Bank Liquidity Creation and Real Economic Output[*]

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Abstract

We study the relation between bank liquidity creation (*LC*) and real economic output. We find that *LC per capita* is statistically and economically significantly positively related to *GDP per capita*, particularly when the liquidity is created by small banks. The relation is robust to using OLS, instrumental variables, and many other checks. We also find that *LC per capita* beats alternative measures of bank output in "horse races" – it remains statistically and economically significant, while the alternative measures are not. Finally, the relation is strongest in industries thought to be most bank-dependent, consistent with the hypothesized transmission mechanism.

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1. Introduction

Liquidity creation (*LC*) is one of the most important roles that banks play in the economy. Bank liquidity creation – which incorporates loans, deposits, off-balance sheet guarantees, derivatives, and all other balance sheet and off-balance sheet financial activities – is theoretically linked to the economy. Bank loans, particularly those to bank-dependent customers without capital market opportunities, are often thought to be primary engines of economic growth (e.g., Smith, 1776; Jayaratne and Strahan, 1996). These loans also play an important role in affecting output through the bank lending channel of monetary policy (e.g., Bernanke and Blinder, 1998), particularly for small banks that tend to cater to small, bank-dependent firms (Kashyap and Stein, 2000; Berger and Bouwman, 2014). Transactions deposits, another key component of *LC,* provide liquidity and payments services which are essential to a well-functioning economy (Kashyap, Rajan, and Stein, 2002). Off-balance sheet guarantees like loan commitments and standby letters of credit allow customers to expand their economic activities because they are able to plan their investments and other expenditures knowing that the funds to finance these expenditures will be forthcoming in the future when needed (e.g., Boot, Greenbaum, and Thakor 1993). Moreover, these guarantees are often used as backups for other capital market financing, such as commercial paper and municipal revenue bonds, and in this way assist the capital markets in financing economic growth. Similarly, derivatives, the other main type of bank off-balance sheet activity, aid real economic activity by allowing firms to hedge risks related to future changes in interest rates, foreign exchange rates, and other market prices (e.g., Stulz, 2003). These connections between the components of *LC* and real economic activity may be seen as part of the more general literature on the effects of finance on the real economy (e.g., Greenwood and Jovanovic, 1990; Bencivenga and Smith, 1991; Levine and Zervos, 1996; Levine, 1997).

Despite the theoretical links between *LC* and the economy, the empirical literature until now is missing any test of whether *LC* affects real economic output, measurement of how large such an effect may be, and whether this effect is stronger than that of more traditional measures of bank output, such as total assets

(*TA*) or gross total assets (*GTA*), discussed further below. The goal of this paper is to fill these gaps in the literature. Specifically, we test if real economic output is higher in local markets in which *LC* is relatively high, after controlling for other determinants of real output. In addition, we measure how large this effect of *LC* on real economic output is. We also test whether *LC* is better than *TA* or *GTA* in predicting real economic output. Finally, we hypothesize that the primary transmission mechanism through which *LC* impacts *GDP* is through bank-dependent industries. Our results provide evidence to support this view.

Until recently, *LC* was mostly relegated to a theoretical concept and was not often used in empirical studies. Berger and Bouwman (2009) provide the first comprehensive measure of *LC* that takes into account the contributions of all bank assets, liabilities, equity, and off-balance sheet activities. To summarize briefly, measured *LC* is the weighted sum of all assets, liabilities, equity, and off-balance sheet activities, where the weights are based on the liquidity and the location on or off of the balance sheet of each item. Since liquidity is created when banks transform illiquid assets into liquid liabilities, positive weights are given to both illiquid assets and liquid liabilities (e.g., Bryant, 1980; Diamond and Dybvig, 1983). Banks in this situation are taking something illiquid from the public and giving it something liquid. Similarly, negative weights are given to liquid assets, illiquid liabilities, and equity because banks destroy liquidity when they transform liquid assets into illiquid liabilities or equity. In these cases, banks are taking something liquid from the public and giving it something illiquid. Off-balance sheet activities are assigned weights consistent with those assigned to functionally similar on-balance sheet activities. For example, unused loan commitments are assigned a positive weight because provide liquidity to the public similar to that of transactions deposits (e.g., Boot, Greenbaum, and Thakor, 1993; Holmstrom and Tirole, 1998; Kashyap, Rajan, and Stein, 2002). See Berger and Bouwman (2009) for more details.

LC is also a measure of the output of a bank. According to the modern theory of financial intermediation, banks' two major roles in the economy are liquidity creation and risk transformation. According to the risk transformation theories, banks transform risk by issuing riskless deposits to finance risky loans (e.g., Diamond, 1984; Ramakrishnan and Thakor, 1984; Boyd and Prescott, 1986). While *LC* is only one of the two major functions of a bank, the two roles often coincide, given that both riskless deposits and risky loans contribute positively to *LC*. It is therefore expected that the output of *LC* is highly correlated with the output of risk transformation. Since there is as yet no empirical measure of risk transformation, *LC* may be viewed as the best available measure of total bank output.

The vast majority of empirical studies in banking use one of two measures of bank assets, total assets (*TA*) or gross total assets (*GTA*), as their main measure of bank output. *GTA* equals *TA* plus allowances for loan and lease losses and the allocated transfer risk reserve.[1] The empirical research includes studies of the effects of bank output or size on corporate governance (e.g., Laeven and Levine, 2009), small business lending (e.g., Berger, Miller, Petersen, Rajan, and Stein, 2005), the effects of government interventions and bailouts (e.g., Duchin and Sosyura, 2014), and many other topics. The measures of bank assets are also used as a size cutoff to determine which banks are classified as community banks (e.g., DeYoung, Hunter, and Udell, 2004), and which banks are subject to different regulatory treatment, such as extra supervision as Systemically Important Financial Institutions (SIFIs), stress tests, and consumer protections.[2]

We argue that *LC* is a superior measure of bank output to *TA* or *GTA* because *LC* takes into account off-balance sheet guarantees and derivatives, deposits and other liabilities, and equity in addition to assets, and because it weights various asset categories differently. As noted above, off-balance sheet guarantees allow customers to expand their economic activities by helping them plan expenditures and are often used as backups for other capital market financing. Similarly, off-balance sheet derivatives allow customers to engage in economic activities without facing significant price risks. *TA* and *GTA* do not include off-balance sheet activities. Off-balance sheet activities make up about half of all bank liquidity creation in the U.S. and their notional values far exceed on-balance sheet assets (Berger and Bouwman, 2016), so neglecting off-balance sheet activities fails to take into account a major part of bank output. By including transactions

[1] *GTA* may be considered to be a superior measure of the size of the balance sheet to *TA* because *GTA* includes all of the items that are part of the balance sheet that must be financed.
[2] For a list of studies using assets to measure bank output or size, as well as regulatory treatments that are based on assets, see Berger and Bouwman (2016, pp. 48-49, Box 5.1).

deposits with positive weights, *LC* also helps capture the value to the economy of both the liquidity provided by these deposits and the payments services associated with them. Deposits are not included in the asset measures. Another potentially important difference is that *TA* and *GTA* weight all assets positively, whereas *LC* applies both positive and negative weights to different assets. To illustrate, marketable securities held by a bank increase measured bank output when *TA* or *GTA* are used, but they decrease measured output when *LC* is used. We argue that the negative weight is more appropriate, since holding such securities takes something liquid away from the public.[3] As a result of all of these differences, we expect that *LC* will have greater effects on economic output that *TA* or *GTA*.

As indicated above, we test if real economic output is higher in local markets in which *LC* is relatively high, measure the size of this effect of *LC* on real economic output, and test whether *LC* dominates *TA* and *GTA* in predicting real economic output. We specifically regress *GDP per capita* on *LC per capita*, both measured in real 2010 dollars, in all 50 U.S. states annually from 1984 to 2010, controlling for a number of state conditioning variables as well as state and year fixed effects. We also regress industry-level *GDP per capita* on *LC per capita*, and find evidence that supports our hypothesis that a primary mechanism through which *LC* affects economic output is through bank-dependent industries.

By way of preview, we find that *LC per capita* is positively related to real economic output in terms of *GDP per capita*, and that these results are both statistically and economically significant. A one standard deviation increase in *LC per capita* is related to a 2.57% increase in *GDP per capita*. This relation holds in both OLS and instrumental variable estimations, and is robust to other checks. Moreover, we find that when *TA per capita* or *GTA per capita* are included in the regressions, *LC per capita* remains statistically and economically significant, while these alternative measures of bank output are not significant. To further ameliorate concerns of endogeneity, we show that in a test of reverse causality following Granger's (1969)

[3] This is not to suggest that holding securities is not valuable to the bank in terms of reducing liquidity risk, but rather that there is not of direct benefit to the customers of the bank.

framework, *GDP per capita* does not have a causal effect on *LC per capita*.

When splitting bank *LC* by size class, we find positive, significant effects on *GDP per capita* for both small and large bank *LC per capita*, although small bank *LC* matters more per dollar. The greater effect per dollar of small bank *LC per capita* is consistent with the literature suggesting that small banks often provide financial services to small businesses that cannot be replicated by capital markets, while large banks more often serve large companies that have outside capital market alternatives, making the large bank *LC per capita* less important.[4] In addition, we find that off-balance sheet *LC per capita* matters more to *GDP per capita* than on-balance sheet *LC per capita*. This may help explain why *LC per capita* is significantly related to *GDP per capita*, whereas *TA per capita* and *GTA per capita* are not when they are included in the same regressions – *TA per capita* and *GTA per capita* exclude off-balance sheet activities. This result is consistent with Berger and Bouwman (2014), who find that *off-balance sheet LC* is more important than *on-balance sheet LC* for predicting financial crises. We also investigate how the effects of *LC* vary during normal times and financial crises and find mixed results – the effects of *LC per capita* on *GDP per capita* are stronger than in normal times during some crises and weaker during other crises. In addition, we investigate the dynamics of the relation between *LC per capita* and *GDP per capita*, and find the effects of *LC per capita* are strongest in the first year. We also conduct a number of robustness checks that support our main results.

Finally, we analyze the relation between state-level *LC per capita* and state-industry-level *GDP per capita*. This allows us to test our hypothesized transmission mechanism – that *LC* affects *GDP* primarily through its effect on bank-dependent industries. We find that the relation is positive for nearly all industries, and statistically and economically significant in industries considered to be more bank-dependent (similar to Rajan and Zingales, 1998), consistent with the hypothesized transmission mechanism.

[4] In addition, small businesses are often thought of as the engine of economic growth in the United States. Small business accounted for 63% of net new jobs between 1993 and 2013 and comprise 99.7% of U.S. employer firms (SBA, 2014).

The remainder of the paper is organized as follows. Section 2 discusses the data. Section 3 presents the main results of the effects of state *LC per capita* on state *GDP per capita*, some robustness checks, analyses by size, and instrumental variable estimation. Section 4 investigates the effects during financial crises versus normal times, and Section 5 probes the dynamics of the relation between *LC* and real economic output. Section 6 presents some additional robustness tests. Section 7 examines our results on a state-industry level. Section 8 concludes by providing a summary of the results, policy implications, and suggestions for future research.

2. Data

Table 1 reports the sources, definitions, and summary statistics for the variables used in the analysis. The sample consists of annual state level observations over 1984-2010. The dependent variable is *GDP per capita*. We collect *GDP* figures by state from the Bureau of Economic Analysis (BEA) and normalize this variable by the state's population in each year using annual US Census intercensal population estimates. Over the course of the sample, the average state *GDP per capita* was $39,089.95. All financial variables are calculated in real 2010 dollars throughout the analysis.

Our key independent variable is *LC per capita*. We use Berger and Bouwman's (2009) preferred CATFAT liquidity creation measure. These data are available on the bank level at a quarterly frequency.[5] We calculate the annual average CATFAT for each bank for each sample year and convert these data to the state level. Most banks operate solely in one state. In these cases, we simply include the bank's *LC* in the state's total. For multistate banks, we assume that *LC* is geographically distributed according to the deposits of the bank, taken from the FDIC's Summary of Deposits (SoD) database, which reports the amount of deposits held in each office of each bank in the U.S. This assumption is necessary because deposits is the only balance sheet variable we can use to determine location, although we recognize that this creates

[5] These data are available at: https://sites.google.com/a/tamu.edu/bouwman/data.

measurement error, since *LC* reflects more outputs than just deposits. This measurement error creates an attenuation bias against finding any effect of *LC per capita* on *GDP per capita*. In a robustness check, we find that the results are robust to the exclusion of multistate banks.

We also adjust the data to account for one reporting anomaly in the SoD dataset. Some banks wish to take advantage of relaxed banking regulations in Delaware and South Dakota. As such, they list more deposits in these two states than their actual holdings. To account for this, we make two adjustments to the data. First, we eliminate banks in these two states which report 100% of their deposits in one banking office within the state but do not report their headquarters in the same state. Second, we winsorize the data at the 5% level, by year, to control for extreme values. Within our sample, the mean value of *LC per capita* is $12.01, with a standard deviation of $9.47. As noted below, our results are also robust to the exclusion of data from Delaware and South Dakota.

Figure 1 displays the time series of total *GDP* and *LC* at the national level over the sample period. We report total *GDP* and total *LC* here, rather than normalizing by population, so as to not underweight states with larger populations.[6] Generally, we find that the two variables move together, declining only during the recent subprime financial crisis of the late 2000s. This figure provides us with a preliminary indication that bank *LC* is related to economic output.

We collect several additional bank-level variables. We collect *TA* and *GTA* from annual Call Reports, and test them as alternatives to *LC* as generators of state *GDP*. We also collect *Bank Equity* from the Call Reports, which is used to instrument for *LC*. We convert each of these variables from the bank level variable to the state level, following the same procedure used for *LC*. Following this, all three of these variables are normalized by state population and winsorized at the 5% level.

Finally, we collect a number of state-level variables to control for the state's economic and political environment. We collect the top marginal rate of each state's *Income Tax*, its *Minimum Wage*, and its

[6] This is effectively the same as weighting the individual states by their populations.

Government Expenditures per capita for each year in the sample. If a state has no minimum wage law, we instead use the Federal minimum wage, since this essentially acts as the state's minimum. In our sample, the average top marginal level *of State Income Tax* is 5.19%; the average *State Minimum Wage* is $6.05; and the average *State Expenditures per capita* are $4,727.42. We also collect data on the political parties which control the state's government. We calculate separate dummy variables indicating whether Democrats, Republicans, or Independents control each state's governorship and whether Democrats, Republicans, or neither controls the legislature. Over our sample period, we find that 47.85% of state-year observations have Republican-controlled governorships, while 48.96% have Democrat-controlled governorships and 3.19% have third party-controlled governorships. State legislatures are controlled by Republicans 27.48% of the time, and by Democrats 46.37% of the time. State legislatures are split between the two parties 26.07% of the time.[7] All regressions also include *State Fixed Effects* to control for other unspecified differences across the states that are persistent over time.

We also calculate *Regional GDP per capita* for each state and year to further control for economic conditions. *Regional GDP* is calculated by summing the *GDP* of all states sharing a border with a given state. We then divide this total by the combined populations of all bordering states.[8] Over our sample, the average *Regional GDP per capita* is $39,806.31, close to the average state level *GDP per capita*.[9]

In our main specifications, we also include *Time Fixed Effects* to control for changes in the aggregate economic environment. In alternative specifications, we drop *Time Fixed Effects* and instead include the *federal funds rate* and the *TED Spread*, which control for the aggregate banking environment in an alternative way. The *federal funds* rate is the interest rate at which banks lend to each other, and is targeted by the Federal Reserve as its primary monetary policy tool. The *TED Spread* is the difference between the

[7] Nebraska's state legislature is unicameral and non-partisan. We classify their legislature as "split."

[8] We classify Alaska's bordering states as: Hawaii, Oregon, Washington, and California. We classify Hawaii's bordering states as: Alaska, Oregon, Washington, and California.

[9] This variable is potentially endogenous because it may also be affected by the state's GDP per capita. However, as shown in the Tables below, the results are robust to exclusion of this variable.

three-month LIBOR and the 3-month U.S. T-bill rate, and traditionally acts as an indicator of credit risk in the banking system (Cornett, McNutt, Strahan, and Tehranian, 2011).

3. Main Results

Table 2 presents our first set of regression results. All independent variables are lagged one year to mitigate potential endogeneity concerns, as contemporaneous *GDP* cannot cause lagged *LC*. We examine the effect of lagged *LC per capita* on *GDP per capita* for all banks using ordinary least squares (OLS). Regression (1) includes only *State Fixed Effects* and *Time Fixed Effects* as control variables. Regression (2) adds lagged *State Income Tax*, lagged *State Minimum Wage*, and lagged *State Government Expenses per capita*, while regression (3) adds lagged *Regional GDP per capita*. Regression (4) is our full model, which also includes lagged state-level political control variables. Regression (5) is a robustness check, which removes *Time Fixed Effects* and adds the lagged *federal funds* rate and the lagged *TED Spread*.

Across all specifications, the coefficient on lagged *LC per capita* is economically and statistically significant and positively related to *GDP per capita*. Using the coefficient from the full model in column (4), 105.00, we find that a one standard deviation increase in *LC per capita* is associated with an economically significant 2.57% increase in *GDP per capita*, evaluated at the sample mean level of \$39,089.95.[10] The measured effect is similar across regression specifications.

Turning to the control variables, we also find that in all regressions, the coefficient on lagged *State Income Tax* is not significantly different from zero, while the coefficients on lagged *State Minimum Wage*, lagged *State Government Expenditures per capita*, and lagged *Regional GDP per capita* are all positive and significantly different from zero. We find that the coefficient on the *Democratic Party Governor Dummy* is not statistically different from zero. Additionally, we find that the coefficient on the *Third Party Governor Dummy* is negative and statistically significant, suggesting that relative to a Republican governor,

[10] We calculate economic impact by multiplying the standard deviation of lagged *LC* (\$9.56) by its coefficient from the regression (105.00), and dividing by the sample mean of *GDP per capita* (\$39,089.95). We follow a similar methodology throughout the paper.

a third party governor is associated with lower state *GDP per capita*. Further, we find that the *State Legislature Dummy Variables* are not statistically different from zero. These results are also robust to the exclusion of *Time Fixed Effects* and the inclusion of the lagged *Federal Funds* rate and lagged *TED Spread* in regression (5). All variables maintain their signs and levels of significance from regression (4). Turning to the *State Fixed Effects* (not shown), the effects for Wyoming, Texas, Illinois, and Connecticut are appreciably larger than the omitted state, Alabama, while West Virginia, Mississippi, and Maine have fixed effects which suggest that their *GDP per capita* is much lower than Alabama. Examining the *Time Fixed Effects* (not shown), the crisis years, especially 2008 and 2009, have especially low *GDP per capita* relative to other years in the sample.

Table 3 presents OLS regressions using contemporaneous independent variables rather than the lagged independent variables found in Table 2. Regressions follow the same format as above, with regression (4) serving as our main regression. We find that all results are robust to this alternative specification.

Table 4 presents the results of our "horse races" between *LC per capita* and the two normalized measures of assets, *TA per capita and GTA per capita*. Regressions (1) and (2) include lagged *TA per capita* and *GTA per capita*, respectively, with control variables, but exclude lagged *LC per capita*. Regressions (3) and (4) run "horse races" between the lagged *LC per capita* and lagged *TA per capita* and lagged *GTA per capita*, respectively, inclusive of all the control variables. In all regressions, standard errors are clustered at the state level. In regressions (1) and (2), we find that both *TA per capita* and *GTA per capita* are positively related to *GDP per capita*, but only the coefficient on *TA per capita* is statistically significant, and it is only significant at the 10% level, as opposed to the 1% for *LC per capita* in the earlier tables. We further find, in regressions (3) and (4), that lagged *LC per capita* outperforms the traditional measures of bank output in terms of forecasting *GDP per capita*. Neither lagged *TA per capita* nor lagged *GTA per capita* have coefficients that are statistically different from zero when including *LC per capita*. Additionally, because their t-statistics are less than one, both variables reduce the model's Adjusted R^2, meaning that their inclusion reduces the model's goodness of fit. Meanwhile, the coefficient on lagged *LC* *per capita* remains statistically significant and positive, while maintaining an economic magnitude similar to that found in the previous regressions. A robustness check below suggests that the main reason for these results may be the inclusion of off-balance sheet activities in the *LC* measure, which are excluded by *TA* and *GTA.* The coefficients on all control variables maintain their signs and levels of significance.

Table 5 presents results which examine the effect of *LC per capita* on *GDP per capita* by bank size class. We split our sample of banks using a cutoff of $1 billion dollars in assets. Banks below $1 billion in size are generally considered to be community banks (DeYoung, Hunter, and Udell, 2004) and $1 billion is the traditional dividing line between small and large banks throughout much of the empirical banking literature (e.g., Carter and McNulty, 2005; Berger and Black, 2011). We repeat the analysis from Table 2, but substitute the two size-based *LC per capita* measures for total *LC per capita*. We report only specifications that include all the control variables in this table. Regression (1) is our full specification with *Time Fixed Effects* while regression (2) replaces *Time Fixed Effects* with the *Federal Funds* rate and the *TED Spread*. In both regressions, we find that the coefficients on *LC per capita* by both small and large banks are positive and statistically significant. Using the coefficient from regression (1) on small bank *LC*, 383.4, a one standard deviation shift in *LC* by small banks is associated with a 9.37% increase in *GDP per capita* over the sample mean level. For a similar increase, using the coefficient on large bank *LC*, 96.05, *GDP per capita* increases by 2.55% over the sample mean. These results may shed light on why banks are important to economic output. The banking literature generally suggests that small banks often provide relationship loans and commitments to small businesses that cannot be replicated by capital markets, while large banks provide transactional credit to companies that have outside capital market alternatives (Berger, Miller, Petersen, Rajan, and Stein, 2005). Consistent with this, our data suggest that small bank *LC* may be more important to economic growth than large bank *LC* on a per-dollar basis. Moreover, we find that the coefficients on small bank *LC per capita* and large bank *LC per capita* are statistically different from each other at the 10% level in both regressions. The respective F-statistics for these tests are 3.41 and 3.12, with corresponding p-values of 0.0708 and 0.0838, and are shown in the table below the regression coefficients. Finally, in both regressions, we find that the control variables behave in a manner consistent with earlier results.

The potentially endogenous nature of our key exogenous variable, *LC per capita*, is also a concern. For example, banks may expand into or grow more in states with higher economic growth, and/or move out of or shrink in states with poor economic growth. Accordingly, we estimate our model using a two-stage least squares (2SLS) approach. We instrument for *LC per capita* using *Bank Equity per capita*.

The theories are split on the causal effects of equity on bank liquidity creation. Some suggest that bank capital may impede liquidity creation by making the bank's capital structure less fragile (e.g., Diamond and Rajan, 2000, 2001). Fragile capital structures encourage banks to commit to monitoring their borrowers and off-balance sheet counterparties, and additional equity capital makes it harder for less-fragile banks to commit to monitoring, which in turn hampers their abilities to create liquidity. Capital may also reduce liquidity creation because it "crowds out" deposits, which are an important source of liquidity creation (e.g., Gorton and Winton, 2014).

An alternative view is that higher capital improves banks' ability to absorb risk and hence their ability to create liquidity. Liquidity creation makes banks less liquid, exposing them to liquidity risk, raising the likelihood and severity of losses associated with having to dispose of illiquid assets or miss out on lending opportunities to meet customers' liquidity demands (Allen and Santomero, 1997; Allen and Gale, 2004). Capital absorbs risk and expands banks' risk-bearing capacity (e.g., Bhattacharya and Thakor, 1993; Repullo, 2004; Von Thadden, 2004; Coval and Thakor, 2005), so higher capital ratios may allow banks to create more liquidity. A recent theory paper by Donaldson, Piacentino, and Thakor (2015) also shows formally that higher capital leads to more liquidity creation.

Berger and Bouwman (2009) find a positive relation between bank capital and liquidity creation for large banks and a negative relation for small banks using U.S. data from 1993 - 2003. At least part of this difference between large and small banks appears to be due to off-balance sheet activities. When they exclude off-balance sheet activities, the positive relation between capital and liquidity creation for large banks becomes statistically insignificant. Evidence from other countries generally find a negative relation for small banks and an insignificant effect for large banks, possibly because large banks in the other countries often do not have significant off-balance sheet activities (e.g., Fungacova, Weill, and Zhou, 2010; Fungacova and Weill, 2012; Lei and Song, 2013; Distinguin, Roulet, and Tarazi, 2013; Horvath, Seidler, and Weill, 2014).[11] *Bank Equity* is causally related to *LC*, but it should not be related directly to *GDP* except through its effect on *LC*, satisfying the exclusion restriction.

Table 6 presents the results of our 2SLS model. Panel A reports the first-stage regressions. Regressions (1) and (2) examine all banks together, using total *LC per capita* as the dependent variable and *Bank Equity per capita* as an independent variable, along with all of the control variables from the main regressions. Regression (1) includes *Time Fixed Effects* while regression (2) includes the *Federal Funds* rate and the *TED Spread*. In both regressions, the coefficient on *Bank Equity per capita* is positive and statistically significant. The remaining regressions split the sample by size class. Regressions (3a) and (3b) include *Time Fixed Effects* while regressions (4a) and (4b) substitute the *Federal Funds* rate and the *TED Spread*. Regressions (3a) and (4a) show that the coefficient on *Bank Equity per capita* for small banks is positive and statistically significant. Similarly, regressions (3b) and (4b) show that the coefficient on *Bank Equity per capita* of large banks is positive and statistically significant.

Panel B of Table 6 reports the second-stage regressions in which *GDP per capita* is the dependent variable. Regressions (1) and (2) examine all banks together. We find that the coefficient on lagged *LC per capita* is positive and economically and statistically significant. The 2SLS model estimate in column

[11] There is also evidence on the effects of capital on lending, a key component of liquidity creation. For example, studies of the banking crisis in the US in the early 1990s (also known as the "credit crunch") generally find that more capital is associated with higher lending and higher capital requirements are associated with reduced lending, suggesting that buffers over the regulatory minimums are needed for increased lending (e.g., Berger and Udell, 1994; Hancock, Laing, and Wilcox, 1995; Peek and Rosengren, 1995a,b; Shrieves and Dahl, 1995; Thakor, 1996). Studies of other time periods and other nations seem to confirm these results, although the effects are often smaller (e.g., Peek and Rosengren, 2000; Calomiris and Wilson, 2004; Driscoll, 2004; Francis and Osborne, 2009; Berrospide and Edge, 2010; Aiyar, Calomiris, and Wieladek, 2012; Jiménez, Ongena, Peydró, and Saurina, 2013).

(1), with a coefficient of 116.7, suggests that a one standard deviation increase in lagged bank *LC per capita* is related to a 2.85% increase in *GDP per capita*, consistent with our earlier results. The coefficient in column (2), 106.1, is related to a similar 2.6% increase in *GDP per capita.*

Regressions (3) and (4) report results in which *LC per capita* is divided between small and large banks. Regression (3) includes *Time Fixed Effects* while regression (4) substitutes the *Federal Funds* rate and the *TED Spread*. Both regressions show that the coefficients on small and large bank *LC per capita* are economically and statistically significant and positive. The coefficients on lagged *LC per capita* for small and large banks are 724.1 and 111.7, respectively in regression (3). The 2SLS coefficients are larger than the OLS coefficients, a common finding in the literature (e.g., Levitt, 1996; Berger and Bouwman, 2009). Using these coefficients, we estimate that a one standard deviation increase in small or large bank *LC per capita* is related to 17.71% and 2.73% increases over mean GDP levels, respectively. Once again, we test whether the coefficients on small and large *LC per capita* are statistically different from each other and find the differences to be statistically significant at the 10% level. The control variable coefficients are also similar to those presented in Tables 2-4. In all regressions, we estimate a Wald test for a weak instrument. In all specifications, the Wald statistic is larger than the critical value at the 10% level, 24.58, meaning we are able to reject the null hypothesis of a weak instrument.[12]

Additionally, Berger and Bouwman (2009) develop both the CATFAT and CATNONFAT measures of *LC*, the first of which we use in our main regressions. CATFAT captures on- and off-balance sheet *LC*, while CATNONFAT includes on-balance sheet *LC* only. Here, we use CATNONFAT for on-balance sheet *LC* and calculate (CATFAT – CATNONFAT) to measure off-balance sheet *LC.* In Table 7, we replicate the regressions of Table 2, but replace our *LC per capita* measure with *On-B/S LC per capita* and *Off-B/S*

[12] We also instrument for *LC per Capita* using a combination of *Bank Equity per capita,* the Rice-Strahan Index for bank deregulation, and dummy variables to represent Inter- and Intra-state banking deregulation. The Rice-Strahan Index represents the combination of several state-level bank regulatory powers (e.g. branching restrictions) to estimate the strength of bank regulation in each state (Rice and Strahan, 2010)This specification takes advantage of changes in the regulatory environment, which would affect bank liquidity creation but not state-level GDP. Our results are robust to this alternative instrumentation. However, the model with all four instruments is overidentified.

LC per capita. We find that while both measures consistently have positive coefficients, only *Off-B/S LC per capita* is statistically and economically significant. This result is consistent with the finding in Driscoll (2004), who finds no statistically significant effect of bank lending on state output. As discussed above, off-balance sheet guarantees like loan commitments and standby letters of credit, which make up most of *Off-B/S LC,* allow customers to expand their economic activities because they are able to plan their investments and other expenditures and because these guarantees are often used as backups for other capital market financing. In addition, derivatives provided by banks off the balance sheet also help with planning and production because they allow customers to hedge price risks. This result may help explain why *LC per capita* beat *TA per capita* and *GTA per capita* in the "horse races" above –*TA* and *GTA* exclude off-balance sheet activities.

4. Test of Reverse Causality

To further assuage endogeneity concerns, we estimate a test of reverse causality, following the methodology of Granger (1969). To this point in our analysis, we have studied the effect of *LC per capita* on *GDP per capita*. Here, we run a regression of *LC per capita* on lagged *GDP per capita*, lagged *LC per capita*, and the control variables used in the above analysis. Table 8 presents the outcome of this test.

Similar to previous tables, regression (1) includes only *State Fixed Effects* and *Time Fixed Effects* as control variables. Regression (2) adds lagged *State Income Tax*, lagged *State Minimum Wage*, and lagged *State Government Expenses per capita*, while regression (3) adds lagged *Regional GDP per capita*. Regression (4) is our full model, which also includes lagged state-level political control variables. Regression (5) is again a robustness check, which removes *Time Fixed Effects* and adds the lagged *federal funds* rate and the lagged *TED Spread*. Across regressions, we do not find any evidence that *GDP per capita* Granger-causes *LC per capita*.

5. Crisis Regressions

We also investigate the effect of bank *LC per capita* during financial crises. Financial crises are often periods in which liquidity provided both by banks and by capital markets decline, so liquidity creation may be especially important. The recent subprime crisis results may be particularly interesting, given that others find this crisis is related to a liquidity shock (e.g., Cornett, McNutt, Strahan, and Tehranian, 2011; Chodorow-Reich, 2014; Acharya and Mora, 2015; Gorton and Muir, 2015).

To do this, we replicate Table 2, but include interaction terms in which lagged *LC per capita* is multiplied by a dummy variable indicating whether a given year is a crisis year. We examine five distinct crisis periods, following Berger and Bouwman (2013).[13] The crises include the 1987 stock market crash, the 1990-1992 credit crunch, the 1998 Long Term Capital Management (LTCM) episode and Russian debt crisis, the 2000-2002 dot-com bubble bursting and September 11 terrorist attacks, and the 2007-2009 subprime lending crisis.

Table 9 presents our crisis regression results. Across all specifications, the coefficient on lagged *LC per capita* remains positive and statistically significant with an economic magnitude similar to earlier results, suggesting that our results hold during normal times. We find that in regression (4), the coefficients on all *Crisis Interaction* terms are jointly different from zero, suggesting that the effect of *LC per capita* differ during crises than normal times.[14] However, we find no clear pattern for the behavior of *LC per capita* across the crises represented in our sample. Three of the *Crisis Interaction* terms with the *LC per capita* variable – the *1998 Interaction* term, the *2000-2002 Interaction* term, and the *2007-2009 Interaction* term – are positive, suggesting that the effects of *LC per capita* on *GDP per capita* may be stronger during the last three crises than during normal times. Notably, the results appear to be the strongest during the recent financial crisis, when liquidity appeared to be of the greatest importance. In addition, the sum of the coefficient on *LC per capita* and each of these three *Crisis Interaction* terms with the *LC per capita*

[13] Berger and Bouwman (2013) classify crises by quarters. Since we use yearly data, the quarters defined as crisis quarters in Berger and Bouwman (2013) do not line up perfectly with our annual data. Accordingly, we classify a year as a "crisis year" if any quarter within the year is part of a crisis.

[14] The estimated effects of *LC per capita* during one of the crisis periods is the sum of the coefficient on *LC per capita* plus the coefficient on the interaction term with the dummy for that crisis.

variable are positive and significant. Thus, *LC per capita* appears to have statistically and economically significant effects on *GDP per capita* during normal times and is accentuated during the last three crises. The coefficients on the interaction terms for the 1987 and 1990-1992 crises are negative, and adding them to the *LC per capita* coefficients yields a statistically insignificant result, suggesting that *LC per capita* was not effective during these first two crisis periods.

6. Dynamic Effects

We next estimate regressions which analyze the dynamics of the relation by including two- and three-year lagged *LC per capita* variables along with the one-year lagged value to forecast *GDP per capita*. We estimate regressions which include each lagged value separately, and finally a regression which includes all three lags. These results are reported in Table 10. In regressions (1)-(3) and (5)-(7), we find that the coefficients on one-, two-, and three-year lagged *LC per capita* are independently positive and statistically significant. When all lagged *LC* variables are combined in regressions (4) and (8), we find that the coefficients on the one-year lagged *LC per capita* are statistically significant. In regression (4), this coefficient is significant at the 5% level, while it is significant at the 1% level in regression (8). The weak statistical significance level of the coefficients on two- and three-year lagged *LC per capita* is likely due to the fact that the three lagged *LC per capita* variables are collinear, with correlations over 85%. These results suggest that most of the effects of *LC per capita* on *GDP per capita* occur during the first year.

7. Additional Robustness Tests

We estimate a number of additional robustness tests. We estimate our OLS regressions using an alternative functional form, substituting natural logarithms of *GDP per capita* and *LC per Capita* for their levels. Table 11 reports the results of these regressions. We find that our results are robust to this alternative specification, as well as to taking natural logarithms of *GDP* and *LC* not normalized by state populations. We further find that our 2SLS results are also robust to the use of natural logarithms for these key variables (not shown).

We also investigate whether our results are driven by our method of allocating *LC* proportionally based on the deposits in branches of multistate banks. We drop all multistate banks from our sample and repeat our analysis. Table 12 presents the outcome of these tests. We find that these results do not differ from our earlier findings that *LC* is positive related to *GDP*, and that *LC* outperforms *TA* and *GTA* in a "horse race."

We conduct six more robustness checks that we do not show in the tables. First, we test for a quadratic relation between *LC per capita* and *GDP per capita*. We find that a squared *LC per capita* term is negative, but not statistically significant. Second, we try including lagged *GDP per capita* on the right-hand-side of the *GDP per capita* regressions and find that the main results continue to hold. Third, we try regressing the annual change in *GDP per capita* on the change in *LC per capita* plus the control variables, and find that a similar relation holds. Fourth, we replicate results using standard errors clustered by both state and year, and find our results to be robust. Fifth, we estimate regressions for subsamples of states based on their prior economic conditions. We split our sample each year using the Federal Reserve Bank of Philadelphia's Coincident Index[15] and (separately) GDP growth in the previous year. Regardless of the subsample, we find that *LC per capita* is a statistically significant and economically meaningful predictor of *GDP per capita*. However, we find that the economic magnitude of *LC per capita*'s effect on *GDP per capita* is greater for states with an above-median Coincident Index or above-median GDP growth in the previous year. Sixth, we repeat our analysis omitting Delaware and South Dakota because of the reporting irregularities described above and find that our results continue to hold.

8. Industry-Level Results

[15] This index combines four state-level economic indicators – nonfarm payroll employment, average hours worked in manufacturing, the unemployment rate, and wage and salary disbursements deflated by the consumer price index – into a single statistic.

We finally study the effect of state-level *LC per Capita* on state-industry-level *GDP per capita*. As discussed above, we hypothesize that the main transmission mechanism through which bank *LC* affects *GDP* is through increased output of firms in bank-dependent industries. Industries with better access to capital markets are less likely to be affected by bank *LC*. This is suggested by results in Rajan and Zingales (1998), who find that firms in manufacturing-based industries which are more dependent on external financing grow faster in countries with developed financial systems.[16]

We obtain GDP data by industry at the state level from the BEA. The industries are based on the BEA's North American Industry Classification System (NAICS) from 1997-2010. We are unable to include the data before this time, as they are based on the Standard Industry Classification (SIC) system, which is not consistent with NAICS classifications.[17]

Table 13 presents the results of our industry-level study. We run the regressions for each industry and present only the coefficients and t-statistics for *LC per capita*. We include but do not show all of the controls from Table 2, such as lagged state income tax, state minimum wage, state government expenditures, regional GDP, political dummy variables, as well as state and year fixed effects. The dependent variable in each regression is the state-industry-level *GDP per capita*. Our findings show that the coefficient on *LC per capita* is positively related to *GDP per capita* for all industries except health care and "other services," suggesting that the effects of *LC* on real economic growth are widespread. However, this relation is not statistically significant for all industries. We find that output in bank-dependent industries like mining, construction, and manufacturing is strongly influenced by bank liquidity creation, consistent with Rajan and Zingales (1998). Alternatively, we find that the *GDP per capita* of industries which are not bank-dependent, such as the government and health care, are not positively influenced by *LC*

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[16] We are not able to use identical industry classifications to those of Rajan and Zingales (1998), as they limit their analysis to manufacturing-based industries, whereas we include all industries in our sample.

[17] This discontinuity is not only due to differing industry classifications, but also due to the fact that NAICS-based statistics are calculated using U.S. GDP while the SIC-based statistics are calculated based on U.S. Gross Domestic Income (GDI). There are also unlisted differences in "source data and different estimation methodologies." As a result, the BEA cautions against combining the two data series.

per capita. Our state-industry-level results give us more confidence in our main result that *LC* is positively related to real economic growth.

9. Conclusion

This paper studies the relation between bank liquidity creation (*LC)* and economic output. We find that *LC per capita* is positively related to real economic output in terms of *GDP per capita*, and that the results are both statistically and economically significant. Moreover, we find that both small and large bank *LC per capita* have positive and significant effects on *GDP per capita*, but that the effect of small bank *LC* matters more per dollar. These results are robust to OLS and IV methodologies. We also study this relation during normal times and financial crises, and find mixed results. The effects of *LC per capita* on *GDP per capita* are stronger in some crises than in normal times and nonexistent during other crises. We also study the dynamics of the relation, and find that the effects of *LC per capita* are strongest in the first year. Finally, we conduct a state-industry-level analysis and find that the effects on output are relatively widespread and stronger in more bank-dependent industries. This result sheds light on a key transmission mechanism by which *LC* impacts economic growth, and confirms our hypothesis that bank-dependent industries are main mechanism by which this effect occurs.

Our paper also sheds light on the use of *LC* as a measure of bank output. When compared to traditional measures of bank output, total assets (*TA*) and gross total assets (*GTA*), we find that *LC* is a statistically and economically significant determinant of *GDP per capita*, while *TA per capita* and *GTA per capita* are not, suggesting that *LC* may be a superior measure of bank output. This may be because *LC* takes into account off-balance sheet activities, liabilities, and capital, as well as assets, and/or because it weights different assets differently. A robustness check suggests that the inclusion of off-balance sheet activities may be a crucial factor.

This study also has important policy implications. Policymakers might want to encourage liquidity creation within a robust banking sector, as this may lead to higher levels of economic output. However, there may be an optimal point for liquidity creation. From a microprudential perspective, excessive liquidity creation may cause liquidity risk within individual institutions. From a macroprudential perspective, excessive liquidity creation may also cause result in asset bubbles that burst and cause financial crises (Acharya and Naqvi, 2012; Berger and Bouwman, 2014). Thus, policymakers face a trade-off between economic growth on the one hand and individual institution and financial system stability on the other hand. Moreover, current regulations may also discourage liquidity creation. The Basel III Accord includes liquidity ratios which discourage banks from creating liquidity, as banks are required to hold more liquid assets such as marketable securities and are discouraged from holding illiquid loans and liquid deposits (e.g., Grind, Sterngold, and Chung, 2014). However, the Basel III ratios are generally not very highly correlated with the *LC/GTA* ratio, so that Basel III liquidity requirements may not have a very large effect on bank liquidity creation (Berger and Bouwman, 2016). Further, higher required bank capital ratios may either encourage or discourage liquidity creation within banks depending upon which of the theoretical concepts empirically dominates, which is not clear from the literature.

This paper also has implications for future research. While we find that bank liquidity creation impacts economic growth, more research is needed on the underlying mechanisms or channels through which it occurs. We find that 1) small bank liquidity creation has a greater economic impact per dollar than that of large banks, 2) off-balance sheet liquidity creation has larger effects on the economy than on-balance sheet liquidity creation, and 3) bank liquidity creation has greater effects on bank-dependent industries. More research is needed to verify and expand these findings. Finally, more research on the effects of bank capital ratios on liquidity creation is needed to clarify which of the theoretical effects dominate under different circumstances.

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Figure 1: Total GDP (in trillions) vs. Total Liquidity Creation (in billions) over time – This figure plots the total GDP and total Liquidity Creation over the 1984-2010 sample period. These measures are not normalized by population, but are rather reported as the sum of the GDP and liquidity creation of all states in the United States. GDP and Liquidity Creation have been divided by 1 billion for scaling purposes.

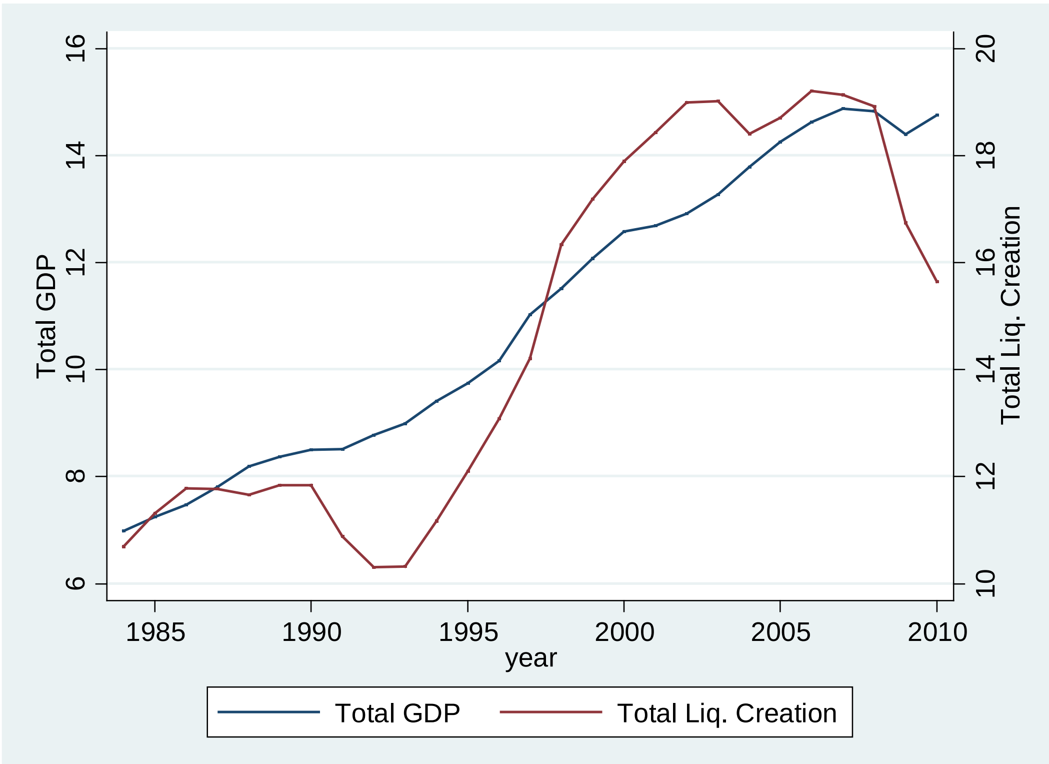

Table 1 – Definitions, Sources, and Summary Statistics: This table presents definitions, sources, and summary statistics for key variables used in the analysis below. The sample period is 1984-2010. Bank-level data are reported as of December of each year; state-level data are reported on an annual basis. All financial variables are calculated in real 2010 dollars using the GDP price deflator. Washington, DC is dropped due to a lack of data availability and extreme outlier GDP figures. For bank variables, we use the proportions of the variables in the states, where the weights are the proportions of deposits in the different states where banks operate based on the June FDIC Summary of Deposits (SoD) data. Bank-level data are winsorized at the 5% level.

Panel A: Definitions and Sources

Dependent Variables:

	Definition	**Source**
GDP per capita ($/capita)	Annual GDP of the state, normalized by the state's population	GDP - Bureau of Economic Analysis (BEA): http://bea.gov/regional/index.htm Population – US Census: http://www.census.gov/popest/

Alternative Key Independent Variables:

	Definition	**Source**
Liquidity Creation (LC) per capita ($/capita)	Total liquidity creation of all banks in the state, normalized by the state's population	CATFAT data, Berger & Bouwman (2009): http://faculty.weatherhead.case.edu/bouwman/data.html
Total Assets (TA) per capita (Thousands, $/capita)	All assets held by banks in the state, normalized by the state's population	Call Report Data
Gross Total Assets (GTA) per capita (Thousands, $/capita)	All gross total assets held by banks in the state, normalized by the state's population	Call Report Data

Control Variables:

	Definition	**Source**
State Inc. Tax (Percentage)	Top marginal rate of the state's income tax	NBER: http://users.nber.org/~taxsim/state-rates/maxrate.html
State Minimum Wage ($/hour)	Minimum wage mandated by state law. If there are no minimum wage laws in the state, then minimum wage equals the Federal minimum wage	Tax Policy Center: http://www.taxpolicycenter.org/taxfacts/content/PDF/state_min_wage.pdf
State Expenditures per capita ($/capita)	Total spending by the state's government normalized by the state's population	U.S. Census: http://www.census.gov/govs/local/

Regional GDP per capita ($/capita)	Total GDP of all bordering states,[18] normalized by the population of all bordering states	BEA
Governor Dummies	*Rep. Governor Dummy* takes a value of one if the state has a Republican governor. *Dem. Governor Dummy* takes a value of one if the state has a Democratic governor. *Indep. Governor Dummy* takes a value of one if the state has a governor who belongs to a third party. We exclude Indep. Governor Dummy to avoid collinearity.	National Governor's Association: http://www.nga.org/cms/home.html
Legislature Dummies	*Rep. Legislature* takes a value of one if both houses of the state's legislature are controlled by Republicans. *Dem. Legislature* takes a value of one if both houses of the state's legislature are controlled by Democrats. *Split Legislature* takes a value of one if the control of the houses of the state's government is divided between the two parties.[19] We exclude Split Legislature to avoid collinearity.	National Conference of State Legislatures (NCSL): http://www.ncsl.org/research/about-state-legislatures/partisan-composition.aspx
Federal Funds Rate (Percentage)	The interest rate charged by an institution when lending overnight funds to another institution. This variable is used only when year fixed effects are not included.	Federal Reserve
TED Spread (Percentage)	The difference between interest rates on short-term US debt and interbank loan interest rates. This variable is used only when year fixed effects are not included.	Bloomberg
State Fixed Effects	Takes a value of one if the observation corresponds to the state.	
Year Fixed Effects	Takes a value of one if the observation corresponds to the year.	

Instrument:

	Definition	**Source**
Bank Equity per capita (Thousands, $/capita)	Total bank book equity in the state, normalized by the state's population	Call Report Data

[18] We classify Alaska's bordering states as: Hawaii, Oregon, Washington, and California. We classify Hawaii's bordering states as: Alaska, Oregon, Washington, and California.
[19] Nebraska's state legislature is unicameral and non-partisan. We classify their legislature as "split."

Panel B: Summary Statistics

	Mean	Std. Dev.	Count	Min	Max
GDP per capita ($)	39089.95	9979.41	1350	20339.51	86781.63
Liquidity Creation per capita ($)	12.01	9.47	1350	2.50	61.81
Total Assets per capita (Thousands, $)	21.83	11.11	1350	9.61	102.83
GTA per capita (Thousands, $)	28.54	11.31	1350	15.49	106.08
State Inc. Tax (Percentage)	5.19	3.08	1350	0	13.50
State Min. Wage ($/hour)	6.05	1.04	1350	1.98	8.65
State Exp. per capita ($)	4727.42	1911.18	1350	1705.34	17270.06
Regional GDP per capita ($)	39806.31	7888.58	1350	24953.96	64162.27
Rep. Governor Dummy	.4785	.4997	1350	0	1
Dem. Governor Dummy	.4896	.5000	1350	0	1
Indep. Governor Dummy	.0319	.1757	1350	0	1
Rep. Legislature Dummy	.2748	.4466	1350	0	1
Dem. Legislature Dummy	.4637	.4989	1350	0	1
Split Legislature Dummy	.2607	.4392	1350	0	1
Federal Funds Rate (Percentage)	4.58	2.63	1350	0.12	8.76
TED Spread (Percentage)	0.68	0.42	1250	0.17	1.76
Bank Equity per capita (Thousands, $)	1.88	1.10	1350	0.46	8.65

Table 2: The Effects of Lagged Bank Liquidity Creation on State Gross Domestic Product (GDP) – This table presents Ordinary Least Squares (OLS) regression results. The dependent variable is state-level *GDP per capita*. The key independent variable, *liquidity creation per capita*, is liquidity creation (CATFAT) normalized by state population. The sample period is 1984-2010, and t-statistics based on standard errors clustered at the state level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1) *GDP/Capita*	(2) *GDP/Capita*	(3) *GDP/Capita*	(4) *GDP/Capita*	(5) *GDP/Capita*
LC per Capita$_{t-1}$	75.76**	106.8***	106.9***	105.0***	101.3***
	(2.463)	(3.848)	(3.799)	(3.966)	(4.831)
State Inc. Tax$_{t-1}$		230.9	269.2	285.6	347.5*
		(0.940)	(1.238)	(1.354)	(1.683)
State Min. Wage$_{t-1}$		1,012***	987.1***	969.0***	722.9*
		(2.927)	(2.882)	(2.812)	(1.976)
State Gvt. Exp. per capita$_{t-1}$		2.517***	2.279**	2.253***	1.898**
		(3.104)	(2.633)	(2.770)	(2.395)
Regional GDP per capita$_{t-1}$			0.515***	0.506***	0.588***
			(3.718)	(3.783)	(6.084)
Third Party Governor Dummy$_{t-1}$				-1,596***	-1,526***
				(-2.752)	(-2.946)
Dem. Governor Dummy$_{t-1}$				420.9	339.1
				(1.123)	(0.885)
Split Legislature$_{t-1}$				712.2	453.5
				(1.005)	(0.699)
Dem. Legislature$_{t-1}$				-184.9	-336.9
				(-0.263)	(-0.501)
Fed Funds Rate$_{t-1}$					251.7**
					(2.060)
TED Spread$_{t-1}$					-633.6**
					(-2.266)
Constant	22,161***	9,856***	-2,456	-2,145	-3,368
	(30.33)	(2.931)	(-0.505)	(-0.464)	(-1.074)
State FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	NO
Observations	1,300	1,300	1,300	1,300	1,200
Adj. R-squared	0.914	0.927	0.932	0.933	0.930

Table 3: The Effects of Contemporaneous Bank Liquidity Creation on State Gross Domestic Product (GDP) – This table presents Ordinary Least Squares (OLS) regression results. In this table, we replace lagged independent variables with contemporaneous independent variables to check the robustness of our model. The dependent variable is state-level GDP per capita. The key independent variable, liquidity creation per capita, is liquidity creation (CATFAT) normalized by state population. The sample period is 1984-2010, and t-statistics based on standard errors clustered at the state level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
	GDP/Capita	*GDP/Capita*	*GDP/Capita*	*GDP/Capita*	*GDP/Capita*
LC per Capita$_t$	82.00**	116.7***	116.8***	115.6***	98.40***
	(2.406)	(3.775)	(3.745)	(3.891)	(4.532)
State Inc. Tax$_t$		262.4	289.5	315.3	326.3
		(1.024)	(1.279)	(1.444)	(1.560)
State Minimum Wage$_t$		898.7***	881.1***	870.2***	661.9**
		(3.445)	(3.534)	(3.563)	(2.573)
State Expenditures per capita$_t$		3.373***	3.079***	3.051***	2.105***
		(3.347)	(2.815)	(2.946)	(2.796)
Regional GDP per capita$_t$			0.508***	0.507***	0.596***
			(3.660)	(3.684)	(6.165)
Third Party Governor Dummy$_t$				-1,354***	-1,188***
				(-2.843)	(-3.229)
Dem. Governor Dummy$_t$				490.2	460.9
				(1.429)	(1.351)
Split Legislature$_t$				712.0	571.8
				(0.805)	(0.714)
Dem. Legislature$_t$				-399.2	-251.7
				(-0.531)	(-0.362)
Fed. Funds Rate$_t$					204.5**
					(2.253)
TED Spread$_t$					579.6
					(1.629)
Constant	21,477***	7,734**	-4,188	-3,940	-5,330**
	(31.16)	(2.615)	(-0.894)	(-0.901)	(-2.278)
State FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	NO
Observations	1,350	1,350	1,350	1,350	1,250
Adj. R-squared	0.908	0.930	0.934	0.936	0.937

Table 4: "Horse Races" between Bank Liquidity Creation, Total Assets, and Gross Total Assets – This table presents Ordinary Least Squares (OLS) regression results. The dependent variable is state-level *GDP per capita*. We compare the effects of *TA per capita* and *GTA per capita* on *GDP per capita* to the effect of *LC per capita* on *GDP per capita.* The sample period is 1984-2010, and t-statistics based on standard errors clustered at the state level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1) *GDP/Capita*	(2) *GDP/Capita*	(3) *GDP/Capita*	(4) *GDP/Capita*
LC per Capita$_{t-1}$			103.7***	109.7***
			(3.620)	(3.673)
TA per Capita $_{t-1}$	40.55*		3.615	
	(1.725)		(0.143)	
GTA per Capita$_{t-1}$		29.20		-9.922
		(1.287)		(-0.397)
State Inc. Tax$_{t-1}$	228.5	228.8	284.9	287.9
	(1.066)	(1.054)	(1.361)	(1.394)
State Min. Wage$_{t-1}$	844.4**	845.2**	969.8***	964.7***
	(2.427)	(2.446)	(2.829)	(2.841)
State Gvt. Exp. per capita$_{t-1}$	2.101**	2.087**	2.254***	2.254***
	(2.500)	(2.464)	(2.778)	(2.764)
Regional GDP per capita$_{t-1}$	0.475***	0.484***	0.504***	0.510***
	(3.569)	(3.602)	(3.787)	(3.819)
Third Party Governor Dummy$_{t-1}$	-1,982***	-1,993***	-1,602***	-1,570**
	(-3.015)	(-3.023)	(-2.699)	(-2.609)
Dem. Governor Dummy$_{t-1}$	381.7	381.8	420.9	420.8
	(0.964)	(0.958)	(1.122)	(1.127)
Split Legislature$_{t-1}$	905.0	901.5	715.0	704.1
	(1.209)	(1.194)	(1.007)	(0.977)
Dem. Legislature$_{t-1}$	1.814	22.62	-187.1	-182.4
	(0.00260)	(0.0325)	(-0.267)	(-0.259)
Constant	-415.4	-830.3	-2,135	-2,033
	(-0.0918)	(-0.183)	(-0.460)	(-0.443)
State FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES
Observations	1,300	1,300	1,300	1,300
Adj. R-squared	0.930	0.929	0.933	0.933

Table 5: The Effects of Bank Liquidity Creation on GDP by Bank Size - This table presents Ordinary Least Squares (OLS) regression results. The dependent variable is state-level GDP per capita. The key independent variable, liquidity creation per capita, is liquidity creation (CATFAT) normalized by state population. The sample is split by bank size. Small banks are banks which have less than $1 billion in total assets. The sample period is 1984-2010, and t-statistics based on standard errors clustered at the state level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1) *GDP/Capita*	(2) *GDP/Capita*
LC per Capita - Small$_{t-1}$	383.4**	360.7**
	(2.308)	(2.311)
LC per Capita - Large$_{t-1}$	96.05***	93.25***
	(3.374)	(3.784)
State Inc. Tax$_{t-1}$	288.5	354.1*
	(1.332)	(1.692)
State Min. Wage$_{t-1}$	976.5***	724.6**
	(3.010)	(2.083)
State Gvt. Exp. per capita$_{t-1}$	2.144***	1.827**
	(2.795)	(2.378)
Regional GDP per capita$_{t-1}$	0.508***	0.596***
	(3.657)	(6.280)
Third Party Governor Dummy$_{t-1}$	-1,320**	-1,263**
	(-2.415)	(-2.395)
Dem. Governor Dummy$_{t-1}$	441.7	355.7
	(1.166)	(0.926)
Split. Legislature$_{t-1}$	723.2	459.5
	(1.026)	(0.712)
Dem. Legislature$_{t-1}$	-46.16	-229.3
	(-0.0648)	(-0.338)
Fed Funds Rate$_{t-1}$		240.9**
		(2.041)
TED Spread$_{t-1}$		-646.0**
		(-2.300)
Constant	-2,546	-3,766
	(-0.548)	(-1.209)
Small-Large F-Statistic	3.41	3.12
Small-Large p-value	0.0708	0.0838
State FE	YES	YES
Year FE	YES	NO
Observations	1,300	1,200
Adj. R-squared	0.934	0.931

Table 6: The Effects of Bank Liquidity Creation on GDP in a 2SLS setting - This table presents two-stage least squares (2SLS) results. Panel A presents the first stage regressions, which utilize liquidity creation per capita as the dependent variable, and Bank Equity per capita as the instrument. Panel B reports the second stage results. The dependent variable in Panel B is state-level GDP per capita. The key independent variable, liquidity creation per capita, is liquidity creation (CATFAT) normalized by state population. The sample is split by bank size. Small banks are banks which have less than $1 billion in total assets. The sample period is 1984-2010, and z-statistics based on standard errors clustered at the state level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A - First Stage Regressions:

	(1) *Lag. Liq. Creation*	(2) *Lag. Liq. Creation*	(3a) *Lag. Liq. Creation – Small*	(3b) *Lag. Liq. Creation - Large*	(4a) *Lag. Liq. Creation – Small*	(4b) *Lag. Liq. Creation - Large*
Equity per Capita$_{t-1}$	4.748***	3.955***				
	(5.940)	(5.127)				
Equity per Capita - Small$_{t-1}$			5.300***	3.578	5.028***	3.070
			(5.266)	(1.461)	(5.309)	(1.153)
Equity per Capita - Large$_{t-1}$			0.0211	3.278***	-0.0242	2.756***
			(0.203)	(8.393)	(-0.288)	(6.801)
State Inc. Tax$_{t-1}$	-0.572***	-0.595*	-0.134**	-0.388**	-0.147**	-0.388
	(-2.729)	(-1.863)	(-2.645)	(-2.408)	(-2.514)	(-1.556)
State Min. Wage$_{t-1}$	-1.178**	-1.151**	-0.0517	-0.920***	-0.0572	-0.802**
	(-2.641)	(-2.478)	(-0.574)	(-3.071)	(-0.659)	(-2.550)
State Gvt. Exp. per capita$_{t-1}$	-0.00149	-0.00233**	-8.66e-05	-0.000368	-0.000142	-0.000890*
	(-1.384)	(-2.305)	(-0.487)	(-0.699)	(-1.090)	(-1.680)
Regional GDP per capita$_{t-1}$	-0.000434	0.000408**	-5.34e-05	-0.000298	5.30e-05**	0.000229**
	(-1.674)	(2.275)	(-1.163)	(-1.586)	(2.160)	(2.265)
Third Party Governor Dummy$_{t-1}$	-3.768**	-2.736	-0.972*	-3.148**	-0.833	-2.426*
	(-2.241)	(-1.474)	(-1.913)	(-2.556)	(-1.655)	(-1.751)
Dem. Governor Dummy$_{t-1}$	-0.322	-0.722	-0.0435	-0.522	-0.0850	-0.778
	(-0.517)	(-1.177)	(-0.303)	(-1.023)	(-0.569)	(-1.486)
Split Legislature$_{t-1}$	1.720	0.430	0.204	1.033	0.0417	0.386
	(1.472)	(0.416)	(0.631)	(1.596)	(0.150)	(0.621)
Dem. Legislature$_{t-1}$	1.484	-0.767	0.126	0.863	-0.108	-0.476
	(1.221)	(-0.825)	(0.378)	(1.202)	(-0.466)	(-0.719)
Fed. Funds Rate$_{t-1}$		0.00913			-0.0101	0.0960
		(0.0824)			(-0.445)	(1.339)
TED Spread$_{t-1}$		-1.837**			-0.0633	-1.196**
		(-2.645)			(-0.538)	(-2.581)
Constant	21.17***	7.495**	0.651	14.22**	-1.656	4.770
	(2.782)	(2.286)	(0.426)	(2.438)	(-1.414)	(1.644)
State FE	YES	YES	YES	YES	YES	YES
Year FE	YES	NO	YES	YES	NO	NO
Observations	1,300	1,200	1,300	1,300	1,200	1,200
Adj. R-squared	0.665	0.648	0.671	0.755	0.669	0.728

Panel B - Second Stage Regressions:

	(1) GDP/Capita	(2) GDP/Capita	(3) GDP/Capita	(4) GDP/Capita
LC per Capita$_{t-1}$	116.7***	106.1**		
	(2.887)	(2.070)		
LC per Capita - Small$_{t-1}$			724.1**	734.1**
			(2.341)	(2.143)
LC per Capita - Large$_{t-1}$			111.7**	114.6*
			(1.971)	(1.710)
State Inc. Tax$_{t-1}$	292.0	350.6*	316.0	396.7*
	(1.434)	(1.684)	(1.494)	(1.815)
State Min. Wage$_{t-1}$	986.4***	729.1**	1,041***	792.4***
	(3.209)	(2.231)	(3.699)	(2.612)
State Gvt. Exp. per capita$_{t-1}$	2.274***	1.907***	2.173***	1.912***
	(3.157)	(2.744)	(3.334)	(2.737)
Regional GDP per capita$_{t-1}$	0.507***	0.584***	0.515***	0.561***
	(3.926)	(7.625)	(3.630)	(6.659)
Third Party Governor Dummy$_{t-1}$	-1,555***	-1,513***	-950.7	-879.8
	(-2.811)	(-3.172)	(-1.633)	(-1.380)
Dem. Governor Dummy$_{t-1}$	426.0	342.3	458.5	388.1
	(1.197)	(0.950)	(1.274)	(1.085)
Split Legislature$_{t-1}$	691.1	451.3	640.6	448.3
	(0.992)	(0.718)	(0.932)	(0.716)
Dem. Legislature$_{t-1}$	-212.4	-337.6	-42.92	-122.2
	(-0.311)	(-0.520)	(-0.0577)	(-0.180)
Fed. Funds Rate$_{t-1}$		253.0**		250.2**
		(2.330)		(2.383)
TED Spread$_{t-1}$		-629.2**		-604.5**
		(-2.311)		(-2.136)
Constant	-4,541	-3,373	-5,694	-4,249
	(-0.589)	(-1.127)	(-0.717)	(-1.409)
Small-Large χ^{2}-statistic			3.46	2.84
Small-Large p-value			0.0595	0.0919
State FE	YES	YES	YES	YES
Year FE	YES	NO	YES	NO
Observations	1,300	1,200	1,300	1,200
Adj. R-squared	0.933	0.930	0.932	0.928
Wald Test Statistic for Instrument Validity	286.06	286.06	200.53	145.90

Table 7: On- and Off-Balance Sheet Liquidity Creation – This table presents Ordinary Least Squares (OLS) regression results. The dependent variable is state-level *GDP per capita*. The key independent variables are on- and off- balance sheet *liquidity creation per capita* (CATFAT-CATNONFAT and CATNONFAT), normalized by state population. The sample period is 1984-2010, and t-statistics based on standard errors clustered at the state level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1) *GDP/Capita*	(2) *GDP/Capita*	(3) *GDP/Capita*	(4) *GDP/Capita*	(5) *GDP/Capita*
On-B/S LC per Capita$_{t-1}$	20.25	42.08	107.8	71.90	86.85
	(0.106)	(0.265)	(0.754)	(0.520)	(0.684)
Off-B/S LC per Capita$_{t-1}$	80.70***	112.5***	106.9***	107.9***	102.6***
	(2.857)	(4.621)	(4.329)	(4.659)	(5.496)
State Inc. Tax$_{t-1}$		226.6	269.3	282.9	343.6
		(0.938)	(1.209)	(1.332)	(1.567)
State Min. Wage$_{t-1}$		982.0***	987.5***	954.0***	717.7*
		(2.793)	(2.862)	(2.709)	(1.938)
State Gvt. Exp. per capita$_{t-1}$		2.545***	2.279***	2.271***	1.908**
		(3.187)	(2.687)	(2.867)	(2.482)
Regional GDP per capita$_{t-1}$			0.515***	0.499***	0.587***
			(3.768)	(3.793)	(6.146)
Third Party Governor Dummy$_{t-1}$				-1,659***	-1,556***
				(-2.823)	(-2.945)
Dem. Governor Dummy$_{t-1}$				423.6	340.6
				(1.121)	(0.885)
Split Legislature$_{t-1}$				711.6	451.9
				(0.995)	(0.688)
Dem. Legislature$_{t-1}$				-200.5	-346.3
				(-0.283)	(-0.505)
Fed Funds Rate$_{t-1}$					251.7**
					(2.055)
TED Spread$_{t-1}$					-622.9**
					(-2.652)
Constant	22,428***	10,283***	-2,466	-1,752	-3,275
	(38.48)	(2.831)	(-0.487)	(-0.357)	(-1.001)
State FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	NO
Observations	1,300	1,300	1,300	1,300	1,200
Adj. R-squared	0.914	0.927	0.932	0.933	0.930

Table 8: Test of Reverse Causality - This table presents Ordinary Least Squares (OLS) regression results. The dependent variable is state-level Liquidity Creation per capita. The key independent variable, GDP per capita, is Gross Domestic Product (GDP) normalized by state population. We also include lagged Liquidity Creation per capita as a control variable, following the methodology of Granger (1969). The sample period is 1984-2010, and t-statistics based on standard errors clustered at the state level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
VARIABLES	*LC/Capita*	*LC/Capita*	*LC/Capita*	*LC/Capita*	*LC/Capita*
GDP per Capita $_{t-1}$	2.327	26.51	39.12	35.51	26.04
	(0.0640)	(0.719)	(0.948)	(0.889)	(0.581)
LC per Capita$_{t-1}$	0.878***	0.872***	0.870***	0.866***	0.869***
	(46.11)	(41.10)	(41.56)	(39.32)	(39.24)
State Inc. Tax$_{t-1}$		-0.0657	-0.0765	-0.0930	0.0353
		(-0.741)	(-0.856)	(-1.112)	(0.370)
State Min. Wage$_{t-1}$		-0.122	-0.129	-0.163	-0.0971
		(-0.697)	(-0.752)	(-0.952)	(-0.521)
State Gvt. Exp. per capita$_{t-1}$		-0.000334*	-0.000328	-0.000315	-0.000111
		(-1.717)	(-1.620)	(-1.528)	(-0.402)
Regional GDP per capita$_{t-1}$			-0.000105	-0.000133	1.36e-05
			(-1.068)	(-1.279)	(0.216)
Third Party Governor Dummy$_{t-1}$				-1.311***	-1.098*
				(-2.926)	(-1.891)
Dem. Governor Dummy$_{t-1}$				-0.241	-0.321
				(-1.008)	(-1.113)
Split Legislature$_{t-1}$				0.632	0.326
				(1.517)	(0.811)
Dem. Legislature$_{t-1}$				0.588	-0.0696
				(1.426)	(-0.180)
Fed Funds Rate$_{t-1}$					0.124*
					(1.936)
TED Spread$_{t-1}$					-1.115***
					(-3.773)
Constant	0.847	2.011	4.417**	4.905**	1.284
	(0.960)	(1.274)	(2.254)	(2.405)	(0.963)
State FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	NO
Observations	1,300	1,300	1,300	1,300	1,200
Adjusted R-squared	0.908	0.908	0.909	0.909	0.903

Table 9: The Effects of Bank Liquidity Creation on GDP during crises - This table presents Ordinary Least Squares (OLS) regression results. The dependent variable is state-level GDP per capita. The key independent variable, liquidity creation per capita, is liquidity creation (CATFAT) normalized by state population. We also include variables which interact liquidity creation per capita with dummy variables capturing various financial and banking crises. The sample period is 1984-2010, and t-statistics based on standard errors clustered at the state level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1) *GDP/Capita*	(2) *GDP/Capita*	(3) *GDP/Capita*	(4) *GDP/Capita*	(5) *GDP/Capita*
LC per Capita$_{t-1}$	67.07**	96.91***	98.86***	96.91***	113.8***
	(2.379)	(3.724)	(3.742)	(3.898)	(4.819)
LC per Capita$_{t-1}$ * 1987 Crisis Dummy	-192.1**	-109.7	-64.83	-70.56	-69.68
	(-2.114)	(-1.198)	(-0.704)	(-0.821)	(-1.257)
LC per Capita$_{t-1}$ * 1990-1992 Crisis Dummy	-195.2***	-185.4***	-158.4**	-162.4**	-130.3***
	(-3.271)	(-2.749)	(-2.445)	(-2.612)	(-3.816)
LC per Capita $_{t-1}$ * 1998 Crisis Dummy	50.11	23.59	28.05	24.85	-13.13
	(1.657)	(0.773)	(1.056)	(0.920)	(-0.739)
LC per Capita $_{t-1}$ * 2000-2002 Crisis Dummy	37.50*	33.58	25.11	24.19	-51.15***
	(1.781)	(1.515)	(1.189)	(1.142)	(-3.437)
LC per Capita $_{t-1}$ * 2007-2009 Crisis Dummy	29.39	57.60*	45.26	51.15*	8.281
	(0.741)	(1.818)	(1.404)	(1.724)	(0.466)
State Inc. Tax$_{t-1}$		196.6	238.2	254.0	278.2
		(0.837)	(1.119)	(1.241)	(1.339)
State Min. Wage$_{t-1}$		987.1***	967.5***	950.6***	788.1**
		(2.813)	(2.775)	(2.706)	(2.069)
State Gvt. Exp. per capita$_{t-1}$		2.542***	2.309***	2.289***	1.830**
		(3.177)	(2.703)	(2.857)	(2.309)
Regional GDP per capita$_{t-1}$			0.494***	0.485***	0.576***
			(3.630)	(3.688)	(6.175)
Third Party Governor Dummy$_{t-1}$				-1,684**	-1,578***
				(-2.625)	(-2.940)
Dem. Governor Dummy$_{t-1}$				422.4	338.1
				(1.160)	(0.893)
Split Legislature$_{t-1}$				686.1	519.6
				(1.001)	(0.798)
Dem. Legislature$_{t-1}$				-238.8	-262.4
				(-0.341)	(-0.387)
Fed. Funds Rate$_{t-1}$					322.5**
					(2.569)
TED Spread$_{t-1}$					-924.2***
					(-3.526)
Constant	22,151***	10,066***	-1,759	-1,419	-2,970
	(29.98)	(2.962)	(-0.361)	(-0.306)	(-0.890)
State FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	NO
Observations	1,300	1,300	1,300	1,300	1,200
Adj. R-squared	0.915	0.928	0.932	0.934	0.932

Table 10: The Effects of Bank Liquidity Creation on GDP over multiple years - This table presents Ordinary Least Squares (OLS) regression results. The dependent variable is state-level GDP per capita. The key independent variable, liquidity creation per capita, is liquidity creation (CATFAT) normalized by state population. We also include the two- and three- year lagged liquidity creation per capita. The sample is split by bank size. Small banks are banks which have less than $1 billion in total assets. The sample period is 1984-2010, and t-statistics based on standard errors clustered at the state level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	GDP/Capita	*GDP/Capita*	*GDP/Capita*	*GDP/Capita*	*GDP/Capita*	*GDP/Capita*	*GDP/Capita*	*GDP/Capita*
LC per Capita$_{t-1}$	105.0***			80.27**	101.3***			92.83***
	(3.966)			(2.061)	(4.831)			(2.885)
LC per Capita$_{t-2}$		88.68***		29.27		89.95***		23.02
		(3.542)		(1.675)		(4.211)		(1.330)
LC per Capita$_{t-3}$			75.00***	-9.042			71.72***	-16.05
			(2.814)	(-0.301)			(3.164)	(-0.576)
State Inc. Tax$_{t-1}$	285.6	290.8	293.2	324.4	347.5*	342.7*	327.7*	347.4*
	(1.354)	(1.427)	(1.414)	(1.470)	(1.683)	(1.725)	(1.696)	(1.692)
State Min. Wage$_{t-1}$	969.0***	913.6**	874.7**	942.8**	722.9*	686.8*	661.7*	720.6*
	(2.812)	(2.368)	(2.098)	(2.298)	(1.976)	(1.862)	(1.784)	(1.963)
State Gvt. Exp. per capita$_{t-1}$	2.253***	1.799**	1.829*	1.846**	1.898**	1.864**	1.846**	1.891**
	(2.770)	(2.316)	(1.985)	(2.022)	(2.395)	(2.348)	(2.306)	(2.377)
Regional GDP per capita$_{t-1}$	0.506***	0.509***	0.515***	0.541***	0.588***	0.595***	0.606***	0.589***
	(3.783)	(3.575)	(3.544)	(3.796)	(6.084)	(6.171)	(6.281)	(6.061)
Third Party Governor Dummy$_{t-1}$	-1,596***	-1,532***	-1,614***	-1,341**	-1,526***	-1,650***	-1,763***	-1,520***
	(-2.752)	(-2.839)	(-2.688)	(-2.359)	(-2.946)	(-3.009)	(-3.040)	(-2.913)
Dem. Governor Dummy$_{t-1}$	420.9	351.0	322.5	350.1	339.1	299.8	279.4	338.8
	(1.123)	(0.891)	(0.783)	(0.887)	(0.885)	(0.764)	(0.700)	(0.887)
Split Legislature$_{t-1}$	712.2	659.9	692.1	590.3	453.5	483.2	488.2	455.7
	(1.005)	(1.023)	(1.030)	(0.909)	(0.699)	(0.733)	(0.727)	(0.700)
Dem. Legislature$_{t-1}$	-184.9	-112.2	-64.07	-170.6	-336.9	-353.4	-361.8	-334.9
	(-0.263)	(-0.162)	(-0.0909)	(-0.249)	(-0.501)	(-0.513)	(-0.516)	(-0.500)
Fed. Funds Rate$_{t-1}$					251.7**	248.3**	249.7**	249.9**
					(2.060)	(2.041)	(2.030)	(2.032)
TED Spread$_{t-1}$					-633.6**	-642.5**	-680.4**	-630.1**
					(-2.266)	(-2.294)	(-2.445)	(-2.249)
Constant	-2,145	-1,477	-783.2	-2,012	-3,368	-3,102	-3,026	-3,371
	(-0.464)	(-0.290)	(-0.142)	(-0.361)	(-1.074)	(-0.985)	(-0.957)	(-1.073)
State FE	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	NO	NO	NO	NO
Observations	1,300	1,250	1,200	1,200	1,200	1,200	1,200	1,200
Adj. R-squared	0.933	0.936	0.932	0.934	0.930	0.929	0.928	0.930

Table 11: The Effects of Lagged Log Bank Liquidity Creation on Log State Gross Domestic Product (GDP) – This table presents Ordinary Least Squares (OLS) regression results. The dependent variable is the natural logarithm of state-level *GDP per capita*. The key independent variable, *log liquidity creation per capita*, is the natural logarithm of liquidity creation (CATFAT) normalized by state population. The sample period is 1984-2010, and t-statistics based on standard errors clustered at the state level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ln(GDP/Capita)	*ln(GDP/Capita)*	*ln(GDP/Capita)*	*ln(GDP/Capita)*	*ln(GDP/Capita)*	*ln(GDP/Capita)*	*ln(GDP/Capita)*
ln(LC per Capita)$_{t-1}$	0.0470***	0.0511***	0.0476***	0.0461***	0.0453***	0.0460***	0.0481***
	(3.099)	(3.942)	(4.061)	(4.252)	(5.418)	(4.236)	(4.241)
TA per Capita $_{t-1}$						2.38e-05	
						(0.0500)	
GTA per Capita$_{t-1}$							-0.000215
							(-0.477)
State Inc. Tax$_{t-1}$		-0.000166	0.00216	0.00220	0.00396	0.00219	0.00226
		(-0.0588)	(0.781)	(0.838)	(1.353)	(0.840)	(0.878)
State Min. Wage$_{t-1}$		0.0164**	0.0165***	0.0158**	0.00970	0.0158**	0.0157**
		(2.561)	(2.756)	(2.627)	(1.486)	(2.631)	(2.644)
ln(State Gvt. Exp. per capita)$_{t-1}$		0.268**	0.264**	0.259**	0.210***	0.259**	0.258**
		(2.326)	(2.432)	(2.465)	(2.928)	(2.459)	(2.450)
ln(Regional GDP per capita)$_{t-1}$			0.591***	0.558***	0.586***	0.558***	0.559***
			(4.698)	(4.484)	(6.834)	(4.495)	(4.508)
Third Party Governor Dummy$_{t-1}$				-0.0295	-0.0252	-0.0295	-0.0286
				(-1.543)	(-1.500)	(-1.548)	(-1.518)
Dem. Governor Dummy$_{t-1}$				0.00891	0.00759	0.00891	0.00892
				(1.246)	(1.050)	(1.241)	(1.250)
Split Legislature$_{t-1}$				0.0128	0.00819	0.0128	0.0127
				(0.997)	(0.643)	(0.995)	(0.976)
Dem. Legislature$_{t-1}$				0.00531	-0.000440	0.00527	0.00555
				(0.384)	(-0.0342)	(0.386)	(0.403)
Fed Funds Rate$_{t-1}$					0.00424**		
					(2.118)		
TED Spread$_{t-1}$					-0.0151***		
					(-2.797)		
Constant	10.01***	7.820***	1.841	2.214	2.318***	2.214	2.210
	(583.8)	(8.541)	(1.031)	(1.286)	(6.841)	(1.285)	(1.283)
State FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	NO	YES	YES
Observations	1,300	1,300	1,300	1,300	1,200	1,300	1,300
Adj. R-squared	0.947	0.954	0.958	0.959	0.954	0.959	0.959

Table 12: The Effects of Bank Liquidity Creation on GDP for Single-State Banks – This table presents Ordinary Least Squares (OLS) regression results. The dependent variable is the natural logarithm of state-level *GDP per capita*. The key independent variable, *liquidity creation per capita*, is liquidity creation (CATFAT) normalized by state population. We omit all multistate banks. The sample period is 1984-2010, and t-statistics based on standard errors clustered at the state level are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	*GDP/Capita*	*GDP/Capita*	*GDP/Capita*	*GDP/Capita*	*GDP/Capita*	*GDP/Capita*	*GDP/Capita*
LC per Capita$_{t-1}$	42.85*	79.77***	81.97***	79.39***	77.73***	98.67***	113.8***
	(1.696)	(3.321)	(3.436)	(3.551)	(3.852)	(2.999)	(3.420)
TA per Capita $_{t-1}$						-51.71	
						(-1.288)	
GTA per Capita$_{t-1}$							-72.44**
							(-2.324)
State Inc. Tax$_{t-1}$		232.4	272.7	286.2	349.9*	272.5	259.8
		(0.938)	(1.256)	(1.345)	(1.699)	(1.305)	(1.314)
State Min. Wage$_{t-1}$		959.1***	936.3***	914.8**	693.3*	884.1**	859.7**
		(2.746)	(2.703)	(2.615)	(1.856)	(2.590)	(2.541)
State Gvt. Exp. per capita$_{t-1}$		2.530***	2.294**	2.267**	1.891**	2.297***	2.339***
		(2.991)	(2.555)	(2.678)	(2.316)	(2.695)	(2.764)
Regional GDP per capita$_{t-1}$			0.523***	0.511***	0.640***	0.524***	0.522***
			(3.772)	(3.853)	(6.939)	(3.921)	(3.921)
Third Party Governor Dummy$_{t-1}$				-1,732***	-1,616***	-1,729***	-1,669**
				(-3.130)	(-3.300)	(-2.934)	(-2.607)
Dem. Governor Dummy$_{t-1}$				385.7	296.8	368.6	345.9
				(0.995)	(0.746)	(0.973)	(0.944)
Split Legislature$_{t-1}$				762.3	447.3	773.3	780.3
				(1.033)	(0.663)	(1.030)	(1.036)
Dem. Legislature$_{t-1}$				-126.9	-383.6	-165.6	-197.5
				(-0.177)	(-0.551)	(-0.228)	(-0.271)
Fed Funds Rate$_{t-1}$					244.4*		
					(1.965)		
TED Spread$_{t-1}$					-627.5**		
					(-2.302)		
Constant	22,284***	10,235***	-2,300	-1,925	-4,452	-1,588	-473.0
	(29.07)	(2.979)	(-0.468)	(-0.413)	(-1.360)	(-0.344)	(-0.105)
State FE	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	NO	YES	YES
Observations	1,300	1,300	1,300	1,300	1,200	1,300	1,300
Adjusted R-squared	0.912	0.925	0.930	0.931	0.928	0.932	0.932

Table 13: State-Industry-Level Regression Results - This table presents a state-industry-level analysis in an OLS setting. The dependent variables are the state-level *GDP per capita* for individual industries. We present the coefficients and t-statistics for *LC per capita*. We include but do not show all of the controls from Table 2, including lagged state income tax, state minimum wage, state government expenditures, regional GDP, political dummy variables and state and year fixed effects. Data are from the BEA using their 1997-2010 NAICS industry classifications. All t-statistics are based on standard errors clustered at the state level. Industries with statistically significant coefficients are listed in bold type.

Industry	*Coefficient on LC/Capita*	*t-Statistic*	*Estimated Economic Impact of One Standard Deviation Increase in State-Level LC/Capita*
Mining	**46.646**	**2.007**	**17.77%**
Manufacturing	**24.974**	**3.186**	**1.16%**
Finance, insurance, and real estate	**16.348**	**3.120**	**0.52%**
Professional & business services	**8.504**	**1.743**	**0.49%**
Construction	**8.503**	**1.827**	**1.19%**
Information	**6.573**	**2.215**	**0.85%**
Transportation & warehousing	**5.008**	**1.983**	**1.08%**
Retail trade	**3.715**	**2.065**	**0.36%**
Government	3.670	1.003	-
Arts, Entertainment & Recreation	**3.394**	**1.444**	**0.44%**
Agriculture, forestry, fishing, & hunting	3.134	0.674	-
Utilities	**1.201**	**1.571**	**0.44%**
Wholesale trade	0.257	0.080	-
Other services, except government	-0.060	-0.090	-
Educational services & health care	**-3.466**	**-1.754**	**-0.90%**