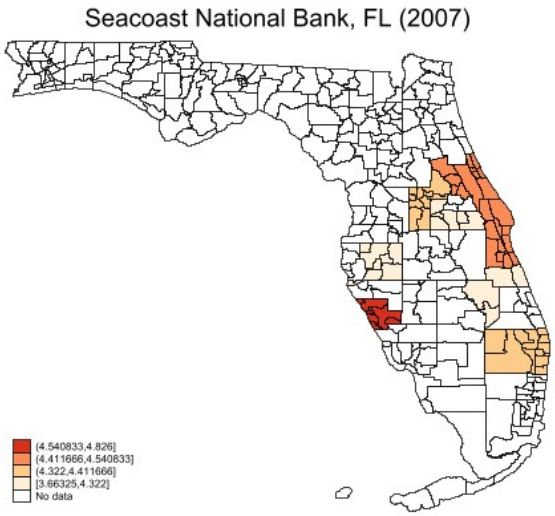
(a) Bank of Colorado



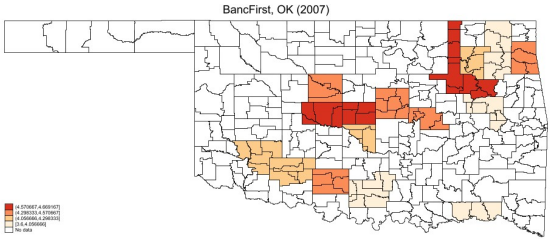
(b) Colony Bank



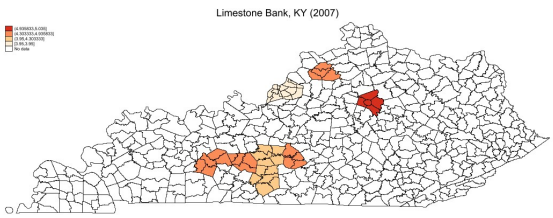
(c) Citizens National Bank of Meridian



(d) Seacoast National Bank



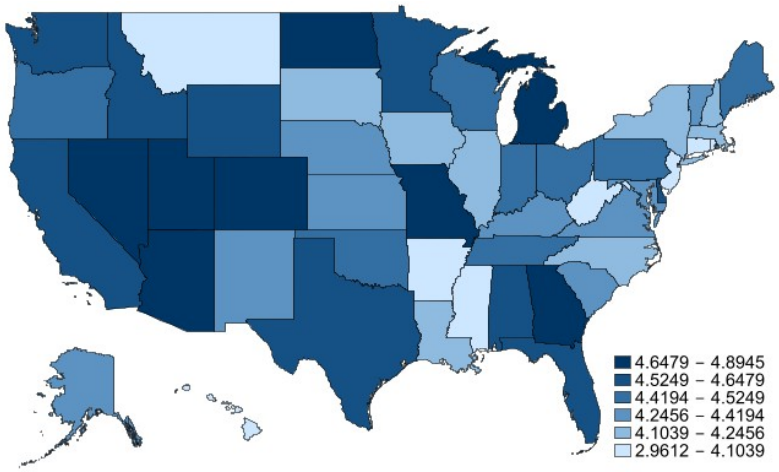
(e) BancFirst (OK)



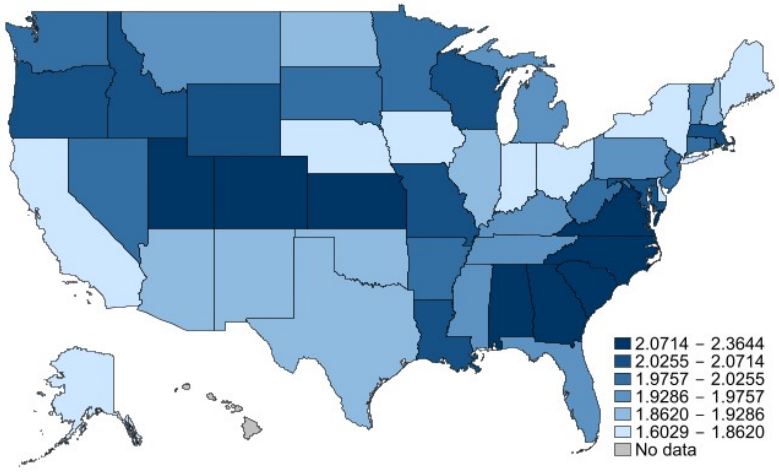
(f) Limestone Bank

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 B.4a), Colony Bank (Appendix Figure B.4b), Citizens National Bank of Meridian Bank (Appendix Figure B.4c), Seacoast National Bank (Appendix Figure B.4d), BancFirst (Appendix Figure B.4e), and Limestone Bank (Appendix Figure B.4f). 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.

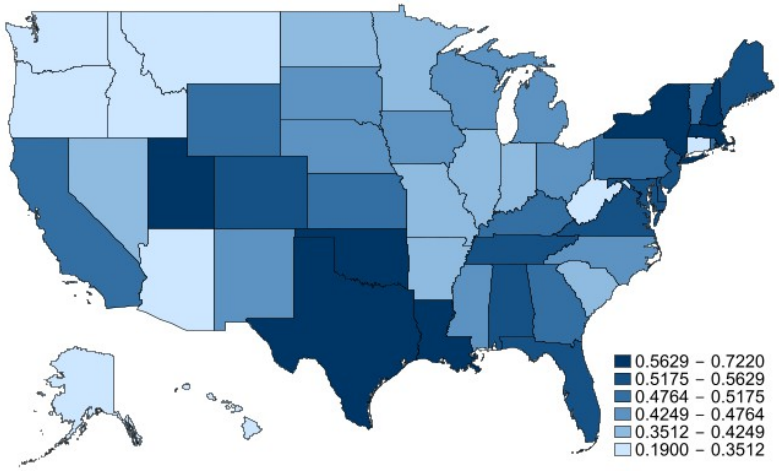
Figure B.5: Deposit Rate Across States and Time



(a) 2006Q4



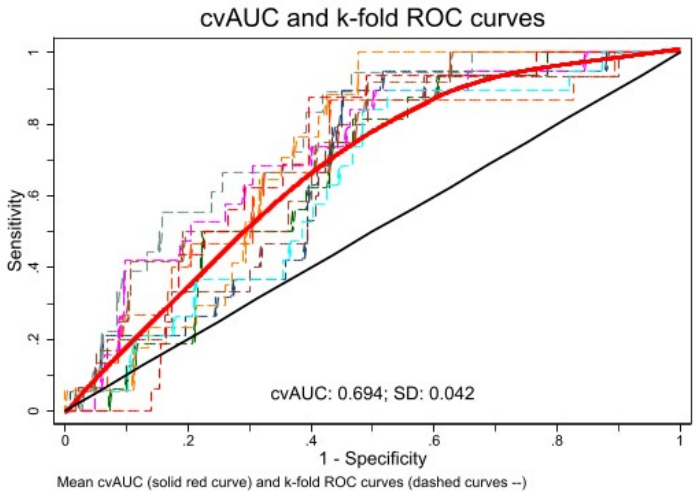
(b) 2009Q1



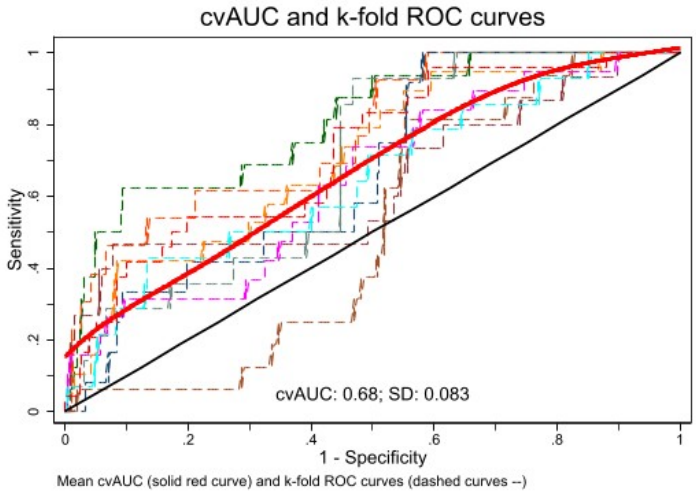
(c) 2017Q1

Notes: This figure uses RateWatch data to present a heatmap of state deposit rates (12-month, $10K CDs). Figure B.5a presents state deposit rates in 2006Q4; Figure B.5b presents state deposit rates in 2009Q1; Figure B.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 $\times$ 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.

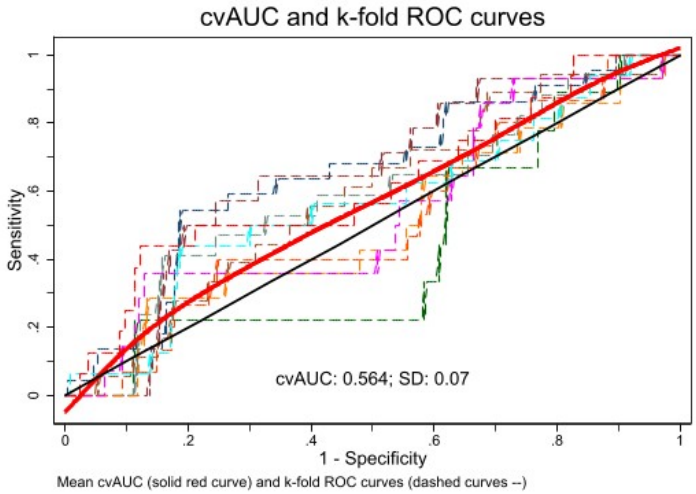
Figure B.6: Out-of-Sample Estimation: Deposit Rates Predict State Recessions



(a) Recession in 4 Quarters



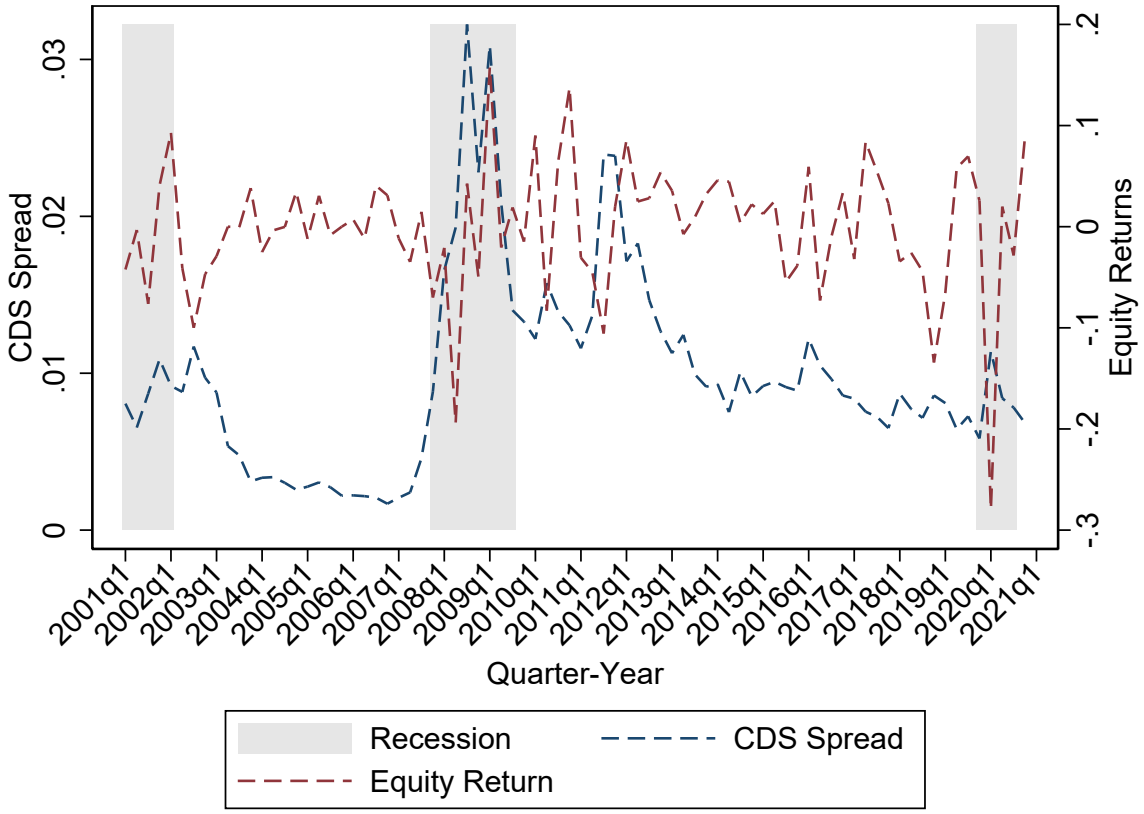
(b) Recession in 8 Quarters



(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: $logit(p_{c,t+k}) = \beta_0 + \beta_1 Rate_{c,t} + \epsilon_{c,t}$ 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 24-quarter (k = 4, 8, 12, 16, 20, 24) lead indicators of economic activity. The cross-validated AUCs are averaged from each fold. 10 folds are used to produce these figures. Figure B.6a, Figure B.6b, and Figure B.6c reports the cross-validated AUCs using the 4-quarter, 8-quarter, 12-quarter forecast classifiers. The likelihood of a state being in a recession is 5.18% from 2005Q1 through 2020Q4. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks.

Figure B.7: 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.

Table B.1: Variation in Branch Deposit Rates Across Banks

	(1)	(2)	(3)	(4)	(5)	(6)
	Bank	County	County×Year	Bank×Year	County× Year, Bank	County× Year, Bank×Year
R^2	0.1920	0.2096	0.9497	0.9277	0.9547	0.9601
N	6,719	6,642	3,018	6,719	3,014	2,865

Notes: This table reports the R^2 and number of observations from regressing the 12-month certificate of deposit rate at the Branch × Bank × Year level on bank fixed effects (column 1), county fixed effects (column 2), county×year fixed effects (column 3), bank× year fixed effects (column 4), county×year and bank fixed effects (column 5), and bank×year and county×year fixed effects (column 6). Using the deposits rate data from RateWatch, we construct a panel at the branch × month-year level. The annual branch deposit rate is the branch deposit rate in the last reporting month of each year. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks that report deposit rates for at least 5 branches each year.

Table B.2: What Explains Variation in Single-State Bank Deposit Rates?

Rate_t	(1)	(2)	(3)	(4)	(5)
Unemployed_{t-1}	0.9327**	0.7428*	0.7428*	0.9084**	0.9408**
	(0.4043)	(0.3998)	(0.3997)	(0.4336)	(0.4461)
Services_{t-1}		0.0639***	0.0639***	0.0602***	0.0613***
		(0.0184)	(0.0184)	(0.0178)	(0.0181)
$\text{Black/Hispanic}_{t-1}$				-0.0289	-0.0258
				(0.0438)	(0.0422)
Female_{t-1}				-0.0018	-0.0022
				(0.0211)	(0.0213)
Married_{t-1}				-0.0068	-0.0118
				(0.0175)	(0.0185)
$\text{Post-Secondary}_{t-1}$				0.0176	0.0107
				(0.0202)	(0.0220)
$\ln(\text{Fam. Inc.})_{t-1}$					0.0057
					(0.0164)
$\ln(\text{Poverty})_{t-1}$					0.0127
					(0.0364)
Bank × Month-Year FE	✓	✓	✓		
State FE		✓			
State × Month-Year FE			✓		
Bank × Month-Year × State FE				✓	✓
N	68,171	68,171	68,171	68,171	68,171
R^2	0.9685	0.9685	0.9685	0.9685	0.9685

Notes: This table presents the relation between various county-specific demographic and economic characteristics and bank deposit rates. The table presents regressions of bank deposit rates on county characteristics, measured in the previous year. The regression specification is the following: $\text{Deposit Rate}_{b,c,t} =_1 \cdot \text{X}_{c,t-1} + \alpha_{b,s,t} + \epsilon_{b,c,t}$ where Rate denotes bank b's deposit rate in county c of state s measured in month-year t, X represents a vector of demographic and economic characteristics in county c measured in year $t-1$. The annual demographic and economic characteristics are sourced from the American Community Survey (ACS), conducted by the U.S. Census Bureau, which began in 2005. These county-level variables include the unemployed share, the share of the population employed in the services industry, the proportion of Black and Hispanic individuals, the share of females, the share of married individuals, the proportion with post-secondary education, the average log of family income, and the average log of poverty (measured as family income relative to the poverty threshold). Using the deposits rate data from RateWatch, we construct a panel at the bank × county × month-year level. The sample period is 2005 through 2020. The analysis is restricted to single-state banks. Two-way commuting zone and month-year clustered standard errors are reported in parentheses.

Table B.3: County Economic Activity and Deposit Rate: All Counties

Panel A: GDP Growth						
Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0021	-0.0024	-0.0086***	-0.0098***	-0.0048**	-0.0007
	(0.0016)	(0.0018)	(0.0020)	(0.0021)	(0.0020)	(0.0021)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	36,483	34,087	31,830	29,688	27,621	25,595
R^2	0.1024	0.1046	0.1060	0.1078	0.1095	0.1154
Panel B: Employment Growth						
Δln(Employment)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0027***	-0.0042***	-0.0057***	-0.0060***	-0.0045***	-0.0015*
	(0.0008)	(0.0008)	(0.0009)	(0.0010)	(0.0009)	(0.0009)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	36,650	34,232	31,955	29,801	27,719	25,676
R^2	0.3516	0.3639	0.3739	0.3828	0.3909	0.3944
Panel C: Business Formation						
ln(Applications)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0099	-0.0215***	-0.0383***	-0.0465***	-0.0400***	-0.0350***
	(0.0068)	(0.0077)	(0.0077)	(0.0081)	(0.0083)	(0.0086)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	30,932	28,658	26,474	24,372	22,306	20,273
R^2	0.9880	0.9882	0.9883	0.9885	0.9888	0.9889
Panel D: Wage Growth						
Δln(Annual Wages)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0012	-0.0064***	-0.0116***	-0.0098***	-0.0037	-0.0003
	(0.0025)	(0.0023)	(0.0024)	(0.0025)	(0.0026)	(0.0027)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,638	4,330	4,056	3,795	3,533	3,271
R^2	0.4836	0.5104	0.5244	0.5252	0.5290	0.5177

Notes: This table presents the relation between county deposit rates and economic activity in all 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 six-year (k = 1, 2, 3, 4, 5, 6) 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, employment growth in Panel B, natural-log of the number of new business applications in Panel C, and the wage growth in Panel D. *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 each year. Average GDP growth is 1.25%, average employment growth is 0.00%, average log-transformed # of applications is 2.08%, and wage growth is 2.98% for all counties from 2001 through 2020. The independent variable is standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table B.4: Additional Measures of Economic Activity and Deposit Rate

Panel A: Unemployment Rate						
Unemployment	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.1955**	0.2111**	0.3829***	0.4067***	0.3523***	0.3530***
	(0.0798)	(0.0850)	(0.0941)	(0.1123)	(0.1211)	(0.1223)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,867	4,570	4,302	4,039	3,775	3,516
R^2	0.8619	0.8661	0.8732	0.8792	0.8810	0.8818
Panel B: Payroll Growth						
Δ ln(Payroll)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0046	0.0011	-0.0086***	-0.0130***	-0.0025	-0.0073**
	(0.0034)	(0.0029)	(0.0028)	(0.0029)	(0.0028)	(0.0033)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,876	4,566	4,290	4,028	3,765	3,502
R^2	0.3590	0.3855	0.4041	0.4138	0.4213	0.4196
Panel C: Establishment Growth						
Δln(# Establishments)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0004	-0.0000	-0.0034***	-0.0062***	-0.0039**	-0.0058***
	(0.0013)	(0.0013)	(0.0013)	(0.0016)	(0.0015)	(0.0015)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,876	4,566	4,290	4,028	3,765	3,502
R^2	0.5301	0.5436	0.5520	0.5523	0.5551	0.5629
Panel D: Delinquency Rate						
Delinquency (30-89 days)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0511	0.0794**	0.0698*	0.0807**	0.0901**	0.0808*
	(0.0323)	(0.0344)	(0.0401)	(0.0350)	(0.0392)	(0.0441)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	2,356	2,337	2,146	1,959	1,770	1,585
R^2	0.9280	0.9263	0.9239	0.9195	0.9145	0.9105
Panel E: CPI Growth						
CPI (% Chg.)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.2284***	-0.2182***	-0.3003***	-0.4220***	-0.3923***	-0.3022***
	(0.0706)	(0.0727)	(0.0756)	(0.0790)	(0.0823)	(0.0749)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	2,570	2,558	2,424	2,295	2,164	2,033
R^2	0.7845	0.8817	0.8880	0.9069	0.9103	0.9195

Notes: This table presents the relation between county deposit rates and unemployment rates (Panel A), establishment growth (Panel B), inflation (Panel C), payroll growth (Panel D), and delinquency rate (Panel E) 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 the unemployment rate in Panel A, estbalishment growth in Panel B, inflation in Panel C payroll growth in Panel D, and delinquency rate in Panel E. *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 each year. The average unemployment rate, establishment growth, annual CPI growth, payroll growth, and delinquency rate is 5.79%, 0.84%, 3.38%, 1.94%, and 2.53% respectively, for metro counties from 2001 to 2020. The independent variable is standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table B.5: Placebo Test: Deposit Rates Reflect Localized Deposit Shortages in Metro Counties

Panel A: GDP Growth						
Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0007	-0.0052	-0.0101*	-0.0160***	-0.0053	0.0023
	(0.0042)	(0.0050)	(0.0053)	(0.0058)	(0.0075)	(0.0054)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	1,479	1,311	1,178	1,061	942	837
R^2	0.3285	0.3486	0.3549	0.3532	0.3654	0.3759
Panel B: Employment Growth						
Δln(Employment)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0013	-0.0025	-0.0058*	-0.0024	-0.0021	0.0019
	(0.0034)	(0.0028)	(0.0032)	(0.0029)	(0.0032)	(0.0027)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	1,509	1,337	1,201	1,081	958	851
R^2	0.6275	0.6463	0.6637	0.6900	0.7114	0.7204
Panel C: Business Formation						
ln(Applications)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0223	-0.0208	-0.0092	0.0154	0.0392*	0.0432*
	(0.0196)	(0.0257)	(0.0226)	(0.0209)	(0.0198)	(0.0227)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	1,154	1,007	880	767	658	564
R^2	0.9950	0.9951	0.9950	0.9950	0.9954	0.9953
Panel D: Wage Growth						
Δ ln(Annual Wages)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0011	-0.0064*	-0.0071*	-0.0056	-0.0010	0.0060*
	(0.0043)	(0.0036)	(0.0038)	(0.0039)	(0.0042)	(0.0036)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	1,509	1,326	1,180	1,059	938	833
R^2	0.5859	0.6168	0.6284	0.6509	0.6647	0.6649

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 six-year (k = 1, 2, 3, 4, 5, 6) 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, employment growth in Panel B, natural-log of the number of new business applications in Panel C, and wage growth in Panel D. *Rate* denotes the average bank deposit rate for non-metro counties (1993 USDA ERS Rural-Urban Continuum Codes ≥ 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 of deposit rates at the bank $\times$ month-year level. We replace each bank's deposit rate in metro counties with its average deposit rate across non-metro counties. Then, the average deposit rate across banks for each county in each month is computed, so the within-county variation is driven purely by bank composition. The annual county deposit rate is the county deposit rate in the last reporting month of each year. Average GDP growth is 1.71%, average employment growth is 0.71%, average log-transformed # of applications is 3.23%, and average wage growth of 3.53% for metro counties from 2001 through 2020. The independent variable is standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table B.6: Placebo Test: Deposit Rates Reflect Localized Deposit Shortages in Non-Metro Counties

Panel A: GDP Growth						
Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0025	0.0018	-0.0030	-0.0036	0.0020	-0.0010
	(0.0053)	(0.0054)	(0.0055)	(0.0067)	(0.0064)	(0.0062)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	2,418	2,087	1,844	1,634	1,438	1,263
R^2	0.1914	0.1937	0.2054	0.2075	0.2112	0.1854
Panel B: Employment Growth						
Δln(Employment)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0016	0.0033	-0.0006	-0.0013	-0.0009	-0.0020
	(0.0023)	(0.0025)	(0.0032)	(0.0033)	(0.0028)	(0.0031)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	2,442	2,108	1,864	1,653	1,454	1,277
R^2	0.4637	0.4827	0.4949	0.5029	0.5219	0.5331
Panel C: Business Formation						
ln(Applications)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0039	-0.0126	-0.0145	-0.0342	-0.0500**	-0.0528**
	(0.0159)	(0.0189)	(0.0194)	(0.0228)	(0.0232)	(0.0227)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	1,907	1,627	1,402	1,214	1,030	871
R^2	0.9936	0.9938	0.9937	0.9941	0.9946	0.9949
Panel D: Wage Growth						
Δ ln(Annual Wages)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0068**	0.0039	-0.0031	-0.0021	-0.0056	-0.0041
	(0.0033)	(0.0036)	(0.0047)	(0.0050)	(0.0040)	(0.0042)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	2,442	2,083	1,829	1,604	1,401	1,227
R^2	0.4045	0.4332	0.4364	0.4390	0.4617	0.4546

Notes: This table presents the relation between county deposit rates and economic activity in non-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 six-year (k = 1, 2, 3, 4, 5, 6) 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, employment growth in Panel B, natural-log of the number of new business applications in Panel C, and wage growth in Panel D. *Rate* denotes the average bank deposit rate across metro counties (1993 USDA ERS Rural-Urban Continuum Codes < 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 of deposit rates at the bank $\times$ month-year level. We replace each bank's deposit rate in non-metro counties with its average deposit rate across metro counties. Then, the average deposit rate across banks for each county in each month is computed, so the within-county variation is driven purely by bank composition. The annual county deposit rate is the county deposit rate in the last reporting month of each year. Average GDP growth is 1.71%, average employment growth is 0.71%, average log-transformed # of applications is 3.23%, and average wage growth of 3.53% for metro counties from 2001 through 2020. The independent variable is standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table B.7: County Economic Activity and Deposit Rate of Large Banks

Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0029	-0.0017	0.0014	-0.0030	-0.0007	0.0022
	(0.0034)	(0.0032)	(0.0035)	(0.0030)	(0.0035)	(0.0043)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	2,171	1,949	1,760	1,575	1,412	1,291
R^2	0.4321	0.4362	0.4526	0.4562	0.4126	0.4296
Panel B: Employment Growth						
Δln(Employment)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0026	-0.0020	-0.0022	-0.0014	-0.0011	0.0017
	(0.0018)	(0.0021)	(0.0021)	(0.0021)	(0.0019)	(0.0021)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	2,198	1,972	1,781	1,594	1,429	1,305
R^2	0.7072	0.7293	0.7486	0.7554	0.7706	0.7786
Panel C: Business Formation						
ln(Applications)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0267*	-0.0272	-0.0286	-0.0237	-0.0230	-0.0446**
	(0.0162)	(0.0207)	(0.0184)	(0.0159)	(0.0180)	(0.0197)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	1,861	1,667	1,489	1,328	1,166	1,029
R^2	0.9937	0.9937	0.9938	0.9936	0.9935	0.9934
Panel D: Wage Growth						
Δln(Annual Wages)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0003	-0.0015	-0.0018	-0.0042*	-0.0015	0.0028
	(0.0026)	(0.0031)	(0.0030)	(0.0025)	(0.0026)	(0.0029)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	2,198	1,953	1,754	1,564	1,395	1,258
R^2	0.5365	0.5609	0.5966	0.6068	0.6170	0.6203

Notes: This table presents the relation between county deposit rates and economic activity in metro counties. The analysis is limited to multi-state banks – those that operate in more than one state – with an average dispersion (standard deviation) in deposit rates below the 25$^{\text{th}}$ percentile for the sample. 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 six-year (k = 1, 2, 3, 4, 5, 6) 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, employment growth in Panel B, natural-log of the number of new business applications in Panel C, and the wage growth in Panel D. *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 each year. Average GDP growth is 1.71%, average employment growth is 0.71%, average log-transformed # of applications is 3.23%, and average wage growth of 3.53% for metro counties from 2001 through 2020. The independent variable is standardized. The sample period is from 2001 through 2020. The independent variables are standardized. The sample period is from 2001 through 2020. County clustered standard errors are reported in parentheses.

Table B.8: County Economic Activity, Deposit Rate, and Share of Large Banks

Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0004	-0.0072**	-0.0138***	-0.0091**	-0.0027	0.0006
	(0.0034)	(0.0036)	(0.0040)	(0.0038)	(0.0035)	(0.0043)
$\mathbb{1}_{\text{Share of Large Banks} \leq P25} \times$ Rate	0.0014	0.0044	0.0065**	0.0066**	0.0047	0.0013
	(0.0030)	(0.0032)	(0.0030)	(0.0027)	(0.0033)	(0.0039)
$\mathbb{1}_{P25 < \text{ Share of Large Banks} \leq P50} \times$ Rate	-0.0026	-0.0010	0.0023	0.0033**	0.0023	0.0005
	(0.0018)	(0.0018)	(0.0015)	(0.0015)	(0.0016)	(0.0016)
$\mathbb{1}_{P50 < \text{Share of Large Banks} \leq P75} \times$ Rate	-0.0002	-0.0001	0.0004	0.0009	0.0008	0.0003
	(0.0023)	(0.0020)	(0.0016)	(0.0016)	(0.0017)	(0.0016)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,466	4,192	3,937	3,690	3,436	3,187
R^2	0.2765	0.2832	0.2894	0.2828	0.2766	0.2764

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 six-year (k = 1, 2, 3, 4, 5, 6) annual lead indicators of economic activity. The regression specification is the following: $\Delta ln(GDP)_{c,t+k} = \beta_1 \cdot Rate_{c,t} \times \mathbb{1}_{\text{Share of Large Banks} \leq P25} + \beta_2 \cdot Rate_{c,t} \times \mathbb{1}_{P25 < \text{Share of Large Banks} \leq P50} + \beta_3 \cdot Rate_{c,t} \times \mathbb{1}_{P50 < \text{Share of Large Banks} \leq P75} + \alpha_c + \alpha_t + \epsilon_{c,t}$ where $\Delta ln(GDP)$ denotes GDP growth. *Rate* denotes the average bank deposit rate, and $\mathbb{1}_{\text{Share of Large Banks} \leq P25}$, $\mathbb{1}_{P25 < \text{Share of Large Banks} \leq P50}$, and $\mathbb{1}_{P50 < \text{Share of Large Banks} \leq P75}$ denote whether the county's share of non-single state ("'large") banks is in the first, second, or third quartiles, respectively. 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 each year. Average GDP growth is 1.71% for metro counties from 2001 through 2020. The *Rate* variable is standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table B.9: County Economic Activity and Deposit Rate: Excluding Failed Banks

Panel A: GDP Growth						
Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0037	-0.0048	-0.0134***	-0.0041	-0.0054*	-0.0008
	(0.0034)	(0.0032)	(0.0041)	(0.0040)	(0.0032)	(0.0037)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,521	4,245	3,995	3,745	3,489	3,241
R^2	0.2696	0.2752	0.2804	0.2766	0.2761	0.2828
Panel B: Employment Growth						
Δln(Employment)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0043**	-0.0059***	-0.0096***	-0.0104***	-0.0064***	-0.0014
	(0.0018)	(0.0019)	(0.0019)	(0.0018)	(0.0017)	(0.0014)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,560	4,280	4,029	3,776	3,516	3,265
R^2	0.6388	0.6526	0.6701	0.6797	0.6889	0.7003
Panel C: Business Formation						
ln(Applications)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0007	-0.0171	-0.0343**	-0.0322*	-0.0194	-0.0176
	(0.0143)	(0.0170)	(0.0169)	(0.0181)	(0.0184)	(0.0205)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	3,890	3,617	3,367	3,112	2,854	2,602
R^2	0.9931	0.9932	0.9933	0.9933	0.9935	0.9935
Panel D: Wage Growth						
Δln(Annual Wages)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0043	-0.0074***	-0.0140***	-0.0115***	-0.0052**	0.0004
	(0.0027)	(0.0026)	(0.0026)	(0.0027)	(0.0025)	(0.0024)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,560	4,260	4,000	3,752	3,496	3,243
R^2	0.4854	0.5090	0.5248	0.5229	0.5218	0.5179

Notes: This table presents the relation between county deposit rates and economic activity in metro counties, excluding the sample of failed banks. 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 six-year (k = 1, 2, 3, 4, 5, 6) 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 $\times$ 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 each year. Average GDP growth is 1.71%, average employment growth is 0.71%, average log-transformed # of applications is 3.23%, and average wage growth of 3.53% for metro counties from 2001 through 2020. The independent variable is standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table B.10: County Economic Activity and Money Market Deposit Rate

Panel A: GDP Growth						
Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0024	-0.0055***	-0.0039**	-0.0031*	-0.0033*	-0.0024
	(0.0016)	(0.0017)	(0.0018)	(0.0017)	(0.0018)	(0.0021)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,454	4,177	3,922	3,674	3,422	3,180
R^2	0.2679	0.2794	0.2782	0.2730	0.2697	0.2781
Panel B: Employment Growth						
Δln(Employment)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0017*	-0.0039***	-0.0039***	-0.0018*	-0.0011	-0.0007
	(0.0009)	(0.0010)	(0.0010)	(0.0009)	(0.0009)	(0.0009)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,514	4,232	3,972	3,719	3,462	3,213
R^2	0.6326	0.6539	0.6700	0.6790	0.6939	0.7047
Panel C: Business Formation						
ln(Applications)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0096	-0.0059	-0.0054	-0.0068	-0.0082	-0.0090
	(0.0077)	(0.0077)	(0.0078)	(0.0079)	(0.0080)	(0.0089)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	3,811	3,538	3,284	3,032	2,778	2,526
R^2	0.9932	0.9934	0.9934	0.9934	0.9936	0.9936
Panel D: Wage Growth						
Δln(Annual Wages)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0018	-0.0043***	-0.0039***	-0.0024*	-0.0008	-0.0010
	(0.0013)	(0.0013)	(0.0014)	(0.0013)	(0.0013)	(0.0014)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,514	4,212	3,946	3,693	3,441	3,187
R^2	0.4855	0.5143	0.5246	0.5269	0.5325	0.5230

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 six-year (k = 1, 2, 3, 4, 5, 6) 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, employment growth in Panel B, natural-log of the number of new business applications in Panel C, and the wage growth in Panel D. *Rate* denotes the average bank deposit rate. The deposit rate is the rate on money market accounts 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 each year. Average GDP growth is 1.71%, average employment growth is 0.71%, average log-transformed # of applications is 3.23%, and average wage growth of 3.53% for metro counties from 2001 through 2020. The independent variable is standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table B.11: County Economic Activity and the Other Deposit Rates

Δ ln(GDP)$_{t+3}$	MM (10K)	MM (25K)	MM (50K)	MM (100K)
Rate	-0.0059**	-0.0050**	-0.0067***	-0.0052**
	(0.0026)	(0.0024)	(0.0023)	(0.0024)
County FIPS FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
N	4,071	4,072	2,721	2,501
R^2	0.2660	0.2654	0.3436	0.3362

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 $t+3$ as a function of the average deposit rate within a county at year t. The regression specification is the following: $\Delta ln(GDP)_{c,t+3} = \beta_1 \cdot Rate_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t}$ where $\Delta ln(GDP)$ denotes GDP growth. *Rate* denotes the average bank deposit rate onmoney-market accounts with a \$10,000 minimum size in column (1), money-market accounts with a \$25,000 minimum size in column (2), money-market accounts with a \$50,000 minimum size in column (3), and money-market accounts with a \$100,000 minimum size in column (4). 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 each year. Average GDP growth is 1.71% for metro counties from 2001 through 2020. The independent variable is standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table B.12: County Economic Activity and the Term Structure of Certificates of Deposits

Panel A: Certificates of Deposit (CDs) with a $10,000 Minimum Size

Δ ln(GDP)$_{t+3}$	1-Month	3-Month	6-Month	12-month	24-Month	36-month	60-month
Rate	0.0008	-0.0024	-0.0069**	-0.0103***	-0.0088**	-0.0090**	-0.0043
	(0.0184)	(0.0030)	(0.0034)	(0.0033)	(0.0036)	(0.0035)	(0.0034)
County FIPS FE	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓
N	1,141	3,902	4,156	4,177	4,127	4,080	3,981
R^2	0.3241	0.2733	0.2660	0.2672	0.2684	0.2701	0.2742

Panel B: Certificates of Deposit (CDs) with a $100,000 Minimum Size

Δ ln(GDP)$_{t+3}$	1-Month	3-Month	6-Month	12-month	24-Month	36-month	60-month
Rate	-0.0043	-0.0013	-0.0034	-0.0045	-0.0019	-0.0063	-0.0022
	(0.0049)	(0.0035)	(0.0030)	(0.0030)	(0.0046)	(0.0046)	(0.0033)
County FIPS FE	✓	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓	✓
N	1,305	2,390	2,610	2,660	2,436	2,293	2,255
R^2	0.3415	0.3472	0.3363	0.3408	0.3465	0.3577	0.3683

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 $t+3$ as a function of the average deposit rate within a county at year t. The regression specification is the following: $\Delta ln(GDP)_{c,t+3} = \beta_1 \cdot Rate_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t}$ where $\Delta ln(GDP)$ denotes GDP growth. *Rate* denotes the average bank deposit rate on CDs with a $10,000 minimum size in Panel A and a $100,000 minimum size in Panel B, broken down by maturity: 1-month in column (1), 3-month in column (2), 6-month in column (3), 12-month in column (4), 24-month in column (5), 36-month in column (6), and 60-month in column (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 each year. Average GDP growth is 1.71% for metro counties from 2001 through 2020. The independent variable is standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table B.13: County Economic Activity and Deposit Rate: 2010-2015

Panel A: GDP Growth						
Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0175	-0.0549***	-0.0169	-0.0011	0.0348**	-0.0037
	(0.0210)	(0.0171)	(0.0169)	(0.0154)	(0.0173)	(0.0174)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	1,456	1,437	1,424	1,415	1,406	1,168
R^2	0.2491	0.2441	0.2505	0.2659	0.4372	0.4876
Panel B: Employment Growth						
Δln(Employment)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0123	-0.0185***	-0.0221***	-0.0137**	-0.0071	0.0035
	(0.0076)	(0.0061)	(0.0084)	(0.0064)	(0.0069)	(0.0094)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	1,477	1,457	1,442	1,430	1,420	1,178
R^2	0.4623	0.4876	0.5107	0.5401	0.8095	0.8205
Panel C: Business Formation						
ln(Applications)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0486	-0.0152	-0.1238***	-0.1134***	-0.1474***	-0.2247***
	(0.0339)	(0.0403)	(0.0453)	(0.0386)	(0.0552)	(0.0697)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	1,477	1,457	1,442	1,430	1,420	1,412
R^2	0.9983	0.9981	0.9978	0.9979	0.9960	0.9943
Panel D: Wage Growth						
Δ ln(Annual Wages)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0155	-0.0161*	-0.0123	-0.0084	0.0145	0.0193
	(0.0119)	(0.0098)	(0.0142)	(0.0119)	(0.0113)	(0.0128)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	1,477	1,455	1,435	1,421	1,413	1,171
R^2	0.4035	0.4378	0.4563	0.4532	0.5275	0.5354

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 six-year (k = 1, 2, 3, 4, 5, 6) 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, employment growth in Panel B, natural-log transformed number of new business applications in Panel C, and wage growth in Panel D. *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 each year. Average GDP growth is 1.83%, average employment growth is 1.40%, average log-transformed # of applications is 1.63%, and average wage growth of 3.65% for metro counties from 2010 through 2015. The independent variables are standardized. The sample period is from 2010 through 2015. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table B.14: County Economic Activity, Deposit Rate, and Deposit Betas

Panel A: GDP Growth						
Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0027	-0.0071**	-0.0136***	-0.0049	-0.0036	-0.0000
	(0.0032)	(0.0034)	(0.0042)	(0.0039)	(0.0036)	(0.0043)
Rate × Beta	-0.0055	-0.0074	-0.0066	-0.0054	-0.0064	-0.0014
	(0.0043)	(0.0046)	(0.0047)	(0.0038)	(0.0041)	(0.0044)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,578	4,292	4,029	3,775	3,513	3,258
R^2	0.2672	0.2764	0.2802	0.2715	0.2694	0.2739
Panel B: Employment Growth						
Δln(Employment)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0024	-0.0055***	-0.0094***	-0.0088***	-0.0059***	-0.0026
	(0.0016)	(0.0016)	(0.0018)	(0.0017)	(0.0017)	(0.0016)
Rate × Beta	-0.0038**	-0.0018	-0.0001	0.0003	-0.0009	-0.0024
	(0.0018)	(0.0017)	(0.0018)	(0.0019)	(0.0016)	(0.0015)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,638	4,347	4,079	3,820	3,553	3,291
R^2	0.6303	0.6469	0.6648	0.6743	0.6870	0.6966
Panel C: Business Formation						
ln(Applications)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	0.0021	-0.0155	-0.0315*	-0.0354*	-0.0338*	-0.0374*
	(0.0144)	(0.0163)	(0.0165)	(0.0183)	(0.0191)	(0.0203)
Rate × Beta	0.0118	0.0127	0.0223	0.0287	0.0263	0.0257
	(0.0250)	(0.0250)	(0.0238)	(0.0249)	(0.0240)	(0.0239)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	3,923	3,640	3,378	3,112	2,851	2,591
R^2	0.9933	0.9935	0.9935	0.9935	0.9938	0.9937
Panel D: Wage Growth						
Δln(Annual Wages)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Rate	-0.0013	-0.0064***	-0.0116***	-0.0098***	-0.0038	-0.0003
	(0.0025)	(0.0023)	(0.0024)	(0.0025)	(0.0026)	(0.0027)
Rate × Beta	-0.0046	-0.0006	-0.0004	-0.0021	-0.0049*	-0.0064**
	(0.0031)	(0.0029)	(0.0028)	(0.0029)	(0.0025)	(0.0027)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,638	4,330	4,056	3,795	3,533	3,271
R^2	0.4840	0.5104	0.5244	0.5253	0.5295	0.5186

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 six-year (k = 1, 2, 3, 4, 5, 6) annual lead indicators of economic activity. The regression specification is the following: $Y_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \beta_2(Rate_{c,t} \cdot Beta_c) + \alpha_c + \alpha_t + \epsilon_{c,t}$ where Y denotes GDP growth in Panel A, employment growth in Panel B, natural-log transformed number of new business applications in Panel C, and wage growth in Panel D. *Rate* denotes the average bank deposit rate, *Beta* denotes the deposit beta that is computed from first regressing $\Delta ln(Deposits)_{b,c,t} = \alpha + \beta \cdot \Delta FFR_t + \epsilon b, ct$, where $\Delta ln(Deposits)$ represents deposit growth, and FFR represents the Fed Funds Rate. These deposit betas are aggregated at the county level by weighting the bank-by-county deposit betas according to the average bank deposit share in each county over the sample period: $Beta_c = \sum_b w_{b,c} \cdot \beta_{b,c}$. See table notes for Table 2 for a description of the sample. The independent variables are standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table B.15: County Economic Activity and Deposit Rate: 2006

Panel A: GDP Growth			
Δ ln(GDP)	2007	2008	2009
Rate_{2006}	0.0149**	-0.0158**	-0.0022
	(0.0063)	(0.0062)	(0.0067)
N	241	242	239
R^2	0.0143	0.0182	0.0004
Panel B: Employment Growth			
Δ ln(Employment)	2007	2008	2009
Rate_{2006}	0.0089**	-0.0022	-0.0102***
	(0.0039)	(0.0031)	(0.0036)
N	244	245	242
R^2	0.0146	0.0016	0.0316
Panel C: CPI Growth			
CPI (% Chg.)	2007	2008	2009
Rate_{2006}	-0.0568	-0.3390***	-0.6492***
	(0.1326)	(0.1294)	(0.1627)
N	124	123	124
R^2	0.0008	0.0568	0.0842

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: $Y_{c,t+k} = \beta_1 \cdot Rate_{c,t} + \epsilon_{c,t}$ where Y denotes GDP growth, employment growth in Panel B, and the annual percentage change in CPI in Panel B. *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 each year. Average GDP growth is 0.38%, average employment growth is 0.21%, and average inflation is 2.16% for metro counties from 2006 through 2009. The independent variable is standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. Heteroskedacticity-robust standard errors are reported in parentheses.

Table B.16: Forecasting County Recessions

Panel A: Deposit Rates			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0183***	0.0490***	0.0445***
	(0.0048)	(0.0050)	(0.0054)
N	4,579	4,296	4,034
pseudo R^2	0.0033	0.0259	0.0206
AUC	0.5548	0.6054	0.5882
Overall test statistic, χ^2	14.3698	90.1792	65.1959
p-value	0.0002	0.0000	0.0000
Panel B: GDP Growth Lags			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
L1.Δ ln(GDP)	0.1012	0.2061	0.4492***
	(0.1697)	(0.1964)	(0.1499)
L2.Δ ln(GDP)	0.2058	0.1382	0.0851
	(0.1836)	(0.2792)	(0.1171)
L3.Δ ln(GDP)	0.1195	0.1545	0.4079***
	(0.2513)	(0.2963)	(0.1378)
N	3,492	3,234	2,982
pseudo R^2	0.0016	0.0020	0.0076
AUC	0.5065	0.5310	0.5591
Overall test statistic, χ^2	3.9357	3.8807	17.2911
p-value	0.2685	0.2746	0.0006
Panel C: GDP Growth Lags and Deposit Rates			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0277***	0.0603***	0.0521***
	(0.0054)	(0.0055)	(0.0058)
L1.Δ ln(GDP)	0.0218	0.0010	0.2518*
	(0.1728)	(0.1812)	(0.1502)
L2.Δ ln(GDP)	0.1127	-0.0562	-0.0538
	(0.1605)	(0.1504)	(0.1008)
L3.Δ ln(GDP)	0.0354	-0.0511	0.1869
	(0.1992)	(0.1637)	(0.1418)
N	3,492	3,234	2,982
pseudo R^2	0.0085	0.0391	0.0348
AUC	0.5957	0.6565	0.6306
Overall test statistic, χ^2	34.2555	127.6021	100.3784
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) $t+k$ in metro counties: Panel A: $logit(p_{c,t+k}) = \beta_0 + \beta_1 Rate_{c,t} + \beta_2 Rate_{c,t} + \alpha_c + \epsilon_{c,t+k}$; Panel B: $logit(p_{c,t+k}) = \beta_0 + \beta_1 \cdot \Delta ln(GDP)_{c,t-1} + \beta_2 \cdot \Delta ln(GDP)_{c,t-2} + \beta_3 \cdot \Delta ln(GDP)_{c,t-3} + \alpha_c + \epsilon_{c,t+k}$; Panel C: $logit(p_{c,t+k}) = \beta_0 + \beta_1 Rate_{c,t} + \beta_2 \cdot \Delta ln(GDP)_{c,t-1} + \beta_3 \cdot \Delta ln(GDP)_{c,t-2} + \beta_4 \cdot \Delta ln(GDP)_{c,t-3} + \alpha_c + \epsilon_{c,t+k}$ where $logit(p) = ln(\frac{p}{1-p})$ denotes the log of the odds ratio, $\Delta ln(GDP)$ denotes GDP growth, *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. The independent variable is standardized. The likelihood of a county being in a recession is 15.12% for metro counties from 2001 through 2020. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. Heteroskedacticity-robust standard errors are reported in parentheses.

Table B.17: Forecasting County Recessions with County Fixed Effects

Panel A: Deposit Rates			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0202***	0.0546***	0.0481***
	(0.0049)	(0.0053)	(0.0057)
County FIPS FE	✓	✓	✓
N	4,337	4,037	3,793
pseudo R^2	0.0768	0.1028	0.0957
AUC	0.7009	0.7307	0.7240
Overall test statistic, χ^2	277.8121	384.2369	316.4925
p-value	0.0866	0.0000	0.0006
Panel B: GDP Growth Lags			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(GDP)$_{t-1}$	0.4431***	0.4831***	0.8556***
	(0.1439)	(0.1572)	(0.1746)
Δ ln(GDP)$_{t-2}$	0.4030***	0.3776	0.3674**
	(0.1445)	(0.2309)	(0.1518)
Δ ln(GDP)$_{t-3}$	0.3649	0.3659	0.6551***
	(0.2884)	(0.2891)	(0.1729)
County FIPS FE	✓	✓	✓
N	3,293	3,039	2,790
pseudo R^2	0.0819	0.0795	0.0855
AUC	0.7015	0.7007	0.7107
Overall test statistic, χ^2	237.5858	211.4627	197.5873
p-value	0.4771	0.8628	0.9458
Panel C: GDP Growth Lags and Deposit Rates			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0251***	0.0609***	0.0509***
	(0.0056)	(0.0057)	(0.0063)
Δ ln(GDP)$_{t-1}$	0.3604**	0.2601*	0.6119***
	(0.1401)	(0.1375)	(0.1600)
Δ ln(GDP)$_{t-2}$	0.3215***	0.1763	0.2011*
	(0.1247)	(0.1345)	(0.1220)
Δ ln(GDP)$_{t-3}$	0.2673	0.1394	0.3775**
	(0.2430)	(0.1385)	(0.1545)
County FIPS FE	✓	✓	✓
N	3,293	3,039	2,790
pseudo R^2	0.0873	0.1154	0.1097
AUC	0.7106	0.7425	0.7369
Overall test statistic, χ^2	269.1455	352.0962	285.6236
p-value	0.0808	0.0000	0.0094

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: Panel A: $logit(p_{c,t+k}) = \beta_0 + \beta_1 Rate_{c,t} + \beta_2 Rate_{c,t} + \alpha_c + \epsilon_{c,t+k}$; Panel B $logit(p_{c,t+k}) = \beta_0 + \beta_1 \Delta ln(GDP)_{c,t-1} + \beta_2 \Delta ln(GDP)_{c,t-2} + \beta_3 \Delta ln(GDP)_{c,t-3} + \alpha_c + \epsilon_{c,t+k}$; Panel C: $logit(p_{c,t+k}) = \beta_0 + \beta_1 Rate_{c,t} + \beta_2 \Delta ln(GDP)_{c,t-1} + \beta_3 \Delta ln(GDP)_{c,t-2} + \beta_4 \Delta ln(GDP)_{c,t-3} + \alpha_c + \epsilon_{c,t+k}$ where $logit(p) = ln(\frac{p}{1-p})$ denotes the log of the odds ratio, $\Delta ln(GDP)$ denotes GDP growth, *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. The independent variable is standardized. The likelihood of a county being in a recession is 15.12% for metro counties from 2001 through 2020. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. Heteroskedacticity-robust standard errors are reported in parentheses.

Table B.18: GDP Growth and State Deposit Rate

Δln(GDP)	4 Qtrs Ahead	8 Qtrs Ahead	12 Qtrs Ahead	16 Qtrs Ahead	20 Qtrs Ahead	24 Qtrs Ahead
Rate	-0.0015	-0.0046***	-0.0059***	-0.0041**	-0.0019	-0.0028*
	(0.0018)	(0.0017)	(0.0017)	(0.0018)	(0.0021)	(0.0014)
State FE	✓	✓	✓	✓	✓	✓
Quarter-Year FE	✓	✓	✓	✓	✓	✓
N	3,244	3,091	2,887	2,685	2,481	2,277
R^2	0.6424	0.6607	0.6768	0.7150	0.7449	0.7576

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 state 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 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 independent variable is standardized. Average quarterly GDP growth is 0.30% from 2005 through 2020. The sample period is from 2005Q1 through 2020Q4. The analysis is restricted to single-state banks. State clustered standard errors are reported in parentheses.

Table B.19: Deposit Rates Predict State Recessions

Panel A: No Fixed Effects			
$\mathbb{1}_{Recession}$	4 Qtrs Ahead	8 Qtrs Ahead	12 Qtrs Ahead
Rate	0.0239***	0.0257***	0.0143***
	(0.0034)	(0.0040)	(0.0039)
N	3,040	2,836	2,632
pseudo R^2	0.0353	0.0399	0.0111
AUC	0.6990	0.6812	0.5827
Overall test statistic, χ^2	61.9248	47.3748	13.9552
p-value	0.0000	0.0000	0.0002
Panel B: State Fixed Effects			
$\mathbb{1}_{Recession}$	4 Qtrs Ahead	8 Qtrs Ahead	12 Qtrs Ahead
Rate	0.0242***	0.0262***	0.0147***
	(0.0034)	(0.0039)	(0.0039)
State FE	✓	✓	✓
N	3,040	2,836	2,632
pseudo R^2	0.0708	0.0786	0.0488
AUC	0.7260	0.7191	0.6747
Overall test statistic, χ^2	0.0754	0.0803	0.0492
p-value	0.0000	0.0002	0.3555

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) $t+k$: $logit(p_{s,t+k}) = \beta_0 + \beta_1 Rate_{s,t} + \beta_2 Rate_{s,t} + \epsilon_{s,t+k}$ in Panel A and $logit(p_{s,t+k}) = \beta_0 + \beta_1 Rate_{s,t} + \beta_2 Rate_{s,t} + \alpha_s + \epsilon_{s,t+k}$ in Panel B 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 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 likelihood of a state being in a recession is 5.18% from 2001 through 2020. The sample period is from 2005Q1 through 2020Q4. The analysis is restricted to single-state banks. Heteroskedacticity-robust standard errors are reported in parentheses.

Table B.20: GDP Growth and State Deposit Rate using Call Reports Data

Δln(GDP)	4 Qtrs Ahead	8 Qtrs Ahead	12 Qtrs Ahead	16 Qtrs Ahead	20 Qtrs Ahead	24 Qtrs Ahead
Rate	-0.0048***	-0.0046***	-0.0019	0.0016	0.0005	0.0029***
	(0.0014)	(0.0013)	(0.0016)	(0.0016)	(0.0008)	(0.0008)
State FE	✓	✓	✓	✓	✓	✓
Quarter-Year FE	✓	✓	✓	✓	✓	✓
N	2,907	2,703	2,499	2,295	2,091	1,887
R^2	0.2537	0.2682	0.2770	0.2847	0.2973	0.3065

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 state 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 24-quarter (k = 4, 8, 12, 16, 20, 24) 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 bank deposit rate computed from the call reports as the annualized interest expense on domestic deposits divided by total domestic deposits. The independent variable is standardized. Average quarterly GDP growth is 0.30% from 2005 through 2020. The sample period is from 2005Q1 through 2020Q4. The analysis is restricted to single-state banks. State clustered standard errors are reported in parentheses.

Table B.21: Deposit Rates Predict County Recessions Better in Concentrated Markets

Panel A: No Fixed Effects					
$\mathbb{1}[Recession]_{t+2}$	Large Metro	Small Metro	Large Urban	Small Urban	Rural
Rate_t	0.0478***	0.0463***	0.0239***	0.0136***	-0.0091
	(0.0049)	(0.0042)	(0.0070)	(0.0039)	(0.0063)
N	4,296	7,066	3,319	13,704	5,749
pseudo R^2	0.0259	0.0190	0.0037	0.0008	0.0003
AUC	0.6053	0.5741	0.5228	0.5052	0.5166
Overall test statistic, χ^2	90.2024	115.1499	11.4203	11.9883	2.0344
p-value	0.0000	0.0000	0.0007	0.0005	0.1538
Panel B: County Fixed Effects					
$\mathbb{1}[Recession]_{t+2}$	Large Metro	Small Metro	Large Urban	Small Urban	Rural
Rate_t	0.0533***	0.0546***	0.0269***	0.0170***	-0.0087
	(0.0051)	(0.0044)	(0.0073)	(0.0040)	(0.0064)
County FIPS FE	✓	✓	✓		
N	4,037	6,554	3,191	13,553	5,685
pseudo R^2	0.1028	0.0950	0.0595	0.0618	0.0494
AUC	0.7307	0.7162	0.6710	0.6637	0.6444
Overall test statistic, χ^2	384.2455	579.1674	182.1187	880.7135	310.9590
p-value	0.0000	0.0000	0.6840	0.2797	0.9831

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) $t+2$: $logit(p_{c,t+2}) = \beta_0 + \beta_1 Rate_{c,t} + \epsilon_{c,t+k}$ in Panel A and $logit(p_{c,t+2}) = \beta_0 + \beta_1 Rate_{c,t} + \epsilon_{c,t+k}$ in Panel B. 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. A county is in a recession if its GDP growth between two consecutive years is below -2%. Column (1) limits the sample to metro areas with populations of 1 million or more (1993 USDA ERS Rural-Urban Continuum Codes 0 or 1). Column (2) focuses on metro areas with populations under 1 million (1993 USDA ERS Rural-Urban Continuum Codes 2 or 3). Column (3) narrows the sample to urban areas with populations exceeding 20,000 (1993 USDA ERS Rural-Urban Continuum Codes 4 or 5). Column (4) restricts the sample to urban areas with populations below 20,000 (1993 USDA ERS Rural-Urban Continuum Codes 6 or 7). Column (5) focuses on rural areas with populations under 2,500 (1993 USDA ERS Rural-Urban Continuum Codes 8 or 9). 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 each year. The independent variable is standardized. The likelihood of a county being in a recession is 15.12% for large metro counties, 17.23% for small metro counties, 20.10% for large urban counties, 27.47% for small urban counties, and 32.92% for rural counties from 2001 through 2020. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. Heteroskedacticity-robust standard errors are reported in parentheses.

Table B.22: What Balance Sheet Characteristics Predict Deposit Rates?

Rate_t	(1)	(2)
$\text{Credit/Deposits}_{t-1}$	0.0444***	0.0261***
	(0.0036)	(0.0074)
Cash/Assets_{t-1}		-0.0165***
		(0.0033)
$\text{Dividends/Assets}_{t-1}$		-0.0059***
		(0.0020)
$\text{Deposits/Assets}_{t-1}$		-0.0037
		(0.0036)
$\text{Securities/Assets}_{t-1}$		-0.0189***
		(0.0071)
$\ln(\text{Assets})_{t-1}$		-0.0102
		(0.0068)
Bank FE	✓	✓
Year FE	✓	✓
N	94,259	94,259
R^2	0.9416	0.9416

Notes: The table presents the relation between deposit rates and bank characteristics. The regression specification is the following: $\text{Rate}_{b,t} = \mathbb{B}X_{b,t-1} + \alpha_b + \alpha_t + \epsilon_{b,t}$ where Rate represents the average deposit rate of bank b in year t, X represents a vector of bank characteristics for bank b in year $t-1$. This vector includes the average loan balance divided by total deposits, total cash holdings divided by total bank assets, total dividend on common stocks divided by total assets, total deposits divided by total assets, total securities divided by total assets, and the natural-log of total assets. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County-clustered standard errors are reported in parentheses.

Table B.23: Insured and Uninsured Deposit Growth and Quartiles of 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
$\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$	-0.0001	-0.0015*	-0.0035***	-0.0015**	0.0031***	0.0008	0.0013**
	(0.0007)	(0.0008)	(0.0007)	(0.0008)	(0.0008)	(0.0007)	(0.0005)
$\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$	-0.0007	-0.0024***	-0.0044***	0.0000	0.0053***	0.0025***	0.0009
	(0.0006)	(0.0008)	(0.0010)	(0.0008)	(0.0007)	(0.0005)	(0.0008)
$\mathbb{1}_{\text{Dep Rate Change}>P75}$	0.0016**	0.0000	-0.0037***	0.0044***	0.0080***	0.0045***	0.0022***
	(0.0007)	(0.0009)	(0.0009)	(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	0.0549	0.0534	0.0536	0.0567	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
$\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$	-0.0033	0.0014	-0.0036	-0.0010	0.0057**	-0.0056**	-0.0003
	(0.0029)	(0.0028)	(0.0030)	(0.0031)	(0.0026)	(0.0028)	(0.0033)
$\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$	0.0047*	0.0032	-0.0061*	-0.0036	0.0070**	0.0017	-0.0031
	(0.0024)	(0.0038)	(0.0036)	(0.0027)	(0.0029)	(0.0032)	(0.0037)
$\mathbb{1}_{\text{Dep Rate Change}>P75}$	0.0032	0.0032	-0.0117***	-0.0009	0.0085***	0.0019	-0.0002
	(0.0025)	(0.0025)	(0.0031)	(0.0034)	(0.0025)	(0.0028)	(0.0028)
Quarter-Year FE	✓	✓	✓	✓	✓	✓	✓
N	233,084	237,548	242,312	242,464	240,887	239,551	238,319
R^2	0.0689	0.0703	0.0699	0.0703	0.0703	0.0707	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 × 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 from 2001 through 2020. The analysis is restricted to single-state banks. Two-way bank and quarter-year clustered standard errors are reported in parentheses.

Table B.24: Gap Between Uninsured and Insured Rate by Years from County Recession

	N	P25	Median	P75	Mean	SD
L3.Gap	4,168	-0.1323	0.05	0.225	0.0492	0.3272
L2.Gap	4,645	-0.1617	0.0393	0.242	0.0382	0.4214
L1.Gap	5,416	-0.175	0.04	0.25	0.0392	0.422
Gap	6,164	-0.1285	0.0667	0.2722	0.0795	0.3959
F1.Gap	4,654	-0.1333	0.0582	0.2617	0.0749	0.396
F2.Gap	3,925	-0.142	0.065	0.2875	0.0833	0.4185
F3.Gap	3,638	-0.1433	0.0652	0.2876	0.0728	0.4214

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%. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks.

Table B.25: Loan Growth and Quartiles of Bank Rate Changes

$\Delta ln(\text{Loans})$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	t-3	t-2	t-1	t	t+1	t+2	t+3
$\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$	-0.0012*	-0.0004	0.0008	0.0010	-0.0004	0.0003	0.0009*
	(0.0006)	(0.0008)	(0.0005)	(0.0008)	(0.0006)	(0.0005)	(0.0005)
$\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$	-0.0029***	-0.0007	0.0023***	0.0016**	0.0000	0.0005	0.0010**
	(0.0008)	(0.0007)	(0.0008)	(0.0007)	(0.0006)	(0.0005)	(0.0005)
$\mathbb{1}_{\text{Dep Rate Change}>P75}$	0.0017*	0.0028***	0.0058***	0.0052***	0.0019***	0.0018***	0.0022***
	(0.0009)	(0.0009)	(0.0010)	(0.0008)	(0.0007)	(0.0006)	(0.0005)
Quarter-Year FE	✓	✓	✓	✓	✓	✓	✓
N	212,897	217,267	221,913	222,368	218,083	213,718	209,460
R^2	0.0227	0.0223	0.0221	0.0229	0.0262	0.0306	0.0317

Notes: The table presents the coefficients estimated from the following regression for bank b at time t (quarter-year): $Y_{b,t+k} = \beta_0 + \beta_1 \mathbb{1}_{P25<\text{Dep Rate Change}\leq P50,b,t} + \beta_2 \mathbb{1}_{P50<\text{Dep Rate Change}\leq P75,b,t} + \beta_3 \mathbb{1}_{\text{Dep Rate Change}>P75,b,t} + \alpha_t + \epsilon_{b,t}$ where Y is $\Delta ln(Loans)_{b,t+k}$, denoting 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 × 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 from 2001 through 2020. The analysis is restricted to single-state banks. Two-way bank and quarter-year clustered standard errors are reported in parentheses.

Table B.26: Changes in Bank Capital, NPL, and Quartiles of Bank Rate Changes

Panel A: Changes in Bank Capital

ΔTier 1 Ratio	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	t-3	t-2	t-1	t	t+1	t+2	t+3
$\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$	0.0004	0.0002	0.0000	-0.0041	-0.0070	0.0033	-0.0002
	(0.0004)	(0.0003)	(0.0004)	(0.0046)	(0.0070)	(0.0031)	(0.0004)
$\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$	0.0007***	0.0001	0.0001	-0.0057	-0.0028	0.0011	-0.0003
	(0.0002)	(0.0005)	(0.0005)	(0.0060)	(0.0028)	(0.0011)	(0.0004)
$\mathbb{1}_{\text{Dep Rate Change}>P75}$	0.0002	-0.0002	-0.0006	-0.0026	-0.0028	0.0003	-0.0012
	(0.0004)	(0.0005)	(0.0005)	(0.0024)	(0.0024)	(0.0003)	(0.0011)
Quarter-Year FE	✓	✓	✓	✓	✓	✓	✓
N	164,542	167,796	171,189	173,701	172,491	171,237	170,091
R^2	0.0031	0.0031	0.0025	0.0006	0.0006	0.0006	0.0006

Panel B: Changes in Non-Performing Loan Ratio

$\Delta\frac{\text{NPL}}{\text{Loans}}$	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	t-3	t-2	t-1	t	t+1	t+2	t+3
$\mathbb{1}_{P25<\text{Dep Rate Change}\leq P50}$	-0.0001	0.0001	-0.0001*	-0.0000	-0.0000	-0.0000	0.0001
	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
$\mathbb{1}_{P50<\text{Dep Rate Change}\leq P75}$	-0.0002	-0.0001	-0.0001	-0.0002**	0.0001	-0.0001	-0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
$\mathbb{1}_{\text{Dep Rate Change}>P75}$	-0.0001	-0.0001	-0.0002**	-0.0000	-0.0000	0.0000	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Quarter-Year FE	✓	✓	✓	✓	✓	✓	✓
N	175,929	179,216	182,623	186,097	186,097	182,738	179,333
R^2	0.0075	0.0075	0.0074	0.0074	0.0074	0.0074	0.0074

Notes: The table presents the coefficients estimated from the following regression for bank b at time t (quarter-year): $\Delta Y_{b,t+k} = \beta_0 + \beta_1 \mathbb{1}_{P25<\text{Dep Rate Change}\leq P50,b,t} + \beta_2 \mathbb{1}_{P50<\text{Dep Rate Change}\leq P75,b,t} + \beta_3 \mathbb{1}_{\text{Dep Rate Change}>P75,b,t} + \alpha_t + \epsilon_{b,t}$ where Y is $\Delta\frac{\text{Tier 1 Capital}}{\text{Risk-Weighted Assets}}$, denoting the tier 1 capital ratio in Panel A and $\Delta\frac{\text{NPL}}{\text{Lagged Loans}}$, denoting the non-performing loan growth in 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 from 2001 through 2020. The analysis is restricted to single-state banks. Two-way bank and quarter-year clustered standard errors are reported in parentheses.

Table B.27: Deposit Rate Predicts Recessions Accounting for Deposit Growth

Panel A: Deposit Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(Deposit)	-0.0227***	-0.0090*	-0.0024
	(0.0062)	(0.0052)	(0.0051)
N	4,579	4,296	4,034
pseudo R^2	0.0040	0.0006	0.0000
AUC	0.5905	0.5485	0.5069
Overall test statistic, χ^2	13.3450	3.0575	0.2120
p-value	0.0003	0.0804	0.6452
Panel B: Deposit Rate and Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0200***	0.0499***	0.0450***
	(0.0049)	(0.0051)	(0.0054)
Δ ln(Deposit)	-0.0242***	-0.0134**	-0.0065
	(0.0066)	(0.0054)	(0.0049)
N	4,579	4,296	4,034
pseudo R^2	0.0079	0.0274	0.0210
AUC	0.5925	0.6120	0.5917
Overall test statistic, χ^2	27.3545	95.9340	68.3068
p-value	0.0000	0.0000	0.0000

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 $logit(p_{c,t+k}) = \beta_0 + \beta_1 \cdot \Delta ln(Deposit)_{c,t} + \epsilon_{c,t+k}$ 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%. The independent variables are standardized. The likelihood of a county being in a recession is 15.12% for metro counties from 2001 through 2020. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. Heteroskedacticity-robust standard errors are reported in parentheses.

Table B.28: Deposit Rate Predicts Recessions after Accounting for Deposit Growth with County Fixed Effects

Panel A: Deposit Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(Deposit)	-0.0183***	0.0006	0.0129*
	(0.0063)	(0.0065)	(0.0068)
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	0.0212***	0.0549***	0.0477***
	(0.0049)	(0.0053)	(0.0057)
Δ ln(Deposit)	-0.0198***	-0.0052	0.0077
	(0.0063)	(0.0060)	(0.0062)
County FIPS FE	✓	✓	✓
N	4,337	4,037	3,793
pseudo R^2	0.0792	0.1030	0.0960
AUC	0.7025	0.7307	0.7237
Overall test statistic, χ^2	293.9763	386.6196	317.4426
p-value	0.0239	0.0000	0.0006

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%. The independent variables are standardized. The likelihood of a county being in a recession is 15.12% for metro counties from 2001 through 2020. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. Heteroskedacticity-robust standard errors are reported in parentheses.

Table B.29: County Economic Activity and Deposit Rate in Low vs. High Credit Growth Counties

Δln(GDP)	1 Year Ahead	2 Years Ahead	3 Years Ahead	4 Years Ahead	5 Years Ahead	6 Years Ahead
Low Credit Growth × Rate	-0.0037**	-0.0038**	-0.0032***	-0.0036***	-0.0034**	-0.0031**
	(0.0016)	(0.0015)	(0.0012)	(0.0012)	(0.0015)	(0.0015)
Rate	-0.0000	-0.0040	-0.0113**	-0.0011	0.0001	0.0031
	(0.0036)	(0.0037)	(0.0045)	(0.0041)	(0.0038)	(0.0044)
County FIPS FE	✓	✓	✓	✓	✓	✓
Year FE	✓	✓	✓	✓	✓	✓
N	4,390	4,123	3,875	3,634	3,387	3,145
R^2	0.2615	0.2710	0.2747	0.2669	0.2663	0.2728

Notes: This table presents the relation between county deposit rates, credit growth 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 six-year (k = 1, 2, 3, 4, 5, 6) annual lead indicators of economic activity. The regression specification is the following: $\Delta ln(GDP)_{c,t+k} = \beta_1 \cdot \text{Low Credit Growth}_c \times \text{Rate}_{c,t} + \beta_2 \cdot \text{Rate}_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t}$ where $\Delta ln(GDP)$ denotes GDP growth, Low Credit Growth × Rate is the interaction of the county deposit rate and an indicator for counties with a three-year average total credit growth in the bottom quartile prior to a recession over the sample period, *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 each year. Average GDP growth is 1.71% for metro counties from 2001 through 2020. The independent variables are standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks operating in metro counties that experienced at least one recession during the sample period. County clustered standard errors are reported in parentheses.

Table B.30: County Economic Activity and Credit Growth

Panel A: Small Business Lending Growth			
$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(SBL)	0.0054*	0.0029*	-0.0024
	(0.0029)	(0.0016)	(0.0021)
County FIPS FE	✓	✓	✓
Year FE	✓	✓	✓
N	4,578	4,292	4,029
R^2	0.1617	0.2496	0.1924
Panel B: Mortgage Lending Growth			
$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(Mortgages)	0.0060*	0.0028	0.0017
	(0.0033)	(0.0021)	(0.0022)
County FIPS FE	✓	✓	✓
Year FE	✓	✓	✓
N	4,578	4,292	4,029
R^2	0.1603	0.2487	0.1919
Panel C: Total Lending Growth			
$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(Total)	0.0067**	0.0034*	0.0011
	(0.0033)	(0.0019)	(0.0019)
County FIPS FE	✓	✓	✓
Year FE	✓	✓	✓
N	4,578	4,292	4,029
R^2	0.1607	0.2490	0.1918

Notes: This table presents the relation between county deposit rates and economic activity in metro counties, after controlling for credit growth. 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: $\Delta ln(GDP)_{c,t+k} = \beta_1 \cdot \Delta ln(Credit)_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t}$ where $\Delta ln(GDP)$ denotes GDP growth, $\Delta ln(Credit)$ 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+mortgage) in Panel C. Average GDP growth is 1.71% for metro counties from 2001 through 2020. The independent variables are standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table B.31: Deposit Rates Predict County Recessions Accounting for Credit Growth

Panel A: Small Business Lending Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0212***	0.0505***	0.0457***
	(0.0050)	(0.0051)	(0.0054)
Δ ln(SBL)	-0.0339***	-0.0152**	-0.0110*
	(0.0057)	(0.0061)	(0.0064)
N	4,579	4,296	4,034
pseudo R^2	0.0113	0.0275	0.0215
AUC	0.5885	0.6124	0.5934
Overall test statistic, χ^2	44.8559	97.8137	68.1517
p-value	0.0000	0.0000	0.0000
Panel B: Mortgage Lending Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0177***	0.0502***	0.0453***
	(0.0047)	(0.0052)	(0.0052)
Δ ln(Mortgages)	-0.0306***	0.0296***	-0.0454***
	(0.0053)	(0.0058)	(0.0055)
N	4,579	4,296	4,034
pseudo R^2	0.0112	0.0338	0.0347
AUC	0.5689	0.6320	0.6391
Overall test statistic, χ^2	41.6821	123.5814	132.2330
p-value	0.0000	0.0000	0.0000
Panel C: Total Lending Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0178***	0.0497***	0.0455***
	(0.0047)	(0.0051)	(0.0052)
Δ ln(Total)	-0.0310***	0.0260***	-0.0456***
	(0.0055)	(0.0058)	(0.0056)
N	4,579	4,296	4,034
pseudo R^2	0.0111	0.0319	0.0344
AUC	0.5683	0.6280	0.6388
Overall test statistic, χ^2	40.7898	118.4363	132.4512
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) $t+k$ in metro counties: $logit(p_{c,t+k}) = \beta_0 + \beta_1 Rate_{c,t} + \beta_2 \cdot \Delta ln(Credit)_{c,t} + \epsilon_{c,t+k}$ 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+mortgage) 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 each year. The independent variables are standardized. The independent variables are standardized. The likelihood of a county being in a recession is 15.12% for metro counties from 2001 through 2020. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. Heteroskedacticity-robust standard errors are reported in parentheses.

Table B.32: Deposit Rates Predict County Recessions Accounting for Credit Growth: With County Fixed Effects

Panel A: Small Business Lending Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0225***	0.0555***	0.0487***
	(0.0050)	(0.0053)	(0.0058)
Δ ln(SBL)	-0.0302***	-0.0102*	-0.0063
	(0.0057)	(0.0058)	(0.0061)
County FIPS FE	✓	✓	✓
N	4,337	4,037	3,793
pseudo R^2	0.0833	0.1036	0.0960
AUC	0.7096	0.7306	0.7241
Overall test statistic, χ^2	320.7028	384.4530	316.0254
p-value	0.0013	0.0000	0.0007
Panel B: Mortgage Lending Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0193***	0.0562***	0.0486***
	(0.0047)	(0.0054)	(0.0055)
Δ ln(Mortgages)	-0.0312***	0.0343***	-0.0460***
	(0.0055)	(0.0062)	(0.0056)
County FIPS FE	✓	✓	✓
N	4,337	4,037	3,793
pseudo R^2	0.0847	0.1131	0.1097
AUC	0.7061	0.7452	0.7395
Overall test statistic, χ^2	295.7131	471.9410	412.0828
p-value	0.0203	0.0000	0.0000
Panel C: Total Lending Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate	0.0195***	0.0557***	0.0488***
	(0.0047)	(0.0054)	(0.0056)
Δ ln(Total)	-0.0313***	0.0313***	-0.0461***
	(0.0057)	(0.0062)	(0.0056)
County FIPS FE	✓	✓	✓
N	4,337	4,037	3,793
pseudo R^2	0.0844	0.1111	0.1092
AUC	0.7059	0.7428	0.7388
Overall test statistic, χ^2	295.0563	465.0323	405.6754
p-value	0.0216	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+mortgage) 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 each year. The independent variables are standardized. The likelihood of a county being in a recession is 15.12% for metro counties from 2001 through 2020. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. Heteroskedacticity-robust standard errors are reported in parentheses.

Table B.33: 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)	-0.0318***	-0.0081	-0.0044
	(0.0058)	(0.0063)	(0.0066)
N	4,579	4,296	4,034
pseudo R^2	0.0070	0.0004	0.0001
AUC	0.5811	0.5131	0.5074
Overall test statistic, χ^2	30.6497	1.6702	0.4313
p-value	0.0000	0.1962	0.5114
Panel B: Mortgage Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(Mortgages)	-0.0308***	0.0282***	-0.0432***
	(0.0053)	(0.0057)	(0.0055)
N	4,579	4,296	4,034
pseudo R^2	0.0080	0.0071	0.0125
AUC	0.5619	0.5454	0.5890
Overall test statistic, χ^2	33.6249	24.6360	62.7308
p-value	0.0000	0.0000	0.0000
Panel C: Total Credit Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(Total)	-0.0312***	0.0255***	-0.0432***
	(0.0055)	(0.0057)	(0.0056)
N	4,579	4,296	4,034
pseudo R^2	0.0079	0.0056	0.0121
AUC	0.5613	0.5431	0.5854
Overall test statistic, χ^2	32.4155	20.1481	61.4210
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) $t+k$ 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+mortgage) in Panel C. The independent variables are standardized. The likelihood of a county being in a recession is 15.12% for metro counties from 2001 through 2020. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. Heteroskedacticity-robust standard errors are reported in parentheses.

Table B.34: Credit Growth and Recessions with County Fixed Effects

Panel A: Small Business Lending Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(SBL)	-0.0282***	-0.0039	-0.0005
	(0.0057)	(0.0059)	(0.0063)
County FIPS FE	✓	✓	✓
N	4,337	4,037	3,793
pseudo R^2	0.0787	0.0725	0.0729
AUC	0.7041	0.6837	0.6843
Overall test statistic, χ^2	296.0532	240.2963	232.6894
p-value	0.0176	0.5007	0.6028
Panel B: Mortgage Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(Mortgages)	-0.0316***	0.0324***	-0.0443***
	(0.0055)	(0.0060)	(0.0056)
County FIPS FE	✓	✓	✓
N	4,337	4,037	3,793
pseudo R^2	0.0811	0.0814	0.0855
AUC	0.7022	0.7040	0.7102
Overall test statistic, χ^2	281.7599	292.1490	314.7861
p-value	0.0635	0.0135	0.0007
Panel C: Total Credit Growth			
$\mathbb{1}_{Recession}$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Δ ln(Total)	-0.0317***	0.0302***	-0.0443***
	(0.0058)	(0.0060)	(0.0057)
County FIPS FE	✓	✓	✓
N	4,337	4,037	3,793
pseudo R^2	0.0808	0.0798	0.0850
AUC	0.7019	0.7024	0.7090
Overall test statistic, χ^2	280.6678	287.6307	310.0895
p-value	0.0694	0.0212	0.0013

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: $logit(p_{c,t+k}) = \beta_0 + \beta_1 \cdot \Delta ln(Credit)_{c,t} + \epsilon_{c,t+k}$ 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+mortgage) in Panel C. The independent variables are standardized. The likelihood of a county being in a recession is 15.12% for metro counties from 2001 through 2020. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. Heteroskedacticity-robust standard errors are reported in parentheses.

Table B.35: County Economic Activity and Residual Deposit Rates

Panel A: Small Business Lending Growth			
$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate Residual	-0.0009	-0.0018**	-0.0029***
	(0.0008)	(0.0008)	(0.0010)
County FIPS FE	✓	✓	✓
Year FE	✓	✓	✓
N	3,716	3,454	3,202
R^2	0.2495	0.2478	0.2521
Panel B: Mortgage Lending Growth			
$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate Residual	-0.0009	-0.0019**	-0.0029***
	(0.0008)	(0.0008)	(0.0010)
County FIPS FE	✓	✓	✓
Year FE	✓	✓	✓
N	3,716	3,454	3,202
R^2	0.2495	0.2478	0.2520
Panel C: Total Lending Growth			
$\Delta ln(\text{GDP})$	1 Year Ahead	2 Years Ahead	3 Years Ahead
Rate Residual	-0.0009	-0.0019**	-0.0029***
	(0.0008)	(0.0008)	(0.0010)
County FIPS FE	✓	✓	✓
Year FE	✓	✓	✓
N	3,716	3,454	3,202
R^2	0.2495	0.2478	0.2520

Notes: This table presents the relation between the residual of county deposit rates, after partialling out the effects of contemporaneous and lagged values of credit growth and economic activity in metro counties 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: $\Delta ln(GDP)_{c,t+k} = \beta_1 \cdot \text{Rate Residual}_{c,t} + \alpha_c + \alpha_t + \epsilon_{c,t}$ where $\Delta ln(GDP)$ denotes GDP growth. Rate Residual represents the predicted residual from a regression model that estimates the relationship between the deposit rate and annual credit growth, according to the following specification $Rate_{c,t} = \beta_1 \cdot \text{Credit Growth}_{c,t-1,t} + \beta_2 \cdot \text{Credit Growth}_{c,t-2,t-1} + \beta_3 \cdot \text{Credit Growth}_{c,t-3,t-2} + \beta_4 \cdot \text{Credit Growth}_{c,t-4,t-3} + \alpha_c + \alpha_t + \epsilon_{c,t}$. Credit growth is measured as small business lending growth in Panel A, mortgage lending growth in Panel B, and total lending growth (small business lending+mortgage) 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 each year. Average GDP growth is 1.71% for metro counties from 2001 through 2020. The independent variables are standardized. The sample period is from 2001 through 2020. The analysis is restricted to single-state banks. County clustered standard errors are reported in parentheses.

Table B.36: Deposit Rates Predict State Recessions Accounting for Real Indicators

Panel A: No Fixed Effects				
$\mathbb{1}_{Recession}$	12 Qtrs Ahead	12 Qtrs Ahead	12 Qtrs Ahead	12 Qtrs Ahead
Rate	0.0304***			
	(0.0046)			
ln(Auto Sales)		-0.0111**		
		(0.0048)		
ln(UI Claims)			-0.0123***	
			(0.0047)	
ln(Job Openings)				-0.0112**
				(0.0049)
N	2,020	2,020	2,020	2,020
pseudo R^2	0.0713	0.0078	0.0101	0.0076
AUC	0.7151	0.5726	0.5819	0.5706
Overall test statistic, χ^2	64.6570	5.4797	7.2825	5.4219
p-value	0.0000	0.0192	0.0070	0.0199
Panel B: State Fixed Effects				
$\mathbb{1}_{Recession}$	12 Qtrs Ahead	12 Qtrs Ahead	12 Qtrs Ahead	12 Qtrs Ahead
Rate	0.0349***			
	(0.0053)			
ln(Auto Sales)		0.0841***		
		(0.0269)		
ln(UI Claims)			-0.0384**	
			(0.0196)	
ln(Job Openings)				0.0743***
				(0.0212)
State FE	✓	✓	✓	
N	1,720	1,720	1,720	1,720
pseudo R^2	0.1363	0.0719	0.0653	0.0747
AUC	0.8069	0.6988	0.7002	0.7086
Overall test statistic, χ^2	197.5445	49.3590	50.3406	59.5572
p-value	0.0000	0.2340	0.2057	0.0478

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 $logit(p_{s,t+k}) = \beta_0 + \beta_1 \cdot \Delta X_{s,t} + \epsilon_{s,t+k}$ where $logit(p) = ln(\frac{p}{1-p})$. In Panel B, we add state fixed effects. X denotes the independent variable at the state-quarterly frequency - the average deposit rate in column 1, natural-log of auto sales in column 2, natural-log of the number of unemployment insurance claims in column 3, and natural-log of the number of job openings in column 4. A state is in a recession if its GDP growth between two consecutive years is below -2%. The independent variables are standardized. The likelihood of a state being in a recession is 5.18% from 2005Q1 through 2020Q4. The sample period is from 2005Q1 through 2017Q4. Heteroskedacticity-robust standard errors are reported in parentheses.

Table B.37: Deposit Rate Predicts State Recessions after Accounting for Real Indicators

Panel A: No Fixed Effects			
$\mathbb{1}_{Recession}$	4 Qtrs Ahead	8 Qtrs Ahead	12 Qtrs Ahead
Rate	0.0318***	0.0447***	0.0352***
	(0.0047)	(0.0065)	(0.0057)
ln(Auto Sales)	-0.0150	-0.0117	0.0126
	(0.0153)	(0.0163)	(0.0174)
ln(UI Claims)	0.0153*	0.0164*	0.0080
	(0.0080)	(0.0092)	(0.0094)
ln(Job Openings)	-0.0123	-0.0172	-0.0361**
	(0.0142)	(0.0154)	(0.0164)
N	2,428	2,224	2,020
pseudo R^2	0.0957	0.1485	0.0894
AUC	0.7580	0.8026	0.7521
Overall test statistic, χ^2	111.3559	103.7804	102.2571
p-value	0.0000	0.0000	0.0000
Panel B: State Fixed Effects			
$\mathbb{1}_{Recession}$	4 Qtrs Ahead	8 Qtrs Ahead	12 Qtrs Ahead
Rate	0.0324***	0.0428***	0.0341***
	(0.0047)	(0.0061)	(0.0063)
ln(Auto Sales)	-0.0256	-0.0424	0.0375
	(0.0377)	(0.0431)	(0.0494)
ln(UI Claims)	0.0800***	0.0704***	0.0147
	(0.0235)	(0.0237)	(0.0293)
ln(Job Openings)	0.0949***	0.1174***	-0.0043
	(0.0320)	(0.0371)	(0.0381)
State FE	✓	✓	✓
N	2,064	1,892	1,720
pseudo R^2	0.1600	0.2195	0.1372
AUC	0.8324	0.8604	0.8075
Overall test statistic, χ^2	215.2556	215.1488	202.0207
p-value	0.0000	0.0000	0.0000

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 $logit(p_{s,t+k}) = \beta_0 + \beta_1 \cdot Rate_{s,t} + \beta_2 \cdot ln(\text{Auto Sales})_{s,t} + \beta_3 \cdot ln(\text{UI Claims})_{s,t}) + \beta_4 \cdot ln(\text{Job Openings})_{s,t} + \epsilon_{s,t+k}$ where $logit(p) = ln(\frac{p}{1-p})$. In Panel B, we add state fixed effects. *Rate* denotes the average bank deposit rate. $ln(\text{Auto Sales})$ denotes the natural-log of auto sales. $ln(\text{UI Claims})$ denotes the natural-log of the number of unemployment insurance claims. $ln(\text{Job Openings})$ denotes the natural-log of the number of job openings. A state is in a recession if its GDP growth between two consecutive years is below -2%. The independent variables are standardized. The likelihood of a state being in a recession is 5.18% from 2005Q1 through 2020Q4. The sample period is from 2005Q1 through 2017Q4. Heteroskedacticity-robust standard errors are reported in parentheses.

Appendix C Local Import Competition and Local Deposit Rates

We 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 markets 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 regions that are more vulnerable to import competition as these regions are expected to experience greater economic contraction.

We use data on shipping costs from Barrot et al. (2022) to identify the link between regional economic activity and deposit rates.[38] 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 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 set higher deposit rates in regions that face greater import competition between 2001 and 2007, according to the following regression specification:

$$\text{Deposit Rate}_{b,z,t} = \beta_1 \cdot \text{Shipping Costs}_z + X_z + \alpha_{b,s,t} + \epsilon_{b,z,t} \tag{C.1}$$

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.

Table C.1 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 0.02 pp increase in the deposit rate (see column (1)). 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).

[38] 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 constructed by combining the industry shipping costs with the industry composition in each commuting zone, expressed in labor share. Controls include 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.

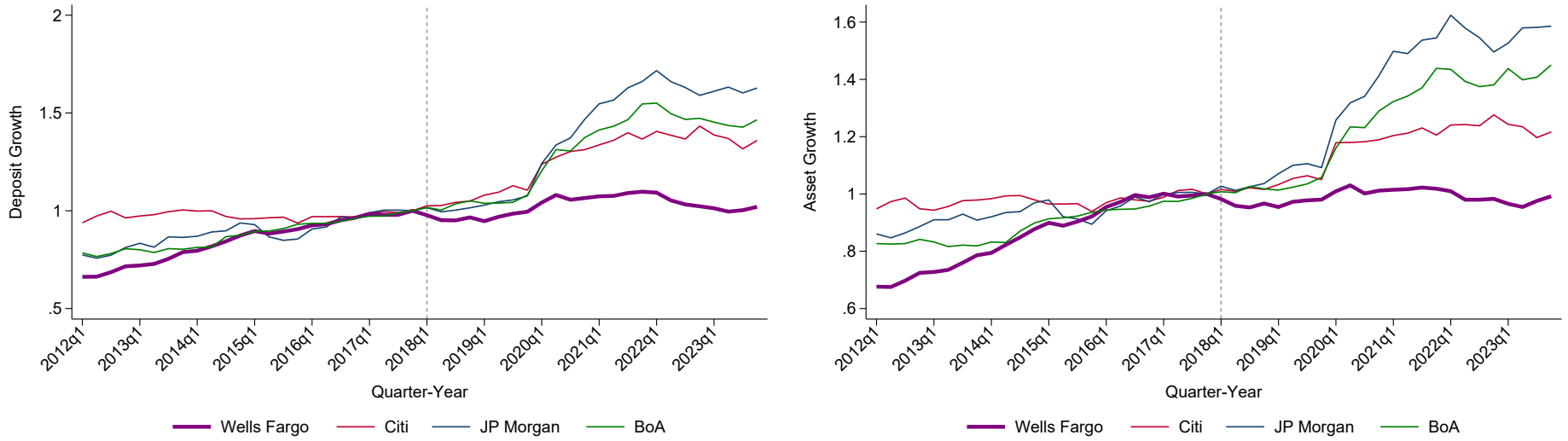
Table C.1: Instrumental Variable Regression: Shipping Costs and Single-State Bank Deposit Rates

Rate	(1)	(2)	(3)	(4)	(5)
Shipping Costs	-0.0159**	-0.0153**	-0.0153**	-0.0153**	-0.0144*
	(0.0074)	(0.0074)	(0.0074)	(0.0074)	(0.0075)
log Employment					0.0351
					(0.0215)
Manufacturing Employment (%)					-0.0192*
					(0.0104)
log Income					-0.0040
					(0.0237)
log Debt					-0.0515**
					(0.0237)
Δ_{91-99}HMDA Loan Orig.					-0.0512***
					(0.0127)
Δ_{91-99} Net CH Import		0.0125	0.0125	0.0125	0.0140
		(0.0096)	(0.0096)	(0.0096)	(0.0085)
Bank × Month-Year FE	✓	✓	✓		
State FE		✓			
State × Month-Year FE			✓		
Bank × Month-Year × State FE				✓	✓
Quintiles HP Growth					✓
N	67,538	67,538	67,538	67,538	67,538
R^2	0.9375	0.9375	0.9375	0.9375	0.9388

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. The independent variables are standardized. 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.

Appendix D Case Study: Wells Fargo Additional Results

Figure D.1: Wells Fargo Deposit and Asset Growth around Active Enforcement

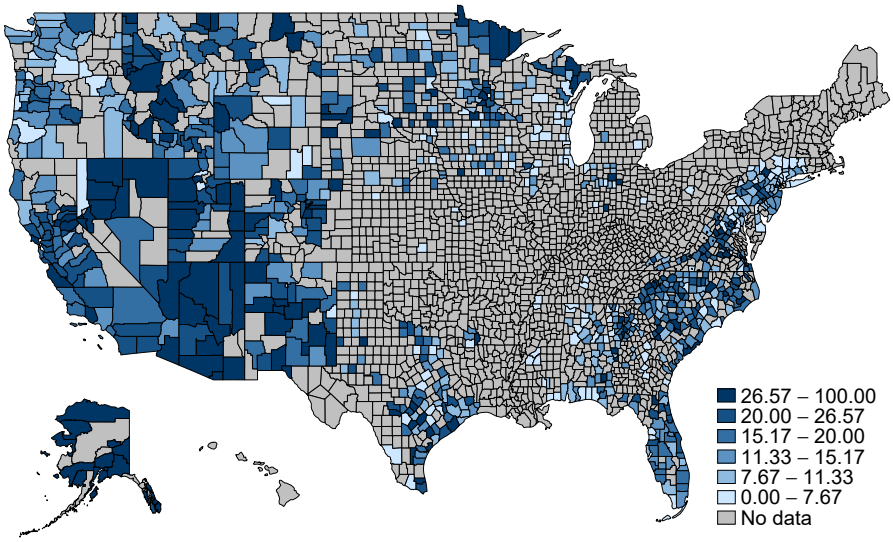


(a) Deposit Growth

(b) Asset Growth

Notes: This figure illustrates plots the deposit growth (Panel D.1a) and asset growth (Panel D.1b) of Wells Fargo (purple), Citibank (red), JP Morgan Chase (green), and Bank of America (blue) between 2012Q1 and 2023Q4. Deposit and asset growth are measured relative to their 2017 values, which are normalized to 1.

Figure D.2: Wells Fargo Deposit Share in 2017



Notes: This figure presents a heatmap of Wells Fargo's share of deposits (%) in each county in 2017, using the FDIC's Summary of Deposits data. The intensity of the blue shading represents the quantile range of the deposit rate.

Table D.1: Bank Deposit Activity around Wells Fargo Active Enforcement

	(1)	(2)
	Δln(Deposits)	Rate
WF County × Post	-0.0200***	0.0123*
	(0.0033)	(0.0068)
Bank × County FIPS FE	✓	✓
County FIPS × Year FE	✓	✓
N	261,009	25,449
R^2	0.3948	0.9262

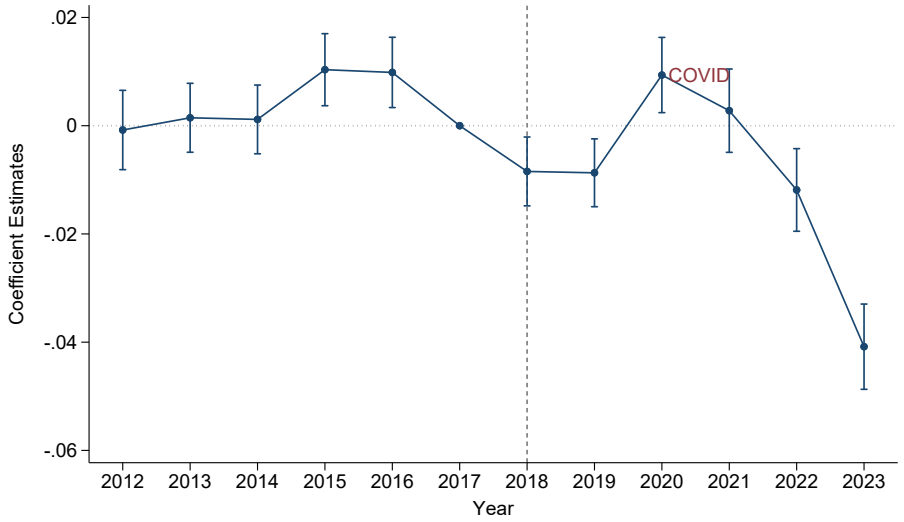
Notes: This table presents the relation between bank deposit activity in counties with a Wells Fargo around the Wells Fargo Active Enforcement. The table presents the results from estimating following model: $Y_{b,c,t} = \beta_1 \mathbb{1}_{\text{WF County},c} \times Post_t + \alpha_{c,t} + \alpha_{b,c} + \epsilon_{c,t}$ where Y is deposit growth in column (1) and deposit rate in column (2). $\mathbb{1}_{\text{WF County}}$ is an indicator for whether the county had a Wells Fargo in 2017, and *Post* is an indicator for the post-enforcement period, after 2017. 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 single-state 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 each year. The sample period is from 2012 through 2023. County clustered standard errors are reported in parentheses.

Table D.2: County Economic Activity in Regions with Low Wells Fargo Credit Participation

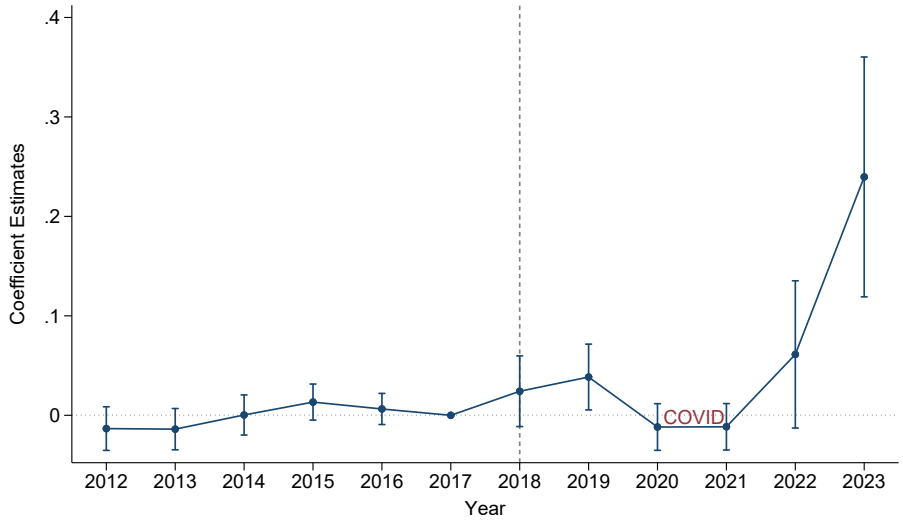
	(1)	(2)	(3)	(4)
	Δln(Deposits)	Rate	ln(SBL)	Δln(GDP)
WF County × Post	-0.0078***	0.0591***	-0.0483***	-0.0037*
	(0.0019)	(0.0211)	(0.0148)	(0.0019)
County FIPS FE	✓	✓	✓	✓
Year FE	✓	✓	✓	✓
N	20,659	20,659	20,659	20,659
R^2	0.3758	0.7069	0.9745	0.1405

Notes: This table presents the relation between deposit activity in counties with a Wells Fargo around the Wells Fargo Active Enforcement, specifically for counties where Wells Fargo's total share of small business and mortgage lending is less than 15% in 2017. The table presents the results from estimating following model: $Y_{c,t} = \beta_1 \mathbb{1}_{\text{WF County},c} \times Post_t + \alpha_c + \alpha_t + \epsilon_{c,t}$ where Y is deposit growth in column (1), deposit rate in column (2), small business lending in column (3), and GDP growth in columnn (4). $\mathbb{1}_{\text{WF County}}$ is an indicator for whether the county had a Wells Fargo in 2017, and *Post* is an indicator for the post-enforcement period, after 2017. 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 single-state 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 each year. The sample period is from 2012 through 2023. County clustered standard errors are reported in parentheses.

Figure D.3: County Deposit Growth and Deposit Rate around Active Enforcement



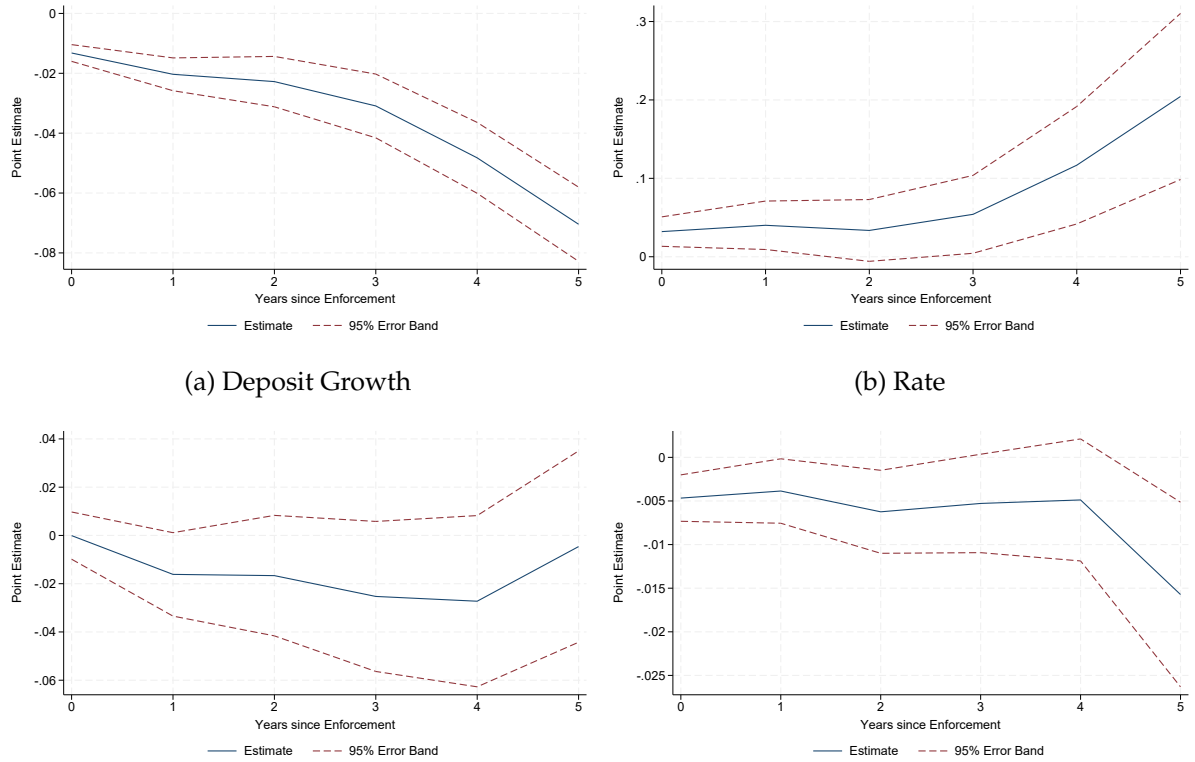
(a) Deposit Growth



(b) Rate

Notes: The figure presents the trend in county deposit growth and deposit rate in counties with a Wells Fargo. The regression specification is the following $Y_{c,t} = \sum_{\substack{k=-6 \\ k\neq -1}}^{6} \beta_k \cdot \mathbb{1}_{\text{WF County},c} \times \mathbb{1}_{t=k+2018} + \alpha_c + \alpha_t + \epsilon_{c,t}$ where Y is the deposit growth (Δ ln(Deposits)) in Panel D.3a and the deposit rate (Rate) in Panel D.3b of county c in year t, $\mathbb{1}_{\text{WF County}}$ is an indicator for whether a county had a Wells Fargo in 2017. The dashed line demarcates the pre and post periods. The deposit rate is the rate on the 12-month certificate of deposit of at least $10,000. Using the deposit rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across single-state 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 each year. The sample period is from 2012 through 2023.

Figure D.4: Heterogeneous Dynamics in Response to Wells Fargo Active Enforcement: Jordà Linear Projections



(a) Deposit Growth

(b) Rate

(c) Small Business Lending

(d) GDP Growth

Notes: The figure plots the coefficients and the associated 95% confidence intervals of the interaction term from the following Jordà (2005) style projection regression: $Y_{f,t+h} - Y_{f,t} = \beta_1 \mathbb{1}_{\text{WF County},c} \times Post_t + \alpha_c + \alpha_t + \epsilon_{c,t}$ where Y is deposit growth (Panel D.4a), deposit rate (Panel D.4b), log-small business lending (Panel D.4c), GDP growth (Panel D.4d), of county c in year t, and h denotes the steps (years) of the projection. The x-axis indicates the years since the shock. $\mathbb{1}_{\text{WF County}}$ is an indicator for whether the county had a Wells Fargo in 2017, and *Post* is an indicator for the post-enforcement period, after 2017. The sample period is from 2012 through 2023. The y-axis indicates the point estimate associated β_1 estimate. County clustered standard errors are reported in parentheses.

Appendix E Case Study: COVID Household Stimulus

In this case study, we use American Community Survey data to estimate the county share of eligible households for the Economic Impact Payments. Economic Impact Payments (EIPs), also known as stimulus checks, were direct payments issued by the U.S. government to help individuals and families during the COVID-19 pandemic. These payments aimed to provide immediate financial relief to eligible individuals to support spending and economic activity. Eligibility was primarily based on income, with full payments going to individuals earning up to $75,000 annually ($150,000 for married couples). The amount of the payment gradually decreased for higher earners, and those with dependent children were eligible for additional funds.

The central hypothesis is that deposit rates effectively reflect the liquidity positions of banks. We propose that areas with a higher share of households eligible for stimulus checks experienced an increase in the local supply of deposits following COVID. This increase in deposit supply contributed to a decline in deposit rates, which subsequently affected credit availability, particularly for small businesses that are highly reliant on local banks for financing. A heatmap illustrating the share of eligible households is shown in Figure E.1.

To test this hypothesis, we apply a difference-in-differences approach, comparing the economic outcomes of counties based on their eligibility for stimulus checks, both before and after the COVID-19 pandemic. We control for time-invariant county characteristics with county fixed effects and account for macroeconomic trends with time fixed effects. The model is specified as follows:

$$Y_{c,t} = \beta_1 \text{Eligible Share}_{,c} \times Post_t + \alpha_c + \alpha_t + \epsilon_{c,t} \tag{E.1}$$

where Y refers to outcome variables including deposit growth, deposit rate and credit growth, Eligible Share is the county's share of the population that is eligible for stimulus checks, and *Post* is an indicator for the post-COVID period, after 2019. The sample period spans 2016 through 2023.

To assess the validity of the parallel trends assumption, we examine the pre- and post-trend behavior of deposit growth and deposit rates for counties with higher eligibility for stimulus checks, as shown in Figure E.2. We find that, in general, deposit growth (Figure E.2a) increases in counties with a higher share of eligible households after COVID. Similarly, deposit rates (Figure E.2b) follow a comparable pattern, declining after COVID. We do not observe clear pre-trends before COVID. These findings suggest that the trends for counties with higher eligibility were moving in parallel to those with lower eligibility before the pandemic, lending support to the parallel trends assumption. By including county and time fixed effects, we ensure that any differences in outcomes between the treated and control counties can be attributed to the stimulus payments, rather than other confounding factors.

Next, we examine the impact of COVID stimulus on county deposit growth in Panel A of Table E.1. Column (1) presents the results without any fixed effects, while Column (2) includes county fixed effects, Column (3) adds year fixed effects, and Column (4) incorporates both county and year fixed effects. We find that county deposit growth increases by up to 10.09 percentage points in counties with a higher share of stimulus-eligible households after COVID, indicating an expansion in the supply of deposits. This increase represents approximately 210% of the average deposit growth. Turning to county deposit rates in Panel B, we observe a decrease of up to 29 basis points in counties with a higher share of eligible households after COVID, accounting for up to 32% of the average deposit rate in these counties. These results suggest that the stimulus payments had a significant impact on both deposit growth and deposit rates in counties with a larger share of eligible households.

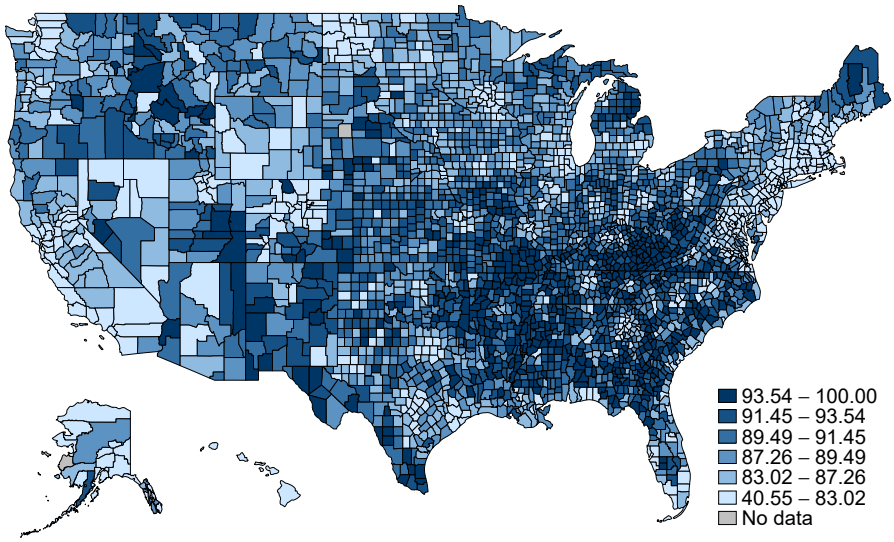
We argue that the liquidity windfall resulting from the stimulus translates into higher small business lending in counties with greater eligibility for stimulus checks. Small busi-

nesses, which typically rely on local bank branches for financing (see Petersen and Rajan (1994)), faced more difficulty securing loans after the asset cap, stifling local economic activity and growth. In Table E.2, we test this hypothesis. Panel A compares small business lending in counties with a higher share of stimulus-eligible households before and after COVID. We find that these counties experience up to a 41% increase in small business lending. This expansion in lending is accompanied by a corresponding increase in GDP, with up to an 8 percentage point increase in future GDP growth. In Appendix Figure E.3, we examine the impulse responses of deposit growth, deposit rates, small business lending, and GDP growth at the county level. We observe that while deposit growth shows an immediate effect following COVID, the decline in deposit rates and increase in small business lending occur later, followed by an increase in GDP growth.

Thus far, the analysis has employed a reduced-form instrumental variable design, using the share of the population eligible for economic impact payments as a proxy for receiving these payments. This is effectively an intention-to-treat (ITT) analysis. However, as with any ITT analysis, there may be concerns that other systematic factors could create a gap between the share of eligible households and the share of households that ultimately received the stimulus. To address these concerns, we directly examine the effect of the total amount of EIP payments in Round 1. We focus on Round 1 because it preceded the PPP program and was unanticipated in its timing and unprecedented in its scope. A limitation of this analysis, however, is that the total amount of EIP payments is available only at the state level, which limits statistical power. Despite this limitation, the findings reported in Table E.3 corroborate the county-level analysis.

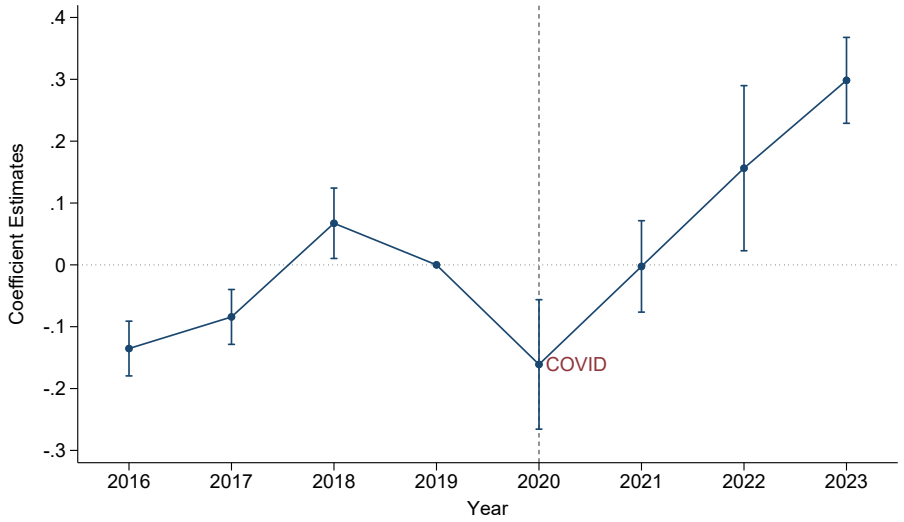
Overall, these findings illustrate how economic contractions and expansions can be influenced by liquidity shocks.

Figure E.1: Share of Eligible Households for Economic Impact Payments

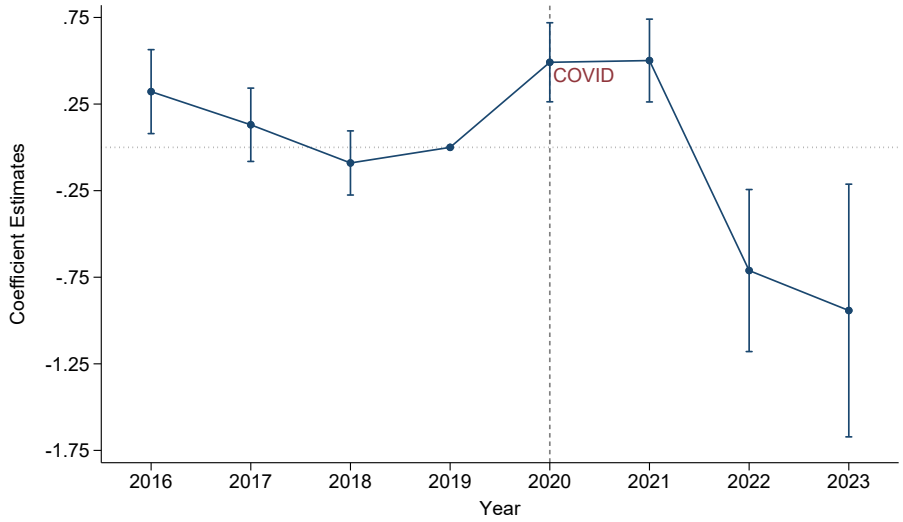


Notes: This figure presents a heatmap of the share of eligible households for economic impact payments. The eligible share is measured using the 2019 wave of the 5-year American Community Survey (ACS), administered by the US Census. The intensity of the blue shading represents the quantile range of the deposit rate.

Figure E.2: County Deposit Growth and Deposit Rate around COVID Stimulus



(a) Deposit Growth



(b) Rate

Notes: The figure presents the trend in county deposit growth and deposit rate for counties with a higher eligible share for the Economic Impact Program. The regression specification is the following $Y_{c,t} = \sum_{\substack{k=-4 \\ k\neq -1}}^{3} \beta_k \cdot \text{Eligible Share} \times \mathbb{1}_{t=k+2020} + \alpha_c + \alpha_t + \epsilon_{c,t}$ where Y is the deposit growth (Δ ln(Deposits)) in Panel D.3a and the deposit rate (Rate) in Panel D.3b, Eligible Share is county's share of households that are eligible for economic impact payments. The eligible share is measured using the 2019 wave of the 5-year American Community Survey (ACS), administered by the US Census. The deposit rate is the rate on the 12-month certificate of deposit of at least $10,000. Using the deposit rate data from RateWatch, we construct a panel at the bank $\times$ county $\times$ month-year level. Then, the average deposit rate across single-state 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 each year. The sample period is from 2016 through 2023.

Table E.1: County Deposit Activity around COVID Stimulus

Panel A: Deposit Growth

Δln(Deposits)	(1)	(2)	(3)	(4)
Eligible Share × Post	0.1009***	0.0962***	0.0984***	0.0930***
	(0.0130)	(0.0130)	(0.0129)	(0.0130)
Eligible Share	-0.1222***		-0.1222***	
	(0.0102)		(0.0102)	
Post	-0.0459***	-0.0417***		
	(0.0113)	(0.0114)		
County FIPS FE		✓		✓
Year FE			✓	✓
N	14,970	14,970	14,970	14,970
R^2	0.0771	0.1667	0.3462	0.4353

Panel B: Deposit Rate

Rate	(1)	(2)	(3)	(4)
Eligible Share × Post	-0.2793**	-0.2915**	-0.2533*	-0.2474*
	(0.1357)	(0.1353)	(0.1353)	(0.1343)
Eligible Share	-0.3302***		-0.3197***	
	(0.0974)		(0.0972)	
Post	0.5768***	0.5827***		
	(0.1217)	(0.1217)		
County FIPS FE		✓		✓
Year FE			✓	✓
N	14,970	14,970	14,970	14,970
R^2	0.0365	0.2052	0.5500	0.7156

Notes: This table presents the relation between county deposit activity around the COVID stimulus. The table presents the results from estimating following model: $Y_{c,t} = \beta_1 \text{Eligible Share}_c \times Post_t + \alpha_c + \alpha_t + \epsilon_{c,t}$ where Y is deposit growth in Panel A and deposit rate in Panel B, Eligible Share is county's share of households that are eligible for economic impact payments, and Post is an indicator for the post-COVID period, after 2019. The eligible share is measured using the 2019 wave of the 5-year American Community Survey (ACS), administered by the US Census. 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 single-state 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 each year. The sample period is from 2016 through 2023. County clustered standard errors are reported in parentheses.

Table E.2: County Economic Activity around COVID Stimulus

Panel A: Small Business Lending

ln(SBL)	(1)	(2)	(3)	(4)
Eligible Share × Post	0.4145***	0.3074***	0.4064***	0.2985***
	(0.1196)	(0.0683)	(0.1191)	(0.0682)
Eligible Share	-16.4287***		-16.4267***	
	(0.5395)		(0.5396)	
Post	-0.0737	0.0130		
	(0.1029)	(0.0572)		
County FIPS FE		✓		✓
Year FE			✓	✓
N	14,970	14,970	14,970	14,970
R^2	0.3969	0.9785	0.4003	0.9821

Panel B: GDP Growth

Δln(GDP)	(1)	(2)	(3)	(4)
Eligible Share × Post	0.0838***	0.0811***	0.0841***	0.0821***
	(0.0103)	(0.0104)	(0.0103)	(0.0104)
Eligible Share	-0.1142***		-0.1139***	
	(0.0090)		(0.0090)	
Post	-0.0638***	-0.0616***		
	(0.0087)	(0.0087)		
County FIPS FE		✓		✓
Year FE			✓	✓
N	14,970	14,970	14,970	14,970
R^2	0.0113	0.1265	0.0787	0.1937

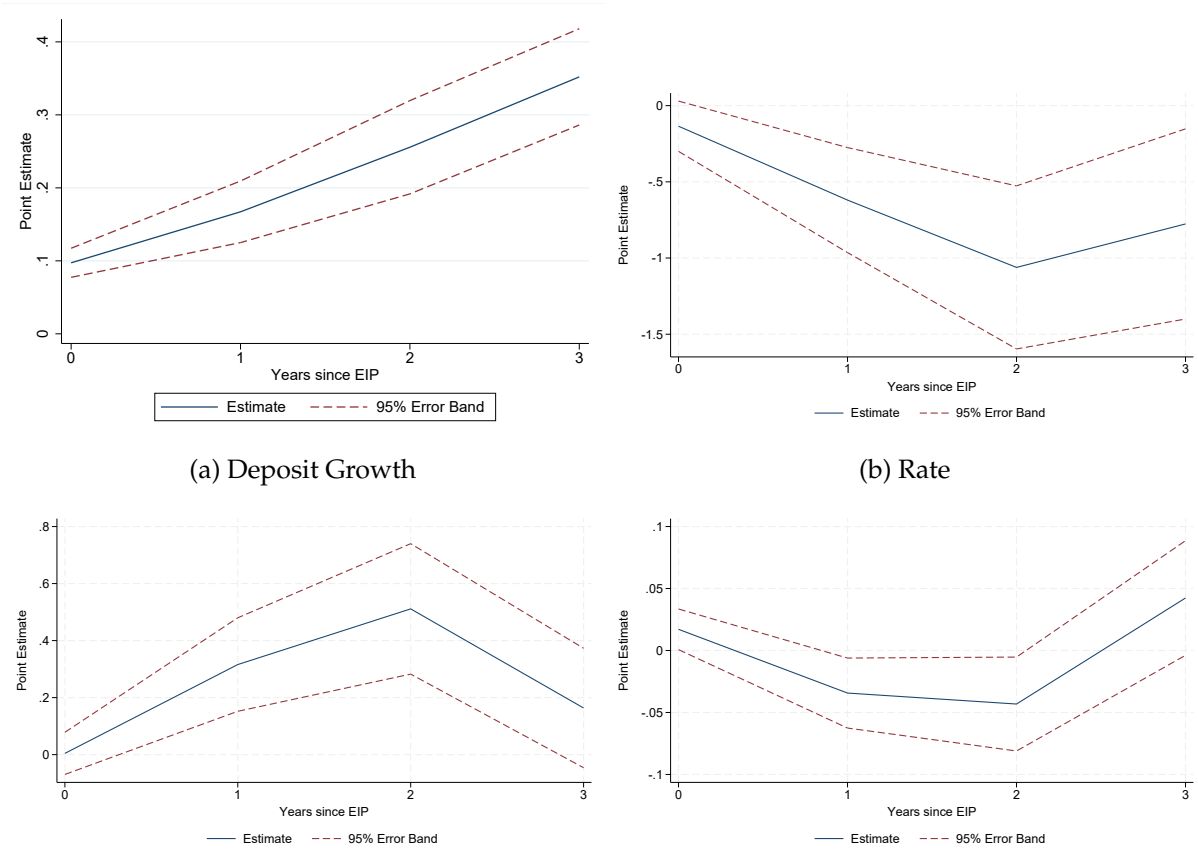
Notes: This table presents the relation between county small business lending and GDP growth around the COVID stimulus. The table presents the results from estimating following model: $Y_{c,t} = \beta_1 \text{Eligible Share}_c \times Post_t + \alpha_c + \alpha_t + \epsilon_{c,t}$ where Y is log-small business lending in Panel A and GDP growth in Panel B, Eligible Share is county's share of households that are eligible for economic impact payments, and Post is an indicator for the post-COVID period, after 2019. The eligible share is measured using the 2019 wave of the 5-year American Community Survey (ACS), administered by the US Census. The sample period is from 2012 through 2023. County clustered standard errors are reported in parentheses.

Table E.3: State Economic Activity and COVID Stimulus

	(1) Δ ln(Deposits)	(2) Rate	(3) ln(SBL)	(4) Δ ln(GDP)
ln(EIP)	0.0214*	-0.0152	0.9969***	0.0074***
	(0.0125)	(0.0110)	(0.0345)	(0.0022)
Constant	-0.1613	0.5365***	0.4923	-0.0574*
	(0.1935)	(0.1674)	(0.5308)	(0.0329)
N	51	51	51	51
R^2	0.0184	0.0453	0.9540	0.1533

Notes: This table presents the relation between the total amount of household stimulus and deposit and economic activity at the state-level in 2020. The independent variable of interest is the log-amount of economic impact payments. The table presents the results from estimating following cross-sectional regression in 2020: $Y_s = \alpha + \beta ln(\text{EIP})_s + \epsilon s$ where Y is deposit growth (Δln(Deposits)) in column (1), deposit rate in column (2), log-small business lending (ln(SBL)) in column (3), and GDP growth (Δln(GDP)) in column (4), ln(EIP) is the log-amount of economic impact payments. 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. The average deposit rate across banks for each county in each month is computed. The state deposit rate is then constructed as the average of the county deposit rate for each state in the last reporting month of each quarter. Heteroskedacticity-robust standard errors are reported in parentheses.

Figure E.3: Heterogeneous Dynamics in Response to COVID Stimulus: Jordà Linear Projections



(a) Deposit Growth

(b) Rate

(c) Small Business Lending

(d) GDP Growth

Notes: The figure plots the coefficients and the associated 95% confidence intervals of the interaction term from the following Jordà (2005) style projection regression: $Y_{f,t+h} - Y_{f,t} = \beta_1 \text{Eligible Share}_c \times Post_t + \alpha_c + \alpha_t + \epsilon_{c,t}$ where Y is deposit growth (Panel E.3a), deposit rate (Panel E.3b), log-small business lending (Panel E.3c), GDP growth (Panel E.3d), of county c in year t, and h denotes the steps (years) of the projection. Eligible Share is county's share of households that are eligible for economic impact payments, and Post is an indicator for the post-COVID period, after 2019. The eligible share is measured using the 2019 wave of the 5-year American Community Survey (ACS), administered by the US Census. The sample period is from 2012 through 2023. The x-axis indicates the years since the shock. The y-axis indicates the point estimate associated β_1 estimate. County clustered standard errors are reported in parentheses.